

Содержание

	Стр.
1. Пояснительная записка	3
2. Общие методические рекомендации по выполнению практических заданий	4
2.1 Подготовка к выполнению практического задания	4
2.2 Оформление практического задания	4
3. Тематическое планирование практических занятий	5
4. Содержание практических занятий	7
5. Информационное обеспечение обучения	161

1. Пояснительная записка

Дисциплина «Английский язык» является общеобразовательной дисциплиной, в процессе изучения которой обучающиеся должны приобрести определенные знания. Наряду с изучением теоретического материала по дисциплине «Иностранный язык» большое внимание должно быть уделено практическим занятиям. Последние представляют собой весьма важную часть в общем объеме дисциплины.

Данные методические рекомендации составлены на основе рабочей программы «Иностранный язык» по специальности 15.02.09 Аддитивные технологии в соответствии с обязательной нагрузкой в количестве 168 часов.

В результате освоения учебной дисциплины обучающийся должен **уметь**:

- вести диалог (диалог–расспрос, диалог–обмен мнениями/суждениями, диалог–побуждение к действию, этикетный диалог и их комбинации) в ситуациях официального и неофициального общения в бытовой, социокультурной и учебно-трудовой сферах, используя аргументацию, эмоционально-оценочные средства.
- рассказывать, рассуждать в связи с изученной тематикой, проблематикой прочитанных/прослушанных текстов; описывать события, излагать факты, делать сообщения.
- создавать словесный социокультурный портрет своей страны и страны/стран изучаемого языка на основе разнообразной страноведческой и культуроведческой информации; заполнять различные виды анкет, сообщать сведения о себе в форме, принятой в стране/странах изучаемого языка.
- самостоятельно совершенствовать устную и письменную речь, пополнять словарный запас; читать аутентичные тексты разных стилей (публицистические, художественные, научно-популярные и технические), используя основные виды чтения (ознакомительное, изучающее, просмотровое/поисковое) в зависимости от коммуникативной задачи.
- понимать относительно полно (общий смысл) высказывания на изучаемом иностранном языке в различных ситуациях общения;
- понимать основное содержание аутентичных аудио- или видеотекстов познавательного характера на темы, предлагаемые в рамках курса, выборочно извлекать из них необходимую информацию, оценивать важность/новизну информации, определять свое отношение к ней.
- описывать явления, события, излагать факты в письме личного и делового характера; переводить со словарем иностранные тексты профессиональной направленности.

Студент должен **знать**:

- лексический (1200-1400 лексических единиц) и грамматический минимум, необходимый для чтения и перевода (со словарем) иностранных текстов профессиональной направленности;
- лингвострановедческую, страноведческую и социокультурную информацию, расширенную за счет новой тематики и проблематики речевого общения;
- тексты, построенные на языковом материале повседневного и профессионального общения.

В процессе освоения учебной дисциплины у обучающихся должны быть сформированы общие и профессиональные компетенции:

ОК4. Осуществлять поиск и использование информации, необходимой для эффективного выполнения профессиональных задач, профессионального и личностного развития.

ОК 5. Использовать информационно-коммуникационные технологии в профессиональной деятельности.

ОК 6. Работать в коллективе и команде, эффективно общаться с коллегами, руководством, потребителями.

ОК 7. Брать на себя ответственность за работу членов команды (подчиненных), результат выполнения заданий.

ОК 8. Самостоятельно определять задачи профессионального и личностного развития, заниматься самообразованием, осознанно планировать повышение квалификации.

ОК 9. Ориентироваться в условиях частой смены технологий в профессиональной деятельности.

ПК 1.1. Применять средства бесконтактной оцифровки для целей компьютерного проектирования, входного и выходного контроля.

ПК 1.2. Создавать и корректировать средствами компьютерного проектирования цифровые трехмерные модели изделий.

ПК 2.1. Организовывать и вести технологический процесс на установках для аддитивного производства.

ПК 2.2. Контролировать правильность функционирования установки, регулировать ее элементы, корректировать программируемые параметры.

ПК 2.3. Проводить доводку и финишную обработку изделий, созданных на установках для аддитивного производства.

ПК 2.4. Подбирать параметры аддитивного технологического процесса и разрабатывать оптимальные режимы производства изделий на основе технического задания (компьютерной/цифровой модели).

ПК 3.1. Диагностировать неисправности установок для аддитивного производства.

ПК 3.2. Организовывать и осуществлять техническое обслуживание и текущий ремонт механических элементов установок для аддитивного производства.

ПК 3.3. Заменять неисправные электронные, электронно-оптические, оптические и прочие функциональные элементы установок для аддитивного производства и проводить их регулировку.

Данные методические рекомендации призваны помочь обучающимся в овладении всеми видами речевой деятельности в соответствии с требованиями программы.

Целью данных методических указаний является углубление языковых знаний, формирование навыков анализа языковых средств, расширение словарного запаса, углубление и расширение знаний и навыков употребления грамматических явлений и формирование у обучающихся речевой, языковой и коммуникативной компетенции, уровень развития которой позволяет использовать иностранный язык, как инструмент межкультурного общения, так и для целей самообразования.

2. Общие методические рекомендации по выполнению практических заданий

2.1 Подготовка к выполнению практического задания

Для выполнения практических заданий обучающийся должен руководствоваться следующими положениями:

1. Внимательно ознакомиться с описанием соответствующей практической работы и установить, в чем состоит основная цель и задача этой работы;
2. По лекционному курсу и соответствующим литературным источникам изучить теоретическую часть, относящуюся к данной работе.

Успешное выполнение практических заданий может быть достигнуто в том случае, если обучаемый представляет себе цель выполнения практической работы, поэтому важным условием является тщательная подготовка к работе.

2.2 Оформление практического задания

Оформление практического задания является важнейшим этапом выполнения. Каждую работу обучающиеся выполняют, руководствуясь следующими положениями:

1. На новой странице тетради указать название и порядковый номер практической работы, а также кратко сформулировать цель работы;
2. Записать при необходимости план решения заданий;

3. Схемы и графики вычертить с помощью карандаша и линейки с соблюдением принятых стандартных условных обозначений;
4. После проведения практических занятий обучающиеся должны составить отчет о проделанной работе. Практическая работа должна быть написана разборчивым подчерком и выполнена в тетради с полями для проверки работы преподавателем. Итогом выполнения является устная защита работы, по вопросам, которые прописаны в конце каждой работы.

3. Тематическое планирование практических занятий

2 курс

№ п\п	Наименование тем	Кол-во часов
Раздел 1.	Введение. Вводно-коррективный курс	6
Тема 1.1.	Формы обращения. Приветствия. Речевой этикет. Личные, притяжательные местоимения, глаголы to be, to have.	6
Раздел 2.	Страна изучаемого языка	12
Тема 2.1.	Географическое положение Великобритании. Present Simple.	4
Тема 2.2.	Столица страны изучаемого языка. Past Simple	4
Тема 2.3.	Экономика страны изучаемого языка. Future Simple.	4
Раздел 3.	Деловая поездка за рубеж	14
Тема 3.1.	В аэропорту. На вокзале. Страдательный залог времен Simple. Present Simple Passive.	4
Тема 3.2.	Оформление документов. Паспортный и таможенный контроль. Страдательный залог времен Simple.	6
Тема 3.3	В гостинице. Past Simple Passive	2
	Контрольная работа	2
	Итоговое занятие	1
Раздел 4.	Введение в специальность	46
Тема 4.1	Что такое аддитивные технологии? Present Continuous	6
Тема 4.2.	История развитие аддитивных технологий. Present Continuous-Present Simple.	6
Тема 4.3	Преимущества использования аддитивных технологий. Past Continuous.	6
Тема 4.4.	Область применения аддитивных технологий. Future Continuous.	6
Тема 4.5	Система автоматизированного проектирования (CAD) . Present Perfect	6
Тема 4.6.	Этапы аддитивного производства. Present Perfect-Past Simple.	6
Тема 4.7.	Пост - производство. Past Perfect	6
	Контрольная работа	2
	Дифференцированный зачет	2

3 курс

№ п\п	Наименование тем	Кол-во часов
Раздел 5.	3D печать.	20
Тема 5.1.	История развития 3D печати. Страдательный залог Simple.	6
Тема 5.2.	Технология 3D печати. Страдательный залог Continuous	6
Тема 5.3.	Материалы, используемые в 3D печати. Подготовка к контрольной работе.	6
	Контрольная работа	2

	Итоговое занятие	2
Раздел 6	Классификация аддитивных технологий	37
Тема 6.1.	Технология FDM. Инфинитив.	6
Тема 6.2.	Технология SLA. Инфинитив страдательного залога	6
Тема 6.3.	Технология SLS. Инфинитив активного залога.	6
Тема 6.4.	Технология DMLS. Сложное дополнение	6
Тема 6.5.	Технология LOM. Сложное дополнение	6
Тема 6.6.	Технология SGC. Сложное подлежащее	4
	Контрольная работа	2
	Дифференцированный зачет	1

4 курс

№ п/п	Наименование тем	Кол-во часов
Раздел 7.	Программное обеспечение	23
Тема 7.1.	Программное обеспечение в аддитивном производстве. Причастие I.	8
Тема 7.2.	Типы программного обеспечения. Причастие II	6
Тема 7.3.	Применение программного обеспечения. Подготовка к контрольной работе.	6
	Контрольная работа	2
	Итоговое занятие	1
Раздел 8	Оборудование в аддитивном производстве	9
Тема 8.1.	3D принтеры. Герундий/инфинитив.	6
Тема 8.2.	Производители 3D принтеров. Герундий/инфинитив. Повторение.	4
	Дифференцированный зачет	1

4. Содержание практических занятий

2 КУРС 3 СЕМЕСТР ВВЕДЕНИЕ. ВВОДНО-КОРРЕКТИВНЫЙ КУРС.

Практическое занятие № 1.

Тема: Речевой этикет. Приветствие. Глагол to be.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, аудирования, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Составить диалог по теме. Упр.6-9.

A Informal situations (school/work friends, neighbors):

Greetings

- Hi.
- Hey.
- Hello.
- Good morning/afternoon/evening.
- How are you?
- How is it going?
- How are you getting on?
- How are things?
- What's new?
- What's up?

Possible replies

- Fine.
- OK.
- Good.
- So, so.
- Very /pretty much the same.
- Very well, thank you.
- Getting better /worse.
- Not too bad/well, thanks. And you?

Farewells

- I've got to go. Bye.
- Take care.
- See you later.
- Must dash.
- It's getting late. I must be going.

B Formal situations (co-workers, business partners):

Greetings

- Hello, Mr/Mrs/Miss....
- Good morning/afternoon/evening.
- It's nice to meet you (again).
- How have you been?
- How do you do?

Possible replies

- I've been good, thank you.

- How do you do?
- I'm doing well.
- It's nice to meet you too.

Farewells

- I'm sorry but I have to leave now.
- If you'll excuse me, I must be going.
- I'd better be going.
- I hope to see you soon.
- I look forward to seeing you again.

Language help! *How do you do* is very formal and uncommon, mostly used by older people. Usually the answer is the same
How have you been/ It's nice to meet you again is only asked by people who have already met

1. Listen and practice the conversations. Take turns to ask and answer questions:

- | | |
|------------------------------------|-----------------------------------|
| - Good morning. | - Morning, Anna. |
| - Good morning, Anna. How are you? | - Hi, Dave. |
| - Fine, thanks. How are you? | - How are you doing? |
| - Good. | - I'm doing fine, thanks. Coffee? |
| | - Yes, please. |

2. Memorize the dialogues:

"How are you getting on?"

"Fine, thank you. And how are you?"

"Not too well."

"Why, what's the matter?"

"It's a long time since we met last."

"Yes, very."

"I'm glad you're back. I was missing you badly."

"Oh, thank you. So was I."

"How's John?"

"Very much the same."

"How's Donald getting on with his article?"

"I'm afraid I don't know. I don't see much of him."

3. Ask questions to which the following could be the answers.

- Fine, thank you.
- He's doing well, thank you.
- Not too well, I'm afraid.
- Everybody's fine.
- Getting better.
- It's a long time since we met last.
- I'm finishing it, thank you.

4. Answer the questions.

- How are you?
- How is your mother (father) getting on?
- How is everybody at home?
- How's your sister feeling?

- e. How are things with your aunt? I hear she was ill.
f. How are you getting on with your study/ new job?

5. Вставь нужную форму глагола to be:

- The sun.....very hot.
- I.....happy.
- She.....from China.
- Mary.....a nice girl.
- John.....a student.

6. Сделай предложения вопросительными и отрицательными:

- My brother is small.
- Mr Brown and Mr Smith are from London.
- The houses are very big.
- English is easy.
- This book is interesting.

7. Составь короткие диалоги, используя нужную форму глагола to be:

Example: Jane / a singer? - No, / a doctor. -Is Jane a singer? - No, she is a doctor.

- You / at home? - No, / in the office.
- Your car / red? - No, / black.
- The Kremlin / in Tokyo? - No, / in Moscow.
- They / policemen? — No, / pilots.
- Simon / in London? — No, / in Paris.

8. Вставьте глагол to be в Present, Past или Future Simple

- Yesterday we... at the theatre.
- Where ... your mother now? — She ... in the kitchen.
- Where ... you yesterday? — I ... at the cinema.
- When I come home tomorrow, all my family ... at home.
- ... your little sister in bed now? — Yes, she ...
- ... you... at school tomorrow? — Yes I ...
- When my granny... young, she ... an actress.
- My friend ... in Moscow now.

Практическое занятие № 2.

Тема: Речевой этикет. Знакомство. Представление себя и других. Глагол to have.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, аудирования, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Представить себя и своего друга, упр.9-12.

1. Countries and nationalities. Tick the countries you know. Write the missing letters.

countries	nationalities
I'm from ...	I'm...
Brazil	Brazili <u>a</u> <u>n</u>
Australia	Australi _ _
Argentina	Argentini _ _
the USA	Americ _ _
Germany	Germ _ _
Italy	Itali _ _
Mexico	Mexic _ _
Russia	Russi _ _
the UK	Brit <u>i</u> <u>s</u> <u>h</u>
Spain	Span _ _ _
Poland	Pol _ _ _
Turkey	Turk _ _ _

Japan	Japan _ _ _ _
China	Chin _ _ _ _
France	French

2. Fill in the gaps. Read and practice the conversations. Where do the conversations take place?

Receptionist: Good morning. What's your name please?

Jane: It's Jane Smith.

Receptionist: And where are you from?

Jane: I'm from

Receptionist: What are your names, please?

Joe: My name's Joe Hill and this is Susan West.

Receptionist: Where are you from?

Joe: We are from ...

Receptionist: Welcome to the conference. You're in room C.

4. Topical vocabulary. Look at the form for an Internet café chat room. Put the words into the correct box.

doctor student single Poland businessman/woman
learning English films the USA married
Brazil music sport

Job
doctor

Marital status
single

Interests
learning English

Country
Poland

5. Read the E-mails and put them into correct order.

To Vanessa
Hello Vanessa. My name is Tom and I'm interested in English. I'm a businessman from Poland. My brother is married to an American woman. They are doctors. I'm in San Francisco with him for one month. Tell me more about you.

To Vanessa
Hello again, Vanessa. I'm 30 years old and I'm single. I'm in an Internet café on 5th Street. Where are you?

To Tom
Hi. My name is Vanessa. I'm a doctor from Brazil but I'm on holiday in San Francisco in the USA. I'm interested in learning English. Please write to me (in English!).

To Tom
Hi Tom. Thank you for your E-mail. I'm 28 years old. I'm single and I'm interested in sport and films. Now I'm in an Internet café on 5th Street too!

6. Are these sentences true (T) or false (F)?

1. Vanessa is 20 years old and she is married.
2. She is on holiday in Madrid. She is Chinese.

3. She is interested in sport and films.
4. Tom is French and he is married to an American woman.
5. She is a doctor from Brazil.
6. Tom is interested in learning Spanish.

Do you have penpals/penfriends? What countries are they from?

7. RECORDING 1. Listen to the people's introductions. Introduce yourself, follow the plan.

1. Greeting.

Hi/Hello/Good afternoon....

2. First name/last name.

My first/last name is.....

3. Place of living.

I'm from

4. Age.

I'm

5. Marital status.

I'm married/single.

6. Occupation.

I'm a first year student at

7. Hobby/Interests.

My hobby is .../I'm interested in.....

8. Introduce your classmate. Follow the plan. Pay attention to the verbs and pronouns.

9. Выбери нужную форму (have got — has got):

1. Jack and Mary..... a car.
2. We..... many friends.
3. Mr Smith.....a big family.
4. Mr and Mrs. Brown.....a new house in the city.
5. Ted.....many toys.

10. Сделай предложения вопросительными и отрицательными:

1. Michael and Sam have got three cousins.
2. We have got a new TV set.
3. I have got a guitar.
4. Doctor Edwards has got two children.

11. Составь предложения по образцу:

	Jane and Sally	Mr White	The Browns	Tom Canty	Kevin
Balcony				+	
Car	+	+			+
Dog	+		+	+	+
Cat		+		+	

Example: Jane and Sally haven't got a cat, but they have got a dog.

1. Mr White.....
2. The Browns.....
3. Tom Canty.....
4. Kevin.....

12. Закончи предложения:

1. They have got a new car, but.....

2. Nick has got two small sisters, but.....
3. I have got a big house, but.....
4. Susan has got many pencils, but.....
5. I have got....., but.....

Практическое занятие № 3.

Тема: Речевой этикет. Формы обращения.. Местоимения.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, аудирования, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Упр.3, ответить на вопросы, упр.4-7.

1 How would you address each of the following situations.

1. An old man you don't know.
2. A policeman.
3. Your foreign colleague, whose name is Sam Smith. He is 45.
4. His wife. Her name is June. She is 38.
5. His daughter Ella. She is not married.
6. His daughter Mary who is married to Dr. Robert Rice.
7. Her husband.
8. Your friend's professor Bruce Baker.
9. Lily Lewis whose marital status you don't know. She is in her early thirties.

2 Match the phrases from two columns.

- | | |
|--|---|
| 1. Hello, John. How is it going? | A. Good morning, Mrs Baker. It was very kind of you to invite me. |
| 2. Sally, this is Jane. | B. Hello, Jane. Pleased to meet you. |
| 3. Do you know George? | C. Hello, Pete. It's nice to see you again. |
| 4. Miss Smith, I'd like to introduce you Mr Brown. | D. No, I don't believe I have. |
| 5. Pam, say hello to Pete. | E. I'm very well, thank you. |
| 6. How do you do? | F. How do you do. |
| 7. I don't believe you've met Miss Baker, have you? | G. How do you do, Miss Smith? |
| 8. Good morning, Mrs Smith. I'm so pleased you could come. | H. They are fine, thank you. And how are your parents? |
| | I. No, can't say I do. |

3 Read the following conversation to find out: 1) who the speakers are; 2) where it is taking place. Suggest the suitable title for it.

Ted: Excuse me, you must be Tom.

Tom: Sorry?

Ted: You are Tom, aren't you? You've just come from London, haven't you?

Tom: Yes, that's right. I'm Tom Anderson.

Ted: Good, and I'm Ted Royal.

Tom: How do you do.

Ted: How do you do. That's Mrs Royal and our son. Liz, Allan, come and say hello to Tom.

Liz: Hello, Tom, did you have a good flight?

Tom: Oh, yes, very nice, thank you. Hello, Allan.

Allan: Hello.

Ted: Come on, Tom, we've got the car outside. Liz, did you find a baggage trolley for Tom?

Liz: I'm afraid, I didn't. I couldn't find one anywhere.

Ted: Never mind, give me one of your bags, Tom.

Tom: Oh, thank you Mr Royal.

Ted: By the way, I hope you don't mind me calling you Tom?

Tom: No, of course not.

Liz: And Ted, don't you think it would be better if Tom called us by our first names?

Ted: Yes, of course. "Mr Royal" makes me feel like a grandfather.

Answer the following questions.

1. Why did Ted say "Excuse me"? 2. What difference would it have made if he hadn't used this expression? 3. Why did Tom say "Sorry"? 4. Why do you think Tom didn't say "How do you do" to Allan? 7. Would he have sounded too formal?

4. Вставьте личные местоимения:

1. Sally is ten.is in the fifth form.
2. Mr Brown isn't French.is English.
3. Mark and I are in the same class.are friends.
4. Are you a pupil? — Yes, am.
5. Are.....from England, Frank?

5. Вставьте притяжательные местоимения (*my, his, her, its, our, their, your*), изменив предложения (по образцу):

1. Jane has got a white rabbit. — **Her** rabbit is white.
2. Nick has got two young sisters. —.....
3. We have got a young English teacher. —.....
4. Susan has got a very nice father. —
5. You have got a new book. -.....
6. I have got..... —.....

6. Замените выделенные слова на местоимения в объектном падеже:

1. We are waiting for **our** guests. — We are waiting for **them**.
2. Alice saw **a white rabbit** in the field.
3. Phone **my** brother and me.
4. Don't tell **the** story to **your** sister.
5. He gave **fish** to **his** cat.
6. Sandra is cooking **food** for the party.

7. Вставьте указательные местоимения (*this/that - these/those*):

1. Are (that/those) boxes heavy?
2. Does (this/these) woman like coffee?
3. Do (those/that) girls come from Spain?
- 4.(That/those) tall girl is very pretty.

Практическое занятие № 4.

Тема: Географическое положение Великобритании. Present Simple.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, аудирования, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Выучить лексику, перевести текст, выполнить упражнения к тексту, упр.10-13.

1 Discuss the following questions.

1. What is the difference between the names "Great Britain" and "the United Kingdom"?
2. What countries does Great Britain include? What are they? What are their capitals?

4. What do you imagine when you think of Britain and its people?

2 Find geographical names in the text and translate them. Do we use the articles with them?

3 Fill in the gaps if necessary.

1. The official name of ... Great Britain is ... United Kingdom of ... Great Britain and ... Northern Ireland.
2. ... U. K consists of ... England, ... Scotland, ... Wales and ... Northern Ireland.
3. The western coast of ... Great Britain is washed by ... Atlantic Ocean and ... Irish Sea.
4. ... English Channel separates the south-east of ... Great Britain from ... France the narrower part of which is called ... Strait of Dover.
5. The climate in Great Britain is generally mild, humid and temperate due to the influence of ... Gulf Stream.
6. There are many rivers in Great Britain but they are not long. The longest of them is ... Thames, which is a little over 200 miles.

4 Find the cardinal directions in the text.

север - северный - на севере - к северу от;
юг - южный - на юге - к югу от;
запад - западный - на западе - к западу от;
восток - восточный - на востоке - к востоку от.

5 Translate the sentences into Russian.

1. Горы находятся *на западе* и *севере* страны.
2. Низменности *на юге* и *востоке*.
3. *Западное* побережье Великобритании омывается Атлантическим океаном и Северным морем.
4. Ла-Манш отделяет *юго-восточную* часть Великобритании от Франции.

6 Topical vocabulary. Read and translate.

red rose	красная роза
thistle	чертополох
daffodil	нарцисс
shamrock	трилистник
mainland	материк
island	остров
to consist of /include	состоять из/включать
the English Channel	пролив Ла-Манш
the Strait of Dover	Па-де-Кале или Дуврский пролив (узкая часть Ла-Манша)
the Gulf Stream	теплое течение Гольфстрим
mild	мягкий
humid	сырой, влажный
temperate	умеренный
weather forecast	прогноз погоды
lowlands	низменности
mountains	горы
the House of Commons	палата общин
the House of Lords	палата лордов
highly developed country	высокоразвитое государство
parliamentary monarchy	парламентская монархия
to mine mineral resources	добывать минеральные ресурсы
coal	уголь
census	перепись населения

7 Reading and speaking. Group work.

Group 1. Read the text, find information about the geographical position and climate of Great Britain. Say whether it is true (T) or false (F).

1. The official name of Great Britain is the United Kingdom of Great Britain and Northern Ireland.
2. The UK consists of three parts – England, Scotland, and Wales.
3. Great Britain officially includes England, Scotland and Wales and Northern Ireland.
4. The English Channel separates the south-east of Great Britain from France.
5. The climate in Great Britain is generally hot and dry due to the influence of the Strait of Dover.
6. The English say that they have three variants of weather. It is very changeable.

Group 2. Read the text, find information about the capitals, ports, emblems and the political system of Great Britain. Say whether it is true (T) or false (F).

1. The longest river of Great Britain is the Severn, which is a little over 200 miles.
2. Britain's principal ports are London, Liverpool, Manchester, Hull, Glasgow.
3. The capital city of England is Liverpool.
4. The national emblem of Scotland is a red rose.
5. Great Britain is rich in coal which is mined mostly in England.
6. The UK is the constitutional monarchy. The official head of the state is the Prime Minister.

GREAT BRITAIN

The official name of the country we usually call England is the United Kingdom of Great Britain and Northern Ireland. The U K is situated on the group of islands lying to the west of the continent of Europe. The UK consists of England, Scotland, Wales and Northern Ireland. The total land area of the United Kingdom is 244,000 square kilometres. The population of the country according to the 2011 census is about 63,182,000. The mountains are in the west and the north of the country. There are lowlands in the south and the east. Great Britain officially includes England, Scotland and Wales.

The western coast of Great Britain is washed by the Atlantic Ocean and the Irish Sea. The eastern coast is washed by the waters of the North Sea. The English Channel, which is 32 kilometres wide, separates the south-east of Great Britain from France the narrower part of which is called the Strait of Dover. So Great Britain is surrounded by water. Not far from the British Isles there is warm Gulf Stream. So, the climate in Great Britain is generally mild, humid and temperate due to the influence of the Gulf Stream. This humid and mild climate is good for plants. The trees and flowers begin to blossom early in spring. In January average temperature is from 3 to 7 degrees below zero and in July it is from 16-17 degrees above zero.

British people say: "Other countries have a climate, in England we have weather." The weather in Britain changes very quickly. One day may be fine and the next day may be wet. The morning may be warm and the evening may be cool. The English also say that they have three variants of weather: when it rains in the morning, when it rains in the afternoon or when it rains all day long. Every daily paper publishes a weather forecast. Both the radio and television give the weather forecast several times each day.

There are many rivers in Great Britain but they are not long. The longest of them is the Thames, which is a little over 200 miles. Britain's principal ports are London, Liverpool, Manchester, Hull, Glasgow.

The capital city of England is London. The capital city of Scotland is Edinburgh. The capital city of Wales is Cardiff. Belfast is the capital of Northern Ireland.

The national emblem of England is a red rose. The national emblem of Scotland is a thistle. The national emblem of Wales is a daffodil. The national emblem of Northern Ireland is a shamrock.

Great Britain is not rich in mineral resources, except coal, mined mostly in Wales. But it is a highly developed country.

The UK is the parliamentary monarchy. Legislative power belongs to her Majesty Queen Elizabeth II, and the Parliament, which consists of the House of Commons and the House of Lords. Officially the Head of the State is the Queen.

8. RECORDING. Choose the right variant.

1. The United Kingdom of Great Britain and Northern Ireland includes...

- a) England and Scotland;
- b) Wales and Northern Ireland;
- c) England, Scotland, Wales and Northern Ireland;

2. The Prime Minister lives ...

- a) at Buckingham Palace;
- b) near the Stonehenge;
- c) at 10 Downing Street;

3. The Queen lives in ...

- a) Oxford;
- b) the Parliament;
- c) Buckingham Palace;

4. is a birthplace of William Shakespeare.

- a) Liverpool;
- b) Stratford - upon – Avon;
- c) Edinburgh;

5. is a home of The Beatles.

- a) London;
- b) Cardiff;
- c) Liverpool;

6. and ... is famous for the Universities.

- a) Oxford and Cambridge;
- b) Belfast and Cardiff;
- c) Stratford - upon – Avon and London;

7. About 2% of the working population are...

- a) businessmen;
- b) farmers
- c) teachers;

8. In Wales is very popular.

- a) Kensington Garden;
- b) the Snowdon National Park
- c) Hyde Park;

9. Welsh people speak...

- a) English;
- b) both English and Welsh;
- c) English and French;

10. Over ... million tourists come to Britain every year.

- a) 28;
- b) 38;
- c) 48;

11. What is Stonehenge? It is...

- a) a clock;
- b) a temple;
- c) a temple, or a clock, or a calendar. Nobody knows.

12. Britain is an island. In fact there are over ... islands.

- a) 800;
- b) 900;
- c) 1000;

9 Speaking and discussion.

1. What place in Britain would you like to visit most of all and why?
2. Would you like to live in Britain? Why/why not?

10 Put the verbs in the Present Simple form.

1. One fly _____ (to fly) , two flies _____ (to fly).
2. One girl _____ (to cry), four girls _____ (to cry).
3. When a wolf _____ (to see) the moon, it _____ (to begin) to howl.
4. Wolves and sheep _____ (to be) never friends.
5. Our hens _____ (to lay) a lot of eggs.
6. Boys _____ (to fight) and _____ (to shout).
7. That boy _____ (to try) to catch some balls.
8. These girls _____ (to try) to run away from an angry turkey.

11. Yan is at a summer camp in Poland. Write what he usually does in the camp. Put the verbs in bracket in the correct form.

1. He _____ (get) up at 7.
2. He _____ (have) his English lesson every day.
3. He _____ (speak) English to his friends.
4. He _____ (play) board games in the afternoon.
5. Sometimes he _____ (swim) in the lake.
6. He often _____ (go) hiking.
7. He sometimes _____ (sit) by the camp fire in the evenings.
8. He never _____ (go) on a trip without his friends.

12. Put the verbs in the Present Simple form.

go, like, love, watch, read, like, walk, come, do, watch

My name's Pavel. In the evening I usually (1) _____ my homework. Then I (2) _____ TV or video. I (3) _____ action films! They are super! Then I (4) _____ my dog. After that I (5) _____ home, (6) _____ a book and (7) _____ to bed. My sister is little. She doesn't (8) _____ action films. She (9) _____ cartoons. She (10) _____ them every day.

13. Look at the chart and write about Ellie.

	sports programmes	comedies	action films	the news
Often		✓	✓	
Sometimes	✓			
Rarely	✓			
Never				✓

Ellie often watches comedies.
_____.

Практическое занятие № 5.

Тема: Географическое положение Великобритании. Present Simple.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, аудирования, чтения, письма.

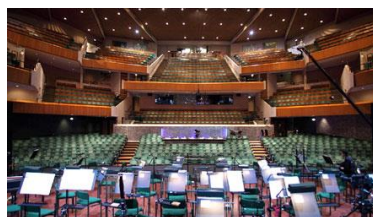
Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Перевести текст, сделать презентацию о Великобритании. Упр.4,5.

PLACES TO GO. WALES

Wales is a part of the United Kingdom and it's famous for its beautiful scenery, music festivals and friendly people. It has its own language, Welsh, but nearly everyone speaks English. Wales is also famous for its long place names like Llanfairpwllgwyngyllgogerychwyrndrobwll-llantysillioogoch! The best time to visit is from June to September.

Cardiff is a capital city. It's a busy, modern city on a river called the Taff. There is a beautiful castle in the center of the city and some interesting museums. St. David's Hall is a good place for traditional Welsh music. You can also go to concerts and sports events at the amazing Millennium Stadium.



Brecon Beacons National Park is a great place for walks and picnics. You can walk along Offa's Dyke in the Black Mountains and enjoy the wonderful views, or go fishing at Llangorse Lake, the largest natural lake in the south Wales.

Snowdonia National Park is in the north of the country. Every year about 500.000 people climb Snowdon, the highest mountain in Wales. You can also travel up the mountain by train!



Llandudno is an old seaside town on the north coast. It's famous for its long beaches and beautiful scenery, and is a good place to go surfing. You can also go surfing at many places in the south of the country like Broadhaven and Tenby.

Topical vocabulary

the Taff – река Тафф

St. David's Hall - Сент-Дэвид Холл, центр проведения выступлений местных и мировых звезд, конференций и представлений из области современного искусства.

Millennium Stadium – стадион Миллениум

Brecon Beacons National Park – национальный парк Бреккон-Биконс

Offa's Dyke – дамба Оффы, бывшая граница между Англией и Уэльсом

the Black Mountains – Черные горы

Llangorse Lake – озеро Ллэнгорс

Snowdonia National Park – национальный парк Сноудония

Llandudno – Лландидно, морской курорт и город в Уэльсе
Tenby – Тэнби, город на юго-западе

1 Are these sentences true or false?

1. Wales is a country in the United Kingdom.
2. They speak two languages in Wales.
3. August isn't a good time to visit.
4. You can listen to music at the Millennium Stadium.
5. Snowdon is in the Black Mountains.
6. You can travel by train up Snowdon.
7. Llandudno is a modern town.
8. Wales is a good place for surfing.

2. Make notes about Wales.

facts about the country	places to visit and things to do

3. Do you have your dream country you would like to visit? Tell about places to visit and things to do.

4. Поставьте подлежащее и сказуемое в 3-е лицо единственного числа.

1. *I always listen to the radio in the morning.* – *He always listens to the radio in the morning.*
2. I sometimes write letters to my school friends.
3. I always drink tea for breakfast.
4. I often watch football matches on TV.
5. I live in Moscow.

5. Поставьте глаголы в Present Simple.

Adam.....(1. be) a young man from Bristol. He..... (2. live) in a new big house near the city centre.
He.....(3. be) a student at the university. He.....(4. study) History and Literature. Every day he.....(5. go) to the university by bus. He.....(6. have) many friends and they always.....(7. go) to the park on Sundays. In the evenings they sometimes.....(8. go) to the disco or to the cinema. Adam.....(9. not like) going to the theatre.

Практическое занятие №6.

Тема: Столица страны изучаемого языка. Лондон. Past Simple.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, аудирования, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Перевести текст, выполнить задания к тексту, выполнить упр. 6-9.

1 Answer the questions.

1. What do you know about London?
2. Have you ever been to London? Would you like to visit it?
3. What famous London sights do you know?

2 Topical vocabulary. Read and translate.

the Tower of London - Лондонский Тауэр, крепость на северном берегу Темзы;

the Houses of Parliament – Парламент;

Trafalgar Square – Трафальгарская площадь;

Kensington Gardens - Кенсингтонский парк, примыкающий к Гайд парку;

Westminster Abbey- Вестминстерское Аббатство;

Hyde Park – Гайд парк, королевский парк в центре Лондона;
Madame Tussaud's Museum – музей мадам Тюссо;
Poet's Corner – Уголок поэтов в Вестминстерском Аббатстве;
the Royal Exchange – Королевская биржа;
Big Ben – Биг Бен, самый большой из пяти колоколов Вестминстерского дворца (часто это название относят к часам и часовой башне в целом);
the British Museum - Британский музей;
the National Gallery – Национальная галерея;
the river Thames – река Темза.

LONDON

London is the capital of the United Kingdom, its economic, political and cultural centre. It is one of the world's most important ports and one of the largest cities in the world. London with its suburbs has a population about 11 million people.

It is situated on the river Thames about forty miles from the mouth and is divided into two parts by the river: north and south.

The history of London goes back to Roman times. It has been a capital for nearly a thousand years. Due to favourable geographical position a small town soon became an important trade centre.

Actually London can be divided into several parts. First there is the City of London. It's the financial and business centre of Great Britain. It's the district where most offices and banks are concentrated: the Royal Exchange and the Bank of England are here, too. The East End is the district where mostly working people live. A lot of docks, factories, poor houses are concentrated here. The old port is now called "Docklands".

The West End makes a great contrast to the working district of London. It is full of richest hotels, largest supermarkets, best cinemas and concert halls. It is famous for its beautiful parks and gardens such as Hyde Park or Kensington Gardens. Many ancient buildings still stand here.

Another important district of London is Westminster where most of government buildings are located. Westminster Palace is the seat of the British Parliament where the country's leaders speak. The Houses of Parliament stand beside the river Thames. On the highest tower there is the most famous and largest clock of the country - Big Ben.

Standing not far from the Houses of Parliament, Westminster Abbey is a symbol of England. The legend says that Westminster Abbey was founded by St Peter himself but we know it was built by King Edward in 1065. The coronation of all British Kings and Queens takes place in Westminster Abbey. It is also famous for its Poet's Corner where many outstanding people - statesmen, painters, and poets were buried there. Among them Tennyson and Geoffrey Chaucer, the first English national poet, world famous scientists Isaac Newton Charles Darwin, etc.

Every year millions of tourists come to London to visit the places of interests. They make sightseeing tours of the city, visit the Trafalgar Square, the British Museum, the National Gallery, Madame Tussaud's Museum of waxworks, etc. They also visit the most ancient historic monuments dating back to Roman times such as the Tower of London which had been a fortress, a prison and a royal palace. At present it is one of the most interesting museums of GB. Now the King and the Queen of Britain do not live in the Tower. When the Queen is in London, she stays in Buckingham Palace, her official residence.

3 Reading and speaking. Group work.

Group 1. Find information about the parts of London. Say are these sentences true or false (T/F)?

1. London consists of several parts: the City, the West End, the East End, Westminster.
2. The West End is an industrial district of London. It's the district where most offices and banks are concentrated.
3. The East End is populated by working class families. It is full of richest hotels, largest supermarkets, best cinemas and concert halls.

4. The City is a financial center of London.
5. The West End is famous for its beautiful parks and gardens such as Hyde Park or Kensington Gardens.
6. Westminster is a district of London where most of government buildings are located.

Group 2. Find information about the sights of London. Say are these sentences true or false (T/F)?

1. Westminster Palace is the seat of the British Parliament where the country's leaders speak.
2. Westminster Abbey is a symbol of Edinburgh.
3. Buckingham Palace stands beside the river Thames.
4. The coronation of all British Kings and Queens takes place in Westminster Abbey.
5. The Tower of London had been a royal palace.
6. When the Queen is in London, she stays in Harrods, her official residence.

4. RECORDING. Choose the right variant.

1. London is on the river ...

- a) Severn;
- b) Taff;
- c) Thames;

2. There are ... bridges in London.

- a) 29;
- b) 39;
- c) 49;

3. The most famous bridge in London is...

- a) Millennium Bridge;
- b) Cannon Street Railway Bridge;
- c) Tower Bridge;

4. "The Tube" is ...

- a) a black taxi;
- b) the Underground;
- c) a red bus;

5. Madam Tussaud's is..

- a) the National Gallery;
- b) the British Museum;
- c) a museum of wax models;

6. The most famous store in Britain is...

- a) Marks and Spenser;
- b) Harrods;
- c) House of Fraser;

7. Covent Garden is ...

- a) a place for growing flowers;
- b) a place for shopping and a center of London street life;
- c) a place for playing football.

What do people like about London?

Where can people relax and have fun in London?

5. Make notes about London.

facts about the city	places to visit and things to do

What do you like about London? Would you like to visit it?

6. Write the Past Simple of the following words:

open - opened	regret -	cry -	stay -
love -	quarrel -	fry -	travel -
plan -	drop -	arrive -	close -
empty -	die -	play -	tidy -

7. Look at the list of irregular verbs at the back of the book and complete the table:

Infinitive	Past	Infinitive	Past
go	.....	.....	broke
have	.....	.....	cut
.....	came	take	.....
be	.....	.....	stole
wake	.....	drink	.....
meet	.....	.....	put
.....	sang	make	.....
speak	.....	.....	run
.....	told	begin	.....

8. Underline the verbs in Past Simple.

In the summer I visited my grandparents. We went to the forest, swam in the river, went fishing, read books, went to the cinema, and watched TV all the time. I visited my friends, played football, listened to music, worked in the fields, went boating, and had a good time. I picked berries and mushrooms. I lay on the sand.

9. Put the verbs in Past Simple.

be (2), feed, take, start, visit, listen

The children went to London. The Tour _____ at Hyde Park in the morning. The children _____ the ducks and squirrels there. Then they _____ photos of Trafalgar Square. The next stop _____ the British Museum. They also _____ the Tower of London. The children _____ to the famous bell Big Ben. In the evening they _____ very tired.

Практическое занятие №7.

Тема: Столица страны изучаемого языка. Лондон. Past Simple.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, аудирования, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Перевести текст, сделать презентацию о Лондоне/его достопримечательностях. Упр. 2-6.

BAKER STREET

221b Baker Street, London. This address is famous all over the world as the greatest detective Mr. Sherlock Holmes and his friend Doctor Watson lived there for 23 years from 1881 to 1904. The house itself was built in 1815. It is a two-storied building. The rooms are exactly the same as they were when Sherlock Holmes lived and worked there. The Sherlock Holmes museum was opened on March 27, 1990. In every room in the museum there are exhibits reminding visitors of various stories.

Sir Arthur Conan Doyle wrote 60 Sherlock Holmes adventures – four long novels 56 short stories. It is allowed to examine every item take pictures everywhere in the museum. The role of Mrs. Hudson has not been forgotten. On the ground floor there is Hudson's old English restaurant serving traditional English food. The museum is absolutely remarkable. Sir Arthur Conan Doyle helped us to see the brilliant detective and also the late 19th century life- style of professional gentlemen through the Sherlock Holmes stories.

1. Answer the following questions.

1. Who lived at 221 b Baker Street?
2. When was the house built?
3. When was the museum opened?
4. How many stories and novels did Sir Arthur Conan Doyle write?
5. What do you know about Sherlock Holmes and Doctor Watson?
6. What books by Sir Arthur Conan Doyle did you read?
7. What films about Sherlock Holmes and Dr. Watson did you see?

2. Look at what Maria did and didn't do last Sunday. Then write sentences:

- | | |
|-----------------------|------------------------------------|
| wake up late – | have lunch with her grandparents — |
| do her homework + | take her dog out for a walk + |
| speak to her friend – | help her mother make dinner + |

3. Imagine your friend works in the zoo. Write what he did yesterday. Use the following phrases.

to come up to all the cages, to open them, to talk to the animals, to wash some of the animals, to give them food, to clean the cages, to bring water for the animals, to close the cages

4. Ask and answer questions what people did or didn't do yesterday. Then ask your partner questions to fill in the table about him/her:

	go for a walk	play golf	write a letter	wash the car
Peter	+	+		
Mr and Mrs Page	+		+	+
Your partner				

1. Peter/go for a walk? *Did Peter go for a walk yesterday? Yes, he did.*
2. Peter/play golf?
3. Peter/write a letter?
4. Mr and Mrs Page/play golf?
5. Mr and Mrs Page/wash the car?

5. Use the time expressions below to write true sentences about yourself:

three months ago	yesterday	last weekend	in 2014	last Tuesday
------------------	-----------	--------------	---------	--------------

1. I went to a pop concert three months ago.
2.
3.
4.
5.

6. Write questions in Past Simple.

Kim: What _____ (you do) last night, Lisa?
 Lisa: I went to the cinema.
 Kim: What film _____ (you see)?
 Lisa: Shrek.
 Kim: Who _____ (you go) with?
 Lisa: Pete and Zoe.
 Kim: _____ (you enjoy) it?

Lisa: Well, the special effects were brilliant, but the story wasn't very good.

Kim: What time _____ (it finish)?

Lisa: At ten o'clock.

Kim: What _____ (you do) after the film?

Lisa: We went for a pizza.

Практическое занятие № 8.

Тема: Экономика страны изучаемого языка. Великобритания. Future Simple.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, аудирования, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Перевести текст, выполнить задания к тексту. Выполнить упр.6-8.

1. Do you understand the difference between imports and exports? Match the words from two columns.

- | | |
|----------------------|---|
| 1) Imports | a) goods which a country sells to other countries; |
| 2) Exports | b) services sold to other countries; |
| 3) Invisible exports | c) services bought from other countries; |
| 4) Invisible imports | d) goods which a country buys from other countries. |

2. An important part of Britain's overseas trade consists of invisible export. Divide the following into the categories: a visible import, an invisible import, an invisible export.

- A Frenchman spends a week in Edinburgh and goes sightseeing;
- A Londoner buys a Japanese-made car;
- A Russian buys Lipton tea;
- A British company books a group holiday to Greece for its workers;
- A student from Russia takes an English course in London;
- Russian people watch a British serial.

3. Topical vocabulary. Read and translate.

Gross domestic product (GDP) – валовый внутренний продукт;

Gross national product (GNP) – валовый национальный продукт;

To be based on – быть основанным на ч/л;

To employ workforce – нанимать рабочую силу;

Account for – насчитывать;

Branch of industry – отрасль промышленности;

Cotton/woolen industry – хлопчатобумажная/шерстяная промышленность;

Coal-mining – добыча угля;

Electric power industry – энергопромышленность;

Ferrous metallurgy – черная металлургия;

Private enterprises – частные предприятия;

Naval and industrial power – морская и промышленная держава;

Shipbuilding – кораблестроение;

Civil aviation – гражданская авиация;

Manufacturing – производство;

Agriculture – сельское хозяйство;

Play a vital/important role – играть важную роль;

National income – национальный доход;

Retail and wholesale trade – розничная и оптовая торговля;

Natural resources – минеральные ресурсы;

Valuable deposits – ценные запасы/залежи;

Trade deficit – дефицит;

Raw materials – сырье;

Granite – гранит;

Copper – медь;
Zink – цинк;
Salt – соль;

4. Pick up the names of the cities, countries, organizations from the text. Do we use articles with them?

THE ECONOMY OF GREAT BRITAIN

Great Britain is a highly-developed naval and industrial power. Its economy was primarily based on private enterprises. The government controls the coal-mining and electric power industries, ferrous metallurgy and shipbuilding. Part of public transport, civil aviation and national bank are also managed by the state.

The main sectors of British economy are manufacturing, services and agriculture. The share of industry in GNP is 11 times more than that of agriculture. Manufacturing plays a vital role in British economy. It accounts for 1/5 of the GNP and employs less than 1/3 of the workforce.

The rise of Great Britain as an industrial nation was partly due to the presence of considerable mineral resources, the most important of them being coal and iron. Next to coal and iron the chief minerals found on the British Isles are the building stone, marble, granite, slate, lead, tin, copper, zink, salt and china clay. But in the course of the last hundred years many of Britain's most valuable deposits have been worked out.

Big cities and towns such as London, Glasgow, Manchester, Liverpool, Newcastle, Sheffield and Birmingham have enterprises of nearly all branches of industry. The main centres of cotton and woolen industry are Leeds, Bradford and Manchester.

Services play an important role in British economy and make up an increasing proportion of the national income. They account for about 60 per cent of gross domestic product (GDP) and 68 per cent of employees. This sector includes health, education, retail and wholesale trade, tourism, financial and business services, insurance, transport, etc.

In the 19th century Britain dominated international trade, accounting for about one-third of world's exports. Early in the 20th century its position changed. The volume of world's exports increased. With a large population, small land area, and few natural resources, the country depends on foreign trade to supply the raw materials for English factories and to provide a market for the sale of the thousands of types of manufactured goods produced by English industries.

The United Kingdom's principal exports are vehicles, machinery, manufactured goods and textiles. Its main exports are food stuffs and most of the raw materials for industry. Britain imports half the food it needs.

The United Kingdom's main trade partner is the EU. Some 58 percent of the kingdom's exports go to EU nations. Its main EU partners are Germany, which accounts for 12 percent of exports; France, with 12 percent; and the Netherlands with 8 percent. The United Kingdom's largest single market is the United States, which accounts for 13 percent of its exports. The United States also provides 14 percent of the kingdom's imports.

For several decades, the United Kingdom has had a trade deficit, as it has imported more goods and services than it has exported. In 1998, the trade deficit amounted to US\$35 billion or 1.5 percent of GDP.

The United Kingdom has been a member of the European Free Trade Association (E.F.T.A.) since 1959, and a member of the European Economic Community (E.E.C.) since 1973.

5 Complete the sentences, using the information from the text.

1. The British government controls
2. The main sectors of British economy are
3. The most important mineral resources of Great Britain are
4. The main centers of cotton and woolen industry are
5. The service sector includes
6. The United Kingdom's principal exports are

7. Its main EU partners are

6. Complete the sentences.

won't let 'll take ~~ll~~close 'll be won't pass 'll catch

1. It's cold. I'll close the window.
2. His teacher thinks he..... a great pianist one day.
3. Do your homework or I you go out.
4. I'm afraid she her exams.
5. Put on your coat or you a cold.
6. This shirt is nice. Iit.

7. Answer the questions about yourself, using I hope, I believe, I expect, perhaps, probably. Follow the model.

1. Where will you go at the weekend?
I'll probably go skiing in the mountains.
2. What will you buy your friend for his/her birthday?

3. Where will you be at 3 o'clock tomorrow afternoon?

4. Who will you ask if you need studying for the exam?

5. Where will you spend your holidays?

8. Take a role of a fortune teller and tell your group about the future. You can use the ideas below.

One student will...

1. be a dentist
2. have 3 children
3. win a lot of money
4. marry a millionaire

Two students will....

1. be singers
2. live in the USA
3. win a competition
4. fly to the moon

Fortune teller: I think Jim and Lucy will be singers.

Практическое занятие № 9

Тема: Экономика страны изучаемого языка. Великобритания. Future Simple.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Ответить на вопросы к тексту/сделать презентацию. Выполнить упр.2-5.

THE ECONOMY OF GREAT BRITAIN

Great Britain is a highly-developed naval and industrial power. Its economy was primarily based on private enterprises. The government controls the coal-mining and electric power industries, ferrous metallurgy and shipbuilding. Part of public transport, civil aviation and national bank are also managed by the state.

The main sectors of British economy are manufacturing, services and agriculture. The share of industry in GNP is 11 times more than that of agriculture. Manufacturing plays a vital role in British economy. It accounts for 1/5 of the GNP and employs less than 1/3 of the workforce.

The rise of Great Britain as an industrial nation was partly due to the presence of considerable mineral resources, the most important of them being coal and iron. Next to coal and iron the chief minerals found on the British Isles are the building stone, marble, granite, slate, lead, tin, copper, zinc, salt and china clay. But in the course of the last hundred years many of Britain's most valuable deposits have been worked

out.

Big cities and towns such as London, Glasgow, Manchester, Liverpool, Newcastle, Sheffield and Birmingham have enterprises of nearly all branches of industry. The main centres of cotton and woolen industry are Leeds, Bradford and Manchester.

Services play an important role in British economy and make up an increasing proportion of the national income. They account for about 60 per cent of gross domestic product (GDP) and 68 per cent of employees. This sector includes health, education, retail and wholesale trade, tourism, financial and business services, insurance, transport, etc.

In the 19th century Britain dominated international trade, accounting for about one-third of world's exports. Early in the 20th century its position changed. The volume of world's exports increased. With a large population, small land area, and few natural resources, the country depends on foreign trade to supply the raw materials for English factories and to provide a market for the sale of the thousands of types of manufactured goods produced by English industries.

The United Kingdom's principal exports are vehicles, machinery, manufactured goods and textiles. Its main exports are food stuffs and most of the raw materials for industry. Britain imports half the food it needs.

The United Kingdom's main trade partner is the EU. Some 58 percent of the kingdom's exports go to EU nations. Its main EU partners are Germany, which accounts for 12 percent of exports; France, with 12 percent; and the Netherlands with 8 percent. The United Kingdom's largest single market is the United States, which accounts for 13 percent of its exports. The United States also provides 14 percent of the kingdom's imports.

For several decades, the United Kingdom has had a trade deficit, as it has imported more goods and services than it has exported. In 1998, the trade deficit amounted to US\$35 billion or 1.5 percent of GDP.

The United Kingdom has been a member of the European Free Trade Association (E.F.T.A.) since 1959, and a member of the European Economic Community (E.E.C.) since 1973.

1. Answer the questions.

1. What is the British economy based on?
2. What are the United Kingdom's principal exports?
3. What does the service sector include?
4. What is the United Kingdom's main trade partner?
5. What is the United Kingdom's largest single market?
6. The United Kingdom has been a member of several organisations. What are they?

2. Look at Amy's diary for next week. Ask and answer questions as in the example.

MONDAY clean my room	THURSDAY have a guitar lesson
TUESDAY play volleyball	FRIDAY watch TV
WEDNESDAY help mum	SATURDAY meet my friends
	SUNDAY visit grandmother

1. clean her room/Wednesday
Is Amy going to clean her room
on Wednesday?
No, she isn't. She is going to
clean her room on Monday

2. play volleyball/Saturday

4. have a guitar lesson/Friday

5. watch TV/Tuesday

6. meet her friends/Sunday

3. help her mum/Monday

7. visit her grandmother/Thursday

3. Pair work. Ask and answer questions as in the example.

A: Are you going to clean your room on Monday?

B: Yes, I'am./No, I'm not.

4. Writing activity.

Writing Activity
I'm going to on Monday.....
.....
.....
.....

5. Open the brackets, using Future Simple or be going to. Choose between Future Simple and be going to to complete the conversation.

— Can I speak to Fiona, please?

— Speaking. Is that you, Pat?

— It's me. Hi. What you _____ (1 – do) tonight?

— I don't know yet. I think, I _____ (2 — read) the book Nora gave me yesterday.

— How about going to the cinema?

— Sounds good, but I'm looking after my little brother after eight, because my parents are going to their friend's birthday party.

— Poor you. Your brother is so naughty sometimes!

— But I love him. He's so funny! I think, he _____ (3 — be) a good clown. He says he _____ (4 — be) a pilot, nothing else. Well, what _____ (5 — do) you tonight?

— I don't know either. I wanted to go somewhere nice with you, but you are baby-sitting tonight, so I _____ (6 — help) you to baby-sit, if you don't mind.

— Of course, I don't. Come along and we _____ (7 — have) a nice cup of tea and _____ (8— play) with my brother.

Практическое занятие № 10.

Тема: На железнодорожном вокзале. Страдательный залог времен Simple.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, аудирования, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Составить диалог по теме, упр.8-10.

1 Capital cities in Europe - where are they? Speak, connect and write.

I'd like to go to....

Rome.

Berlin.

London.

Paris.

Madrid.

Budapest.

Prague.

Bratislava.

Brussels.

Bern.

..... is in....

Spain.

England.

the Czech Republic.

Italy.

Germany.

France.

Hungary.

Belgium.

Slovenia.

Russia.

<i>Copenhagen.</i>	Finland.
<i>Oslo.</i>	Sweden.
<i>Stockholm.</i>	Switzerland.
<i>Helsinki.</i>	Norway.
<i>Moscow.</i>	Denmark.

I'd like to go to Rome. Rome is in Italy.

I'd like to go to is in

I'd like to go to is in

2 Travel plans. Speak and write. To which of these countries can you travel by train?

I'd like to go to ... You can go...

Rome

Berlin

London

Paris

Madrid

Budapest

Prague

Bratislava

Brussels

.....

by train.

by car.

by plane.

by bus.

by boat.

by bike.

by ????

Where do you want to go? Write about your travel plans:

I'd like to go to by

I'd like to go to by

3 Topical vocabulary. Read and translate.

a railway station – железнодорожный вокзал

direction - направление

a booking office - билетная касса

a ticket - билет

a single ticket - билет в одно направление

a return ticket - билет туда и обратно

a pound – фунт (денежная единица)

a waiting room – зал ожидания

arrival - прибытие

a porter - носильщик

to carry luggage – нести багаж

to push – толкать, продвигать

a truck – багажная тележка

a trunk – дорожный чемодан

a suitcase – чемодан (небольшой плоский)

a luggage van – багажный вагон

abroad – за границей, за границу

a direct train – прямой поезд

to be due out – должен отойти

to be due in – должен прибыть

a sleeping car – спальный вагон

a stopping train – пассажирский поезд

a place of destination – место назначения

chief - главный

a station-master – начальник станции

a bookstall – книжный киоск
a left-luggage office – камера хранения
to call for smth – заходить за чем-либо
a carriage – пассажирский вагон

4 Read the text and practice the conversations.

THE RAILWAY STATION

We are at the railway station in London. Let's look round the station and watch the busy life that is going on. There are a lot of platforms from which trains go out and come in. Our train goes from platform 2, so let us wait in that direction. There is a booking office where you can buy a ticket for your journey. Let's listen to that man buying a ticket.

Man: I want a ticket to Brighton, please, second class.
Booking clerk: Single or return?
Man: Return, please.
Booking clerk: Second return, Brighton: one and fifty pounds, please. (The man gives him two pounds). Fifty pence change, thank you.
Man: Could you tell me what time the next train goes?
Booking clerk: 8.55, platform 12. If you hurry you'll just catch it?
Man: Thanks.

Next to the booking office there is a waiting room where people are waiting for the train's arrival. On the platform the porters are very busy carrying luggage to the train or pushing it on their trucks. They are taking those trunks and suitcases to the luggage van. Look at the labels on them – Paris, Rome, Madrid. Quite a lot of people are going abroad. There is a direct train to Paris, it's due out at 8.50.

Here is a train that has just come in, with crowds of people getting off it. It has had a long journey. Those are sleeping cars in front of the train. It is a stopping train, not an express; it stops at five or six stations before it gets to the place of destination.

The chief man of the railway station is the station-master. There is his office next to the waiting – room. We can see a restaurant which is open. There aren't many people in it, just a few having breakfast, but there are rather more people having a snack. They are drinking cups of tea or coffee, eating sandwiches, buns or biscuits.

Here is a bookstall where you can buy newspapers and magazines. Then follows a left-luggage office. What is that woman saying to the man at the left-luggage office?

Man: Yes, madam.
Woman: I want to leave some luggage here until this afternoon; is that all right?
Man: Oh, yes, madam, that'll be quite all right. Is this just one bag?
Woman: No, there are those two suitcases and this trunk. My husband will call for them with his car this afternoon.
Man: Very well, madam. What name, please?
Woman: Mrs Smith.
Man: Right. Here's the ticket. That'll be twenty pence, please. Thank you.

5 Complete the sentences using the information from the text.

1. A booking office is a place where
2. A waiting room is a place where
3. A porter is a person who
4. A stopping train is a train that
5. A station-master is
6. A bookstall is a place where

6 Do you like travelling by train? Why/why not? Describe it with the following adjectives.

I think		boring/interesting.	
In my opinion	travelling by train is	cheap/expensive.	So, I like/don't like it.
It seems to me		noisy/quiet.	
To my mind		fast/slow.	
		uncomfortable/comfortable.	
		safe/dangerous.	

7 Make the correct order. Practice the conversations.

Dialogue 1

A: 9.25. Platform 3.
 B: What time does it reach London?
 A: Good morning. When does the London train leave, please?
 B: Do I have to change?
 A: You should be there at 11.31, but you may be a bit late.
 B: Yes. You change at Lewes and East Croydon.

Dialogue 2

A: Must I change?
 B: No. It's a direct train.
 A: It gets there at 11.34.
 B: When does it get in?
 A: Afternoon. Which train do I take for Victoria, please?
 B: 9.28. Platform 2.

Dialogue 3

A: It's due in at 11.35, but they're running late today.
 B: Yes. Change at East Croydon.
 A: When do we get there?
 B: Good afternoon. What time's the next train to Victoria, please?
 A: Do I have to change trains?
 B: 9.26. Platform 4. Right up at the front.

8. Fill in: is, are, was or were.

1. A short story competition is organised by our school every year.
2. The electric light bulb invented by Thomas Edison in 1879.
3. Many films produced in Hollywood.
4. The Lost City of the Incas located in Peru.
5. The film *Titanic* directed by James Cameron.
6. The Special Olympics World Games held every four years.
7. Toyota cars made in Japan.
8. Penicillin discovered by Alexander Fleming.
9. The Harry Potter books written by J. K. Rowling.
10. The Parthenon visited by thousands of tourists each year.
11. Breakfast served from 7:00 am to 11:00 am daily.
12. Coffee grown in Brazil.

9. Complete the sentences using one of these verbs in the correct form, present or past.

~~cause~~ overtake damage show hold surround invite translate make write

1. Many accidents are caused by dangerous driving.
2. Cheese from milk.
3. The roof of the building in a storm a few days ago.

4. Youto the wedding. Why didn't you go?
5. A cinema is a place where films
6. In the United States, elections for presidentevery four years.
7. Originally the book in Spanish, and a few years ago it..... into English.
8. Although we were driving fast, weby a lot of other cars.
9. You can't see the house from the road. It by trees.

10. Put the verbs in brackets into the *Past Simple Passive*.

Two men 1) were seen (see) breaking into a house last night. The police 2)(call) and one man 3) (catch) immediately. The other escaped but he 4) (find) soon after. Both men 5) (take) to the police station where they 6)(question) separately by a police officer. The two men 7) (charge) with burglary.

Практическое занятие №11.

Тема: В аэропорту. Страдательный залог времен Simple.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, аудирования, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Составить диалог по теме, упр.5-6.

AT THE AIRPORT

1 Speaking and discussion.

1. Have you ever travelled by plane? Did you like it?
2. Where did you travel to?
3. What do you usually do on the aircraft during the flight?
4. What's the first thing you do on arrival?

2 a) Joe Hunter wants a ticket to Boston. Read and practice the conversation.

Travel agent: Welcome to *Call – a – Flight*. My name is Helen. How can I help you?

Joe: Hello. I'm calling about flights to Boston.

Travel agent: When would you like to go?

Joe: On 24th February. That's a Saturday.

Travel agent: When do you want to come back?

Joe: Sunday 11th March.

Travel agent: How many people are travelling?

Joe: Just me.

Travel agent: And from which airport?

Joe: London Heathrow.

Travel agent: And what's your name please?

Joe: It's Joe Hunter.

Travel agent: Ok. Hold on a moment. I'll just check availability. Right. There's a British Airways flight that leaves London Heathrow at 13.20 on the 24th of February and arrives in Boston at 18.45. The return flight leaves Boston at 5.15 on Sunday the 11th of March, arriving at London Heathrow at 8.20.

Joe: How much is that?

Travel agent: Let me check.. That's £259, including all taxes.

Joe: Ok. That's not too bad. Can I book that please?

Travel agent: Yes, of course. How would you like to pay?

Joe: By credit card, please.

b) Match the travel agent's questions a) -g) to the things she asks about 1-7.

- | | |
|------------------------------------|------------------------------------|
| a) How many people are travelling? | 1. by credit card, please; |
| b) How can I help you? | 2. the date you leave; |
| c) When would you like to go? | 3. the date you return; |
| d) And what's your name please? | 4. the reason you are calling; |
| e) How would you like to pay? | 5. the name of an airport or city; |
| f) When do you want to come back? | 6. number of passengers; |
| g) And from which airport? | 7. a name. |

3 Topical vocabulary. Read and translate.

Check- in desk – пункт регистрации;

A passport – паспорт;

A boarding card – посадочный билет;

Hand luggage – ручная кладь;

A ticket – билет;

Sharp items - острые/колющие/режущие предметы;

Electrical goods – электроприборы;

Pack bags – упаковывать вещи;

A suitcase – чемодан;

Seat number – номер места;

Departure gate – ворота;

To board – садиться на самолет; boarding – посадка в самолет;

Passengers – пассажиры;

A window seat – место у окна;

A middle seat – место в центре, по середине;

An aisle seat – место с краю, у прохода;

Flight – рейс, полет.

4. Joe is at the airport. Listen to the conversation and fill in the gaps.

Woman: Good morning, sir. Can I see your and?

Joe: Certainly. Here you are.

Woman: Thank you. Ok. How many will we be

Joe: Just one

Woman: Did you your yourself?

Joe: Yes I did.

Woman: Do you have any ?

Joe: I have an electrical shaver in my Is that Ok?

Woman: That's fine. So, nothing in your ?

Joe: No.

Woman: Ok. Do you like a or an seat?

Joe: A window seat, please.

Woman: Ok. Just one moment. This is your and You should go straight through the departure lounge. Enjoy your flight.

Joe: What time will we be boarding?

Woman: You will be boarding at 7.

Joe: Thank you.

5. Допишите одну из трех форм глагола:

1. to take, ..., taken
2. to read, read, ...
- 3... was/were, been
4. ..., gave, given
5. to put, put, ...
6. to come, ..., come
- 7..., flew, flown .
8. spoke, spoken

6. Выберите правильную форму страдательного залога (Present, Past, Future Simple Passive):

1. New houses... every year. a) were built; b) are build; c) are built
2. They... met in the airport tomorrow. a) is; b) will be; c) will
3. The fax... last year. a) will be printed; b) was printed; c) is printed
4. Dinner... at 2 o'clock every day. a) is served; b) are served; c) was served
5. The book of this writer... in 2008. a) will be print; b) was printed; c) will be printed
6. The contract... two days ago. a) was signed; b) is signed; c) will be signed.
7. Radio... by Popov. a) is invented; b) was invent; c) was invented
8. Six public holidays... celebrated in Great Britain. a) is; b) was; c) are
9. The room... every day. a) is cleaned; b) is clean; c) will clean
10. My father... next month. a) will operate; b) will be operated; c) is operated

Практическое занятие № 12.

Тема: На таможне. Страдательный залог. Повторение.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, аудирования, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Выучить диалог по теме, упр.6-7.

GOING THROUGH THE CUSTOMS

1. Fill in the gaps.

a passport	a boarding card	hand luggage	a ticket	sharp items
pack your bags	passengers	a flight number	a gate	
a check-in desk	a window/	a middle/an aisle seat		

1. Before you leave the house, you your
2. To travel to another country, you need a and a
3. When you get to the airport, you go to the-in
4. You can choose a seat, a seat and an seat.
5. The person at the check-in desk always asks you if you have any items in your luggage.
6. He or she then gives you your card.
7. You need to listen for your and which your plane leaves from.
8. Then you get on the plane with the other

2. Read and translate.

Item	вещь/предмет
To incur duty	облагаться пошлиной
To declare	задекларировать/указать в декларации
To be allowed	позволять/разрешать

Individual	лицо
Commercial activity	коммерческая деятельность
Caviar	икра
Special permission	особое разрешение
To carry across the border	провозить через границу
To go through the customs	проходить таможенный досмотр
To fill in the customs declaration	заполнить декларацию
Firearms	огнестрельное оружие
Endangered	под угрозой исчезновения
Precious metals/ stones	драгоценные металлы/камни
Substances	вещества

3. Group work. Look through the customs regulations of the Russian Federation. Have you ever carried these items across the border?

Group 1. Items which incur import/export duty.

- Tobacco (individuals, 17 years or over, are allowed to import/export up to 100 cigars, 400 cigarettes, or 0.5kg of tobacco undeclared).
- Alcohol (individuals, 21 years or over, are allowed to import/export up to two liters of alcoholic drinks undeclared).
- Caviar (individuals are allowed to import/export 250g of caviar undeclared).
- Goods intended for production or commercial activity.

Group 2. Items which require special permission to import/export.

- Firearms, ammunition and explosives.
- Radioactive substances.
- Endangered species of flora and fauna.
- Precious metals and precious stones, except as part of personal jewelry.
- Narcotics, psychotropic substances, toxins, and powerful drugs.
- Radio technology, excepting cellphones.
- Extremist film, photography, and publications.
- Objects of cultural significance.

4. RECORDING 5. Listen to the conversation. Choose the correct variant.

A: Good morning, sir

B: Hello

A: Could I see your *precious metals and precious stones?*
passport and visa documentation?
extremist films and publications?

B: Yes, here they are.

A: Is this your first visit to *Australia?*
New Zealand?
Canada?
the United Kingdom?

B: Yes, It is.

A: Where will you be staying?

B: *At a hotel.*
With my friend in London.
At my aunt's house.
At a dormitory.

A: How long will you be staying?

B: I'll be staying *until tomorrow.*
for 1 month.
for two weeks.
until next Tuesday.



rate of exchange – обменный курс.

notice board – доска объявлений.

cash – наличные деньги.

identification – документ, удостоверяющий личность.

traveller's cheques – туристские чеки (обмениваются на деньги или принимаются без обмена в магазине, ресторане и т. п.)

be (in) valid – быть не (действительным).

signature – подпись.

Dialogue 1.

- Excuse me, would you change these Roubles to Dollars, please.
- May I have your customs declaration and the certificate, please.
- Here you are. And what was the second paper you wanted?
- The certificate you got when you changed your Dollars to Roubles.
- I see, here it is

Dialogue 2.

- I'd like to cash this cheque, please.
- Yes, madam... \$ 30. You haven't signed it yet.
- I'm sorry. Here you are.

Dialogue 3.

- I'd like to change these francs, please.
- Yes, sir. How many francs have you got?
- What's the rate of exchange?
- The current rates are on the notice board.

Dialogue 4.

- Good morning. Can I help you?
- Yes, my name is Dixon. I am expecting some money from my bank in Toronto.
- By post, cable or telex, sir?
- By telex.
- Let me see. Oh, yes, 200 from the Royal Bank of Canada. Have you got any identifications?
- Here you are.

2. Read the text and answer the questions.

TEXT A. TRAVELLING

Nowadays travelling abroad is very popular. Some people prefer to travel by plane, especially businessmen, because it's the fastest means of transportation. Those who are not short of time usually travel by train or by ship. It takes more time but gives the opportunity to see the country you travel through, its picturesque landscapes and nature.

While travelling abroad you have to go through **customs**, sometimes several times.

As a rule the customs officers check your passports and visas if they are required. When coming to some countries you may need a health certificate or a certificate of vaccination. If you have anything to declare, then you are to fill in the declaration form.

The customs officers may ask you to show your luggage to them. Usually articles for personal use and wear and also used items and gifts are not liable to duty anywhere. If you are carrying much currency you should also declare it. If you are carrying weapons you need a permit. Although some items are liable to duty, if you carry only a small amount of them, they are duty free.

Occasionally the customs officers may take some of your things for a more detailed inspection but usually they return them soon.

Do not try to break the customs rules and regulations because you may have a lot of troubles.

1. Why do people prefer to travel by plane?
2. What are the advantages of travelling by train?
3. What are the rules of going through the customs?
4. What items should be declared?
5. In what case do you need a permit?

4. Read the text and say are the sentences true or false.

TEXT B. THE SMUGGLER

Sam Lewis was a custom officer. He used to work in a small border town. It was not a busy town and there was not much work. The road was usually very quiet and there were not many travellers. It was not a very interesting job, but Sam liked an easy life. About once a week, he used to meet an old man. His name was Draper. He always used to arrive to at the border early in the morning in a big truck. The truck was always empty. After a while Sam became suspicious. He often used to search the truck, but never found anything. One day he asked Draper about his job. Draper laughed and said "I'm a smuggler".

Last year Sam retired. He spent his saving on an expensive holiday. He flew to Bermuda, and stayed in a luxury hotel. One day he was sitting by the pool and opposite him he saw Draper drinking champagne. Sam walked over to him.

Sam: Hello, there!

Draper: Hi!

Sam: Do you remember me?

Draper: Yes... of course I do. You're a customs officer.

Sam: I used to be, but I'm not anymore. I retired last month. I often used to search your truck...

Draper: ... but you never found anything!

Sam: No, I didn't. Can I ask you something?

Draper: Of course you can.

Sam: Were you a smuggler?

Draper: Of course I was.

Sam: But... the truck was always empty. What were you smuggling?

Draper: Trucks...

True or false?

1. Sam Lewis was a smuggler.
2. He liked his job.
3. About twice a week Sam used to meet an old man in a small truck full of different stuff.
4. Draper was a custom officer.
5. Draper smuggled trucks.

5. Fill in *by* or *with*.

1. The photos were taken with a digital camera.
2. The room was decoratedflowers.
3. *The Green Mile* was writtenStephen King.
4. The sauce was madeonions and peppers.

6. Writing practice. Rewrite the article and put the underlined parts into *the passive*.

You are back home from college. You turn on the lights. You take a cool drink from the fridge and you heat your dinner in the microwave. For people who lived 200 years ago, this would be science fiction! 200 years ago there was no electricity. ¹People heated houses with a real fire and ²they lit rooms with candles. ³Milkmen delivered milk every morning and ⁴people stored it in a cool place. ⁵They cooked food in the fireplace or on a big stove. 200 years ago there was no plumbing! ⁶People carried water from the nearest well or the fountain and ⁷they washed clothes by hand. Then ⁸they ironed clothes with a heavy iron. ⁹They

filled irons with hot coal. ¹⁰People used horse carriages because there were no cars or buses. I think I prefer life in the 21st century, don't you?

Практическое занятие № 14

Тема: В гостинице. Подготовка к контрольной работе.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Составить диалог по теме. Повторить пройденный материал. Подготовиться к контрольной работе.

IN A HOTEL

1 Making a reservation. Резервирование номера в отеле.

"Hi, how much are your rooms?"

"Hi, what are your rates?"

Сколько стоит номер?

"Hello, how much is a room?"

"Our rooms start at \$79 for a basic room."

Стоимость стандартных номеров - от 79\$,

"Our rooms start at \$79 for a standard room and go up to \$300 for a suite."

люксы - 300\$.

"Ok. Can I reserve/rent a room?"

"Hi, I would like to reserve/rent a room."

Я бы хотел забронировать номер.

"Hello, can I reserve/rent a couple of rooms?"

Запрос информации о дате заселения и сроке пребывания:

"What day do you want to check in?"

"Which date did you want to reserve?"

Когда (день/число) вы хотите заселиться?

"What date are you looking for?"

"I want a room from June 22nd to June 25th."

Мне нужен номер с по (период)

"I would like a room for the 19th of July."

"How long will you be staying with us?"

"When will you be checking out?"

На какой период вы бы хотели заселиться?

"How many days would you like the room for?"

"I am going to stay for 3 days."

"I would like to reserve the room for 4 days."

Мне нужен номер на дня/до

"I am going to need the room until July 23rd."

Checking in and checking out. Заселение/регистрация в гостиницу/выезд из гостиницы.

"Hi, I am checking in."

"Hi, I have a reservation and I am checking in."

Здравствуйте, я бронировал номер.

"Where is the elevator?"

Где находится лифт?

"Do you have concierge service here?"

Есть ли у вас консьерж-услуги?

"Do you have a map of the city?"

У вас есть карта города?

"What time should I check out by?"

В котором часу я должен выехать

"What time is check out?"

из отеля?

"Should we charge the credit card on file or did you want to use a different card?"

"Your credit card will be charged a total of \$256.78. Can you sign on the bottom?"

"Thank you for staying with us. We look forward to seeing you again."

Спасибо, что выбрали нас. Ждем вас снова.

2 Read and practice the conversation.

A: "Thank you for calling Great Hotel. How may I help you?"

B: "I would like to rent/reserve a room, but how much do you charge a night?"

A: "Our prices start at \$79 a night for a standard room."

B: "Great. Can you reserve a room for me?"

A: "Sure. What day are you coming in?"

B: "I will be checking in on August 3rd."

A: "How long will you be staying with us?"

B: "I'll need it for three nights."

A: "Ok. I have you coming in on the 3rd of August and checking out on the 6th. Is that correct?"

B: "Yes."

A: "How many total adults?"

B: "Two adults and two kids."

A: "How old are the children?"

B: "10 and 12."

A: "Would you like one room or two rooms?"

B: "Just one is fine."

A: "Would you like a smoking room or a non smoking room?"

B: "Non smoking room please."

A: "Can I have your last name?"

B: "Park."

A: "Your first name"

B: "Young. That's Y O U N G."

A: "Let me confirm your information Mr. Park. I have one non smoking double room with 2 adults and 2 children from August 3rd to August 6th. Is this correct?"

B: "Yes."

A: "The total comes to \$256.78. Can I get your credit card number?"

B: "Sure. It is 44444444444444."

A: "What is the name on the credit card?"

B: "Young Park."

A: "I have the room reserved for you. If you need to cancel, please call us 24 hours before your check in date. Failure to cancel will result in a one day charge on your credit card. Is there anything else I can do for you?"

B: "Yes, one more question. What time can we check in."

A: "We can check you in by 2:00 pm."

B: "Great. Thank you."

A: "Thank you and have a great day."

B: "Thanks. Bye"

A: "Good bye."

3. Make up your own conversation.

Практическое занятие № 15

Тема: Контрольная работа.

Цель: Контроль лексических и грамматических навыков, словарного запаса обучающихся.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности.

Контрольная работа

Вариант I

1. Совместите слова и словосочетания из двух колонок:

Темза	to carry luggage
Здание парламента	Buckingham palace
Билет	hand luggage
Упаковывать вещи	the Thames
Британский музей	the Houses of Parliament
Нести багаж	to pack bags
Букингемский дворец	a ticket
Ручная кладь	the British Museum
Достопримечательности	a window seat
Место у окна	places of interest

2. Дополните предложения и переведите их:

1. Great Britain consists of... parts.
2. The capital of Wales is... .
3. The official head of the United Kingdom is... .

3. Образуйте отрицательную и вопросительную формы от данного предложения:

The Queen lives in Buckingham palace.

4. Исправьте ошибки, если таковые имеются:

1. He doesn't likes studying.
2. She drive a car very fast.
3. They have many friends.
4. After dinner he listens to the music or watch TV

**Контрольная работа
Вариант II**

1. Совместите слова и словосочетания из двух колонок:

Посадочный билет	passengers
Трафальгарская площадь	Westminster Abbey
Регистрация	a window seat
Номер рейса	a boarding card
Вестминстерское Аббатство	to be situated on
Место в центре	Trafalgar Square
Располагаться на	flight number
Пассажиры	check-in desk
Здание парламента	the United Kingdom
Соединенное Королевство	the Houses of Parliament

2. Дополните предложения и переведите их:

1. The climate of Great Britain is
2. The Houses of Parliament is famous for its big hour bell known as
3. The capital of Northern Ireland is

3. Образуйте отрицательную и вопросительную формы от данного предложения:

He bought the ticket two days ago.

4. Исправьте ошибки, если таковые имеются:

1. They didn't visited their granny last week.

2. We maked many mistakes in the test.
3. When were you born?
4. Did you like the film? – No I not.

Практическое занятие № 16

Тема: Итоговое занятие.

Цель: Контроль умений и навыков практического владения английским языком.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Прочитать и перевести текст, выполнить упражнения к тексту, выполнить грамматические задания.

Вариант I

1 Find geographical names in the text and translate them. Do we use the articles with them?

2 Fill in the gaps if necessary.

1. The official name of ... Great Britain is ... United Kingdom of ...Great Britain and ...Northern Ireland.
2. ...U. K consists of...England, ...Scotland, ...Wales and ...Northern Ireland.
3. The western coast of ...Great Britain is washed by ... Atlantic Ocean and ... Irish Sea.
4. ... English Channel separates the south-east of ... Great Britain from ...France the narrower part of which is called ... Strait of Dover.
5. The climate in Great Britain is generally mild, humid and temperate due to the influence of ... Gulf Stream.
6. There are many rivers in Great Britain but they are not long. The longest of them is ...Thames, which is a little over 200 miles.

3 Find the cardinal directions in the text.

север - северный - на севере - к северу от;
 юг - южный - на юге - к югу от;
 запад - западный-на западе - к западу от;
 восток – восточный - на востоке - к востоку от.

4 Translate the sentences into Russian.

1. Горы находятся *на западе* и *севере* страны.
2. Низменности *на юге* и *востоке*.
3. *Западное* побережье Великобритании омывается Атлантическим океаном и Северным морем.
4. Ла-Манш отделяет *юго-восточную* часть Великобритании от Франции.

5 Reading and speaking. Read the text, find information about the geographical position and climate of Great Britain. Say whether it is true (T) or false (F).

1. The official name of Great Britain is the United Kingdom of Great Britain and Northern Ireland.
2. The UK consists of three parts – England, Scotland, and Wales.
3. Great Britain officially includes England, Scotland and Wales and Northern Ireland.
4. The English Channel separates the south-east of Great Britain from France.
5. The climate in Great Britain is generally hot and dry due to the influence of the Strait of Dover.
6. The English say that they have three variants of weather. It is very changeable.

GREAT BRITAIN

The official name of the country we usually call England is the United Kingdom of Great Britain and Northern Ireland. The U K is situated on the group of islands lying to the west of the continent of Europe. The UK consists of England, Scotland, Wales and Northern Ireland The total land area of the United Kingdom is 244,000 square kilometres. The population of the country according to the 2011 census is about 63,182,000. The mountains are in the west and the north of the country. There are lowlands in the south and the east. Great Britain officially includes England, Scotland and Wales.

The western coast of Great Britain is washed by the Atlantic Ocean and the Irish Sea. The eastern coast is washed by the waters of the North Sea. The English Channel, which is 32 kilometres wide, separates the south-east of Great Britain from France the narrower part of which is called the Strait of Dover. So Great Britain is surrounded by water. Not far from the British Isles there is warm Gulf Stream. So, the climate in Great Britain is generally mild, humid and temperate due to the influence of the Gulf Stream. This humid and mild climate is good for plants. The trees and flowers begin to blossom early in spring. In January average temperature is from 3 to 7 degrees below zero and in July it is from 16-17 degrees above zero.

British people say: "Other countries have a climate, in England we have weather." The weather in Britain changes very quickly. One day may be fine and the next day may be wet. The morning may be warm and the evening may be cool. The English also say that they have three variants of weather: when it rains in the morning, when it rains in the afternoon or when it rains all day long. Every daily paper publishes a weather forecast. Both the radio and television give the weather forecast several times each day.

There are many rivers in Great Britain but they are not long. The longest of them is the Thames, which is a little over 200 miles. Britain's principal ports are London, Liverpool, Manchester, Hull, Glasgow.

The capital city of England is London. The capital city of Scotland is Edinburgh. The capital city of Wales is Cardiff. Belfast is the capital of Northern Ireland.

The national emblem of England is a red rose. The national emblem of Scotland is a thistle. The national emblem of Wales is a daffodil. The national emblem of Northern Ireland is a shamrock.

Great Britain is not rich in mineral resources, except coal, mined mostly in Wales. But it is a highly developed country.

The UK is the parliamentary monarchy. Legislative power belongs to her Majesty Queen Elizabeth II, and the Parliament, which consists of the House of Commons and the House of Lords. Officially the Head of the State is the Queen.

6 Speaking and discussion.

1. What place in Britain would you like to visit most of all and why?
2. Would you like to live in Britain? Why/why not?

7 Put the verbs in the Present Simple form.

1. One fly _____ (to fly) , two flies _____ (to fly).
2. One girl _____ (to cry), four girls _____ (to cry).
3. When a wolf _____ (to see) the moon, it _____ (to begin) to howl.
4. Wolves and sheep _____ (to be) never friends.
5. Our hens _____ (to lay) a lot of eggs.
6. Boys _____ (to fight) and _____ (to shout).
7. That boy _____ (to try) to catch some balls.
8. These girls _____ (to try) to run away from an angry turkey.

8. Yan is at a summer camp in Poland. Write what he usually does in the camp. Put the verbs in bracket in the correct form.

1. He _____ (get) up at 7.
2. He _____ (have) his English lesson every day.
3. He _____ (speak) English to his friends.
4. He _____ (play) board games in the afternoon.
5. Sometimes he _____ (swim) in the lake.
6. He often _____ (go) hiking.
7. He sometimes _____ (sit) by the camp fire in the evenings.
8. He never _____ (go) on a trip without his friends.

9. Put the verbs in the Present Simple form.

go, like, love, watch, read, like, walk, come, do, watch

My name's Pavel. In the evening I usually (1) _____ my homework. Then I (2) _____ TV or video. I (3) _____ action films! They are super! Then I (4) _____ my dog. After that I (5) _____ home, (6) _____ a book and (7) _____ to bed. My sister is little. She

doesn't (8) _____ action films. She (9) _____ cartoons. She (10) _____ them every day.

10. Look at the chart and write about Ellie.

	sports programmes	comedies	action films	the news
Often		✓	✓	
Sometimes	✓			
Rarely	✓			
Never				✓

Ellie often watches comedies.

_____.

Вариант II

1 Answer the questions.

1. What do you know about London?
2. Have you ever been to London? Would you like to visit it?
3. What famous London sights do you know?

2 Read and translate the text.

LONDON

London is the capital of the United Kingdom, its economic, political and cultural centre. It is one of the world's most important ports and one of the largest cities in the world. London with its suburbs has a population about 11 million people.

It is situated on the river Thames about forty miles from the mouth and is divided into two parts by the river: north and south.

The history of London goes back to Roman times. It has been a capital for nearly a thousand years. Due to favourable geographical position a small town soon became an important trade centre.

Actually London can be divided into several parts. First there is the City of London. It's the financial and business centre of Great Britain. It's the district where most offices and banks are concentrated: the Royal Exchange and the Bank of England are here, too. The East End is the district where mostly working people live. A lot of docks, factories, poor houses are concentrated here. The old port is now called "Docklands".

The West End makes a great contrast to the working district of London. It is full of richest hotels, largest supermarkets, best cinemas and concert halls. It is famous for its beautiful parks and gardens such as Hyde Park or Kensington Gardens. Many ancient buildings still stand here.

Another important district of London is Westminster where most of government buildings are located. Westminster Palace is the seat of the British Parliament where the county's leaders speak. The Houses of Parliament stand beside the river Thames. On the highest tower there is the most famous and largest clock of the country - Big Ben.

Standing not far from the Houses of Parliament, Westminster Abbey is a symbol of England. The legend says that Westminster Abbey was founded by St Peter himself but we know it was built by King Edward in 1065. The coronation of all British Kings and Queens takes place in Westminster Abbey. It is also famous for its Poet's Corner where many outstanding people - statesmen, painters, and poets were buried there. Among them Tennyson and Geoffrey Chaucer, the first English national poet, world famous scientists Isaac Newton Charles Darwin, etc.

Every year millions of tourists come to London to visit the places of interests. They make sightseeing tours of the city, visit the Trafalgar Square, the British Museum, the National Gallery,

Madame Tussaud's Museum of waxworks, etc. They also visit the most ancient historic monuments dating back to Roman times such as the Tower of London which had been a fortress, a prison and a royal palace. At present it is one of the most interesting museums of GB. Now the King and the Queen of Britain do not live in the Tower. When the Queen is in London, she stays in Buckingham Palace, her official residence.

3 Reading and speaking. Find information about the parts of London. Say are these sentences true or false (T/F)?

1. London consists of several parts: the City, the West End, the East End, Westminster.
2. The West End is an industrial district of London. It's the district where most offices and banks are concentrated.
3. The East End is populated by working class families. It is full of richest hotels, largest supermarkets, best cinemas and concert halls.
4. The City is a financial center of London.
5. The West End is famous for its beautiful parks and gardens such as Hyde Park or Kensington Gardens.
6. Westminster is a district of London where most of government buildings are located.

3. Make notes about London.

facts about the city	places to visit and things to do

What do you like about London? Would you like to visit it?

4. Write the Past Simple of the following words:

open - opened	regret -	cry -	stay -
love -	quarrel -	fry -	travel -
plan -	drop -	arrive -	close -
empty -	die -	play -	tidy -

5. Look at the list of irregular verbs at the back of the book and complete the table:

Infinitive	Past	Infinitive	Past
go	.....	.....	broke
have	.....	.....	cut
.....	came	take	.....
be	.....	.....	stole
wake	.....	drink	.....
meet	.....	.....	put
.....	sang	make	.....
speak	.....	.....	run
.....	told	begin	.....

6. Underline the verbs in Past Simple.

In the summer I visited my grandparents. We went to the forest, swam in the river, went fishing, read books, went to the cinema, and watched TV all the time. I visited my friends, played football, listened to music, worked in the fields, went boating, and had a good time. I picked berries and mushrooms. I lay on the sand.

7. Put the verbs in Past Simple.

be (2), feed, take, start, visit, listen

The children went to London. The Tour _____ at Hyde Park in the morning. The children _____ the ducks and squirrels there. Then they _____ photos of Trafalgar Square. The next stop _____ the British Museum. They also _____ the Tower of London. The children _____ to the famous bell Big Ben. In the evening they _____ very tired.

2 КУРС 4 СЕМЕСТР

ВВЕДЕНИЕ В СПЕЦИАЛЬНОСТЬ. ЧТО ТАКОЕ АДДИТИВНЫЕ ТЕХНОЛОГИИ?

Практическое занятие № 1.

Тема: Что такое аддитивные технологии? Present Continuous.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Прочитать и перевести текст, составить словарь к тексту. Упр. 2-5.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

WHAT IS ADDITIVE MANUFACTURING?

The manufacturing process used in engineering industries basically performs to change the physical properties of the job and change the physical parameters of the job by producing the desired accuracy and surface. Based on the nature of work involved these processes are divided as casting processes, forming processes, joining processes, machining processes and surface finishing processes. Depending upon the flexibility of machining the job, the manufacturing methods can be classified as

- Additive manufacturing
- Subtractive manufacturing

Additive manufacturing (AM) is a process that involves production of parts using computer-aided design files (CAD) through successive additions of layers. There are different ways that the additive manufacturing process is carried out, and an increasingly popular method is 3D printing. Another method includes melting successive layers of materials to create a product. The main benefit of additive manufacturing is that it can create geometrically complex shapes without wasting excess material. Another benefit of the process is that it does not require many tools and is a very cost effective process of manufacturing.

This type of manufacturing is energy efficient as well as environmentally friendly. The materials that are used, especially in 3D printing, end up creating lightweight designs of certain end products. Using

additive manufacturing, there is a reduction in physical tools and increased emphasis on spatial design programs that allow engineers more freedom in ideas to design and create certain products without the restraints of traditional machining. There is also the benefit of a reduction in separate parts of a whole product. The technique can even go as far as personalizing certain items for individuals, such as medical devices or clothing.

In additive manufacturing, a computer program is used to create a 3D model of an item, and then separate the image into thin layers. The models can be based on previous items or products that were actually physically sliced to examine the inner workings and fine details. This process allows the computer program to replicate those details and even manipulate them for improvement. By manipulating the details, this additive manufacturing technique allows for the creation of smoothly running items, synchronized parts, and better functioning. Its cost effectiveness also makes this kind of manufacturing beneficial for creating prototypes of certain items.

One of the most famous examples of a 3D printing product is a lightweight, hybrid car made in the United States in 2010 with the collaboration of several manufacturing and engineering groups. The body of the small car, as well as the glass and panels that are part of it, were all created using additive manufacturing. Fused deposition modeling (FDM) was used as its printing method by the company that produced it. Its lightweight design makes the car efficient in gas use. As an example of how fuel efficient the tiny car is, it only costs two cents for every mile traveled.

Subtractive manufacturing technique defined as the process of removing the material in small amounts from a solid material by involving various machining processes like drilling, milling, turning, cutting, etc. Subtractive manufacturing technologies are generally performed on selected machines where the excess material is removed from the raw material in small amounts, thus obtaining the final finished object. Subtractive manufacturing technologies are done on machines which are operated manually (drilling, milling, etc) and some are of the computer controlled (CNC machines).

2. Ответьте на вопросы:

1. What is additive manufacturing? What are its benefits?
2. What is subtractive manufacturing and what is its main principle?

3. Образуй форму Present Continuous.

speak.....	ran
jump	cut.....
buy.....	put
eat.....	drink.....
walk.....	work.....
stand.....	try
drive.....	go
study.....	read
write	have
shine.....	sit.....

4. Составьте предложения, используя таблицу. Ответьте на вопросы, выбрав нужную форму глагола (am/is/are).

Образец: *What is the dog doing? –The dog is sleeping in the park.*

Mr Connor	are helping	the door
David and Sandra	is buying	with a ball
Robert	are walking	by the door
The dog	are swimming	a newspaper
Mr King	is painting	her mother
They	are having	some sweets
Kevin	are playing	a new film
The children	is watching	dinner
Mr and Mrs Hill	is reading	in the park
people	is sleeping	in the lake

1. What is Mr Connor doing?
2. What.....David and Sandra doing?
3. What..... Robert doing?
4. What.....the dog doing?
5. What.....Mr King doing?
6. What.....they doing?
7. What.....Kevin doing?
8. What.....the children doing?
9. What.....Mr and Mr Hill doing?
10. What.....people doing?

5. Сделайте предложения вопросительными и отрицательными.

1. He is walking to school.
2. Jack is doing homework now.
3. The sun is shining brightly.
4. The horses are running in the field.
5. A mouse is sitting under the floor.

Практическое занятие № 2.

Тема: Что такое аддитивные технологии? Present Continuous.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы к тексту. Упр. 1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту, ответьте на вопросы.

WHAT IS ADDITIVE MANUFACTURING?

The manufacturing process used in engineering industries basically performs to change the physical properties of the job and change the physical parameters of the job by producing the desired accuracy and surface. Based on the nature of work involved these processes are divided as casting processes, forming processes, joining processes, machining processes and surface finishing processes. Depending upon the flexibility of machining the job, the manufacturing methods can be classified as

- Additive manufacturing
- Subtractive manufacturing

Additive manufacturing (AM) is a process that involves production of parts using computer-aided design files (CAD) through successive additions of layers. There are different ways that the additive manufacturing process is carried out, and an increasingly popular method is 3D printing. Another method includes melting successive layers of materials to create a product. The main benefit of additive manufacturing is that it can create geometrically complex shapes without wasting excess material. Another benefit of the process is that it does not require many tools and is a very cost effective process of manufacturing.

This type of manufacturing is energy efficient as well as environmentally friendly. The materials that are used, especially in 3D printing, end up creating lightweight designs of certain end products. Using additive manufacturing, there is a reduction in physical tools and increased emphasis on spatial design programs that allow engineers more freedom in ideas to design and create certain products without the restraints of traditional machining. There is also the benefit of a reduction in separate parts of a whole product. The technique can even go as far as personalizing certain items for individuals, such as medical devices or clothing.

In additive manufacturing, a computer program is used to create a 3D model of an item, and then separate the image into thin layers. The models can be based on previous items or products that were

actually physically sliced to examine the inner workings and fine details. This process allows the computer program to replicate those details and even manipulate them for improvement. By manipulating the details, this additive manufacturing technique allows for the creation of smoothly running items, synchronized parts, and better functioning. Its cost effectiveness also makes this kind of manufacturing beneficial for creating prototypes of certain items.

One of the most famous examples of a 3D printing product is a lightweight, hybrid car made in the United States in 2010 with the collaboration of several manufacturing and engineering groups. The body of the small car, as well as the glass and panels that are part of it, were all created using additive manufacturing. Fused deposition modeling (FDM) was used as its printing method by the company that produced it. Its lightweight design makes the car efficient in gas use. As an example of how fuel efficient the tiny car is, it only costs two cents for every mile traveled.

Subtractive manufacturing technique defined as the process of removing the material in small amounts from a solid material by involving various machining processes like drilling, milling, turning, cutting, etc. Subtractive manufacturing technologies are generally performed on selected machines where the excess material is removed from the raw material in small amounts, thus obtaining the final finished object. Subtractive manufacturing technologies are done on machines which are operated manually (drilling, milling, etc) and some are of the computer controlled (CNC machines).

2. Ответьте на вопросы:

1. What is additive manufacturing? What are its benefits?
2. What is subtractive manufacturing and what is its main principle?

3. Write the words in the ing-form form.

Feed, walk, wash, play, do

1. Can I speak to Brad, please? I'm sorry, he's _____ his pet now.
2. Can I speak to Paul, please? I'm sorry, he's _____ his homework now.
3. What about Kelly? No, sorry, she's _____ her pet in the park now.
4. Can I speak to Jenny then? Sorry, she's _____ the dishes now.
5. Can I speak to Alice or Alex, please? I'm sorry, they're _____ tennis now.

4. Make up negative sentences in Present Progressive.

- the sofa / Sam / is / on / not / sitting.
- Are / playing / not / the cats.
- cooking / Mother / not / my / is
- Reading / friends / her / are / not

Практическое занятие № 3.

Тема: Что такое аддитивные технологии? Present Continuous.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста. Упр. 1-3.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

WHAT IS ADDITIVE MANUFACTURING?

The manufacturing process used in engineering industries basically performs to change the physical properties of the job and change the physical parameters of the job by producing the desired accuracy and surface. Based on the nature of work involved these processes are divided as casting processes, forming

processes, joining processes, machining processes and surface finishing processes. Depending upon the flexibility of machining the job, the manufacturing methods can be classified as

- Additive manufacturing
- Subtractive manufacturing

Additive manufacturing (AM) is a process that involves production of parts using computer-aided design files (CAD) through successive additions of layers. There are different ways that the additive manufacturing process is carried out, and an increasingly popular method is 3D printing. Another method includes melting successive layers of materials to create a product. The main benefit of additive manufacturing is that it can create geometrically complex shapes without wasting excess material. Another benefit of the process is that it does not require many tools and is a very cost effective process of manufacturing.

This type of manufacturing is energy efficient as well as environmentally friendly. The materials that are used, especially in 3D printing, end up creating lightweight designs of certain end products. Using additive manufacturing, there is a reduction in physical tools and increased emphasis on spatial design programs that allow engineers more freedom in ideas to design and create certain products without the restraints of traditional machining. There is also the benefit of a reduction in separate parts of a whole product. The technique can even go as far as personalizing certain items for individuals, such as medical devices or clothing.

In additive manufacturing, a computer program is used to create a 3D model of an item, and then separate the image into thin layers. The models can be based on previous items or products that were actually physically sliced to examine the inner workings and fine details. This process allows the computer program to replicate those details and even manipulate them for improvement. By manipulating the details, this additive manufacturing technique allows for the creation of smoothly running items, synchronized parts, and better functioning. Its cost effectiveness also makes this kind of manufacturing beneficial for creating prototypes of certain items.

One of the most famous examples of a 3D printing product is a lightweight, hybrid car made in the United States in 2010 with the collaboration of several manufacturing and engineering groups. The body of the small car, as well as the glass and panels that are part of it, were all created using additive manufacturing. Fused deposition modeling (FDM) was used as its printing method by the company that produced it. Its lightweight design makes the car efficient in gas use. As an example of how fuel efficient the tiny car is, it only costs two cents for every mile traveled.

Subtractive manufacturing technique defined as the process of removing the material in small amounts from a solid material by involving various machining processes like drilling, milling, turning, cutting, etc. Subtractive manufacturing technologies are generally performed on selected machines where the excess material is removed from the raw material in small amounts, thus obtaining the final finished object. Subtractive manufacturing technologies are done on machines which are operated manually (drilling, milling, etc) and some are of the computer controlled (CNC machines).

2. Ответьте на вопросы:

1. What is additive manufacturing? What are its benefits?
2. What is subtractive manufacturing and what is its main principle?

3. Make up questions.

- now / Tom / coffee / is / drinking?
- playing / Now / the / boys / are?
- the / skipping / girl / now / is?
- the / eating / fish / cats / are?

Практическое занятие № 4.

Тема: История развитие аддитивных технологий. Present Continuous/Present Simple в сравнении.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Прочитать, перевести текст. Упр.1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

DEVELOPMENT OF ADDITIVE MANUFACTURING TECHNOLOGY

Rapid prototyping (RP) has its roots in the developments of the computer industry as well as other technological inventions. The decreasing costs of computers resulted in an increase of its applications even as personal computers. Spread of computers have caused new computer related fields such as computer-aided design (CAD), computer aided manufacturing (CAM) and computer numerical control machines.

In early 1980s Chuck Hull patented the first rapid prototyping system, stereolithography apparatus, and this patent gave rise to the one of the leaders of the industry today, 3D Systems. Although there were more than one patent on the concept of fabricating a 3D object by adding material layer by layer during that period, Hull's patent was generally recognized due to the commercialization of the technology. Although these commercialized technologies started in USA, many developers of rapid prototyping and manufacturing technologies exist throughout the world. Europe, Japan, Korea, China and Israel are among them.

Chuck Hull is the father of 3D printing

Chuck Hull is the co-founder, executive vice president and chief technology officer of 3D Systems. He is the inventor of the solid imaging process known as stereolithograph (3D Printing), the first commercial rapid prototyping technology, and the STL file format. He is named on more than 60 U.S. patents as well as other patents around the world in the fields of ion optics and rapid prototyping. He was inducted into the National Inventors Hall of Fame in 2014.

Hull first came up with the idea in 1983 when he was using UV light to harden tabletop coatings. But on July 16, 1984 Alain Le Méhauté, Olivier de Witte and Jean Claude André filed their patent for the stereolithography process. It was three weeks before Chuck Hull filed his own patent for stereolithography.

The application of French inventors were abandoned by the French General Electric Company and CILAS (The Laser Consortium). Hull coined the term "stereolithography" in his U.S. Patent 4,575,330, entitled "Apparatus for Production of Three-Dimensional Objects by Stereolithography" issued on March 11, 1986. He defined stereolithography as a method and apparatus for making solid objects by successively "printing" thin layers of the ultraviolet curable material one on top of the other.

In Hull's patent, a concentrated beam of ultraviolet light is focused onto the surface of a vat filled with liquid photopolymer. The light beam, moving under computer control, draws each layer of the object onto the surface of the liquid. Wherever the beam strikes the surface, the photopolymer polymerizes/crosslinks and changes to a solid. An advanced CAD/CAM/CAE software mathematically slices the computer model of the object into a large number of thin layers. The process then builds the object layer by layer starting with the bottom layer, on an elevator that is lowered slightly after solidification of each layer.

Additive manufacturing offers industry a range of unique possibilities. The technology makes it possible, for example, to produce viable three-dimensional objects of virtually any complex geometry without significantly increasing the cost of the parts.

However, additive manufacturing is not yet suitable for mass production. Inherent limitations in the processes include lengthy build time: for example, additive manufacturing processes are capable of creating a 1.5 inch cube per hour, on average, while an injection molding machine can produce several similar parts in under a minute. Current additive manufacturing technologies are unlikely to be able to create parts as quickly as molding technologies. Other limitations include the size of the objects that can be made, and the cost and size of the machines and materials used.

2. Ответьте на вопросы:

1. Who is Chuck Hull? What did he invent?
2. What possibilities does additive manufacturing offer industry?
3. How did he define stereolithography?

3. Выберите из скобок глагол в правильной форме. Переведите предложения.

1. He ... (works/is working) for a big insurance company.
2. Water always ... (boils/is boiling) at 100 degrees.
3. I ... (wait/am waiting) for my doctor at the moment.
4. Bob, stop! You ... (eat/are eating) too fast.
5. She ... (has/is having) four brothers.
6. Switch off the radio, please. You ... (don't listen/aren't listening) to it.
7. I know my bad habit: I often ... (talk/am talking) too loudly.
8. Look at the picture. An elegant lady ... (rides/is riding) a horse.
9. Give me some salt, please. I ... (make/am making) seafood salad.
10. Mary never ... (speaks/is speaking) to strange people.

4. Используйте глагол в скобках в одном предложении дважды: в Present Simple и в Present Continuous.

Пример: Tom usually ... in the office but today he ... at the exhibition. (work) – Tom usually works in the office but today he is working at the exhibition. (Обычно Том работает в офисе, но сегодня он работает на выставке.)

1. I always ... orange juice but now I ... peach juice. (drink)
2. She ... a shower at the moment, though she usually ... it in the morning. (take)
3. Mum often ... cherry-pies but this evening she ... an apple-pie. (bake)
4. As a rule we ... to football matches but this Sunday we... to a hockey match. (go)
5. Marta usually ... jeans but today she ... a dress. (wear)
- 6.

Практическое занятие № 5.

Тема: История развитие аддитивных технологий. Present Continuous/Present Simple в сравнении.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы к тексту. Упр.1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

DEVELOPMENT OF ADDITIVE MANUFACTURING TECHNOLOGY

Rapid prototyping (RP) has its roots in the developments of the computer industry as well as other technological inventions. The decreasing costs of computers resulted in an increase of its applications even as personal computers. Spread of computers have caused new computer related fields such as computer-aided design (CAD), computer aided manufacturing (CAM) and computer numerical control machines.

In early 1980s Chuck Hull patented the first rapid prototyping system, stereolithography apparatus, and this patent gave rise to the one of the leaders of the industry today, 3D Systems. Although there were more than one patent on the concept of fabricating a 3D object by adding material layer by layer during that period, Hull's patent was generally recognized due to the commercialization of the technology. Although these commercialized technologies started in USA, many developers of rapid prototyping and manufacturing technologies exist throughout the world. Europe, Japan, Korea, China and Israel are among them.

Chuck Hull is the father of 3D printing

Chuck Hull is the co-founder, executive vice president and chief technology officer of 3D Systems. He is the inventor of the solid imaging process known as stereolithograph (3D Printing), the first commercial rapid prototyping technology, and the STL file format. He is named on more than 60 U.S.

patents as well as other patents around the world in the fields of ion optics and rapid prototyping. He was inducted into the National Inventors Hall of Fame in 2014.

Hull first came up with the idea in 1983 when he was using UV light to harden tabletop coatings. But on July 16, 1984 Alain Le Méhauté, Olivier de Witte and Jean Claude André filed their patent for the stereolithography process. It was three weeks before Chuck Hull filed his own patent for stereolithography.

The application of French inventors were abandoned by the French General Electric Company and CILAS (The Laser Consortium). Hull coined the term “stereolithography” in his U.S. Patent 4,575,330, entitled “Apparatus for Production of Three-Dimensional Objects by Stereolithography” issued on March 11, 1986. He defined stereolithography as a method and apparatus for making solid objects by successively “printing” thin layers of the ultraviolet curable material one on top of the other.

In Hull’s patent, a concentrated beam of ultraviolet light is focused onto the surface of a vat filled with liquid photopolymer. The light beam, moving under computer control, draws each layer of the object onto the surface of the liquid. Wherever the beam strikes the surface, the photopolymer polymerizes/crosslinks and changes to a solid. An advanced CAD/CAM/CAE software mathematically slices the computer model of the object into a large number of thin layers. The process then builds the object layer by layer starting with the bottom layer, on an elevator that is lowered slightly after solidification of each layer.

Additive manufacturing offers industry a range of unique possibilities. The technology makes it possible, for example, to produce viable three-dimensional objects of virtually any complex geometry without significantly increasing the cost of the parts.

However, additive manufacturing is not yet suitable for mass production. Inherent limitations in the processes include lengthy build time: for example, additive manufacturing processes are capable of creating a 1.5 inch cube per hour, on average, while an injection molding machine can produce several similar parts in under a minute. Current additive manufacturing technologies are unlikely to be able to create parts as quickly as molding technologies. Other limitations include the size of the objects that can be made, and the cost and size of the machines and materials used.

2. Ответьте на вопросы:

1. Who is Chuck Hull? What did he invent?
2. What possibilities does additive manufacturing offer industry?
3. How did he define stereolithography?

3. Выберите подходящий по смыслу глагол и поставьте его в предложение в форме Present Simple или Present Continuous.

to stay - to eat – to play – to wash - to cry - to wait – to watch – to wear - to start – to ride

1. Every Thursday they ... fish.
2. Hurry up! The kids ... for you.
3. Ron is in Italy now. He ... at a 5-star hotel.
4. Normally Mike ... work at 9 a.m.
5. They ... billiards at weekends.
6. She ... a bike right now.
7. Little Nick is a quiet boy. He never
8. Dad ... TV news regularly.
9. My sister ... the floor in the kitchen at the moment.
10. My wife ... contact lenses every day.

4. Переведите на английский язык.

1. Мои родители живут в Австралии.
2. Ты любишь орехи?
3. Ты постоянно занимаешь деньги!
4. Я пользуюсь мобильным телефоном каждый день.

5. Сегодня мы наряжаем новогоднюю елку.
6. У Карла нет братьев.
7. Почему ты смеешься?
8. Джон говорит на трех языках.
9. Сейчас не идет дождь.
10. Мы не помним его адрес.

Практическое занятие № 6.

Тема: История развитие аддитивных технологий. Present Continuous/Present Simple в сравнении.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста/презентацию. Упр.1-6.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту, ответьте на вопросы.

DEVELOPMENT OF ADDITIVE MANUFACTURING TECHNOLOGY

Rapid prototyping (RP) has its roots in the developments of the computer industry as well as other technological inventions. The decreasing costs of computers resulted in an increase of its applications even as personal computers. Spread of computers have caused new computer related fields such as computer-aided design (CAD), computer aided manufacturing (CAM) and computer numerical control machines.

In early 1980s Chuck Hull patented the first rapid prototyping system, stereolithography apparatus, and this patent gave rise to the one of the leaders of the industry today, 3D Systems. Although there were more than one patent on the concept of fabricating a 3D object by adding material layer by layer during that period, Hull's patent was generally recognized due to the commercialization of the technology. Although these commercialized technologies started in USA, many developers of rapid prototyping and manufacturing technologies exist throughout the world. Europe, Japan, Korea, China and Israel are among them.

Chuck Hull is the father of 3D printing

Chuck Hull is the co-founder, executive vice president and chief technology officer of 3D Systems. He is the inventor of the solid imaging process known as stereolithograph (3D Printing), the first commercial rapid prototyping technology, and the STL file format. He is named on more than 60 U.S. patents as well as other patents around the world in the fields of ion optics and rapid prototyping. He was inducted into the National Inventors Hall of Fame in 2014.

Hull first came up with the idea in 1983 when he was using UV light to harden tabletop coatings. But on July 16, 1984 Alain Le Méhauté, Olivier de Witte and Jean Claude André filed their patent for the stereolithography process. It was three weeks before Chuck Hull filed his own patent for stereolithography.

The application of French inventors were abandoned by the French General Electric Company and CILAS (The Laser Consortium). Hull coined the term "stereolithography" in his U.S. Patent 4,575,330, entitled "Apparatus for Production of Three-Dimensional Objects by Stereolithography" issued on March 11, 1986. He defined stereolithography as a method and apparatus for making solid objects by successively "printing" thin layers of the ultraviolet curable material one on top of the other.

In Hull's patent, a concentrated beam of ultraviolet light is focused onto the surface of a vat filled with liquid photopolymer. The light beam, moving under computer control, draws each layer of the object onto the surface of the liquid. Wherever the beam strikes the surface, the photopolymer polymerizes/crosslinks and changes to a solid. An advanced CAD/CAM/CAE software mathematically slices the computer model of the object into a large number of thin layers. The process then builds the

object layer by layer starting with the bottom layer, on an elevator that is lowered slightly after solidification of each layer.

Additive manufacturing offers industry a range of unique possibilities. The technology makes it possible, for example, to produce viable three-dimensional objects of virtually any complex geometry without significantly increasing the cost of the parts.

However, additive manufacturing is not yet suitable for mass production. Inherent limitations in the processes include lengthy build time: for example, additive manufacturing processes are capable of creating a 1.5 inch cube per hour, on average, while an injection molding machine can produce several similar parts in under a minute. Current additive manufacturing technologies are unlikely to be able to create parts as quickly as molding technologies. Other limitations include the size of the objects that can be made, and the cost and size of the machines and materials used.

2. Ответьте на вопросы:

1. Who is Chuck Hull? What did he invent?
2. What possibilities does additive manufacturing offer industry?
3. How did he define stereolithography?

3. Put am/is/are or do/don't/does/doesn't. Вставьте am/is/are или do/don't/does/doesn't.

1. I ... working under my project.
2. Excuse me, ... you speak English?
3. He ... not washing his car, he's reading a newspaper.
4. Can you repeat this rule? I ... understand.
5. She ... work. She is ill.
6. How much it cost to go to the theatre?
7. They ... painting the picture in the garden.

4. Put the verbs in brackets into the present continuous or present simple.

1. Excuse me, ... you ... (know) where the post office is?
2. I ... (want) to eat a sandwich.
3. ... you ... (go) to travel abroad next year?
4. Where's Bob? He ... (listen) to music in his room.
5. How often ... you (go) for a walk in the park?
6. My father ... (read) magazines very often.
7. What time ... your mother ... (finish) her job in the evening?
8. She ... (go) to the gym twice a week.
9. Liza ... usually ... (drive) to work. He usually catches the bus.
10. They ... (do) their homework in the room.

5. Put the words in the correct order and the verbs in the correct form.

1. Claire / work / the bank / into.
2. Tina / properly / her car / park / never / can.
3. The children / help / the housework / always / with.
4. Liza / porridge / for / sometimes / breakfast / have.
5. have / the piano lesson / I / at the moment.
6. He / this evening / come / us / with / not.
7. Mr. Smith / to / not / fly / New York / tomorrow.

6. Correct the mistakes.

1. Liza goes shopping tomorrow.
2. Bob brush his teeth twice a day.
3. I am learning English every day.
4. Peter looks for a new flat these days.
5. She eats an apple at the moment.

6. Do you cook dinner often?
7. She doesn't writes letters very often.

Практическое занятие № 7.

Тема: Преимущества использования аддитивных технологий. Past Continuous.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Упр.1-4

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

THE BENEFITS OF ADDITIVE MANUFACTURING

Since its inception in the 1980s, additive manufacturing has greatly transformed the world of manufacturing. AM has the potential to vastly accelerate innovation, compress supply chains, minimize materials and energy usage, and reduce waste. Let's list some benefits of AM technology:

- **Lower energy consumption.** AM saves energy by eliminating production steps, using less material, enabling reuse of by-products, and producing lighter products.
- **Less waste.** Building objects up layer by layer, instead of traditional machining processes that cut away material can reduce material needs and costs by up to 90%. Additionally, AM reduces waste by lowering human error in production.
- **Reduced time to market.** Items can be fabricated as soon as the 3-D digital description of the part has been created, eliminating the need for expensive and time-consuming part tooling and prototype fabrication.
- **Innovation.** AM enables designs with novel geometries that would be difficult or impossible to achieve using CM processes, which can improve a component's engineering performance.
- **Part consolidation.** The ability to design products with fewer, more complex parts, rather than a large number of simpler parts – is the most important of these benefits. Reducing the number of parts in an assembly immediately cuts the overhead associated with documentation and production planning and control. Also, fewer parts mean less time and labor is required for assembling the product, again contributing to a reduction in overall manufacturing costs.
- **Greener manufacturing.** Additive manufacturing also has environmental benefits. To begin with, whereas additive manufacturing depends on electricity, a fairly small amount is needed for the production of parts. Likewise, there's little waste in light of the fact that only the necessary material are utilized and the plastics can be recycled. Moreover, in the case of 3D faxing, there's considerably less trucking of parts. This technology also plays an integral role in the light-weighting of aircraft and vehicles, which is essential for reducing dangerous fuel emissions.

Actually, parts made using additive manufacturing technology allow manufacturing engineers to create solid components with a semi-hollow honeycomb interior. The components have as much strength to weight ratio as solid parts, but they are up to 65% lighter when compared to conventional, subtractive manufacturing techniques, which significantly affects the final product's fuel costs.

- **Avoiding mass production.** For many years, additive manufacturing has been used to instantly generate prototypes, without the need to frequently order factory-built models. Today, additive manufacturing technology is so advanced that it can be used to make finished products. This way, you don't have to mass-produce a product, which makes it a cost-efficient venture.

Why additive manufacturing?

Additive manufacturing technology has new opportunities for the economy and society which facilitate the production of strong light-weight products for the aerospace industry and it allows designs that were not possible with previous manufacturing techniques.

Additive manufacturing technology is majorly preferable because it is the manufacturing process which does not involve the use of moulds or extra tooling agents to create different products. Whereas with the utilisation of typical traditional manufacturing techniques, such as casting or moulding, to create a new product, the manufacturers has to create a mould with the template of the product first. So additive manufacturing does not require different moulds for different products with which the manufacturers find a unique capability to utilize varying designs on the same additive manufacturing machine by designing them in the selected CAD software's. With effect to this the additive manufacturing technologies could change the paradigm for manufacturing, moving away from mass production in factories and high costs.

2. Ответьте на вопросы:

1. What are benefits of additive manufacturing?
2. Why is it preferable?

3. Раскройте скобки, поставив глаголы в форму Past Continuous.

1. While I _____ (to copy) the exercise, my friends _____ (to describe) a picture.
2. When we came in, the children _____ (to clean) their desks.
3. We met her at the bus stop. She _____ (to wait) for the bus.
4. Some of the children _____ (to ski) while other children _____ (to skate). Everybody _____ (to have) a lot of fun.
5. When we came the family _____ (to get) everything ready for Christmas. Bob and Helen _____ (to decorate) the Christmas tree.
6. The girls _____ (to feed) the birds in the garden while the boys _____ (to make) a bird-house.

4. Прочитайте текст, переведите. Подчеркните глаголы в форме Past Continuous. Ответьте на вопрос:

Who broke the window ?

At 7 o'clock the match started on TV, so Dad was still watching it at 7.30. Mum was sitting in the kitchen. She was quietly reading a woman's magazine. Rosie was trying on her Mum's clothes in her room. Nick's cousins were listening to rock music. It was very loud so they didn't hear the crash. At 7.30 the dogs were lying in front of the fire and they were sleeping. Nick went into the garden with his friend to play football. So at 7.30 he was still there.

Практическое занятие № 8.

Тема: Преимущества использования аддитивных технологий. Past Continuous.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста/презентацию. Упр 1-4

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

THE BENEFITS OF ADDITIVE MANUFACTURING

Since its inception in the 1980s, additive manufacturing has greatly transformed the world of manufacturing. AM has the potential to vastly accelerate innovation, compress supply chains, minimize materials and energy usage, and reduce waste. Let's list some benefits of AM technology:

- **Lower energy consumption.** AM saves energy by eliminating production steps, using less material, enabling reuse of by-products, and producing lighter products.
- **Less waste.** Building objects up layer by layer, instead of traditional machining processes that cut away material can reduce material needs and costs by up to 90%. Additionally, AM reduces waste by lowering human error in production.
- **Reduced time to market.** Items can be fabricated as soon as the 3-D digital description of the part has been created, eliminating the need for expensive and time-consuming part tooling and prototype fabrication.
- **Innovation.** AM enables designs with novel geometries that would be difficult or impossible to achieve using CM processes, which can improve a component's engineering performance.
- **Part consolidation.** The ability to design products with fewer, more complex parts, rather than a large number of simpler parts – is the most important of these benefits. Reducing the number of parts in an assembly immediately cuts the overhead associated with documentation and production planning and control. Also, fewer parts mean less time and labor is required for assembling the product, again contributing to a reduction in overall manufacturing costs.
- **Greener manufacturing.** Additive manufacturing also has environmental benefits. To begin with, whereas additive manufacturing depends on electricity, a fairly small amount is needed for the production of parts. Likewise, there's little waste in light of the fact that only the necessary material are utilized and the plastics can be recycled. Moreover, in the case of 3D faxing, there's considerably less trucking of parts. This technology also plays an integral role in the light-weighting of aircraft and vehicles, which is essential for reducing dangerous fuel emissions.

Actually, parts made using additive manufacturing technology allow manufacturing engineers to create solid components with a semi-hollow honeycomb interior. The components have as much strength to weight ratio as solid parts, but they are up to 65% lighter when compared to conventional, subtractive manufacturing techniques, which significantly affects the final product's fuel costs.

- **Avoiding mass production.** For many years, additive manufacturing has been used to instantly generate prototypes, without the need to frequently order factory-built models. Today, additive manufacturing technology is so advanced that it can be used to make finished products. This way, you don't have to mass-produce a product, which makes it a cost-efficient venture.

Why additive manufacturing?

Additive manufacturing technology has new opportunities for the economy and society which facilitate the production of strong light-weight products for the aerospace industry and it allows designs that were not possible with previous manufacturing techniques.

Additive manufacturing technology is majorly preferable because it is the manufacturing process which does not involve the use of moulds or extra tooling agents to create different products. Whereas with the utilisation of typical traditional manufacturing techniques, such as casting or moulding, to create a new product, the manufacturer has to create a mould with the template of the product first. So additive manufacturing does not require different moulds for different products with which the manufacturers find a unique capability to utilize varying designs on the same additive manufacturing machine by designing them in the selected CAD software's. With effect to this the additive manufacturing technologies could change the paradigm for manufacturing, moving away from mass production in factories and high costs.

2. Ответьте на вопросы:

1. What are benefits of additive manufacturing?
2. Why is it preferable?

3. Допишите предложения по содержанию текста предыдущего упражнения, используя глаголы в Past Continuous.

1. When someone broke the window Dad _____
2. When Mum heard the crash she _____
3. The cousins didn't hear the noise because they _____
4. The dogs _____ when the noise woke them up. _____
5. At 7.30 Nick _____

4. Дайте краткие и полные ответы на вопросы в Past Continuous.

Were you going to the cinema at 7 o'clock?

—Yes, I was. I was going to the cinema.

— No, I wasn't. I wasn't going to the cinema.

1. Were you having dinner at 2 o'clock?
2. Was your friend sitting in the yard when you saw him?
3. Was your mother cooking when you came home?
4. Was your sister reading when you called her?
5. Were the children sitting at their desks when you entered the classroom?
6. Were the little children running along the corridor when the lesson began?
7. Were you doing your homework at 7 o'clock last night?
8. Was your father working in the garden when you asked him to dinner?

Практическое занятие № 9.

Тема: Преимущества использования аддитивных технологий. Past Continuous.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста/презентацию. Упр. 1-6

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

THE BENEFITS OF ADDITIVE MANUFACTURING

Since its inception in the 1980s, additive manufacturing has greatly transformed the world of manufacturing. AM has the potential to vastly accelerate innovation, compress supply chains, minimize materials and energy usage, and reduce waste. Let's list some benefits of AM technology:

- **Lower energy consumption.** AM saves energy by eliminating production steps, using less material, enabling reuse of by-products, and producing lighter products.
- **Less waste.** Building objects up layer by layer, instead of traditional machining processes that cut away material can reduce material needs and costs by up to 90%. Additionally, AM reduces waste by lowering human error in production.
- **Reduced time to market.** Items can be fabricated as soon as the 3-D digital description of the part has been created, eliminating the need for expensive and time-consuming part tooling and prototype fabrication.
- **Innovation.** AM enables designs with novel geometries that would be difficult or impossible to achieve using CM processes, which can improve a component's engineering performance.

• **Part consolidation.** The ability to design products with fewer, more complex parts, rather than a large number of simpler parts – is the most important of these benefits. Reducing the number of parts in an assembly immediately cuts the overhead associated with documentation and production planning and control. Also, fewer parts mean less time and labor is required for assembling the product, again contributing to a reduction in overall manufacturing costs.

• **Greener manufacturing.** Additive manufacturing also has environmental benefits. To begin with, whereas additive manufacturing depends on electricity, a fairly small amount is needed for the production of parts. Likewise, there's little waste in light of the fact that only the necessary material are utilized and the plastics can be recycled. Moreover, in the case of 3D faxing, there's considerably less trucking of parts. This technology also plays an integral role in the light-weighting of aircraft and vehicles, which is essential for reducing dangerous fuel emissions.

Actually, parts made using additive manufacturing technology allow manufacturing engineers to create solid components with a semi-hollow honeycomb interior. The components have as much strength to weight ratio as solid parts, but they are up to 65% lighter when compared to conventional, subtractive manufacturing techniques, which significantly affects the final product's fuel costs.

• **Avoiding mass production.** For many years, additive manufacturing has been used to instantly generate prototypes, without the need to frequently order factory-built models. Today, additive manufacturing technology is so advanced that it can be used to make finished products. This way, you don't have to mass-produce a product, which makes it a cost-efficient venture.

Why additive manufacturing?

Additive manufacturing technology has new opportunities for the economy and society which facilitate the production of strong light-weight products for the aerospace industry and it allows designs that were not possible with previous manufacturing techniques.

Additive manufacturing technology is majorly preferable because it is the manufacturing process which does not involve the use of moulds or extra tooling agents to create different products. Whereas with the utilisation of typical traditional manufacturing techniques, such as casting or moulding, to create a new product, the manufacturers has to create a mould with the template of the product first. So additive manufacturing does not require different moulds for different products with which the manufacturers find a unique capability to utilize varying designs on the same additive manufacturing machine by designing them in the selected CAD software's. With effect to this the additive manufacturing technologies could change the paradigm for manufacturing, moving away from mass production in factories and high costs.

2. Ответьте на вопросы:

1. What are benefits of additive manufacturing?
2. Why is it preferable?

3. Задайте вопросы к предложениям, используя слова и фразы в скобках. Ответьте на вопросы.

After the lesson Victor was explaining the new rule, (to you)

— Was Victor explaining the new rule to you?

— Yes, he was. He was explaining the new rule to me.

The children were decorating their classroom. (when)

— When were they decorating the classroom?

— They were decorating it after the lessons.

1. When I went into the yard, the boys were playing, (football)
2. When we were playing, Bob was shouting. (loudly)
3. I met Victor in the street. He was running quickly, (where)
4. The weather was fine, the sun was shining, (all day)
5. Nick was watching his little sister in the garden. (why)
6. His sister was helping him to pack his things when I came, (what things)
7. They were cooking dinner at that time, (with whom)
8. I was waiting for him at 3 o'clock yesterday. (where)
9. He was looking for something when I came in. (what)
10. They were laughing when I entered the classroom. (why)

4. Спросите друзей, что они делали прошлой субботой в 10 часов утра. Используйте следующие слова и выражения:

To watch, to listen to, to carry, to look at, to wait for, to explain something to somebody, to work, to sit, to play.

5. Вставьте подходящие по смыслу глаголы в форме Past Continuous.

play swim feed sleep laugh

Yesterday we went to the zoo and saw there a lot of animals. First we went to see the white bears. They _____. Then we went to the cage with monkeys. There were a lot of children in front of the cage. They _____ because a monkey in the the cage _____. After that we went to see the elephant. There was a man there. He _____ the elephant. But we _____ see much of the lions. They _____.

6. Из имеющихся слов составьте вопросы к готовым ответам. Все вопросы должны быть в Past Continuous.

1. Where | the white bears | swimming | were ?
- In the swimming pool.
2. It | was | raining ?
- Oh, no. It wasn't. The sun was shining brightly.
3. The elephant | what | eating | was ?
- Some grass and fruit.
4. What | was | playing with | the monkey ?
— With a small ball.
5. Were | how many lions | sleeping in the cage?
— Both of them

Практическое занятие № 10.

Тема: Область применения аддитивных технологий. Future Continuous.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Ответить на вопросы. Выполнить упр.1-4 .

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

APPLICATION OF ADDITIVE MANUFACTURING

Additive manufacturing in the medical industry

The medical industry is a sphere where mistakes simply aren't tolerable; the equipment that makes it to market must perform consistently and predictably, and be able to deliver the expected results. But because every person is a unique individual, it can sometimes be difficult and time-consuming to get the desired results, because of the shortcomings of the kit available.

Additive manufacturing has exploded into the medical industry, bringing with it a whole new way of being able to treat and diagnose patients, with equipment which can be tailored exactly to the individual's needs.

Medical devices

Unfortunately in many cases decisions in the medical industry are based on cost, and this often means having to achieve economies of scale. Ordering custom items to be made on a one-off basis are simply not a cost-efficient use of resources for conventional manufacturing requests.

However, additive manufacturing changes matter entirely because it is surprisingly economical to produce medical devices in low volumes, even in batches of just one. This is because there's no expensive tooling required and no arduous manual labour to produce each article. Once designed, the programme "prints" the medical device out using the materials provided, with no manual intervention. This process is so much faster and easier than conventional engineering processes that it opens up a world of new possibilities for the medical industry

Orthopaedics

An area which is particularly challenging for manufacturing, orthopaedics requires both disposable surgical implements and implants which will function in a patient's body. This latter need is particularly demanding as no two bodies are exactly the same and designing a part which can firstly be tolerated by the body without rejection, and then fit into place exactly is no mean feat. The accuracy and ability to easily amend designs is why additive manufacturing is increasingly being chosen as the means to create the components.

When creating parts for implantation into the body, there's no such thing as a standard part. Each component will need to be tailor-made and in most cases, there will be a reasonable need to produce the item speedily. Using additive manufacturing can also help the implantation process for the surgeon and make the post-recovery period easier.

Being able to introduce an extremely exact amount of surface roughness with the aid of the precise design software means that the implants and bone will fuse more easily. Another relatively new concept is the idea of customised, disposable surgical instruments. These are surprisingly cost-effective compared to re-useable surgical tools and can actually increase the success rate of operations

3D printing techniques add an indescribable number of benefits to dental products, particularly with dentures and implants such as crowns and bridges which need to be individually fitted to each person's mouth.

The time to make removable dentures can be dramatically slashed, with the design created within a matter of minutes. Using additive manufacturing eliminates casting errors and the final product will be strong yet capable of having the intricacies needed to guarantee a perfect fit.

Additive manufacturing has been used to produce crowns and bridges since 2005, and it's one of the most widespread applications of the technology. With manual intervention only required to set up the manufacturing equipment and then unload it, 3D printing is a very economical way to create these vital dental components.

The application of additive manufacturing has been central to advances in the medical field, and it's one of the industries where the technology has been the most widely utilised. In 2012 more than 16% of all additive manufacturing applications were completed in the field of medicine, and related industries.

2. Ответить на вопросы:

1. What is the application of additive manufacturing?

3. Вставьте Future Continuous.

1. This time next Monday, I _____ in a huge office in New York. (work)
2. This time on Tuesday, Mary _____ on a beach in Italy. (sunbathe)
3. Don't make noise after midnight – I _____ soundly, I hope. (sleep)
4. Jackeline _____ to Kenya tomorrow at this time. (fly)
5. Students _____ copies while he _____ the report. (make/ finish)
6. I _____ in my study library at 6pm tomorrow. (work).
7. This time next year we _____ the Pacific Ocean. (cross)
8. I _____ the dinner table while my mother _____ the meat. (lay / prepare)
9. You'll recognize Molly! She _____ a pink hat. (wear)
10. From 7 till 12 I _____ classes. (have)
11. _____ you _____ your bike this evening? (use)
12. My auntie and uncle _____ with us this weekend. (stay)
13. I _____ television from ten pm to midnight. (to watch)
14. This time on Friday I _____ on the beach. (to lie)
15. What _____ you _____ tomorrow evening? (to do)

4. Ответьте на вопросы, используя Future Continuous.

Example: What will Owen be doing? (drive to the seaside)

Owen will be driving to the seaside.

1. What Zana be doing? (make a skirt)
2. What Michael be doing? (swim in the Red Sea)
3. What will Paul's grandfather be doing? (work in the orchard)
4. What will Greg be doing at the University? (study languages)
5. What will Megan's mother be doing? (fly to Mumbai)
6. What will the singer be doing at the concert? (sing songs)
7. What will the journalist be doing? (interview the President)
8. What will the professor be doing next September? (reading lectures)

Практическое занятие № 11.

Тема: Область применения аддитивных технологий. Future Continuous.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Прочитать и перевести текст. Упр.2-3

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

APPLICATION OF ADDITIVE MANUFACTURING

Casting

Because of the limited materials at the time of the invention of rapid prototyping machines, rapid prototyped parts or models have weak mechanical strengths. Secondary processes are used in order to convert these parts to functional components. Investment casting (also called lost wax method) is one of these processes. This process, having an ages old history, is very widely used in industrial applications such as in the casting of metal parts of tools, engines, jewelry. Additive manufacturing technologies provide the master pattern to be used for the casting process. Parts are initially manufactured by fused deposition modeling, selective laser sintering, 3D printing or similar processes that are to be molded from

other materials such as metal alloys, titanium and tooling steels. Molding of the original part is generally produced by dipping the built part which is made of either wax or plastics into a ceramic slurry, creating an expandable mold. Then the ceramic mold shell is placed in an oven burning or melting the original pattern inside the shell. This process is also called lost wax method since the original pattern inside the shell is literally lost. The ceramic shell is preheated according to temperatures needed for the type of metal that is going to be cast. The molten metal is poured into the shell which is then allowed to cool and solidify. Finally the shell is broken and the cast part is removed. Due to the necessity of gateways for the entrance of the liquid metal into the mold, some excessive parts are cut and removed which is then followed by finishing operations like grinding or sandblasting

Aerospace Industry

Aerospace industry is another important application field for AM technologies since the amount of the manufactured products are generally in limited amounts. Thus, limited number of production runs and very high costs per item makes this field a feasible sector for the application of AM processes. AM in aerospace industry has huge potential in reducing costs. More importantly it may enable designers to create systems, applications and vehicles that are even unimaginable with the conventional processes. Throughout 19 the industry, AM processes used ranges from master patterns for investment casting processes, drill blankets, models for wind tunnel testing, to rapid manufacturing of parts that are used in real conditions. In order for RMed parts to be used in aerospace, qualifications of the parts has to be established since they should survive the real life conditions just as good as their counterparts manufactured with conventional methods. For this, companies such as Boeing and Northrop Grumman developed their own qualification processes for the initial implementation of the technology. According to the results they obtained from the qualification processes, the systems used for RM are modified to achieve the required properties and after these modifications they qualified SLS, SL and FDM processes to be used in their manufacturing pipeline. As stated by Fox the qualification process is the most important factor in the industry wide implementation of RM.

2.Развейте мысль, используя Future Continuous.

Example: Don't call Greg at seven. (have a bath)

Don't call Greg at seven, he will be having a bath.

1. Don't leave the tiny newborn alone. (cry)
2. Don't call on Steven tonight. (pack)
3. Don't ring anybody up at six am. (sleep)
4. Don't wait for Melody tomorrow, (train)
5. Don't tell your Granny. (grumble)
6. Don't expect Molly to come on Saturday, (work)
7. Don't come to see Miranda after lunch. (typing her novel)
8. Don't send Molly any letters in July. (travel)

3. Переведите на английский. Используйте Future Continuous.

1. Сегодня в кино ты будешь сидеть со мной.
2. Андрей будет ждать тебя возле гипермаркета в 4.
3. Ты пообедаешь со мной завтра? – В это время я сдаю экзамен.
4. Интересно, чем будут заняты дети, пока мы будем наслаждаться концертом.
5. Как я узнаю Тома? На нем будет зеленое пальто.
6. Интересно, будем ли мы все еще встречаться через год.

7. Если ты ей расскажешь, она будет плакать.
8. Чем ты будешь занят завтра в шесть?
9. Уже через час Гриша будет работать в огороде.

Практическое занятие №12.

Тема: Область применения аддитивных технологий. Future Continuous.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Прочитать и перевести текст.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

APPLICATION OF ADDITIVE MANUFACTURING

Automotive Industry

Automotive industry plays an important role in the deployment of AM technologies since a strict competition exists throughout the industry where innovation plays an important role. Among automotive industry and potential areas of RM, motor sports field provides a solid ground for the employment of AM technologies because of low volume production rates and high added value. It is believed that the developments attained in the integration of AM into motor sports manufacturing processes will “filter through to other areas of automotive industry”.

Hearing Aids

In-ear hearing aids manufactured with conventional methods involve a process that the impression of a patient's ear is taken and used as a pattern that is used to make a mold for the shell of the hearing aid. An acrylic material is injected into the mold. The process is completed by the placement of electronics, controls and a cover plate. However, for the hearing aid to be successful, it should fit snugly but not too tightly also ensuring that during patient's talk or chewing it stays in place. Since in conventional method all the process is manual, the return rates for the hearing aid products were very high.

A new process is developed by Siemens Hearing Instruments and Phonak Hearing Systems that uses selective laser sintering (also stereolithography) systems in the manufacturing of these hearing aids via AM. The patients' ears are now scanned by a laser scanner which are then converted into solid models. These solid models are then fine-tuned to establish a good fit in the ear.

2. Употребите глаголы в Future Continuous или Future Simple.

1. Next year they _____ (live) in Spain.
2. It's nearly autumn, soon the leaves _____ (change) colour.
3. At four o'clock on Tuesday afternoon we _____ (fly) over Paris.
4. Don't phone them now: they _____ (have) dinner.
5. I don't like that man and I _____ (not help) him.
6. I _____ (work) at home tomorrow. You can call me there.
7. She _____ (stay) in Leeds all weekend.
8. Your face is dirty. – All right. I _____ (wash) it.
9. What you _____ (do) early on Monday night?
10. Will you have lunch with me on the 24th? – I'd love to, but I'm afraid I _____ (do) exam then.
11. Let's hurry up! It _____ (start) raining in a minute.
12. It's five o'clock and my girlfriend is waiting for me outside. I'm afraid she _____ (not wait) long
13. You _____ (travel) in summer again? – Yes, we _____ (go)

to the Crimea.

Практическое занятие № 13.

Тема: Система автоматизированного проектирования (CAD). Present Perfect.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Упр.1-5

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

COMPUTER AIDED DESIGN TECHNOLOGY (CAD)

Computer-aided design (CAD) is the use of computer technology for the design of objects, real or virtual. CAD often involves more than just shapes. As in the manual drafting of technical and engineering drawings, the output of CAD often must convey also symbolic information such as materials, processes, dimensions, and tolerances, according to application-specific conventions.

CAD may be used to design curves and figures in two-dimensional ("2D") space; or curves, surfaces, and solids in three-dimensional ("3D") objects.

CAD is an important industrial art extensively used in many applications, including automotive, shipbuilding, and aerospace industries, industrial and architectural design, prosthetics, and many more. CAD is also widely used to produce computer animation for special effects in movies, advertising and technical manuals. The modern ubiquity and power of computers means that even perfume bottles and shampoo dispensers are designed using techniques unheard of by engineers of the 1960s. Because of its enormous economic importance, CAD has been a major driving force for research in computational geometry, computer graphics (both hardware and software), and discrete differential geometry.

The design of geometric models for object shapes, in particular, is often called *computer-aided geometric design (CAGD)*

Computer-aided design is one of the many tools used by engineers and designers and is used in many ways depending on the profession of the user and the type of software in question. There are several different types of CAD. Each of these different types of CAD systems require the operator to think differently about how he or she will use them and he or she must design their virtual components in a different manner for each.

There are many producers of the lower-end 2D systems, including a number of free and open source programs. These provide an approach to the drawing process without all the fuss over scale and placement on the drawing sheet that accompanied hand drafting, since these can be adjusted as required during the creation of the final draft.

CAD tools

Computer Aided Design, or CAD, tools are used to design 3D parts for printing. CAD tools in the truest sense are designed to allow you to easily change and manipulate parts based on parameters. Sometimes CAD files are referred to as parametric files. They usually represent parts or assemblies in terms of Constructive Solid Geometry on primitive shapes such as cubes, spheres, cylinders, pyramids, etc.

Typically in such programs the geometry is stored in a feature tree where the dimensions can be modified numerically, and the geometry is then regenerated with great precision. This can be quite beneficial when making drawings with dimensions between the circle and sections that need to be concentrically removed.

Most of the time 3D software apps save their files in an application-specific format, which in the case of proprietary CAD tools usually are frequently changed and guarded trade secrets.

There are interchangeable CAD file formats. The two most widely used interchangeable CSG file formats are STEP and IGES. The most widely used interchangeable mesh file format is STL. STL files are important because, as we will see below, they are used by CAM tools. After your microcontroller has its firmware loaded, it is ready to accept G-codes via the software-emulated RS-232 serial port. This port shows up when you plug in your arguing to the PC via USB. You can either use a program to send these G-

codes over the serial port or you can type them in by hand if you fire up a plain-old terminal application like hyper term or mini com. If you use a program, they generally take files in g code format.

2. Ответить на вопросы:

1. What is CAD?
2. Where is it used?
3. What is the principle of its operation?

3. Напишите 3 формы глаголов:

catch.....	forget.....	get
meet.....	see.....	teach.....
read.....	rain.....	come.....
sleep.....	dance.....	walk.....
happen.....	break.....	think.....

4. Поставьте предложения в Present Perfect.

1. She.....(just break) a vase.
2. We.....(already clean) the room.
3. I.....(just make) the bed.
4. He.....(phone) his friend.
5. It.....(start) raining.
6. A little girl.....(cut) her finger.
7. He.....(eat) all the cakes.
8. Sally.....(wash) the dishes.
9. The plane.....(fly) away.
10. He.....(leave) the house.

5. Сделайте предложения отрицательными, а затем вопросительными.

1. I have finished my work.
2. They have seen this film.
3. Mr Brown has moved to the country.
4. My sister has learnt many new words.
5. Laura has been to France.
6. They had already had breakfast.
7. The storm has begun.
8. A new shop has opened in the town.
9. They have visited many museums.
10. They have already left us.

Практическое занятие № 14.

Тема: Система автоматизированного проектирования (CAD). Present Perfect.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы. Упр.1-6

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

COMPUTER AIDED DESIGN TECHNOLOGY (CAD)

Computer-aided design (CAD) is the use of computer technology for the design of objects, real or virtual. CAD often involves more than just shapes. As in the manual drafting of technical and engineering drawings, the output of CAD often must convey also symbolic information such as materials, processes, dimensions, and tolerances, according to application-specific conventions.

CAD may be used to design curves and figures in two-dimensional ("2D") space; or curves, surfaces, and solids in three-dimensional ("3D") objects.

CAD is an important industrial art extensively used in many applications, including automotive, shipbuilding, and aerospace industries, industrial and architectural design, prosthetics, and many more. CAD is also widely used to produce computer animation for special effects in movies, advertising and technical manuals. The modern ubiquity and power of computers means that even perfume bottles and shampoo dispensers are designed using techniques unheard of by engineers of the 1960s. Because of its enormous economic importance, CAD has been a major driving force for research in computational geometry, computer graphics (both hardware and software), and discrete differential geometry.

The design of geometric models for object shapes, in particular, is often called *computer-aided geometric design (CAGD)*

Computer-aided design is one of the many tools used by engineers and designers and is used in many ways depending on the profession of the user and the type of software in question. There are several different types of CAD. Each of these different types of CAD systems require the operator to think differently about how he or she will use them and he or she must design their virtual components in a different manner for each.

There are many producers of the lower-end 2D systems, including a number of free and open source programs. These provide an approach to the drawing process without all the fuss over scale and placement on the drawing sheet that accompanied hand drafting, since these can be adjusted as required during the creation of the final draft.

CAD tools

Computer Aided Design, or CAD, tools are used to design 3D parts for printing. CAD tools in the truest sense are designed to allow you to easily change and manipulate parts based on parameters. Sometimes CAD files are referred to as parametric files. They usually represent parts or assemblies in terms of Constructive Solid Geometry on primitive shapes such as cubes, spheres, cylinders, pyramids, etc.

Typically in such programs the geometry is stored in a feature tree where the dimensions can be modified numerically, and the geometry is then regenerated with great precision. This can be quite beneficial when making drawings with dimensions between the circle and sections that need to be concentrically removed.

Most of the time 3D software apps save their files in an application-specific format, which in the case of proprietary CAD tools usually are frequently changed and guarded trade secrets.

There are interchangeable CAD file formats. The two most widely used interchangeable CSG file formats are STEP and IGES. The most widely used interchangeable mesh file format is STL. STL files are important because, as we will see below, they are used by CAM tools. After your microcontroller has its firmware loaded, it is ready to accept G-codes via the software-emulated RS-232 serial port. This port shows up when you plug in your arguing to the PC via USB. You can either use a program to send these G-codes over the serial port or you can type them in by hand if you fire up a plain-old terminal application like hyper term or mini com. If you use a program, they generally take files in g code format.

2. Ответить на вопросы:

1. What is CAD?
2. Where is it used?
3. What is the principle of its operation?

3. Что обозначает -'s— (has или is)? Напиши предложения без сокращений.

1. She's gone to the shop.
2. She's very angry.
3. I think Emily's right.
4. He's lived here for ten years.
5. He's always hungry.
6. What's happened?
7. The shop's open every day.
8. Joe's got a bad cold.

9. Jane's happy.
10. Sam's been to Washington.

4. Вставьте for или since. Расставьте словосочетания в два столбика. Составьте предложения с некоторыми из них.

.....1999 six days two weeks
yesterday a month ages

5. Вставьте ago, already, just, since, for или last.

2. He has known her.....1999.
3. She hasn't finished her work.....
4. Have you seen a lion?
6. He has been in Paris..... three years.
7. She has..... finished cooking dinner.
8. Tom hasn't learnt the poem.....
9. We have.....seen the film.
10. She has not cleaned the rooms.....
12. She has worked in the hospital..... April.

6. Переведите на русский язык, обращая внимание на многозначность глагола to have:

1. He has blue eyes.
2. I've got a headache.
3. We have to go shopping today.
4. They have been to London this year.
5. I haven't got a camera.
6. Do you have to go to work today?
7. My friend has bought a car lately.
8. There was no bus, so I had to walk home.
9. In our country men have to do military service.
10. How long have you lived in Moscow?
11. When I came home, mother had already cooked dinner.
12. Did he have to go to work last Monday?
13. Have you had dinner yet?

Практическое занятие № 15.

Тема: Система автоматизированного проектирования (CAD). Present Perfect.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста/презентацию. Упр.1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

COMPUTER AIDED DESIGN TECHNOLOGY (CAD)

Computer-aided design (CAD) is the use of computer technology for the design of objects, real or virtual. CAD often involves more than just shapes. As in the manual drafting of technical and engineering drawings, the output of CAD often must convey also symbolic information such as materials, processes, dimensions, and tolerances, according to application-specific conventions.

CAD may be used to design curves and figures in two-dimensional ("2D") space; or curves, surfaces, and solids in three-dimensional ("3D") objects.

CAD is an important industrial art extensively used in many applications, including automotive, shipbuilding, and aerospace industries, industrial and architectural design, prosthetics, and many more. CAD is also widely used to produce computer animation for special effects in movies, advertising and technical manuals. The modern ubiquity and power of computers means that even perfume bottles and shampoo dispensers are designed using techniques unheard of by engineers of the 1960s. Because of its enormous economic importance, CAD has been a major driving force for research in computational geometry, computer graphics (both hardware and software), and discrete differential geometry. The design of geometric models for object shapes, in particular, is often called *computer-aided geometric design (CAGD)*

Computer-aided design is one of the many tools used by engineers and designers and is used in many ways depending on the profession of the user and the type of software in question. There are several

different types of CAD. Each of these different types of CAD systems require the operator to think differently about how he or she will use them and he or she must design their virtual components in a different manner for each.

There are many producers of the lower-end 2D systems, including a number of free and open source programs. These provide an approach to the drawing process without all the fuss over scale and placement on the drawing sheet that accompanied hand drafting, since these can be adjusted as required during the creation of the final draft.

CAD tools

Computer Aided Design, or CAD, tools are used to design 3D parts for printing. CAD tools in the truest sense are designed to allow you to easily change and manipulate parts based on parameters. Sometimes CAD files are referred to as parametric files. They usually represent parts or assemblies in terms of Constructive Solid Geometry on primitive shapes such as cubes, spheres, cylinders, pyramids, etc.

Typically in such programs the geometry is stored in a feature tree where the dimensions can be modified numerically, and the geometry is then regenerated with great precision. This can be quite beneficial when making drawings with dimensions between the circle and sections that need to be concentrically removed.

Most of the time 3D software apps save their files in an application-specific format, which in the case of proprietary CAD tools usually are frequently changed and guarded trade secrets.

There are interchangeable CAD file formats. The two most widely used interchangeable CSG file formats are STEP and IGES. The most widely used interchangeable mesh file format is STL. STL files are important because, as we will see below, they are used by CAM tools. After your microcontroller has its firmware loaded, it is ready to accept G-codes via the software-emulated RS-232 serial port. This port shows up when you plug in your arguing to the PC via USB. You can either use a program to send these G-codes over the serial port or you can type them in by hand if you fire up a plain-old terminal application like hyper term or mini com. If you use a program, they generally take files in g code format.

2. Ответить на вопросы:

1. What is CAD?
2. Where is it used?
3. What is the principle of its operation?

3. Вставь for или since. Расставь словосочетания в два столбика. Составь предложения с некоторыми из них.

.....1999 six days two weeks
.....yesterday a month ages

4. Вставьте ago, already, just, since, for или last.

2. He has known her.....1999.
3. She hasn't finished her work.....
4. Have you seen a lion?
6. He has been in Paris..... three years.
7. She has..... finished cooking dinner.
8. Tom hasn't learnt the poem.....
9. We have.....seen the film.
10. She has not cleaned the rooms.....
12. She has worked in the hospital..... April

Практическое занятие № 16.

Тема: Этапы аддитивного производства. Present Perfect-Past Simple.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Выполнить упр. 1-4..

1. Прочитайте и переведите текст, составьте словарь к тексту.

ADDITIVE MANUFACTURING PROCESS. BASIC STEPS.

Additive Manufacturing involves the following basic steps:

1. Designing of the model: a template of the respective model is designed in the CAD software.

2. Processing the data: the designed data is been linked with the manufacturing machine to undergo machining.

3. Machining the job: finally the job is machined by layer-to-layer deposition which creates the 3D object. AM involves a number of steps that move from the virtual CAD description to the physical resultant part. Different products will involve AM in different ways and to different degrees. Small, relatively simple products may only make use of AM for visualization models, while larger, more complex products with greater engineering content may involve AM during numerous stages and iterations throughout the development process. Furthermore, early stages of the product development process may only require rough parts, with AM being used because of the speed at which they can be fabricated. At later stages of the process, parts may require careful cleaning and post processing (including sanding, surface preparation and painting) before they are used, with AM being useful here because of the complexity of form that can be created without having to consider tooling. Later on, we will investigate thoroughly the different stages of the AM process, but to summarize, most AM processes involve, to some degree at least, the following eight steps.

Step 1: CAD

All AM parts must start from a software model that fully describes the external geometry. This can involve the use of almost any professional CAD solid modeling software, but the output must be a 3D solid or surface representation. Reverse engineering equipment (e.g., laser scanning) can also be used to create this representation.

Step 2: Conversion to STL

Nearly every AM machine accepts the STL file format, which has become a de facto standard, and nearly every CAD system can output such a file format. This file describes the external closed surfaces of the original CAD model and forms the basis for calculation of the slices.

Step 3: Transfer to AM Machine and STL File Manipulation

The STL file describing the part must be transferred to the AM machine. Here, there may be some general manipulation of the file so that it is the correct size, position, and orientation for building.

Step 4: Machine Setup

The AM machine must be properly set up prior to the build process. Such settings would relate to the build parameters like the material constraints, energy source, layer thickness, timings, etc.

Step 5: Build

Building the part is mainly an automated process and the machine can largely carry on without supervision. Only superficial monitoring of the machine needs to take place at this time to ensure no errors have taken place like running out of material, power or software glitches, etc.

Step 6: Removal

Once the AM machine has completed the build, the parts must be removed. This may require interaction with the machine, which may have safety interlocks to ensure for example that the operating temperatures are sufficiently low or that there are no actively moving parts.

Step 7: Post processing

Once removed from the machine, parts may require an amount of additional cleaning up before they are ready for use. Parts may be weak at this stage or they may have supporting features that must be removed. This therefore often requires time and careful, experienced manual manipulation.

Step 8: Application

Parts may now be ready to be used. However, they may also require additional treatment before they are acceptable for use. For example, they may require priming and painting to give an acceptable surface texture and finish. Treatments may be laborious and lengthy if the finishing requirements are very demanding. They may also be required to be assembled together with other mechanical or electronic components to form a final model or product. While the numerous stages in the AM process have now been discussed, it is important to realize that many AM machines require careful maintenance. Many AM machines use fragile laser or printer technology that must be carefully monitored and that should preferably not be used in a dirty or noisy environment. While machines are designed to operate unattended, it is important to include regular checks in the maintenance schedule, and that different technologies require different levels of maintenance. It is also important to note that AM processes fall outside of most materials and process standards. However, many machine vendors recommend and provide test patterns that can be used periodically to confirm that the machines are operating within acceptable limits.

In addition to the machinery, materials may also require careful handling. The raw materials used in some AM processes have limited shelf-life and must also be kept in conditions that prevent them from unwanted chemical reactions. Exposure to moisture, excess light, and other contaminants should be avoided. Most processes use materials that can be reused for more than one build. However, it may be that reuse could degrade the properties if performed many times over, and therefore a procedure for maintaining consistent material quality through recycling should also be observed.

2. Ответьте на вопросы:

1. What are the basic steps of additive manufacturing?
2. Why do many AM machines require careful maintenance?
3. Why do materials require careful handling?

3. Вставьте yet, ago, already, just, since, for или last.

1. My friend went to America two days
2. He has known her1999.
3. She hasn't finished her work
4. Have you seen a lion?
5. We visited our friendweek.
6. He has been in Paris three years.
7. She has..... finished cooking dinner.
8. Tom hasn't learnt the poem
9. We have seen the film.
10. She has not cleaned the rooms.....

4. Поставьте глаголы в скобках в нужном времени. (Обращай внимание на показатели времени.)

1. Josh.....(finish) school some years ago.
2. Dick.....(finish) his work yet.
3. He ,.....(study) Russian before the war.
4. We.....(have) little trouble with him so far.
5. They ,.....(be) in Moscow since 1980.
6. She.....(make) progress in English since she started learning it.
7. The telegram.....(come) just a minute ago.
8.you (be) to Scotland?
9. He.....(work) here for three years.
10. He (write) the letter already.

Практическое занятие № 17.

Тема: Этапы аддитивного производства. Present Perfect-Past Simple.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы. Выполнить упр. 1-5.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

ADDITIVE MANUFACTURING PROCESS. BASIC STEPS.

Additive Manufacturing involves the following basic steps:

1. Designing of the model: a template of the respective model is designed in the CAD software.

2. Processing the data: the designed data is been linked with the manufacturing machine to undergo machining.

3. Machining the job: finally the job is machined by layer-to-layer deposition which creates the 3D object. AM involves a number of steps that move from the virtual CAD description to the physical resultant part. Different products will involve AM in different ways and to different degrees. Small, relatively simple products may only make use of AM for visualization models, while larger, more complex products with greater engineering content may involve AM during numerous stages and iterations throughout the development process. Furthermore, early stages of the product development process may only require rough parts, with AM being used because of the speed at which they can be fabricated. At later stages of the process, parts may require careful cleaning and post processing (including sanding, surface preparation and painting) before they are used, with AM being useful here because of the complexity of form that can be created without having to consider tooling. Later on, we will investigate thoroughly the different stages of the AM process, but to summarize, most AM processes involve, to some degree at least, the following eight steps.

Step 1: CAD

All AM parts must start from a software model that fully describes the external geometry. This can involve the use of almost any professional CAD solid modeling software, but the output must be a 3D solid or surface representation. Reverse engineering equipment (e.g., laser scanning) can also be used to create this representation.

Step 2: Conversion to STL

Nearly every AM machine accepts the STL file format, which has become a de facto standard, and nearly every CAD system can output such a file format. This file describes the external closed surfaces of the original CAD model and forms the basis for calculation of the slices.

Step 3: Transfer to AM Machine and STL File Manipulation

The STL file describing the part must be transferred to the AM machine. Here, there may be some general manipulation of the file so that it is the correct size, position, and orientation for building.

Step 4: Machine Setup

The AM machine must be properly set up prior to the build process. Such settings would relate to the build parameters like the material constraints, energy source, layer thickness, timings, etc.

Step 5: Build

Building the part is mainly an automated process and the machine can largely carry on without supervision. Only superficial monitoring of the machine needs to take place at this time to ensure no errors have taken place like running out of material, power or software glitches, etc.

Step 6: Removal

Once the AM machine has completed the build, the parts must be removed. This may require interaction with the machine, which may have safety interlocks to ensure for example that the operating temperatures are sufficiently low or that there are no actively moving parts.

Step 7: Post processing

Once removed from the machine, parts may require an amount of additional cleaning up before they are ready for use. Parts may be weak at this stage or they may have supporting features that must be removed. This therefore often requires time and careful, experienced manual manipulation.

Step 8: Application

Parts may now be ready to be used. However, they may also require additional treatment before they are acceptable for use. For example, they may require priming and painting to give an acceptable surface texture and finish. Treatments may be laborious and lengthy if the finishing requirements are very demanding. They may also be required to be assembled together with other mechanical or electronic components to form a final model or product. While the numerous stages in the AM process have now been discussed, it is important to realize that many AM machines require careful maintenance. Many AM machines use fragile laser or printer technology that must be carefully monitored and that should preferably not be used in a dirty or noisy environment. While machines are designed to operate unattended, it is important to include regular checks in the maintenance schedule, and that different technologies require different levels of maintenance. It is also important to note that AM processes fall outside of most materials and process standards. However, many machine vendors recommend and provide test patterns that can be used periodically to confirm that the machines are operating within acceptable limits.

In addition to the machinery, materials may also require careful handling. The raw materials used in some AM processes have limited shelf-life and must also be kept in conditions that prevent them from unwanted chemical reactions. Exposure to moisture, excess light, and other contaminants should be avoided. Most processes use materials that can be reused for more than one build. However, it may be that reuse could degrade the properties if performed many times over, and therefore a procedure for maintaining consistent material quality through recycling should also be observed.

2. Ответьте на вопросы:

1. What are the basic steps of additive manufacturing?
2. Why do many AM machines require careful maintenance?
3. Why do materials require careful handling?

3. Pair work. Put these questions to your groupmate and let him/her answer them.

1. What is a resistor used for?
2. When does the temperature of a resistor rise?
3. What element is used to change the value of voltage?
4. How are resistors rated?
5. What types of resistors do you know?
6. When does a resistor get open?
7. What does an open resistor result in?
8. What is the difference between a fixed resistor and a variable resistor?
9. How much is the current-carrying capacity of a two-ohm resistor?
10. What resistors have a variable value?

4. Choose the right answer.

1. He _____ in Chicago in 2003.
has been
was
2. He _____ Japan.
has never visited
never visited
3. She _____ in this company since 2005.

- has worked
worked
4. How long _____ Anna?
have you known
did you know
5. When _____ Mike?
have you seen
did you see
6. Wait! I _____ my story yet.
haven't finished
didn't finish
7. They _____ this movie four or five times already.
have seen
saw
8. _____ a bus before?
Have you ever driven
Did you ever drive
9. I _____ to her just a minute ago.
have talked
talked
10. So far, she _____ five books by Sidney Sheldon.
has read
read

5. Переведите на английский язык:

1. Ты когда-нибудь был в Нью-Йорке?
2. Я только что пришел.
3. Он никогда не ел устриц.
4. Вы уже сделали домашнее задание? Нет, еще не сделали.
5. Мой друг купил машину в этом году.

Практическое занятие № 18.

Тема: Этапы аддитивного производства. Present Perfect-Past Simple.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста/презентацию. Упр. 1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

ADDITIVE MANUFACTURING PROCESS. BASIC STEPS.

Additive Manufacturing involves the following basic steps:

1. Designing of the model: a template of the respective model is designed in the CAD software.

2. Processing the data: the designed data is been linked with the manufacturing machine to undergo machining.

3. Machining the job: finally the job is machined by layer-to-layer deposition which creates the 3D object. AM involves a number of steps that move from the virtual CAD description to the physical resultant part. Different products will involve AM in different ways and to different degrees. Small, relatively simple products may only make use of AM for visualization models, while larger, more complex products with greater engineering content may involve AM during numerous stages and iterations throughout the development process. Furthermore, early stages of the product development process may only require rough parts, with AM being used because of the speed at which they can be fabricated. At later stages of the process, parts may require careful cleaning and post processing (including sanding, surface preparation and painting) before they are used, with AM being useful here because of the complexity of form that can be created without having to consider tooling. Later on, we will investigate thoroughly the different stages

of the AM process, but to summarize, most AM processes involve, to some degree at least, the following eight steps.

Step 1: CAD

All AM parts must start from a software model that fully describes the external geometry. This can involve the use of almost any professional CAD solid modeling software, but the output must be a 3D solid or surface representation. Reverse engineering equipment (e.g., laser scanning) can also be used to create this representation.

Step 2: Conversion to STL

Nearly every AM machine accepts the STL file format, which has become a de facto standard, and nearly every CAD system can output such a file format. This file describes the external closed surfaces of the original CAD model and forms the basis for calculation of the slices.

Step 3: Transfer to AM Machine and STL File Manipulation

The STL file describing the part must be transferred to the AM machine. Here, there may be some general manipulation of the file so that it is the correct size, position, and orientation for building.

Step 4: Machine Setup

The AM machine must be properly set up prior to the build process. Such settings would relate to the build parameters like the material constraints, energy source, layer thickness, timings, etc.

Step 5: Build

Building the part is mainly an automated process and the machine can largely carry on without supervision. Only superficial monitoring of the machine needs to take place at this time to ensure no errors have taken place like running out of material, power or software glitches, etc.

Step 6: Removal

Once the AM machine has completed the build, the parts must be removed. This may require interaction with the machine, which may have safety interlocks to ensure for example that the operating temperatures are sufficiently low or that there are no actively moving parts.

Step 7: Post processing

Once removed from the machine, parts may require an amount of additional cleaning up before they are ready for use. Parts may be weak at this stage or they may have supporting features that must be removed. This therefore often requires time and careful, experienced manual manipulation.

Step 8: Application

Parts may now be ready to be used. However, they may also require additional treatment before they are acceptable for use. For example, they may require priming and painting to give an acceptable surface texture and finish. Treatments may be laborious and lengthy if the finishing requirements are very demanding. They may also be required to be assembled together with other mechanical or electronic components to form a final model or product. While the numerous stages in the AM process have now been discussed, it is important to realize that many AM machines require careful maintenance. Many AM machines use fragile laser or printer technology that must be carefully monitored and that should preferably not be used in a dirty or noisy environment. While machines are designed to operate unattended, it is important to include regular checks in the maintenance schedule, and that different technologies require different levels of maintenance. It is also important to note that AM processes fall outside of most materials and process standards. However, many machine vendors recommend and provide test patterns that can be used periodically to confirm that the machines are operating within acceptable limits.

In addition to the machinery, materials may also require careful handling. The raw materials used in some AM processes have limited shelf-life and must also be kept in conditions that prevent them from unwanted chemical reactions. Exposure to moisture, excess light, and other contaminants should be avoided. Most processes use materials that can be reused for more than one build. However, it may be that reuse could

degrade the properties if performed many times over, and therefore a procedure for maintaining consistent material quality through recycling should also be observed.

2. Ответьте на вопросы:

1. What are the basic steps of additive manufacturing?
2. Why do many AM machines require careful maintenance?
3. Why do materials require careful handling?

3. Put the verbs in brackets in the Past Simple or in the Present Perfect.

1. I _____ (never/ be) to the USA. I _____ (want) to go there last summer but I couldn't.
2. He _____ (live) in this street all his life.
3. His father _____ (come back) to London last Sunday.
4. Yan _____ (write) a letter to Nick two days ago.
5. He _____ (send) his letter yesterday.
6. They _____ (just/ buy) some postcards.

4. Choose the correct option.

1. She has /'s had a moped since she was 15.
2. We took /'ve taken a taxi to town that morning.
3. We played /'ve played volleyball last night
4. I'm really hungry. I didn't eat / haven't eaten since last night.
5. They visited/ 've visited Colorado last summer.

Практическое занятие № 19.

Тема: Пост - производство.Past Perfect.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Упр. 1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

ADDITIVE MANUFACTURING POST PROCESSING

What is post-processing?

Post-processing is an essential stage of additive manufacturing. It's the last step in the manufacturing process, where parts receive finishing touches such as smoothing and painting.

Why is post-processing important?

Post-processing improves the quality of parts and ensures that they meet their design specifications. The finishing process can enhance a part's surface characteristics, geometric accuracy, aesthetics, mechanical properties, and more. For samples and prototypes, this can mean the difference between a sale or a loss. For production parts, finishing creates a part that is ready to use.

Post-processing capacity

It's important to consider an additive manufacturer's finishing capacity when placing your order. Some companies dedicate only a small area of their facility to finishing. This can lead to expensive post-

processing, outsourcing, or bottlenecks at the finishing stage of production. It can also be an incentive to rush through finishing.

Common Finishing Processes

Many different post-processing techniques exist. Additive manufacturing companies often specialize in certain types of finishing, and may even have their own proprietary finishing process. Below are common finishing techniques. These techniques may be slightly modified for specialty materials.

Natural

The natural finish is the most basic finish. It cleans and sands the places where support structures held the part in the AM machine. The finish does not affect the part's geometry, and is ideal for parts with small features.

- **Results:** Sharp details.
- **Available for:** SLA, SLS, PolyJet 3D printing, FDM
- **Best used for:** Parts with small features and precise geometries.

Standard

This is the most common finish. It begins with the natural finish, described above. Next, the part is bead blasted to create a uniform matte surface.

- **Results:** Uniform smoothness for good aesthetics. A professional look and feel.
- **Available for:** SLA
- **Best used for:** Uniform matte prototypes. Production parts with average aesthetic requirements.

Standard + External

This finish begins with the bead-blasted standard finish, described above. Next, the part's exterior surface is sanded to remove build lines or stair stepping, creating an extremely smooth, low-friction surface. This finish is ideal for parts that slide against another surface. It's also recommended for high-quality prototypes.

- **Results:** Extremely smooth outer surface and superior aesthetics.
- **Available for:** SLA, PolyJet
- **Best used for:** Production parts needing a low-friction surface. High-quality prototypes.

Standard + All

This finish begins with the bead-blasted standard finish, and adds sanding over both the interior and exterior of the part. It is ideal for making master patterns for casting or other types of foundry molds. The completely smooth surface makes it easy to remove a master pattern from the mold without the pattern catching on build lines or stair stepping.

- **Results:** Completely smooth surface, inside and out.
- **Available for:** SLA, PolyJet
- **Best used for:** Foundry patterns.

Primed

For this finish, a part is coated with primer after the Standard + External finishing process. Two coats are applied, with a round of light sanding in between, if necessary. Primed parts are smooth and fully prepped for your in-house paint department, saving hours of labor.

- **Results:** Exceptional smoothness, paint-ready parts.
- **Available for:** SLA, SLS, PolyJet
- **Best used for:** Paint-ready pieces for your in-house paint department or specialty painting contractor.

Presentation

This finish delivers a completed, ready-to-show part. It can be brought to a trade show, presented to a customer, or used in marketing photos and video right away. The ProtoCAM team paints the part for a final production look. We mix automotive-grade paints to create finely tuned colors for an exact match.

- **Results:** A fully-painted, ready-to-show display part with the highest aesthetics.
- **Available for:** SLA, SLS, PolyJet
- **Best used for:** Painted, show-ready pieces.

Clear

For clear SLA parts, the part is sanded where supports were used during production. A coat of clear urethane is applied to the sanded areas to restore a finished shine. The clarity of the part may vary in sections, and build lines and stair stepping may remain.

- **Results:** A clear part with a basic look-through finish and some opacity.

- **Available for:** SLA
- **Best used for:** Clear proof-of-concept prototypes or functional finished parts.

Improved Clear

For improved clarity, build lines and stair stepping are removed from the part's surface. Then the entire part is sanded and a clear coat of urethane is applied.

- **Results:** A clear part with a high level of surface consistency and clarity.
- **Available for:** SLA
- **Best used for:** Clear, show-ready pieces.

Clear Bottle: A Proprietary Finishing Process

Bottles and similar parts with small entries traditionally present a finishing challenge: their large internal surfaces usually remain matte and cloudy. But now with ProtoCAM's proprietary Clear Bottle finish, customers can achieve exceptional clarity on even the most complex pieces.

The Clear Bottle finish almost perfectly replicates the look of a mass production plastic bottle. It has a truly clear, see-through surface on both the interior and the exterior.

- **Results:** Exceptional transparency for complex parts, bottles, and other items with small entries and large internal surfaces.
- **Available for:** SLA
- **Best used for:** Crystal-clear prototypes and samples. Ideal for bottles, containers, complex clear tubes and vessels.

2. Ответьте на вопросы:

1. What is post processing? What does it involve?
2. What are the common finishing processes?

3. Complete the sentences using the verbs in brackets in Past Perfect

*Model 1: Most of my friends were no longer there.
They had left (leave).*

*Model 2: Mr And Mrs Davis were in an airplane.
They were very nervous as the plane took off because they had never flown before (fly).*

1. My best friend, Kevin, was no longer there. He ... (go) away.
2. The local cinema was no longer open. It ... (close) down.
3. Mr Johnson was no longer alive. He ... (die).
4. I didn't recognize Mrs Johnson. She ... (change) a lot.
5. Bill no longer had his car. He ... (sell) it.
6. The woman was a complete stranger to me. I ... (see) before.
7. Margaret was late for work. Her boss was very surprised. She ... (be/late).
8. Jane played tennis yesterday, at least she tried to play tennis. She wasn't very good at it because she (play)
9. It was Keith's first driving lesson. He was very nervous and didn't know what to do. He ... (drive).
10. From downstairs came the sound of a radio playing a song I (not hear) before.

4. You have to make sentences using the words in brackets.

*Model: I wasn't hungry. (I/just/have/lunch.)
I had just had lunch.*

1. Tom wasn't at home when I arrived, (he/just/go out.)
2. We arrived at the cinema late, (the film/already/begin.)
3. They weren't eating when I went to see them, (they/just/finish/their dinner.)
4. I invited Ann to dinner last night but she couldn't come, (she/already/arrange/to do something else.)
5. I was very pleased to see Nora again after such a long time. (I/not/see/her for five years.)
6. Last year our profits were higher than (they, ever, be).
7. When they entered the conference hall (the discussion, already, start).
8. I couldn't recollect that (I, ever, promise, to help him).
9. She apologized that (she, not read, my report, yet).

10. He knew much about the city, (he, live, in London, for a long time).

Практическое занятие № 20.

Тема: Пост - производство.Past Perfect.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы. Упр.1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

ADDITIVE MANUFACTURING POST PROCESSING

What is post-processing?

Post-processing is an essential stage of additive manufacturing. It's the last step in the manufacturing process, where parts receive finishing touches such as smoothing and painting.

Why is post-processing important?

Post-processing improves the quality of parts and ensures that they meet their design specifications. The finishing process can enhance a part's surface characteristics, geometric accuracy, aesthetics, mechanical properties, and more. For samples and prototypes, this can mean the difference between a sale or a loss. For production parts, finishing creates a part that is ready to use.

Post-processing capacity

It's important to consider an additive manufacturer's finishing capacity when placing your order. Some companies dedicate only a small area of their facility to finishing. This can lead to expensive post-processing, outsourcing, or bottlenecks at the finishing stage of production. It can also be an incentive to rush through finishing.

Common Finishing Processes

Many different post-processing techniques exist. Additive manufacturing companies often specialize in certain types of finishing, and may even have their own proprietary finishing process. Below are common finishing techniques. These techniques may be slightly modified for specialty materials.

Natural

The natural finish is the most basic finish. It cleans and sands the places where support structures held the part in the AM machine. The finish does not affect the part's geometry, and is ideal for parts with small features.

- **Results:** Sharp details.
- **Available for:** SLA, SLS, PolyJet 3D printing, FDM
- **Best used for:** Parts with small features and precise geometries.

Standard

This is the most common finish. It begins with the natural finish, described above. Next, the part is bead blasted to create a uniform matte surface.

- **Results:** Uniform smoothness for good aesthetics. A professional look and feel.
- **Available for:** SLA
- **Best used for:** Uniform matte prototypes. Production parts with average aesthetic requirements.

Standard + External

This finish begins with the bead-blasted standard finish, described above. Next, the part's exterior surface is sanded to remove build lines or stair stepping, creating an extremely smooth, low-friction surface. This finish is ideal for parts that slide against another surface. It's also recommended for high-quality prototypes.

- **Results:** Extremely smooth outer surface and superior aesthetics.
- **Available for:** SLA, PolyJet
- **Best used for:** Production parts needing a low-friction surface. High-quality prototypes.

Standard + All

This finish begins with the bead-blasted standard finish, and adds sanding over both the interior and exterior of the part. It is ideal for making master patterns for casting or other types of foundry molds. The

completely smooth surface makes it easy to remove a master pattern from the mold without the pattern catching on build lines or stair stepping.

- **Results:** Completely smooth surface, inside and out.
- **Available for:** SLA, PolyJet
- **Best used for:** Foundry patterns.

Primed

For this finish, a part is coated with primer after the Standard + External finishing process. Two coats are applied, with a round of light sanding in between, if necessary. Primed parts are smooth and fully prepped for your in-house paint department, saving hours of labor.

- **Results:** Exceptional smoothness, paint-ready parts.
- **Available for:** SLA, SLS, PolyJet
- **Best used for:** Paint-ready pieces for your in-house paint department or specialty painting contractor.

Presentation

This finish delivers a completed, ready-to-show part. It can be brought to a trade show, presented to a customer, or used in marketing photos and video right away. The ProtoCAM team paints the part for a final production look. We mix automotive-grade paints to create finely tuned colors for an exact match.

- **Results:** A fully-painted, ready-to-show display part with the highest aesthetics.
- **Available for:** SLA, SLS, PolyJet
- **Best used for:** Painted, show-ready pieces.

Clear

For clear SLA parts, the part is sanded where supports were used during production. A coat of clear urethane is applied to the sanded areas to restore a finished shine. The clarity of the part may vary in sections, and build lines and stair stepping may remain.

- **Results:** A clear part with a basic look-through finish and some opacity.
- **Available for:** SLA
- **Best used for:** Clear proof-of-concept prototypes or functional finished parts.

Improved Clear

For improved clarity, build lines and stair stepping are removed from the part's surface. Then the entire part is sanded and a clear coat of urethane is applied.

- **Results:** A clear part with a high level of surface consistency and clarity.
- **Available for:** SLA
- **Best used for:** Clear, show-ready pieces.

Clear Bottle: A Proprietary Finishing Process

Bottles and similar parts with small entries traditionally present a finishing challenge: their large internal surfaces usually remain matte and cloudy. But now with ProtoCAM's proprietary Clear Bottle finish, customers can achieve exceptional clarity on even the most complex pieces.

The Clear Bottle finish almost perfectly replicates the look of a mass production plastic bottle. It has a truly clear, see-through surface on both the interior and the exterior.

- **Results:** Exceptional transparency for complex parts, bottles, and other items with small entries and large internal surfaces.
- **Available for:** SLA
- **Best used for:** Crystal-clear prototypes and samples. Ideal for bottles, containers, complex clear tubes and vessels.

2. Ответьте на вопросы:

1. What is post processing? What does it involve?
2. What are the common finishing processes?

3. Combine the following sentences using the Past Perfect, using the conjunctions when, after, before, where necessary.

*Model 1: She took some pictures of London. She showed us the pictures.
She showed us the pictures she had taken in London*

*Model 2: Everybody went to bed. I came home.
When I came home, everybody had gone to bed.*

1. He wrote a letter then he went to post it.
2. Ann prepared a beautiful meal for her guests. They ... all enjoyed it.
3. He left his passport behind. He couldn't find the passport.
4. They saw a play at the National Theatre. Then they discussed it.
5. He failed the examination twice. He gave up hope of passing it.
6. I came to the office. The manager signed all the documents.
7. The football match began. We reached the stadium.
8. The weather kept dry for a week. We came to the seaside.
9. They traveled four hundred miles. They reached the end of their journey.
10. The children did their homework. Their mother allows them to watch TV.

4. Complete the sentences using the Past Perfect.

1. We told her that he ... (to buy a TV-set).
2. The man at the station said that the train ... (to leave already).
3. Mary told me that she ... (not to get a letter from her son yet). She said she ... (not to hear from him for some weeks).
4. He understood that he ... (to get off at the wrong station).
5. He said that his parents ... (always to live in the country).
6. I didn't know that she ... (to change her address).
7. He didn't remember how it all ... (to happen).
8. We were sure that she ... (to tell the truth).
9. I saw that the child ... (to catch a cold).
10. She hoped that I ... (to pay for the tickets already).

Практическое занятие № 21.

Тема: Пост - производство. Past Perfect.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста/презентацию. Упр. 1-3.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

ADDITIVE MANUFACTURING POST PROCESSING

What is post-processing?

Post-processing is an essential stage of additive manufacturing. It's the last step in the manufacturing process, where parts receive finishing touches such as smoothing and painting.

Why is post-processing important?

Post-processing improves the quality of parts and ensures that they meet their design specifications. The finishing process can enhance a part's surface characteristics, geometric accuracy, aesthetics, mechanical properties, and more. For samples and prototypes, this can mean the difference between a sale or a loss. For production parts, finishing creates a part that is ready to use.

Post-processing capacity

It's important to consider an additive manufacturer's finishing capacity when placing your order. Some companies dedicate only a small area of their facility to finishing. This can lead to expensive post-processing, outsourcing, or bottlenecks at the finishing stage of production. It can also be an incentive to rush through finishing.

Common Finishing Processes

Many different post-processing techniques exist. Additive manufacturing companies often specialize in certain types of finishing, and may even have their own proprietary finishing process. Below are common finishing techniques. These techniques may be slightly modified for specialty materials.

Natural

The natural finish is the most basic finish. It cleans and sands the places where support structures held the part in the AM machine. The finish does not affect the part's geometry, and is ideal for parts with small features.

- **Results:** Sharp details.
- **Available for:** SLA, SLS, PolyJet 3D printing, FDM
- **Best used for:** Parts with small features and precise geometries.

Standard

This is the most common finish. It begins with the natural finish, described above. Next, the part is bead blasted to create a uniform matte surface.

- **Results:** Uniform smoothness for good aesthetics. A professional look and feel.
- **Available for:** SLA
- **Best used for:** Uniform matte prototypes. Production parts with average aesthetic requirements.

Standard + External

This finish begins with the bead-blasted standard finish, described above. Next, the part's exterior surface is sanded to remove build lines or stair stepping, creating an extremely smooth, low-friction surface. This finish is ideal for parts that slide against another surface. It's also recommended for high-quality prototypes.

- **Results:** Extremely smooth outer surface and superior aesthetics.
- **Available for:** SLA, PolyJet
- **Best used for:** Production parts needing a low-friction surface. High-quality prototypes.

Standard + All

This finish begins with the bead-blasted standard finish, and adds sanding over both the interior and exterior of the part. It is ideal for making master patterns for casting or other types of foundry molds. The completely smooth surface makes it easy to remove a master pattern from the mold without the pattern catching on build lines or stair stepping.

- **Results:** Completely smooth surface, inside and out.
- **Available for:** SLA, PolyJet
- **Best used for:** Foundry patterns.

Primed

For this finish, a part is coated with primer after the Standard + External finishing process. Two coats are applied, with a round of light sanding in between, if necessary. Primed parts are smooth and fully prepped for your in-house paint department, saving hours of labor.

- **Results:** Exceptional smoothness, paint-ready parts.
- **Available for:** SLA, SLS, PolyJet
- **Best used for:** Paint-ready pieces for your in-house paint department or specialty painting contractor.

Presentation

This finish delivers a completed, ready-to-show part. It can be brought to a trade show, presented to a customer, or used in marketing photos and video right away. The ProtoCAM team paints the part for a final production look. We mix automotive-grade paints to create finely tuned colors for an exact match.

- **Results:** A fully-painted, ready-to-show display part with the highest aesthetics.
- **Available for:** SLA, SLS, PolyJet
- **Best used for:** Painted, show-ready pieces.

Clear

For clear SLA parts, the part is sanded where supports were used during production. A coat of clear urethane is applied to the sanded areas to restore a finished shine. The clarity of the part may vary in sections, and build lines and stair stepping may remain.

- **Results:** A clear part with a basic look-through finish and some opacity.
- **Available for:** SLA
- **Best used for:** Clear proof-of-concept prototypes or functional finished parts.

Improved Clear

For improved clarity, build lines and stair stepping are removed from the part's surface. Then the entire part is sanded and a clear coat of urethane is applied.

- **Results:** A clear part with a high level of surface consistency and clarity.
- **Available for:** SLA

- **Best used for:** Clear, show-ready pieces.

Clear Bottle: A Proprietary Finishing Process

Bottles and similar parts with small entries traditionally present a finishing challenge: their large internal surfaces usually remain matte and cloudy. But now with ProtoCAM's proprietary Clear Bottle finish, customers can achieve exceptional clarity on even the most complex pieces.

The Clear Bottle finish almost perfectly replicates the look of a mass production plastic bottle. It has a truly clear, see-through surface on both the interior and the exterior.

- **Results:** Exceptional transparency for complex parts, bottles, and other items with small entries and large internal surfaces.
- **Available for:** SLA
- **Best used for:** Crystal-clear prototypes and samples. Ideal for bottles, containers, complex clear tubes and vessels.

2. Ответьте на вопросы:

1. What is post processing? What does it involve?
2. What are the common finishing processes?

3. Раскройте скобки, употребляя глаголы в Past Simple или Past Perfect.

1. Tom (to return) from the cinema at five o'clock.
2. Tom (to return) from the cinema by five o'clock.
3. I (to finish) my homework at seven o'clock.
4. I (to finish) my homework by seven o'clock.
5. He (to think) that he (to lose) the money.
6. Ann (to tell) me that she (to see) an interesting film.
7. When I (to come) home, mother already (to cook) dinner.
8. When father (to return) from work, we already (to do) our homework.
9. When the teacher (to enter) the classroom, the pupils already (to open) their books.

Практическое занятие № 22.

Тема: Контрольная работа.

Цель: Контроль лексических и грамматических навыков, словарного запаса обучающихся.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности.

Контрольная работа

Вариант 1

1. Вставьте глаголы в Present Simple:

1. We _____ (not/speak) French.
2. A lot of teenagers _____ (play) computer games.
3. _____ (you/study) English every day?
4. He _____ (visit) his grandmother twice a year.

2. Вставьте глаголы в Past Simple:

1. Mary _____ (go) to school yesterday.
2. _____ (you/go) to the cinema on Sunday?
3. He _____ (not/pass) his exam last week.
4. She _____ (see) him two days ago.

3. Вставьте глаголы в Present, Past или Future Simple:

1. He _____ (to be) a student twenty years ago.
2. She _____ (call) you in a few minutes.
3. _____ (you/buy) milk yesterday?
4. I _____ (get up) at 7 am every morning.

4. Выберите соответствующую форму глагола Future Simple или to be going to:

1. I _____ (call) you. I promise.
2. _____ (you /help) me, please?
3. I think he _____ (not/pass) his driving test.
4. I have some plans for Monday. I _____ (visit) my sister.

Вариант II

1. Вставьте глаголы в Present Simple:

1. My father _____ (work) in a bank.
2. I _____ (watch) TV every day.
3. _____ (you/speak) English?
4. She _____ (not/go) to school on Sunday.

2. Вставьте глаголы в Past Simple:

1. I _____ (do) my homework in the evening.
2. He _____ (not/write) a letter to his aunt.
3. _____ (you/go) for a walk?
4. He _____ (buy) some apples for dinner.

3. Вставьте глаголы в Present, Past или Future Simple:

1. He _____ (to be) in Moscow tomorrow.
2. My sister _____ (fall) ill last week.
3. British people _____ (like) drinking tea a lot.
4. Good-bye! I _____ (call) you next week.

4. Выберите соответствующую форму глагола Future Simple или to be going to:

1. What _____ (you/do) tomorrow evening?
2. The doctor _____ (to be) here in five minutes.
3. He won't be at home. He _____ (leave) Moscow tonight.
4. Do you think she _____ (call) us tomorrow?

Практическое занятие № 23.

Тема: Дифференцированный зачет.

Цель: Контроль умений и навыков практического владения английским языком.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности.

Контрольные задания к дифференцированному зачету.

Лексический материал	Грамматический материал
1. Преимущества аддитивного производства	3. Present Perfect Tense
2. Применение аддитивных технологий.	4. Past Perfect Tense

Правила образования Present Perfect Tense

Present Perfect образуется с помощью вспомогательного глагола **to have (has – для 3 л.ед. ч.)** и третьей формы основного глагола.

have\has + V3

He **has written** to his friend Он написал своему другу.

Present Perfect используется, когда речь идёт о действии, которое уже совершилось до момента речи, но имеет непосредственное отношение к данному моменту

He **has finished** his letter Он закончил своё письмо.

(То есть к данному моменту он уже закончил писать письмо и оно готово к отправлению).

Утвердительная форма	He has finished his letter
Отрицательная форма	Has he finished his letter?
Вопросительная форма	He has not finished his letter

Можно делать сокращения: I have = I've, he has = he's

You **have written** to your friend You've **written** to your friend.

You **have not written** to your friend You **haven't written** to your friend.

Можно делать сокращение такого типа:

Have you ever been to London? Вы когда-нибудь были в Лондоне?

Yes I **have**. Да, был.

(То есть вместо того чтобы дать полный ответ, можно написать только начало ответа.)

Present Perfect можно употреблять, если речь идёт о недалёком прошлом:

I **have seen** him this morning Явиделегосегоднютром

(такое предложение можно сказать только утром того же дня).

I **have been** busy this afternoon Ябылзанятсегодняднём

(такое можно сказать только до 6 часов вечера).

Настоящее время группы **perfect** употребляется со следующими наречиями неопределённого времени:

Ever когда-либо.

Never никогда.

Already уже.

Lately в последнее время (за последние дни/недели).

Recently в последнее время (за последние месяцы/годы).

Yet ещё/уже.

Just только что.

Once однажды.

В вопросительной и форме вместо **already** пишется **yet** в значении **уже**:

I **have already done** my homework Я уже сделал своё домашнее задание.

Have you done your homework yet? Ты уже сделал своё домашнее задание

Правила образования PastPerfectTense

Прошедшее время группы **Perfect** используется, когда речь идёт о действии, которое уже произошло до определённого момента в прошлом и это действие связано с этим моментом, а не с моментом речи (то есть с настоящим моментом). Прошедшее время группы **Perfect** образуется при помощи глагола **to have** в форме прошедшего времени и третьей формы смыслового глагола:

had + V3

I heard that he **had left** New York.

Я слышал, что он оставил Нью-Йорк.

I **had read** the book by five o'clock yesterday. Вчера я прочёл книгу к пяти часам вечера.

Когда используется **Past Perfect**, то некоторые слова меняются, например:

Now меняется на **then**:

He says he doesn't know about it now

Он говорит, что не знает об этом сейчас.

He said he **hadn't known** about it **then**

Он сказал, что он не знал об этом тогда.

Меняются также некоторые другие слова:

This/ these меняется на **that/ those**,

Here меняется на **here**,

Yesterday меняется на **the day before**,

Today меняется на **that day**,

Tomorrow меняется на **(the) next day** или **the following day**,

ago меняется на **before** или **earlier** (слово **ago** может и не заменяться),

к выражениям **last week/ last year** прибавляется **the + before**.

В некоторых случаях с использованием **when** или **as soon as** кажется, что речь идёт о **Past Perfect**, но на самом деле это **Past Indefinite** например:

When he saw us he came toward us. Когда он нас увидел, то пошёл по направлению к нам.

Вариант I

1. Прочитайте и переведите текст.

THE BENEFITS OF ADDITIVE MANUFACTURING

Since its inception in the 1980s, additive manufacturing has greatly transformed the world of manufacturing. AM has the potential to vastly accelerate innovation, compress supply chains, minimize materials and energy usage, and reduce waste. Let's list some benefits of AM technology:

- **Lower energy consumption.** AM saves energy by eliminating production steps, using less material, enabling reuse of by-products, and producing lighter products.
- **Less waste.** Building objects up layer by layer, instead of traditional machining processes that cut away material can reduce material needs and costs by up to 90%. Additionally, AM reduces waste by lowering human error in production.
- **Reduced time to market.** Items can be fabricated as soon as the 3-D digital description of the part has been created, eliminating the need for expensive and time-consuming part tooling and prototype fabrication.
- **Innovation.** AM enables designs with novel geometries that would be difficult or impossible to achieve using CM processes, which can improve a component's engineering performance.
- **Part consolidation.** The ability to design products with fewer, more complex parts, rather than a large number of simpler parts – is the most important of these benefits. Reducing the number of parts in an assembly immediately cuts the overhead associated with documentation and production planning and control. Also, fewer parts mean less time and labor is required for assembling the product, again contributing to a reduction in overall manufacturing costs.
- **Greener manufacturing.** Additive manufacturing also has environmental benefits. To begin with, whereas additive manufacturing depends on electricity, a fairly small amount is needed for the production of parts. Likewise, there's little waste in light of the fact that only the necessary material are utilized and the plastics can be recycled. Moreover, in the case of 3D printing, there's considerably less trucking of parts. This technology also plays an integral role in the light-weighting of aircraft and vehicles, which is essential for reducing dangerous fuel emissions.

Actually, parts made using additive manufacturing technology allow manufacturing engineers to create solid components with a semi-hollow honeycomb interior. The components have as much strength to weight ratio as solid parts, but they are up to 65% lighter when compared to conventional, subtractive manufacturing techniques, which significantly affects the final product's fuel costs.

• **Avoiding mass production.** For many years, additive manufacturing has been used to instantly generate prototypes, without the need to frequently order factory-built models. Today, additive manufacturing technology is so advanced that it can be used to make finished products. This way, you don't have to mass-produce a product, which makes it a cost-efficient venture.

2. Ответьте на вопросы:

1. What are benefits of additive manufacturing?
2. Why is it preferable?

3. Поставьте предложения в Present Perfect:

1. She.....(just break) a vase.
2. We.....(already clean) the room.
3. I.....(just make) the bed.
4. He.....(phone) his friend.
5. It.....(start) raining.
6. A little girl.....(cut) her finger.

4. Что обозначает '-s— (has или is)? Напишите предложения без сокращений:

1. She's gone to the shop.
2. She's very angry.
3. I think Emily's right.
4. He's lived here for ten years.
5. He's always hungry.
6. What's happened?

Вариант II

1. Прочитайте и переведите текст.

APPLICATION OF ADDITIVE MANUFACTURING

Additive manufacturing in the medical industry

The medical industry is a sphere where mistakes simply aren't tolerable; the equipment that makes it to market must perform consistently and predictably, and be able to deliver the expected results. But because every person is a unique individual, it can sometimes be difficult and time-consuming to get the desired results, because of the shortcomings of the kit available.

Additive manufacturing has exploded into the medical industry, bringing with it a whole new way of being able to treat and diagnose patients, with equipment which can be tailored exactly to the individual's needs.

Medical devices

Unfortunately in many cases decisions in the medical industry are based on cost, and this often means having to achieve economies of scale. Ordering custom items to be made on a one-off basis are simply not a cost-efficient use of resources for conventional manufacturing requests.

However, additive manufacturing changes matter entirely because it is surprisingly economical to produce medical devices in low volumes, even in batches of just one. This is because there's no expensive tooling required and no arduous manual labour to produce each article. Once designed, the programme

“prints” the medical device out using the materials provided, with no manual intervention. This process is so much faster and easier than conventional engineering processes that it opens up a world of new possibilities for the medical industry

Orthopaedics

An area which is particularly challenging for manufacturing, orthopaedics requires both disposable surgical implements and implants which will function in a patient’s body. This latter need is particularly demanding as no two bodies are exactly the same and designing a part which can firstly be tolerated by the body without rejection, and then fit into place exactly is no mean feat. The accuracy and ability to easily amend designs is why additive manufacturing is increasingly being chosen as the means to create the components.

When creating parts for implantation into the body, there’s no such thing as a standard part. Each component will need to be tailor-made and in most cases, there will be a reasonable need to produce the item speedily. Using additive manufacturing can also help the implantation process for the surgeon and make the post-recovery period easier.

Being able to introduce an extremely exact amount of surface roughness with the aid of the precise design software means that the implants and bone will fuse more easily. Another relatively new concept is the idea of customised, disposable surgical instruments. These are surprisingly cost-effective compared to re-useable surgical tools and can actually increase the success rate of operations

3D printing techniques add an indescribable number of benefits to dental products, particularly with dentures and implants such as crowns and bridges which need to be individually fitted to each person’s mouth.

The time to make removable dentures can be dramatically slashed, with the design created within a matter of minutes. Using additive manufacturing eliminates casting errors and the final product will be strong yet capable of having the intricacies needed to guarantee a perfect fit.

Additive manufacturing has been used to produce crowns and bridges since 2005, and it’s one of the most widespread applications of the technology. With manual intervention only required to set up the manufacturing equipment and then unload it, 3D printing is a very economical way to create these vital dental components.

The application of additive manufacturing has been central to advances in the medical field, and it’s one of the industries where the technology has been the most widely utilised. In 2012 more than 16% of all additive manufacturing applications were completed in the field of medicine, and related industries.

2. Ответить на вопросы:

1. What is the application of additive manufacturing?

3. Раскройте скобки, поставив глаголы в Past Perfect:

Образец: Mr And Mrs Davis were in an airplane.

They were very nervous as the plane took off because they had never flown before (fly).

1. My best friend, Kevin, was no longer there. He ... (go) away.
2. The local cinema was no longer open. It ... (close) down.
3. Mr Johnson was no longer alive. He ... (die).
4. I didn't recognize Mrs Johnson. She ... (change) a lot.
5. Bill no longer had his car. He ... (sell) it.
6. The woman was a complete stranger to me. I ... (see) before.

4. Раскройте скобки, употребляя глаголы в Past Simple или Past Perfect:

1. Tom (to return) from the cinema at five o'clock.
2. Tom (to return) from the cinema by five o'clock.

3. I (to finish) my homework at seven o'clock.
4. I (to finish) my homework by seven o'clock.
5. He (to think) that he (to lose) the money.
6. Ann (to tell) me that she (to see) an interesting film.

3 КУРС 5 СЕМЕСТР 3D ПЕЧАТЬ

Практическое занятие № 1.

Тема: История развития 3D печати. Страдательный залог Simple.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Ответить на вопросы. Упр. 1-5

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

HISTORICAL DEVELOPMENT OF 3D PRINTING

The end of the 1980s and beginning of the 1990s was the earliest time additive manufacturing was used in rapid prototyping. Prototypes offer to examine an object closely and to test it prior to production of the thing. Rapid prototyping, known as RP, suggest much quicker prototype production, often it would take several hours or days, depending on the design. In RP models are created with the help of computer-aided design, known as CAD, soft, machines following that model should define the way of creating the object. So the procedure of constructing things printing its layers is known as 3D printing.

The initiation of 3D printing took place in Massachusetts Institute of Technology and company named 3D systems. At the beginning of the 1990s MIT originated the practice they further labeled with the name 3D printing, certified as 3DP and that's how 3d printing history began. In February 2011 MIT has awarded licenses to 6 corporations and suggested 3DP for its products.

3D systems have introduced a number of 3D techniques since it was settled in 1986. Some of the technologies, like stereolithography apparatus (SLA) and selective laser sintering (SLS), have been trademarked. As 3D Systems and MIT are still the front runners in the 3D printing area, other corporations like Objet Geometries and Stratasys have introduced new technologies to the market.

Nowadays some 3D printing technologies are used to originate fulfilled, ready products. The technology is being improved through highest quality of details printed and the time required to print a detail and clean it when already printed. The time required is becoming less, the substances and appliances growing cheaper. The wider range of materials is coming into use, like ceramics or metals. The size of printers are steadily changing, becoming smaller and smaller.

Additive manufacturing, including 3D printing, are still new to the area of mass-production. AM can be compared to computer numerical controlled machining. The latter, however, is quite contrary to AM. In CNC the material is detached up to the ready product. It's more like a stone fretwork statue.

2. Ответьте на вопросы:

1. What is 3D printing? When was it settled?
2. What's the purpose of its usage?

3. Раскройте скобки, употребляя глаголы в Present Simple Passive. (USUALLY)

1. The postbox (to empty) every day.
2. The stamps (to postmark) at the post office.
3. The letters (to sort) into the different towns.
4. The mail (to load) into the train.
5. The mailbags (to unload) after their journey.
6. The bags (to take) to the post office.
7. The letters (to sort) into the different streets.
8. The letters (to deliver).

4. Раскройте скобки, употребляя глаголы в Past Simple Passive. (YESTERDAY)

1. The postbox (to empty) yesterday.
2. The stamps (to postmark) at the post office.
3. The letters (to sort) into the different towns.
4. The mail (to load) into the train.
5. The mailbags (to unload) after their journey.
6. The bags (to take) to the post office.
7. The letters (to sort) into the different streets.
8. The letters (to deliver).

5. Раскройте скобки, употребляя глаголы в Future Simple Passive. (TOMORROW)

1. The postbox (to empty) tomorrow.
2. The stamps (to postmark) at the post office.
3. The letters (to sort) into the different towns.
4. The mail (to load) into the train.
5. The mailbags (to unload) after their journey.
6. The bags (to take) to the postoffice.
7. The letters (to sort) into the different streets.
8. The letters (to deliver).

Практическое занятие № 2.

Тема: История развития 3D печати. Страдательный залог Simple.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Выполнить упр. 1-2

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

HOW 3D PRINTING WORKS

3D printers work like inkjet printers. Instead of ink, 3D printers deposit the desired material in successive layers to create a physical object from a digital file.

- 1 A laser source sends a laser beam to solidify the material.
- 2 The elevator raises and lowers the platform to help lay the layers.
- 3 The vat contains the material used to create the 3D object.
- 4 The 3D object is created as parts are layered on top of each other.
- 5 Advanced 3D printers use one or more materials, including plastic, resin, titanium, polymers and even gold and silver.

INDUSTRIES

Automotive	Aviation	Do-it-yourself
Manufacturing	Medical	Jewelry

1990s

'92 BUILDING PARTS, LAYER BY LAYER

The first SLA (stereolithographic apparatus) machine is produced by 3D Systems. The machine's process involves a UV laser solidifying photopolymer, a liquid with the viscosity and color of honey that makes three-dimensional parts layer by layer. Although imperfect, the machine proves that highly complex parts can be manufactured overnight.

'99 ENGINEERED ORGANS BRING NEW ADVANCES TO MEDICINE

The first lab-grown organ is implanted in humans when young patients undergo urinary bladder augmentation using a 3-D synthetic scaffold coated with their own cells. The technology, developed by scientists at the Wake Forest Institute for Regenerative Medicine, opened the door to developing other strategies for engineering organs, including printing them. Because they are made with a patient's own cells, there is little to no risk of rejection.

2000s

'02 A WORKING 3D KIDNEY

Scientists engineer a miniature functional kidney that is able to filter blood and produce diluted urine in an animal. The development led to research at the Wake Forest Institute for Regenerative Medicine that aims to "print" organs and tissues using 3D printing technology.

'05 OPEN-SOURCE COLLABORATION WITH 3D PRINTING

Dr. Adrian Bowyer at University of Bath founds RepRap, an open-source initiative to build a 3D printer that can print most of its own components. The vision of this project is to democratize manufacturing by cheaply distributing RepRap units to individuals everywhere, enabling them to create everyday products on their own.

'06 SLS LEADS TO MASS CUSTOMIZATION IN MANUFACTURING

The first SLS (selective laser sintering) machine becomes viable. This type of machine uses a laser to fuse materials into 3D products. This breakthrough opens the door to mass customization and on-demand manufacturing of industrial parts, and later, prostheses. That same year Objet, a 3D printing systems and materials provider, creates a machine capable of printing in multiple materials, including elastomers and polymers. The machine permits a single part to be made with a variety of densities and material properties.

'08 THE FIRST SELF- REPLICATING PRINTER

Following its launch in 2005, RepRap Project releases Darwin, the first self-replicating printer that is able to print the majority of its own components, allowing users who already have one to make more printers for their friends.

'08 DIY CO-CREATION SERVICE LAUNCHES

Shapeways launches a private beta for a new co-creation service and community allowing artists, architects and designers to make their 3D designs as physical objects inexpensively.

'08 MAJOR BREAKTHROUGH FOR PROSTHETICS

The first person walks on a 3D-printed prosthetic leg, with all parts —knee, foot, socket, etc. — printed in the same complex structure without any assembly. The development guides the creation of Bespoke Innovations, a manufacturer of prosthetic devices which makes customized coverings that surround prosthetic legs.

'09 DIY KITS FOR 3D PRINTERS ENTER THE MARKETPLACE

MakerBot Industries, an open-source hardware company for 3D printers, starts selling DIY kits that allow buyers to make their own 3D printers and products.

'09 FROM CELLS TO BLOOD VESSELS

Bioprinting innovator Organovo, relying on Dr. Gabor Forgacs's technology, uses a 3D bioprinter to print the first blood vessel.

2010s

'11 WORLD'S FIRST 3D-PRINTED ROBOTIC AIRCRAFT

Engineers at the University of Southampton design and fly the world's first 3D-printed aircraft. This unmanned aircraft is built in seven days for a budget of £5,000. 3D printing allows the plane to be built with elliptical wings, a normally expensive feature that helps improve aerodynamic efficiency and minimizes induced drag.

'11 WORLD'S FIRST 3D-PRINTED CAR

Kor Ecologic unveils Urbee, a sleek, environmentally friendly prototype car with a complete 3D-printed body at the TEDxWinnipeg conference in Canada. Designed to be fuel-efficient and inexpensive, Urbee gets 200 mpg highway and 100 mpg city. It is estimated to retail for \$10,000 to \$50,000 if it becomes commercially viable.

'11 3D PRINTING IN GOLD AND SILVER

i.materialise becomes the first 3D printing service worldwide to offer 14K gold and sterling silver as materials — potentially opening a new and less expensive manufacturing option for jewelry designers.

'12 3D-PRINTED PROSTHETIC JAW IS IMPLANTED

Doctors and engineers in the Netherlands use a 3D printer made by Layer Wise to print a customized three-dimensional prosthetic lower jaw, which is subsequently implanted into an 83-year old woman suffering from a chronic bone infection. This technology is currently being explored to promote the growth of new bone tissue.

2. Раскройте скобки, употребляя глаголы в Present, Past или Future Simple Passive.

1. My question (to answer) yesterday.
2. Hockey (to play) in winter.
3. Mushrooms (to gather) in autumn.
4. Many houses (to burn) during the Great Fire of London.
5. His new book (to finish) next year.
6. Flowers (to sell) in shops and in the streets.
7. St. Petersburg (to found) in 1703.
8. Bread (to eat) every day.
9. The letter (to receive) yesterday.
10. Nick (to send) to Moscow next week.
11. I (to ask) at the lesson yesterday.
12. I (to give) a very interesting book at the library last Friday.
13. Many houses (to build) in our town every year.
14. This work (to do) tomorrow.
15. This text (to translate) at the last lesson.

Практическое занятие № 3.

Тема: История развития 3D печати. Страдательный залог Simple.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста/презентацию. Упр. 1-4

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

HOW 3D PRINTING WORKS

3D printers work like inkjet printers. Instead of ink, 3D printers deposit the desired material in successive layers to create a physical object from a digital file.

- 1 A laser source sends a laser beam to solidify the material.
- 2 The elevator raises and lowers the platform to help lay the layers.
- 3 The vat contains the material used to create the 3D object.
- 4 The 3D object is created as parts are layered on top of each other.
- 5 Advanced 3D printers use one or more materials, including plastic, resin, titanium, polymers and even gold and silver.

INDUSTRIES

Automotive
Manufacturing

Aviation
Medical

Do-it-yourself
Jewelry

1990s

'92 BUILDING PARTS, LAYER BY LAYER

The first SLA (stereolithographic apparatus) machine is produced by 3D Systems. The machine's process involves a UV laser solidifying photopolymer, a liquid with the viscosity and color of honey that makes three-dimensional parts layer by layer. Although imperfect, the machine proves that highly complex parts can be manufactured overnight.

'99 ENGINEERED ORGANS BRING NEW ADVANCES TO MEDICINE

The first lab-grown organ is implanted in humans when young patients undergo urinary bladder augmentation using a 3-D synthetic scaffold coated with their own cells. The technology, developed by scientists at the Wake Forest Institute for Regenerative Medicine, opened the door to developing other strategies for engineering organs, including printing them. Because they are made with a patient's own cells, there is little to no risk of rejection.

2000s

'02 A WORKING 3D KIDNEY

Scientists engineer a miniature functional kidney that is able to filter blood and produce diluted urine in an animal. The development led to research at the Wake Forest Institute for Regenerative Medicine that aims to "print" organs and tissues using 3D printing technology.

'05 OPEN-SOURCE COLLABORATION WITH 3D PRINTING

Dr. Adrian Bowyer at University of Bath founds RepRap, an open-source initiative to build a 3D printer that can print most of its own components. The vision of this project is to democratize manufacturing by cheaply distributing RepRap units to individuals everywhere, enabling them to create everyday products on their own.

'06 SLS LEADS TO MASS CUSTOMIZATION IN MANUFACTURING

The first SLS (selective laser sintering) machine becomes viable. This type of machine uses a laser to fuse materials into 3D products. This breakthrough opens the door to mass customization and on-demand manufacturing of industrial parts, and later, prostheses. That same year Objet, a 3D printing systems and materials provider, creates a machine capable of printing in multiple materials, including elastomers and polymers. The machine permits a single part to be made with a variety of densities and material properties.

'08 THE FIRST SELF- REPLICATING PRINTER

Following its launch in 2005, RepRap Project releases Darwin, the first self-replicating printer that is able to print the majority of its own components, allowing users who already have one to make more printers for their friends.

'08 DIY CO-CREATION SERVICE LAUNCHES

Shapeways launches a private beta for a new co-creation service and community allowing artists, architects and designers to make their 3D designs as physical objects inexpensively.

'08 MAJOR BREAKTHROUGH FOR PROSTHETICS

The first person walks on a 3D-printed prosthetic leg, with all parts —knee, foot, socket, etc. — printed in the same complex structure without any assembly. The development guides the creation of Bespoke Innovations, a manufacturer of prosthetic devices which makes customized coverings that surround prosthetic legs.

'09 DIY KITS FOR 3D PRINTERS ENTER THE MARKETPLACE

MakerBot Industries, an open-source hardware company for 3D printers, starts selling DIY kits that allow buyers to make their own 3D printers and products.

'09 FROM CELLS TO BLOOD VESSELS

Bioprinting innovator Organovo, relying on Dr. Gabor Forgacs's technology, uses a 3D bioprinter to print the first blood vessel.

2010s

'11 WORLD'S FIRST 3D-PRINTED ROBOTIC AIRCRAFT

Engineers at the University of Southampton design and y the world's rst 3D-printed aircraft. This unmanned aircraft is built in seven days for a budget of £5,000. 3D printing allows the plane to be

built with elliptical wings, a normally expensive feature that helps improve aerodynamic efficiency and minimizes induced drag.

'11 WORLD'S FIRST 3D-PRINTED CAR

Kor Ecologic unveils Urbee, a sleek, environmentally friendly prototype car with a complete 3D-printed body at the TEDxWinnipeg conference in Canada. Designed to be fuel-efficient and inexpensive, Urbee gets 200 mpg highway and 100 mpg city. It is estimated to retail for \$10,000 to \$50,000 if it becomes commercially viable.

'11 3D PRINTING IN GOLD AND SILVER

i.materialise becomes the first 3D printing service worldwide to offer 14K gold and sterling silver as materials — potentially opening a new and less expensive manufacturing option for jewelry designers.

'12 3D-PRINTED PROSTHETIC JAW IS IMPLANTED

Doctors and engineers in the Netherlands use a 3D printer made by Layer Wise to print a customized three-dimensional prosthetic lower jaw, which is subsequently implanted into an 83-year old woman suffering from a chronic bone infection. This technology is currently being explored to promote the growth of new bone tissue.

2. Раскройте скобки, выбирая требуемую форму глагола.

1. At the station they will (meet, be met) by a man from the travel bureau.
2. She will (meet, be met) them in the hall upstairs.
3. The porter will (bring, be brought) your luggage to your room.
4. Your luggage will (bring, be brought) up in the lift.
5. You may (leave, be left) your hat and coat in the cloakroom downstairs.
6. They can (leave, be left) the key with the clerk downstairs.
7. From the station they will (take, be taken) straight to the hotel.
8. Tomorrow he will (take, be taken) them to the Russian Museum.

3. Передайте следующие предложения в Passive Voice, обращая внимание на место предлога.

E.g. We often speak of her. — She is often spoken of.

1. The senior students laughed at the freshman.
2. The group spoke to the headmistress yesterday.
3. Young mothers looked after their babies with great care.
4. Nobody lived in that old house.
5. They sent for Jim and told him to prepare a report on that subject.
6. We thought about our friend all the time.
7. The doctor will operate on him in a week.
8. The teacher sent for the pupil's parents.
9. They looked for the newspaper everywhere.
10. Nobody slept in the bed.
11. The neighbour asked for the telegram.
12. Everybody listened to the lecturer with great attention.

4. Раскройте скобки, употребляя глаголы в Active Voice или Passive Voice.

1. Nobody (to see) him yesterday.
2. The telegram (to receive) tomorrow.
3. He (to give) me this book next week.
4. The answer to this question can (to find) in the encyclopedia.
5. We (to show) the historical monuments of the capital to the delegation tomorrow.

6. You can (to find) interesting information about the life in the USA in this book.
7. Budapest (to divide) by the Danube into two parts: Buda and Pest.
8. Yuri Dolgoruki (to found) Moscow in 1147.
9. Moscow University (to found) by Lomonosov.
10. We (to call) Zhukovski the father of Russian aviation.

Практическое занятие № 4.

Тема: Технология 3D печати. Страдательный залог Continuous

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить тематический словарь к тексту. Перевести текст. Выполнить упр. 1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

Шб

Практическое занятие № 5.

Тема: Технология 3D печати. Страдательный залог Continuous

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы. Упр.1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

CURRENT 3D PRINTING TECHNOLOGIES

The starting point for any 3D printing process is a 3D digital model, which can be created using a variety of 3D software programs in industry this is 3D CAD, for Makers and Consumers there are simpler, more accessible programs available — or scanned with a 3D scanner. The model is then sliced into layers, thereby converting the design into a file readable by the 3D printer. The material processed by the 3D printer is then layered according to the design and the process. As stated, there are a number of different types of 3D printing technologies, which process different materials in different ways to create the final object. Functional plastics, metals, ceramics and sand are, now, all routinely used for industrial prototyping and production applications.

The different types of 3D printers each employ a different technology that processes different materials in different ways. It is important to understand that one of the most basic limitations of 3D printing — in terms of materials and applications — is that there is no one solution fits all. For example some 3D printers process powdered materials (nylon, plastic, ceramic, metal), which utilize a light/heat source to sinter/melt/fuse layers of the powder together in the defined shape. Others process polymer resin materials and again utilize a light/laser to solidify the resin in ultra thin layers.

Jetting of fine droplets is another 3D printing process, reminiscent of 2D inkjet printing, but with superior materials to ink and a binder to fix the layers. Perhaps the most common and easily recognized process is deposition, and this is the process employed by the majority of entry-level 3D printers. This process extrudes plastics, commonly PLA or ABS, Start with a 3D CAD file either by creating the 3D model or scanned with a 3D scanner.

Various steps involved in 3D printing technology:

1. Glass piece – This is needed for the heat bed. We don't usually ship this with our kit.
2. Power supply – You will need a 12 V power supply. This manual has full instructions on wiring a standard 12 v power supply to the printer
3. Filament – For ideal printing experience, you will need good quality filament poly carbon.

Pontefract Software

To compile and upload firmware to your arduino-based electronics, you use the arduino IDE that you can download from the arduino website, By this software we can control the printer.

Working procedure

1. First we have to design in Auto-CAD or any designing softwares.
2. After designing save the file name as .stl .
3. By using slicer software we have to convert .stl file to g-code file.
4. Now open pronterface software
5. Select the port and speed and click on connect button.
6. Now printer is online we see the display which can seen.
7. Now set the Extrusion Temperature will be 210c for ABS or 160c for PLA (Do not go above 225c)
8. Check the printer it is in good condition or not.
9. Then upload g-code file in pronterface software
10. Then click on print option
11. The 3d printer starts printing 3d object.

Maintenance of 3d Printer

1. Smooth rods should be oiled regularly with machine oil.
2. From time to time ensure that connections are firm and the nuts and bolts are not loose.
3. Ensure the printer is on a solid surface.

Applications

Industrial Design

Automotive And Aviation Industries

Architecture

Food processing

Medical Industry

Complex Structure

Advantages

Create anything with great geometrical complexity.

Ability to personalize every product with individual customer needs.

Produce products which involve great level of complexity that simply could not be produced physically in any other way. Additive manufacturing can eliminate the need for tool production and therefore reduce the costs, lead time and labour associated with it. 3D printing is an energy efficient technology.

Disadvantages

Since the technology is new, limited materials are available for printing.

Consumes more time for less complicated parts.

Size of printable object is limited by the movement of extruder.

In additive manufacturing previous layer has to harden before creating next layer.

Curved geometry will not be much accurate while printing.

2. Ответьте на вопросы:

1. What is the starting point for any 3D printing process?
2. What steps are involved in 3D printing technology?
3. What is working procedure?
4. What are advantages and disadvantages?

3. Translate into English.

1. Этим компьютером сейчас не пользуются.
2. Комнату сейчас убирают.
3. Доклад вчера слушали полчаса.
4. Ваш костюм вчера гладили 20 минут.
5. Ждут его?
6. Красили Вашу комнату долго вчера?
7. Обед готовят.
8. Пишут приглашения сейчас?
9. Мою машину вчера ремонтировали целый день.
10. Её сейчас спрашивают.

4. Поставьте предложения в the Present Continuous Passive

1. My father is washing the car.
2. Farmer Joe is milking the cows.
3. He is not wearing a tie.
4. Is she watering the flowers?

Практическое занятие № 6.

Тема: Технология 3D печати. Страдательный залог Continuous

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста/презентацию. Упр.1-3.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

CURRENT 3D PRINTING TECHNOLOGIES

The starting point for any 3D printing process is a 3D digital model, which can be created using a variety of 3D software programs in industry this is 3D CAD, for Makers and Consumers there are simpler, more accessible programs available — or scanned with a 3D scanner. The model is then sliced into layers, thereby converting the design into a file readable by the 3D printer. The material processed by the 3D printer is then layered according to the design and the process. As stated, there are a number of different types of 3D printing technologies, which process different materials in different ways to create the final object. Functional plastics, metals, ceramics and sand are, now, all routinely used for industrial prototyping and production applications.

The different types of 3D printers each employ a different technology that processes different materials in different ways. It is important to understand that one of the most basic limitations of 3D printing — in terms of materials and applications — is that there is no one solution fits all. For example some 3D printers process powdered materials (nylon, plastic, ceramic, metal), which utilize a light/heat source to sinter/melt/fuse layers of the powder together in the defined shape. Others process polymer resin materials and again utilize a light/laser to solidify the resin in ultra thin layers.

Jetting of fine droplets is another 3D printing process, reminiscent of 2D inkjet printing, but with superior materials to ink and a binder to fix the layers. Perhaps the most common and easily recognized process is deposition, and this is the process employed by the majority of entry-level 3D printers. This process extrudes plastics, commonly PLA or ABS, Start with a 3D CAD file either by creating the 3D model or scanned with a 3D scanner.

Various steps involved in 3D printing technology:

1. Glass piece – This is needed for the heat bed. We don't usually ship this with our kit.
2. Power supply – You will need a 12 V power supply. This manual has full instructions on wiring a standard 12 v power supply to the printer
3. Filament – For ideal printing experience, you will need good quality filament poly carbon.

Pontefract Software

To compile and upload firmware to your arduino-based electronics, you use the arduino IDE that you can download from the arduino website, By this software we can control the printer.

Working procedure

1. First we have to design in Auto-CAD or any designing softwares.
2. After designing save the file name as .stl .
3. By using slicer software we have to convert .stl file to g-code file.
4. Now open pronterface software
5. Select the port and speed and click on connect button.
6. Now printer is online we see the display which can seen.
7. Now set the Extrusion Temperature will be 210c for ABS or 160c for PLA (Do not go above 225c)
8. Check the printer it is in good condition or not.
9. Then upload g-code file in pronterface software
10. Then click on print option
11. The 3d printer starts printing 3d object.

Maintenance of 3d Printer

1. Smooth rods should be oiled regularly with machine oil.
2. From time to time ensure that connections are firm and the nuts and bolts are not loose.
3. Ensure the printer is on a solid surface.

Applications

Industrial Design

Automotive And Aviation Industries

Architecture

Food processing

Medical Industry

Complex Structure

Advantages

Create anything with great geometrical complexity.

Ability to personalize every product with individual customer needs.

Produce products which involve great level of complexity that simply could not be produced physically in any other way. Additive manufacturing can eliminate the need for tool production and therefore reduce the costs, lead time and labour associated with it. 3D printing is an energy efficient technology.

Disadvantages

Since the technology is new, limited materials are available for printing.

Consumes more time for less complicated parts.

Size of printable object is limited by the movement of extruder.

In additive manufacturing previous layer has to harden before creating next layer.

Curved geometry will not be much accurate while printing.

2. Ответьте на вопросы:

1. What is the starting point for any 3D printing process?
2. What steps are involved in 3D printing technology?
3. What is working procedure?
4. What are advantages and disadvantages?

3. Rewrite the sentences in passive voice.

1. Sheila is drinking a cup of tea. -
2. My father is washing the car. -
3. Farmer Joe is milking the cows. -
4. She is taking a picture of him. -
5. I am writing a poem. -
6. We are not playing football. -
7. He is not wearing a tie. -
8. Is she preparing the party? -
9. Are they talking about the meeting? -
10. Is she watering the flowers? -

Практическое занятие № 7.

Тема: Материалы, используемые в 3D печати. Подготовка к контрольной работе

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Выполнить упр. 1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1. Прочитайте и переведите текст, составьте словарь к тексту.

MATERIALS USED IN 3D PRINTING

Plastics

At the moment the majority of 3D Printers, especially the low cost systems, print using a technology called 'Fused filament fabrication (FFF)', these printers currently tend to print using one of the following materials:

PLA (Polylactic Acid) – PLA is probably the easiest material to work with when you first start 3D printing. It is an environmentally friendly material that is very safe to use, as it is a biodegradable thermoplastic that has been derived from renewable resources such as corn starch and sugar canes.

ABS (Acrylonitrile butadiene styrene) – ABS is considered to be the second easiest material to work with when you start 3D printing. It's very safe and strong, and widely used for things like car bumpers, and lego (the kids toy).

PVA (Polyvinyl Alcohol Plastic) – PVA plastic which is quite different to PVA Glue (please don't try putting PVA Glue into your 3D Printer, it definitely won't work). The popular Makerbot Replicator 2 printers use PVA plastic powders.

The higher end printers, can use various powder based materials to create 3D objects, these objects can include:

Polyamide – Which is a strong and flexible material that allows a high level of detail to be achieved. Polyamide objects are constructed from a white, very fine, granular powder.

Alumide – Is a Polyamide-like material distinctive sandy and granular look that is a rigid and strong material. Alumide objects are constructed from a blend of gray aluminum powder and polyamide, a very fine granular powder.

Multicolor – A full color material with a sandy and granular appearance. Models made out of multicolor are constructed from a fine granular powder.

Resins

Resins are also a material sometimes used in 3D Printing, although design freedom is limited due to the structure necessary to support the objects during the printing process. The following are examples of some resins that can be used:

High detail resin – Objects made out of high detail resin are constructed from a photo polymeric liquid. This material is ideal for small and/or very finely-detailed visual models, where high detail is required.

Paintable resin – Objects made out of paintable resin have a smooth surface and will look beautiful painted.

Transparent resin – Objects made out of transparent resin are constructed from a hardened liquid. The material is strong, hard, stiff, water resistant by nature, and of course, transparent. Transparent resin is suited for models needing a good, smooth, quality surface with a transparent look.

Other Materials

Titanium – Is very light and the strongest 3D printing material available. Objects made from titanium are printed using titanium powder that is sintered together by a laser.

Stainless steel – Object produced in stainless steel are 3D printed using a stainless steel powder that is infused with bronze material. Stainless steel is the cheapest form of metal printing, very strong and suitable for very large objects.

Bronze – Objects produced in bronze are 3D printed in using a bronze powder that is infused with bronze.

Bronze is an affordable and strong material for printing models in metal.

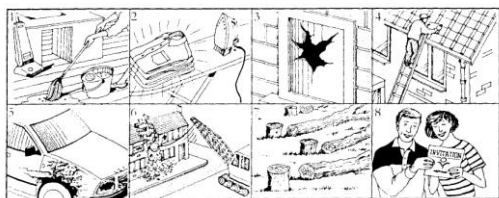
Brass, Silver, Gold – Can also be used in 3D printing, although involves printing a wax mould which is then filled with the molten material.

Ceramics – A 3D printing material that has a shiny appearance, is heat resistant, recyclable and food safe. Models made out of ceramics are constructed from alumina silica ceramic powder, then sealed with porcelain and silica and glazed. A perfect material for home decor items and tableware.

2. Вопросы для обсуждения:

Describe materials used in 3D printing. What are their benefits.

3. Опишите то, что вы видите на картинках № 1, 4, 6. Используйте *the present continuous (is/are being ...)* Образец: *The bridge is being painted at the moment.*



1. (the room / clean)
2. (the roof / repair)
4. (the houses / knock down)

4. Измените предложения и поставьте в форму *the past continuous passive (was/were being)*. Переделайте предложения из действительного в страдательный залог:

Someone is cleaning the windows. - The windows are being cleaned by someone.

1. Somebody is using a computer right now/
2. They are building a new ring road round the city.
3. Grandfather is telling the children a funny story.
4. I think, somebody is following us.

Практическое занятие № 8.

Тема: Материалы, используемые в 3D печати. Подготовка к контрольной работе.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы. Упр.1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

MATERIALS USED IN 3D PRINTING

Plastics

At the moment the majority of 3D Printers, especially the low cost systems, print using a technology called 'Fused filament fabrication (FFF)', these printers currently tend to print using one of the following materials:

PLA (Polylactic Acid) – PLA is probably the easiest material to work with when you first start 3D printing. It is an environmentally friendly material that is very safe to use, as it is a biodegradable thermoplastic that has been derived from renewable resources such as corn starch and sugar canes.

ABS (Acrylonitrile butadiene styrene) – ABS is considered to be the second easiest material to work with when you start 3D printing. It's very safe and strong, and widely used for things like car bumpers, and lego (the kids toy).

PVA (Polyvinyl Alcohol Plastic) – PVA plastic which is quite different to PVA Glue (please don't try putting PVA Glue into your 3D Printer, it definitely won't work). The popular Makerbot Replicator 2 printers use PVA plastic powders.

The higher end printers, can use various powder based materials to create 3D objects, these objects can include:

Polyamide – Which is a strong and flexible material that allows a high level of detail to be achieved. Polyamide objects are constructed from a white, very fine, granular powder.

Alumide – Is a Polyamide-like material distinctive sandy and granular look that is a rigid and strong material. Alumide objects are constructed from a blend of gray aluminum powder and polyamide, a very fine granular powder.

Multicolor – A full color material with a sandy and granular appearance. Models made out of multicolor are constructed from a fine granular powder.

Resins

Resins are also a material sometimes used in 3D Printing, although design freedom is limited due to the structure necessary to support the objects during the printing process. The following are examples of some resins that can be used:

High detail resin – Objects made out of high detail resin are constructed from a photo polymeric liquid. This material is ideal for small and/or very finely-detailed visual models, where high detail is required.

Paintable resin – Objects made out of paintable resin have a smooth surface and will look beautiful painted.

Transparent resin – Objects made out of transparent resin are constructed from a hardened liquid. The material is strong, hard, stiff, water resistant by nature, and of course, transparent. Transparent resin is suited for models needing a good, smooth, quality surface with a transparent look.

Other Materials

Titanium – Is very light and the strongest 3D printing material available. Objects made from titanium are printed using titanium powder that is sintered together by a laser.

Stainless steel – Object produced in stainless steel are 3D printed using a stainless steel powder that is infused with bronze material. Stainless steel is the cheapest form of metal printing, very strong and suitable for very large objects.

Bronze – Objects produced in bronze are 3D printed in using a bronze powder that is infused with bronze.

Bronze is an affordable and strong material for printing models in metal.

Brass, Silver, Gold – Can also be used in 3D printing, although involves printing a wax mould which is then filled with the molten material.

Ceramics – A 3D printing material that has a shiny appearance, is heat resistant, recyclable and food safe. Models made out of ceramics are constructed from alumina silica ceramic powder, then sealed with porcelain and silica and glazed. A perfect material for home decor items and tableware.

2. Вопросы для обсуждения:

Describe materials used in 3D printing. What are their benefits.

3. Present Continuous Passive or Present Simple Passive?

1. Papers (deliver) usually at 8 in the morning, they (look through) at the moment and you will get you soon.
2. Dresses (make) preferably of cotton in hot countries. This wonderful costume (make) specially for this performance now.
3. – What strange sounds!
- Oh, our piano (tune).
4. – Where is your car?
- It (fill) in the garage at the moment.
5. The witness (question) by the police-inspector now.
6. Our luggage (examine) at the customs now. Any luggage going abroad(check) usually here.
7. All the contracts (sign) by the President.
8. You can't use the fax now. It (fix).
9. Lots of people (operate on) in this clinic. And now unfortunately my uncle John (operate) on here.

4. Past Continuous Passive or Past Simple Passive?

1. Many towns (destroy) by the earthquake in Japan last year.
2. He (throw) out of class for cheating.
3. The pop singers arrived at the airport and (welcome) by thousands of fans. Flowers (throw) at them all the way to the exit.
4. The exposition (open) when we drove up to the picture gallery.

5. He couldn't go out as his suit shirt (clean).
6. The petrol tank (fill) last week.
7. The naughty boy (teach) a very good lesson by his friends.

Практическое занятие № 9.

Тема: Контрольная работа.

Цель: Контроль лексических и грамматических навыков, словарного запаса обучающихся.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

Контрольная работа

Вариант I

1. Заполните пропуски (*Present or Past Simple Passive*):

1. My parents (invite) to the party last week.
2. Our flat ... (clean) every week.
3. The local library (destroy) by a fire two years ago.
4. Dinner (serve) at 7 o'clock every evening.

2. Закончите предложения, подобрав глаголы по смыслу. Поставьте предложения в *Present или Past Simple Passive*:

damage	cause	invite	make
--------	-------	--------	------

1. Many accidents by dangerous driving.
2. Cheese from milk.
3. The roof of the building in a storm a few days ago.
4. You to the wedding. Why didn't you go?

3. Напишите предложения в пассивном залоге *Present или Past Simple Passive*:

1. Somebody cleans the room every day.
2. They cancelled all flights because of fog.
3. People don't use this road much.
4. Somebody accused me of stealing money.

4. Напишите вопросы, используя пассивный залог *Present или Past Simple Passive*. Follow the model: *What are pencils made of?*

1. Ask about glass? (how/make?)
2. Ask about television? (when/invent?)
3. Ask about mountains. (how/form?)
4. Ask about keys. (what/make from?)

Вариант II

1. Заполните пропуски (*Present or Past Simple Passive*):

1. A short story competition ... (organise) every year.
2. This ring ... (give) to me as a gift.
3. Coca Cola (drink) by millions of people around the world.
4. The telephone ... (invent) by Alexander Graham Bell.

2. Закончите предложения, подобрав глаголы по смыслу. Поставьте предложения в *Present или Past Simple Passive*:

write	see	hold	surround	translate
-------	-----	------	----------	-----------

1. A cinema is a place where films
2. In the USA elections for president every four years.
3. Originally the book in Spanish, and a few years ago it into English.
4. You can't see the house from the road. It by trees.

3. Напишите предложения в пассивном залоге *Present или Past Simple Passive*:

1. Somebody accused me of stealing money.
2. How do people learn languages?
3. Somebody warned us not to go out alone.
4. My father doesn't use the computer much.

4. Напишите вопросы, используя пассивный залог *Present или Past Simple Passive*.

Follow the model: *What are pencils made of?*

1. Ask about Pluto (*the planet*)? (when/discover?)
2. Ask about silver? (what/use for?)
3. Ask about television. (when/invent?)
4. Ask about paper. (how/make?)

Практическое занятие № 10.

Тема: Итоговое занятие.

Цель: Контроль умений и навыков практического владения английским языком.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности.

Задание: Прочитать и перевести текст, выполнить задания к тексту, ответить на вопросы, выполнить грамматические задания.

Контрольные задания к зачету

Лексические темы	Грамматические темы
1. Материалы, используемые в 3D печати	3. Страдательный залог Continuous
2. История развития 3D печати	4. Страдательный залог Simple

Вариант I

1. Прочитайте и переведите текст.

MATERIALS USED IN 3D PRINTING

Plastics

At the moment the majority of 3D Printers, especially the low cost systems, print using a technology called 'Fused filament fabrication (FFF)', these printers currently tend to print using one of the following materials:

PLA (Polylactic Acid) – PLA is probably the easiest material to work with when you first start 3D printing. It is an environmentally friendly material that is very safe to use, as it is a biodegradable thermoplastic that has been derived from renewable resources such as corn starch and sugar canes.

ABS (Acrylonitrile butadiene styrene) – ABS is considered to be the second easiest material to work with when you start 3D printing. It's very safe and strong, and widely used for things like car bumpers, and lego (the kids toy).

PVA (Polyvinyl Alcohol Plastic) – PVA plastic which is quite different to PVA Glue (please don't try putting PVA Glue into your 3D Printer, it definitely won't work). The popular Makerbot Replicator 2 printers use PVA plastic powders.

The higher end printers, can use various powder based materials to create 3D objects, these objects can include:

Polyamide – Which is a strong and flexible material that allows a high level of detail to be achieved. Polyamide objects are constructed from a white, very fine, granular powder.

Alumide – Is a Polyamide-like material distinctive sandy and granular look that is a rigid and strong material. Alumide objects are constructed from a blend of gray aluminum powder and polyamide, a very fine granular powder.

Multicolor – A full color material with a sandy and granular appearance. Models made out of multicolor are constructed from a fine granular powder.

Resins

Resins are also a material sometimes used in 3D Printing, although design freedom is limited due to the structure necessary to support the objects during the printing process. The following are examples of some resins that can be used:

High detail resin – Objects made out of high detail resin are constructed from a photo polymeric liquid. This material is ideal for small and/or very finely-detailed visual models, where high detail is required.

Paintable resin – Objects made out of paintable resin have a smooth surface and will look beautiful painted.

Transparent resin – Objects made out of transparent resin are constructed from a hardened liquid. The material is strong, hard, stiff, water resistant by nature, and of course, transparent. Transparent resin is suited for models needing a good, smooth, quality surface with a transparent look.

Other Materials

Titanium – Is very light and the strongest 3D printing material available. Objects made from titanium are printed using titanium powder that is sintered together by a laser.

Stainless steel – Object produced in stainless steel are 3D printed using a stainless steel powder that is infused with bronze material. Stainless steel is the cheapest form of metal printing, very strong and suitable for very large objects.

Bronze – Objects produced in bronze are 3D printed in using a bronze powder that is infused with bronze.

Bronze is an affordable and strong material for printing models in metal.

Brass, Silver, Gold – Can also be used in 3D printing, although involves printing a wax mould which is then filled with the molten material.

Ceramics – A 3D printing material that has a shiny appearance, is heat resistant, recyclable and food safe. Models made out of ceramics are constructed from alumina silica ceramic powder, then sealed with porcelain and silica and glazed. A perfect material for home decor items and tableware.

2. Вопросы для обсуждения:

Describe materials used in 3D printing. What are their benefits.

3. Present Continuous Passive or Present Simple Passive?

1. Papers (deliver) usually at 8 in the morning, they (look through) at the moment and you will get you soon.
2. Dresses (make) preferably of cotton in hot countries. This wonderful costume (make) specially for this performance now.
3. – What strange sounds!
- Oh, our piano (tune).
4. – Where is your car?
- It (fill) in the garage at the moment.
5. The witness (question) by the police-inspector now.
6. Our luggage (examine) at the customs now. Any luggage going abroad(check) usually here.

7. All the contracts (sign) by the President.
8. You can't use the fax now. It (fix).
9. Lots of people (operate on) in this clinic. And now unfortunately my uncle John (operate) on here.

4. Past Continuous Passive or Past Simple Passive?

1. Many towns (destroy) by the earthquake in Japan last year.
2. He (throw) out of class for cheating.
3. The pop singers arrived at the airport and (welcome) by thousands of fans. Flowers (throw) at them all the way to the exit.
4. The exposition (open) when we drove up to the picture gallery.
5. He couldn't go out as his suit shirt (clean).
6. The petrol tank (fill) last week.
7. The naughty boy (teach) a very good lesson by his friends.

Вариант II

1. Прочитайте и переведите текст.

HISTORICAL DEVELOPMENT OF 3D PRINTING

The end of the 1980s and beginning of the 1990s was the earliest time additive manufacturing was used in rapid prototyping. Prototypes offer to examine an object closely and to test it prior to production of the thing. Rapid prototyping, known as RP, suggest much quicker prototype production, often it would take several hours or days, depending on the design. In RP models are created with the help of computer-aided design, known as CAD, soft, machines following that model should define the way of creating the object. So the procedure of constructing things printing its layers is known as 3D printing.

The initiation of 3D printing took place in Massachusetts Institute of Technology and company named 3D systems. At the beginning of the 1990s MIT originated the practice they further labeled with the name 3D printing, certified as 3DP and that's how 3d printing history began. In February 2011 MIT has awarded licenses to 6 corporations and suggested 3DP for its products.

3D systems have introduced a number of 3D techniques since it was settled in 1986. Some of the technologies, like stereolithography apparatus (SLA) and selective laser sintering (SLS), have been trademarked. As 3D Systems and MIT are still the front runners in the 3D printing area, other corporations like Objet Geometries and Stratasys have introduced new technologies to the market.

Nowadays some 3D printing technologies are used to originate fulfilled, ready products. The technology is being improved through highest quality of details printed and the time required to print a detail and clean it when already printed. The time required is becoming less, the substances and appliances growing cheaper. The wider range of materials is coming into use, like ceramics or metals. The size of printers are steadily changing, becoming smaller and smaller.

Additive manufacturing, including 3D printing, are still new to the area of mass-production. AM can be compared to computer numerical controlled machining. The latter, however, is quite contrary to AM. In CNC the material is detached up to the ready product. It's more like a stone fretwork statue.

2. Ответьте на вопросы:

1. What is 3D printing? When was it settled?
2. What's the purpose of its usage?

3. Put the verbs in brackets into the Present Continuous Passive.

1. The letter _____ (write) now.
2. The oranges _____ (buy) now.
3. Sandwiches _____ (make) now.
4. The newspaper _____ (not/read) at the moment.
5. The song _____ (not/sing) now.
6. _____ the candles _____ (light) now?
7. What lecture _____ (give) now?
8. Whose report _____ (listen) to at the moment?
9. _____ the news _____ (report) at the moment?

10. _____ the interview _____ (give) now?

4. Complete the answers to the questions using the Past Continuous Passive.

1. Did she return you the CD yesterday? – No, it _____ (listen) to.
2. Why didn't you put that black shirt on? – It _____ (wash).
3. Why didn't he hear the doorbell? – The carpet _____ (vacuum).
4. Did the teacher check your test yesterday? – No, it _____ (check).
5. Did they find a solution to that problem? – No, it _____ (discuss).
6. Why didn't you try the cake? – It _____ (bake).
7. Could he take the documents yesterday? – No, they _____ (type).

**3 КУРС 6 СЕМЕСТР
КЛАССИФИКАЦИЯ АДДИТИВНЫХ ТЕХНОЛОГИЙ
Практическое занятие № 1.**

Тема: Технология FDM. Инфинитив.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Выполнить упр. 1-5.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

FDM TECHNOLOGY

Fused deposition modeling (FDM) is an additive manufacturing(AM) technology commonly used for modeling, prototyping, and production applications. It is one of the techniques used for 3D printing.

FDM works on an "additive" principle by laying down material in layers; a plastic filament or metal wire is unwound from a coil and supplies material to produce a part. Thus, FDM is also known as a solid-based AM technology.

The technology was developed by S. Scott Crump in the late 1980s and was commercialized in 1990. The exactly equivalent term, fused filament fabrication (FFF), was coined by the members of the RepRap project to give a phrase that would be legally unconstrained in its use. It is also sometimes called Plastic Jet Printing (PJP).

History

Fused deposition modeling (FDM) was developed by S. Scott Crump in the late 1980s and was commercialized in 1990 by Stratasys. With the expiration of the patent on this technology there is now a large open-source development community (called RepRap), as well as commercial and DIY variants, which utilize this type of 3D printer. This has led to two orders of magnitude price drop since this technology's creation.

Process

FDM begins with a software process which processes an STL file (stereolithography file format), mathematically slicing and orienting the model for the build process. If required, support structures may be generated. The machine may dispense multiple materials to achieve different goals: For example, one may

use one material to build up the model and use another as a soluble support structure, or one could use multiple colors of the same type of thermoplastic on the same model. The model or part is produced by extruding small flattened strings of molten material to form layers as the material hardens immediately after extrusion from the nozzle

A plastic filament or metal wire is unwound from a coil and supplies material to an extrusion nozzle which can turn the flow on and off. There is typically a worm-drive that pushes the filament into the nozzle at a controlled rate. The nozzle is heated to melt the material. The thermoplastics are heated past their glass transition temperature and are then deposited by an extrusion head.

The nozzle can be moved in both horizontal and vertical directions by a numerically controlled mechanism. The nozzle follows a tool-path controlled by a computer-aided manufacturing (CAM) software package, and the part is built from the bottom up, one layer at a time. Stepper motors or servo motors are typically employed to move the extrusion head. The mechanism used is often an X-Y-Z rectilinear design, although other mechanical designs such as deltabot have been employed.

Although as a printing technology FDM is very flexible, and it is capable of dealing with small overhangs by the support from lower layers, FDM generally has some restrictions on the slope of the overhang, and cannot produce unsupported stalactites.

During FDM, the hot molten polymer is exposed to air. Operating the FDM process within an inert gas atmosphere such as nitrogen or argon can significantly increase the layer adhesion and leads to improved mechanical properties of the 3D printed objects. An inert gas is routinely used to prevent oxidation during selective laser sintering.

Commercial applications

FDM, a prominent form of rapid prototyping, is used for prototyping and rapid manufacturing. Rapid prototyping facilitates iterative testing, and for very short runs, rapid manufacturing can be a relatively inexpensive alternative.

FDM uses the thermoplastics PLA, ABS, ABSi, polyphenylsulfone (PPSF), polycarbonate (PC), PETG and Ultem 9085, among others. These materials are used for their heat resistance properties. Ultem 9085 also exhibits fire retardancy making it suitable for aerospace and aviation applications. FDM is also used in prototyping scaffolds for medical tissue engineering application

2. Ответьте на вопросы:

1. What is FDM?
2. What principle does it work on?
3. Who developed FDM technology?
4. What is its commercial application?

3. Вставьте частицу to где это необходимо:

1. I like ... play the guitar.
2. My brother can ... speak French.
3. We had ... put on our overcoats because it was cold.
4. They wanted ... cross the river.
5. It is high time for you ... go to bed.
6. May I ... use your, telephone?
7. They heard the girl ... cry out with joy.

4. Закончите следующие предложения, выбирая подходящий инфинитив из правой колонки.

- | | |
|---|-------------|
| 1. San Francisco is a nice place __ | a. to cook |
| 2. The job of a teacher is __ students. | b. to visit |
| 3. It is very easy __ spaghetti. | c. to pay |
| 4. Sharon wants __ to the beach. | d. to teach |
| 5. I need more money __ for my books. | e. to go |

5. Заполните пропуски, используя инфинитив или спрягаемый глагол там, где это требуется.

to need — to call — to make — to help — to go

Have you ever made plans for a vacation? There are many things to do ahead of time. For example, it's important (1) __ hotel reservations. It is also essential (2) __ the airline to make sure your flights are arranged. You also (3) __ to take appropriate clothing for the climate of your destination. Sometimes, it is a good idea (4) __ to a travel agent. They can (5) __ you solve any problems related to your trip.

Практическое занятие № 2.

Тема: Технология FDM. Инфинитив.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы. Упр.1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

FDM TECHNOLOGY

Fused deposition modeling (FDM) is an additive manufacturing(AM) technology commonly used for modeling, prototyping, and production applications. It is one of the techniques used for 3D printing.

FDM works on an "additive" principle by laying down material in layers; a plastic filament or metal wire is unwound from a coil and supplies material to produce a part. Thus, FDM is also known as a solid-based AM technology.

The technology was developed by S. Scott Crump in the late 1980s and was commercialized in 1990. The exactly equivalent term, fused filament fabrication (FFF), was coined by the members of the RepRap project to give a phrase that would be legally unconstrained in its use. It is also sometimes called Plastic Jet Printing (PJP).

History

Fused deposition modeling (FDM) was developed by S. Scott Crump in the late 1980s and was commercialized in 1990 by Stratasys. With the expiration of the patent on this technology there is now a large open-source development community (called RepRap), as well as commercial and DIY variants, which utilize this type of 3D printer. This has led to two orders of magnitude price drop since this technology's creation.

Process

FDM begins with a software process which processes an STL file (stereolithography file format), mathematically slicing and orienting the model for the build process. If required, support structures may be generated. The machine may dispense multiple materials to achieve different goals: For example, one may use one material to build up the model and use another as a soluble support structure, or one could use multiple colors of the same type of thermoplastic on the same model. The model or part is produced by extruding small flattened strings of molten material to form layers as the material hardens immediately after extrusion from the nozzle

A plastic filament or metal wire is unwound from a coil and supplies material to an extrusion nozzle which can turn the flow on and off. There is typically a worm-drive that pushes the filament into the nozzle at a controlled rate. The nozzle is heated to melt the material. The thermoplastics are heated past their glass transition temperature and are then deposited by an extrusion head.

The nozzle can be moved in both horizontal and vertical directions by a numerically controlled mechanism. The nozzle follows a tool-path controlled by a computer-aided manufacturing (CAM) software package, and the part is built from the bottom up, one layer at a time. Stepper motors or servo motors are typically employed to move the extrusion head. The mechanism used is often an X-Y-Z rectilinear design, although other mechanical designs such as deltabot have been employed.

Although as a printing technology FDM is very flexible, and it is capable of dealing with small overhangs by the support from lower layers, FDM generally has some restrictions on the slope of the overhang, and cannot produce unsupported stalactites.

During FDM, the hot molten polymer is exposed to air. Operating the FDM process within an inert gas atmosphere such as nitrogen or argon can significantly increase the layer adhesion and leads to improved mechanical properties of the 3D printed objects. An inert gas is routinely used to prevent oxidation during selective laser sintering.

Commercial applications

FDM, a prominent form of rapid prototyping, is used for prototyping and rapid manufacturing. Rapid prototyping facilitates iterative testing, and for very short runs, rapid manufacturing can be a relatively inexpensive alternative.

FDM uses the thermoplastics PLA, ABS, ABSi, polyphenylsulfone (PPSF), polycarbonate (PC), PETG and Ultem 9085, among others. These materials are used for their heat resistance properties. Ultem 9085 also exhibits fire retardancy making it suitable for aerospace and aviation applications. FDM is also used in prototyping scaffolds for medical tissue engineering application

2. Ответьте на вопросы:

1. What is FDM?
2. What principle does it work on?
3. Who developed FDM technology?
4. What is its commercial application?

3. Прочитайте предложения и сопоставьте вариант перевода с оригиналом:

1. The problem <u>to be solved</u> was of great international importance.	Проблема, <u>которую надо</u> было решить, имело большое международное значение.
2. <u>To know everything</u> is to know nothing.	<u>Знать всё</u> , значит ,не знать ничего.
3. <u>To know law well</u> the students must study hard.	<u>Чтобы</u> знать хорошо право, студенты должны много заниматься..
4. <u>For international law to be developed</u> the International Law Commission was established in 1947.	<u>Чтобы</u> развивалось международное право, в 1947г. было создана Международная правовая комиссия.
5. To consider cases honestly is the duty of every judge.	Рассматривать дело честно долг каждого судьи.

4. Закончите следующие предложения по образцу.

Model: You should change your stressful way of life in order to lose your symptoms.

1. We study English in order
2. We have entered the Medical Institute in order
3. We come to England in order
4. She is working hard in order
5. I went to the polyclinic in order

Практическое занятие № 3.

Тема: Технология FDM. Инфинитив.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Пересказать текст/подготовить презентацию. Упр.1-4.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

FDM TECHNOLOGY

Fused deposition modeling (FDM) is an additive manufacturing(AM) technology commonly used for modeling, prototyping, and production applications. It is one of the techniques used for 3D printing.

FDM works on an "additive" principle by laying down material in layers; a plastic filament or metal wire is unwound from a coil and supplies material to produce a part. Thus, FDM is also known as a solid-based AM technology.

The technology was developed by S. Scott Crump in the late 1980s and was commercialized in 1990. The exactly equivalent term, fused filament fabrication (FFF), was coined by the members of the RepRap project to give a phrase that would be legally unconstrained in its use. It is also sometimes called Plastic Jet Printing (PJP).

History

Fused deposition modeling (FDM) was developed by S. Scott Crump in the late 1980s and was commercialized in 1990 by Stratasys. With the expiration of the patent on this technology there is now a large open-source development community (called RepRap), as well as commercial and DIY variants, which utilize this type of 3D printer. This has led to two orders of magnitude price drop since this technology's creation.

Process

FDM begins with a software process which processes an STL file (stereolithography file format), mathematically slicing and orienting the model for the build process. If required, support structures may be generated. The machine may dispense multiple materials to achieve different goals: For example, one may use one material to build up the model and use another as a soluble support structure, or one could use multiple colors of the same type of thermoplastic on the same model. The model or part is produced by extruding small flattened strings of molten material to form layers as the material hardens immediately after extrusion from the nozzle

A plastic filament or metal wire is unwound from a coil and supplies material to an extrusion nozzle which can turn the flow on and off. There is typically a worm-drive that pushes the filament into the nozzle at a controlled rate. The nozzle is heated to melt the material. The thermoplastics are heated past their glass transition temperature and are then deposited by an extrusion head.

The nozzle can be moved in both horizontal and vertical directions by a numerically controlled mechanism. The nozzle follows a tool-path controlled by a computer-aided manufacturing (CAM) software package, and the part is built from the bottom up, one layer at a time. Stepper motors or servo motors are typically employed to move the extrusion head. The mechanism used is often an X-Y-Z rectilinear design, although other mechanical designs such as deltabot have been employed.

Although as a printing technology FDM is very flexible, and it is capable of dealing with small overhangs by the support from lower layers, FDM generally has some restrictions on the slope of the overhang, and cannot produce unsupported stalactites.

During FDM, the hot molten polymer is exposed to air. Operating the FDM process within an inert gas atmosphere such as nitrogen or argon can significantly increase the layer adhesion and leads to improved mechanical properties of the 3D printed objects. An inert gas is routinely used to prevent oxidation during selective laser sintering.

Commercial applications

FDM, a prominent form of rapid prototyping, is used for prototyping and rapid manufacturing. Rapid prototyping facilitates iterative testing, and for very short runs, rapid manufacturing can be a relatively inexpensive alternative.

FDM uses the thermoplastics PLA, ABS, ABSi, polyphenylsulfone (PPSF), polycarbonate (PC), PETG and Ultem 9085, among others. These materials are used for their heat resistance properties. Ultem 9085 also exhibits fire retardancy making it suitable for aerospace and aviation applications. FDM is also used in prototyping scaffolds for medical tissue engineering application

2. Ответьте на вопросы:

1. What is FDM?
2. What principle does it work on?
3. Who developed FDM technology?
4. What is its commercial application?

3. Замените выделенные части предложений инфинитивными оборотами:

Образец: *The boy had many toys **which he could play with**.*

*The boy had many toys **to play with**.*

1. I have no books **which I can read**.
2. Is there anybody **who will help you with your spelling**?
3. Don't forget that she has a baby **which she must take care of**.
4. Have you got nothing **that you want to say** on this subject?
5. There was nothing **that he could do** except go home.
6. I have only a few minutes **in which I can explain these words to you**.
7. I have an examination **which I must take soon**, so I can't go the theatre with you

4. Замените придаточные предложения инфинитивными оборотами.

Пример: *He is so old that he cannot skate. — He Is too old to skate.*

1. The problem is so difficult that it is impossible to solve it.
2. The box is so heavy that nobody can carry it.
3. The baby is so little that it cannot walk.
4. He is so weak that he cannot lift this weight.
5. She is so busy that she cannot talk with you.
6. She was so inattentive that she did not notice the mistake.
7. The rule was so difficult that they did not understand it.
8. He was so stupid that he did not see the joke.
9. She has got so fat that she cannot wear this dress now.
10. The accident was so terrible that I don't want to talk about it.

Практическое занятие № 4.

Тема: Технология SLA. Инфинитив страдательного залога.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Упр. 1-4

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

SLA TECHNOLOGY

Stereolithography (SLA or SL; also known as stereolithography apparatus, optical fabrication, photo-solidification, or resin printing) is a form of 3-D printing technology used for creating models, prototypes, patterns, and production parts in a layer by layer fashion using photopolymerization, a process by which light causes chains of molecules to link, forming polymers. Those polymers then make up the body of a three-dimensional solid. Research in the area had been conducted during the 1970s, but the term was coined by Chuck Hull in 1986 when he patented the process. He then set up 3D Systems Inc to commercialize his patent. Stereolithography is used to create prototypes for products and in medical modeling, among other uses. While Stereolithography is fast and can produce almost any design, it can be expensive.

History

Stereolithography or "SLA" printing is an early and widely used 3D printing technology. Also known as additive manufacturing (a method of Rapid Prototyping), 3D printing was invented with the intent of allowing engineers to create prototypes of their designs in a more time effective manner. The technology first appeared as early as the 1970s. Japanese researcher Dr. Hideo Kodama first invented the modern layered approach to stereolithography by using ultraviolet light to cure photosensitive polymers. On July 16, 1984, three weeks before Chuck Hull filed his own patent, Alain Le Mehaute, Olivier de Witte and Jean Claude André filed a patent for the stereolithography process. The French inventors' patent application was abandoned by the French General Electric Company (now Alcatel-Alsthom) and CILAS (The Laser Consortium). Le Mehaute believes that the abandonment reflects a problem with innovation in France.

However, the term "stereolithography" was coined in 1986 by Chuck Hull. Chuck Hull patented stereolithography as a method of creating 3D objects by successively "printing" thin layers of an object using a medium curable by ultraviolet light, starting from the bottom layer to the top layer. Hull's patent described a concentrated beam of ultraviolet light focused onto the surface of a vat filled with a liquid photopolymer. The UV light beam is focused onto the surface of the liquid photopolymer, creating each

layer of the desired 3D object by means of crosslinking (or degrading a polymer). In 1986, Hull founded the world's first 3D printing company, 3D Systems Inc, which is currently based in Rock Hill, SC.

Stereolithography's success in the automotive industry allowed 3D printing to achieve industry status and the technology continues to find innovative uses in many fields of study. Attempts have been made to construct mathematical models of stereolithography processes and to design algorithms to determine whether a proposed object may be constructed using 3D printing.

Technology

Stereolithography is an additive manufacturing process that works by focusing an ultraviolet (UV) laser on to a vat of photopolymer resin. With the help of computer aided manufacturing or computer aided design software (CAM/CAD), the UV laser is used to draw a pre-programmed design or shape on to the surface of the photopolymer vat. Because photopolymers are photosensitive under ultraviolet light, the resin is solidified and forms a single layer of the desired 3D object. This process is repeated for each layer of the design until the 3D object is complete.

In models featuring an elevator apparatus, an elevator platform descends a distance equal to the thickness of a single layer of the design into the photopolymer vat. Then, a resin-filled blade sweeps across a cross section of the layer, re-coating it with fresh material. The subsequent layer is traced, joining the previous layer. A complete 3D object can be formed using this process. Designs are then immersed in a chemical bath in order to remove any excess resin and cured in an ultraviolet oven.

It is also possible to print objects "bottom up" by using a vat with a transparent bottom, and focusing the UV or deep-blue polymerization laser upward through the bottom of the vat. For example, the stereolithography machine starts a print by lowering the build platform to touch the bottom of the resin-filled vat, then moving upward the height of one layer. The UV laser then writes the bottom-most layer of the desired part upward through the transparent vat bottom, and the photopolymer hardens selectively where the laser strikes. Then the vat is "rocked", flexing and peeling the bottom of the vat away from the hardened photopolymer; the hardened material detaches from the bottom of the vat and stays attached to the rising build platform, and new liquid photopolymer flows in from the edges of the partially built part. The UV laser then writes the second-from-bottom layer and repeats the process. An advantage of this bottom-up mode is that the build volume can be much bigger than the vat itself, and only enough photopolymer is needed to keep the bottom of the build vat continuously full of photopolymer.

Stereolithography requires the use of supporting structures which attach to the elevator platform to prevent deflection due to gravity and to hold cross sections in place in order to resist lateral pressure from the resin-filled blade or retain newly created sections during the "vat rocking" of bottom-up printing. Supports are created automatically during the preparation of 3D Computer Aided Design models and can also be made manually. With more expensive stereolithography models, these supports must be removed from the finished product manually.

2. Ответьте на вопросы:

1. What is SLA?
2. What is it used for?
3. What is the technology of SLA?

3. Переведите на русский язык, обращая внимание на Active Infinitive и Passive Infinitive.

1. **To play chess** was his greatest pleasure.
2. The child did not like **to be washed**.
3. We like **to be praised** and don't like **to be scolded**.
4. Which is more pleasant: **to give presents** or **to be given presents**?
5. He was glad **to be driven home** in a car.

4. Переведите на русский язык, обращая внимание на Passive Perfect Infinitive.

1. Children were happy **to have been brought home**.
2. Jane remembered **to have been told a lot about the place**.
3. The boys were delighted **to have been brought to the circus**.
4. He was happy **to have been praised by everybody**.

She was excited **to have been taken** to the cinema.

Практическое занятие № 5.

Тема: Технология SLA. Инфинитив страдательного залога.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы. Упр.1-3

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

SLA TECHNOLOGY

Stereolithography (SLA or SL; also known as stereolithography apparatus, optical fabrication, photo-solidification, or resin printing) is a form of 3-D printing technology used for creating models, prototypes, patterns, and production parts in a layer by layer fashion using photopolymerization, a process by which light causes chains of molecules to link, forming polymers. Those polymers then make up the body of a three-dimensional solid. Research in the area had been conducted during the 1970s, but the term was coined by Chuck Hull in 1986 when he patented the process. He then set up 3D Systems Inc to commercialize his patent. Stereolithography is used to create prototypes for products and in medical modeling, among other uses. While Stereolithography is fast and can produce almost any design, it can be expensive.

History

Stereolithography or "SLA" printing is an early and widely used 3D printing technology. Also known as additive manufacturing (a method of Rapid Prototyping), 3D printing was invented with the intent of allowing engineers to create prototypes of their designs in a more time effective manner. The technology first appeared as early as the 1970s. Japanese researcher Dr. Hideo Kodama first invented the modern layered approach to stereolithography by using ultraviolet light to cure photosensitive polymers. On July 16, 1984, three weeks before Chuck Hull filed his own patent, Alain Le Mehaute, Olivier de Witte and Jean Claude André filed a patent for the stereolithography process. The French inventors' patent application was abandoned by the French General Electric Company (now Alcatel-Alsthom) and CILAS (The Laser Consortium). Le Mehaute believes that the abandonment reflects a problem with innovation in France.

However, the term "stereolithography" was coined in 1986 by Chuck Hull. Chuck Hull patented stereolithography as a method of creating 3D objects by successively "printing" thin layers of an object using a medium curable by ultraviolet light, starting from the bottom layer to the top layer. Hull's patent described a concentrated beam of ultraviolet light focused onto the surface of a vat filled with a liquid photopolymer. The UV light beam is focused onto the surface of the liquid photopolymer, creating each layer of the desired 3D object by means of crosslinking (or degrading a polymer). In 1986, Hull founded the world's first 3D printing company, 3D Systems Inc, which is currently based in Rock Hill, SC.

Stereolithography's success in the automotive industry allowed 3D printing to achieve industry status and the technology continues to find innovative uses in many fields of study. Attempts have been made to construct mathematical models of stereolithography processes and to design algorithms to determine whether a proposed object may be constructed using 3D printing.

Technology

Stereolithography is an additive manufacturing process that works by focusing an ultraviolet (UV) laser on to a vat of photopolymer resin. With the help of computer aided manufacturing or computer

aided design software (CAM/CAD), the UV laser is used to draw a pre-programmed design or shape on to the surface of the photopolymer vat. Because photopolymers are photosensitive under ultraviolet light, the resin is solidified and forms a single layer of the desired 3D object. This process is repeated for each layer of the design until the 3D object is complete.

In models featuring an elevator apparatus, an elevator platform descends a distance equal to the thickness of a single layer of the design into the photopolymer vat. Then, a resin-filled blade sweeps across a cross section of the layer, re-coating it with fresh material. The subsequent layer is traced, joining the previous layer. A complete 3D object can be formed using this process. Designs are then immersed in a chemical bath in order to remove any excess resin and cured in an ultraviolet oven.

It is also possible to print objects "bottom up" by using a vat with a transparent bottom, and focusing the UV or deep-blue polymerization laser upward through the bottom of the vat. For example, the stereolithography machine starts a print by lowering the build platform to touch the bottom of the resin-filled vat, then moving upward the height of one layer. The UV laser then writes the bottom-most layer of the desired part upward through the transparent vat bottom, and the photopolymer hardens selectively where the laser strikes. Then the vat is "rocked", flexing and peeling the bottom of the vat away from the hardened photopolymer; the hardened material detaches from the bottom of the vat and stays attached to the rising build platform, and new liquid photopolymer flows in from the edges of the partially built part. The UV laser then writes the second-from-bottom layer and repeats the process. An advantage of this bottom-up mode is that the build volume can be much bigger than the vat itself, and only enough photopolymer is needed to keep the bottom of the build vat continuously full of photopolymer.

Stereolithography requires the use of supporting structures which attach to the elevator platform to prevent deflection due to gravity and to hold cross sections in place in order to resist lateral pressure from the resin-filled blade or retain newly created sections during the "vat rocking" of bottom-up printing. Supports are created automatically during the preparation of 3D Computer Aided Design models and can also be made manually. With more expensive stereolithography models, these supports must be removed from the finished product manually.

2. Ответьте на вопросы:

1. What is SLA?
2. What is it used for?
3. What is the technology of SLA?

3. Раскройте скобки, используя формы Active & Passive Infinitive.

1. She pretended that she didn't want (to dance).
2. He is always glad (to talk) about his hobby.
3. She smiled and waved her hand. She seemed (to recognize) me.
4. The children liked (to tell) fairy tales.
5. The dog was happy (to take) out.

Практическое занятие №6.

Тема: Технология SLA. Инфинитив страдательного залога.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Прочитать и перевести текст, составить словарь к тексту, ответить на вопросы. Упр.1-3

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

SLA TECHNOLOGY **Medical modeling**

Stereolithographic model of a skull

Stereolithographic models have been used in medicine since the 1990s, for creating accurate 3D models of various anatomical regions of a patient, based on datasets from computer scans. Medical modelling involves first acquiring a CT, MRI, or other scan. This data consists of a series of cross sectional images of the human anatomy. In these images different tissues show up as different levels of grey. Selecting a range of grey values enables specific tissues to be isolated. A region of interest is then selected and all the pixels connected to the target point within that grey value range are selected. This enables a specific organ to be selected. This process is referred to as segmentation. The segmented data may then be translated into a format suitable for stereolithography. While stereolithography is normally accurate, the accuracy of a medical model depends on many factors, especially the operator performing the segmentation correctly. There are potential errors possible when making medical models using stereolithography but these can be avoided with practice and well trained operators.

Stereolithographic models are used as an aid to diagnosis, preoperative planning and implant design and manufacture. This might involve for example planning and rehearsing osteotomies. Surgeons use models to help plan surgeries but prosthetists and technologists also use models as an aid to the design and manufacture of custom-fitting implants. Medical models are frequently used to help in the construction of Cranioplasty plates for example.

Advantages and disadvantages

One of the advantages of stereolithography is its speed; functional parts can be manufactured within a day. The length of time it takes to produce a single part depends upon the complexity of the design and the size. Printing time can last anywhere from hours to more than a day. Many 3D printers can produce parts with a maximum size of approximately 50×50×60 cm and some printers, such as the Mammoth stereolithography machine are capable of producing single parts more than 2 meters in length. 3D printed prototypes and designs are strong enough to be machined and can also be used to make master patterns for injection molding, thermoforming, blow molding, and various metal casting processes.

2. Обсудите следующий вопрос:

Where are stereolithographic models used? What are their advantages and disadvantages?

3. Замените придаточные предложения инфинитивными оборотами.

Пример: *He is so old that he cannot skate. — He is too old to skate.*

1. The problem is so difficult that it is impossible to solve it.
2. The box is so heavy that nobody can carry it.
3. The baby is so little that it cannot walk.
4. He is so weak that he cannot lift this weight.
5. She is so busy that she cannot talk with you.
6. She was so inattentive that she did not notice the mistake.
7. The rule was so difficult that they did not understand it.
8. He was so stupid that he did not see the joke.
9. She has got so fat that she cannot wear this dress now.
10. The accident was so terrible that I don't want to talk about it.
11. They were so empty-headed that they could not learn a single thing.
12. The window was so dirty that they could not see through it.
13. She was so foolish that she could not understand my explanation.
14. I have very little wool: it won't make a sweater.

Практическое занятие №7.

Тема: Технология SLS. Инфинитив активного залога.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту, перевести текст. Упр.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

SLS TECHNOLOGY

Selective laser sintering (SLS) is an additive manufacturing (AM) technique that uses a laser as the power source to sinter powdered material, aiming the laser automatically at points in space defined by a 3D model, binding the material together to create a solid structure. It is similar to direct metal laser sintering (DMLS); the two are instantiations of the same concept but differ in technical details. Selective laser melting (SLM) uses a comparable concept, but in SLM the material is fully melted rather than sintered, allowing different properties. SLS (as well as the other mentioned AM techniques) is a relatively new technology that so far has mainly been used for rapid prototyping and for low-volume production of component parts.

History

Selective laser sintering (SLS) was developed and patented by Dr. Carl Deckard and academic adviser, Dr. Joe Beaman at the University of Texas at Austin in the mid-1980s.

As SLS requires the use of high-powered lasers it is often too expensive, not to mention possibly too dangerous, to use in the home. The expense and potential danger of SLS printing means that the home market for SLS printing is not as large as the market for other additive manufacturing technologies, such as Fused Deposition Modeling (FDM). There are, however, a few individuals and companies who are focusing on bringing this technology to the individual consumer. One such individual is Andreas Bastian, an engineering student from Swarthmore College, who recently developed a relatively low-cost SLS printer capable of creating objects from wax or carbon. Another option for at home SLS printing is the Focus SLS printer.

Technology

An additive manufacturing layer technology, SLS involves the use of a high power laser (for example, a carbon dioxide laser) to fuse small particles of plastic, metal, ceramic, or glass powders into a mass that has a desired three-dimensional shape. The laser selectively fuses powdered material by scanning cross-sections generated from a 3-D digital description of the part (for example from a CAD file or scan data) on the surface of a powder bed. After each cross-section is scanned, the powder bed is lowered by one layer thickness, a new layer of material is applied on top, and the process is repeated until the part is completed.

Because finished part density depends on peak laser power, rather than laser duration, a SLS machine typically uses a pulsed laser. The SLS machine preheats the bulk powder material in the powder bed somewhat below its melting point, to make it easier for the laser to raise the temperature of the selected regions the rest of the way to the melting point.

In contrast with some other additive manufacturing processes, such as stereolithography (SLA) and fused deposition modeling (FDM), which most often require special support structures to fabricate overhanging designs, SLS does not need a separate feeder for support material because the part being constructed is surrounded by unsintered powder at all times, this allows for the construction of previously impossible geometries. One design aspect which should be observed however is that with SLS it is 'impossible' to fabricate a hollow but fully enclosed element. This is because the unsintered powder within the element can't be drained.

Since patents have started to expire, affordable home printers have become possible, but the heating process is still an obstacle, with a power consumption of up to 5 kW and temperatures having to be controlled within 2 °C for the three stages of preheating, melting and storing before removal.

2. Ответьте на вопросы:

1. What is SLS? When was it developed?
2. What is the technology of SLS?

Практическое занятие №8.

Тема: Технология SLS. Инфинитив активного залога.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответьте на вопросы. Упр.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

SLS TECHNOLOGY

Selective laser sintering (SLS) is an additive manufacturing (AM) technique that uses a laser as the power source to sinter powdered material, aiming the laser automatically at points in space defined by a 3D model, binding the material together to create a solid structure. It is similar to direct metal laser sintering (DMLS); the two are instantiations of the same concept but differ in technical details. Selective laser melting (SLM) uses a comparable concept, but in SLM the material is fully melted rather than sintered, allowing different properties. SLS (as well as the other mentioned AM techniques) is a relatively new technology that so far has mainly been used for rapid prototyping and for low-volume production of component parts.

History

Selective laser sintering (SLS) was developed and patented by Dr. Carl Deckard and academic adviser, Dr. Joe Beaman at the University of Texas at Austin in the mid-1980s.

As SLS requires the use of high-powered lasers it is often too expensive, not to mention possibly too dangerous, to use in the home. The expense and potential danger of SLS printing means that the home market for SLS printing is not as large as the market for other additive manufacturing technologies, such as Fused Deposition Modeling (FDM). There are, however, a few individuals and companies who are focusing on bringing this technology to the individual consumer. One such individual is Andreas Bastian, an engineering student from Swarthmore College, who recently developed a relatively low-cost SLS printer capable of creating objects from wax or carbon. Another option for at home SLS printing is the Focus SLS printer.

Technology

An additive manufacturing layer technology, SLS involves the use of a high power laser (for example, a carbon dioxide laser) to fuse small particles of plastic, metal, ceramic, or glass powders into a mass that has a desired three-dimensional shape. The laser selectively fuses powdered material by scanning cross-sections generated from a 3-D digital description of the part (for example from a CAD file or scan data) on the surface of a powder bed. After each cross-section is scanned, the powder bed is lowered by one layer thickness, a new layer of material is applied on top, and the process is repeated until the part is completed.

Because finished part density depends on peak laser power, rather than laser duration, a SLS machine typically uses a pulsed laser. The SLS machine preheats the bulk powder material in the powder bed somewhat below its melting point, to make it easier for the laser to raise the temperature of the selected regions the rest of the way to the melting point.

In contrast with some other additive manufacturing processes, such as stereolithography (SLA) and fused deposition modeling (FDM), which most often require special support structures to fabricate overhanging designs, SLS does not need a separate feeder for support material because the part being constructed is surrounded by unsintered powder at all times, this allows for the construction of previously

impossible geometries. One design aspect which should be observed however is that with SLS it is 'impossible' to fabricate a hollow but fully enclosed element. This is because the unsintered powder within the element can't be drained.

Since patents have started to expire, affordable home printers have become possible, but the heating process is still an obstacle, with a power consumption of up to 5 kW and temperatures having to be controlled within 2 °C for the three stages of preheating, melting and storing before removal.

2. Ответьте на вопросы:

1. What is SLS? When was it developed?
2. What is the technology of SLS?

Практическое занятие № 9.

Тема: Технология SLS. Инфинитив активного залога

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составьте словарь к тексту, прочитайте и переведите текст. Упр.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

SLS TECHNOLOGY Materials and applications

Some SLS machines use single-component powder, such as direct metal laser sintering. Powders are commonly produced by ball milling. However, most SLS machines use two-component powders, typically either coated powder or a powder mixture. In single-component powders, the laser melts only the outer surface of the particles (surface melting), fusing the solid non-melted cores to each other and to the previous layer.

Compared with other methods of additive manufacturing, SLS can produce parts from a relatively wide range of commercially available powder materials. These include polymers such as nylon or polystyrene, metals including steel, titanium, alloy mixtures, and composites and green sand. The physical process can be full melting, partial melting, or liquid-phase sintering. Depending on the material, up to 100% density can be achieved with material properties comparable to those from conventional manufacturing methods. In many cases large numbers of parts can be packed within the powder bed, allowing very high productivity.

SLS technology is in wide use around the world due to its ability to easily make very complex geometries directly from digital CAD data. While it began as a way to build prototype parts early in the design cycle, it is increasingly being used in limited-run manufacturing to produce end-use parts. One less expected and rapidly growing application of SLS is its use in art.

Because SLS can produce parts made from a wide variety of materials (plastics, glass, ceramics, or metals), it is quickly becoming a popular process for creating prototypes, and even final products. SLS has been increasingly utilized in industry in situations where small quantities of high quality parts are needed, such as in the aerospace industry, where SLS is being used more often to create prototypes for aircraft. Aircraft are often built in small quantities and stay in service for decades, so producing physical molds for parts becomes non cost effective, so SLS has become an excellent solution.

Advantages

A distinct advantage of the SLS process is that because it is fully self-supporting, it allows for parts to be built within other parts in a process called nesting – with highly complex geometry that simply could not be constructed any other way.

Parts possess high strength and stiffness

Good chemical resistance

Various finishing possibilities (e.g., metallization, stove enameling, vibratory grinding, tub coloring, bonding, powder, coating, flocking).

Complex parts with interior components, channels, can be built without trapping the material inside and altering the surface from support removal.

Fastest additive manufacturing process for printing functional, durable, prototypes or end user parts.

Vast variety of materials and characteristics of Strength, durability, and functionality, SLS offers Nylon based materials as a solution depending on the application.

Due to the excellent mechanical properties the material is often used to substitute typical injection molding plastics.

Disadvantages

SLS printed parts have surface porosity. Such porosity can be sealed by applying sealant such as cyanoacrylate.

2. Обсудите следующие вопросы:

What is SLS technology applied? What is its advantages and disadvantages?

Практическое занятие № 10.

Тема: Технология DMLS. Сложное дополнение

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Упр.1-4

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

DMLS TECHNOLOGY

Direct metal laser sintering (DMLS) is an additive manufacturing metal fabrication technology, occasionally referred to as selective laser sintering (SLS) or selective laser melting (SLM), that generates metal prototypes and tools directly from computer aided design (CAD) data.

DMLS uses a variety of alloys, allowing prototypes to be functional hardware made out of the same material as production components. Since the components are built layer by layer, it is possible to design organic geometries, internal features and challenging passages that could not be cast or otherwise machined. DMLS produces strong, durable metal parts that work well as both functional prototypes or end-use production parts.

The DMLS process begins with a 3D CAD model whereby a STL file is created and sent to the machine's computer program. A technician works with this 3D model to properly orient the geometry for part building and adds supports structure as appropriate. Once this "build file" has been completed, it is "sliced" into the layer thickness the machine will build in and downloaded to the DMLS machine allowing the build to begin. The DMLS machine uses a high-powered optic laser. Inside the build chamber area, there is a material dispensing platform and a build platform along with a recoater blade used to move new powder over the build platform. The technology fuses metal powder into a solid part by melting it locally using the focused laser beam. Parts are built up additively layer by layer, typically using layers 20 micrometers thick.

Benefits

DMLS has many benefits over traditional manufacturing techniques. The ability to quickly produce a unique part is the most obvious because no special tooling is required and parts can be built in a matter of hours. Additionally, DMLS allows for more rigorous testing of prototypes. Since DMLS can use most alloys, prototypes can now be functional hardware made out of the same material as production components.

DMLS is also one of the few additive manufacturing technologies being used in production. Since the components are built layer by layer, it is possible to design internal features and passages that could not be cast or otherwise machined. Complex geometries and assemblies with multiple components can be simplified to fewer parts with a more cost effective assembly. DMLS does not require special tooling like castings, so it is convenient for short production runs.

2. Ответьте на вопросы:

1. What is DMLS?
2. What does it produce?
3. What are the benefits of using DMLS?

3. Раскройте скобки, используя сложное дополнение. Переведите.

1. I want (she) to be my wife.
2. My brother taught (I) to swim and dive.
3. They would like (we) to read aloud.
4. Bob advised (she) to stay for another week.
5. We expect (he) to arrive at noon.
6. I heard (you) open the door.
7. Dad always makes (I) go fishing with him every weekend.
8. Our parents expect (we) to stop quarreling.
9. Sara never lets (he) drive her car.
10. I saw (you) cross the street.

4. Поставьте «to» там, где необходимо.

1. We heard the lorry ... stop near the house.
2. I want my elder sister ... take me to the zoo.
3. I believe the Internet ... be the greatest invention ever.
4. The teacher doesn't let us ... use our mobile phones.
5. They didn't expect her ... be late.
6. The police officer made him ... tell the truth.
7. I would like you ... admit your fault.
8. Swan believes Vicky ... be the best manager in our store.
9. Nick persuaded me ... go in for sports.
10. We saw Jacob ... break the window.
11. I consider this sculpture ... be a masterpiece.
12. She noticed Mary suddenly ... turn pale.

Практическое занятие №11.

Тема: Технология DMLS.Сложное дополнение

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы. Упр.1-4

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1.Прочитайте и переведите текст, составьте словарь к тексту.

DMLS TECHNOLOGY

Direct metal laser sintering (DMLS) is an additive manufacturing metal fabrication technology, occasionally referred to as selective laser sintering (SLS) or selective laser melting (SLM), that generates metal prototypes and tools directly from computer aided design (CAD) data.

DMLS uses a variety of alloys, allowing prototypes to be functional hardware made out of the same material as production components. Since the components are built layer by layer, it is possible to design organic geometries, internal features and challenging passages that could not be cast or otherwise machined. DMLS produces strong, durable metal parts that work well as both functional prototypes or end-use production parts.

The DMLS process begins with a 3D CAD model whereby a STL file is created and sent to the machine's computer program. A technician works with this 3D model to properly orient the geometry for part building and adds supports structure as appropriate. Once this "build file" has been completed, it is "sliced" into the layer thickness the machine will build in and downloaded to the DMLS machine allowing

the build to begin. The DMLS machine uses a high-powered optic laser. Inside the build chamber area, there is a material dispensing platform and a build platform along with a recoater blade used to move new powder over the build platform. The technology fuses metal powder into a solid part by melting it locally using the focused laser beam. Parts are built up additively layer by layer, typically using layers 20 micrometers thick.

Benefits

DMLS has many benefits over traditional manufacturing techniques. The ability to quickly produce a unique part is the most obvious because no special tooling is required and parts can be built in a matter of hours. Additionally, DMLS allows for more rigorous testing of prototypes. Since DMLS can use most alloys, prototypes can now be functional hardware made out of the same material as production components.

DMLS is also one of the few additive manufacturing technologies being used in production. Since the components are built layer by layer, it is possible to design internal features and passages that could not be cast or otherwise machined. Complex geometries and assemblies with multiple components can be simplified to fewer parts with a more cost effective assembly. DMLS does not require special tooling like castings, so it is convenient for short production runs.

2. Ответьте на вопросы:

1. What is DMLS?
2. What does it produce?
3. What are the benefits of using DMLS?

3. Перефразируйте предложения, используя сложное дополнение.

Пример: I want that she will cook mushroom soup. – I want her to cook mushroom soup.

1. The children were laughing and enjoying themselves on the beach. Their parents saw them. – Their parents saw
2. They said: "He is an expert in our industry." – They consider
3. The bike disappeared in the forest. The policeman noticed it. – The policeman noticed
4. Elvis said to his son: "Don't watch horror films." – Elvis doesn't let
5. "Mummy, please, buy me that doll", said the little girl. – The little girl would like
6. Dad says that I can travel to China with you. – Dad allows
7. He swears a lot. Many people heard that. – Many people heard
8. "Bring me some water from the well," my grandmother said. – My grandmother wanted
9. Somebody was watching me. I felt that. – I felt
10. Daniel said: "Helen, you can go to a night club tonight." – Daniel let

4. Поставьте глагол в правильной форме: -ing, infinitive with or without to (с окончанием -ing, инфинитивом с частицей to или без частицы to).

1. The film was very sad. It made me (cry)
2. Have you got enough money or do you want me you some. (lend)
3. I heard her the door and (open, go out)
4. She told him the door. (lock)
5. I saw him the ducks. (feed)

Практическое занятие №12.

Тема: Технология DMLS. Сложное дополнение

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Прочитать, перевести текст, составить вопросы к тексту. Упр.1-3

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст.

DMLS TECHNOLOGY

Applications

Industry Applications

Aerospace - Air ducts, fixtures or mountings holding specific aeronautic instruments, laser-sintering fits both the needs of commercial and military aerospace.

Manufacturing - Laser-sintering can serve niche markets with low volumes at competitive costs. Laser-sintering is independent of economies of scale, this liberates you from focusing on batch size optimization.

Medical - Medical devices are complex, high value products. They have to meet customer requirements exactly. These requirements do not only stem from the operator's personal preferences: legal requirements or norms that differ widely between regions also have to be complied with. This leads to a multitude of varieties and thus small volumes of the variants offered.

Prototyping - Laser-sintering can help by making design and functional prototypes available. As a result, functional testing can be initiated quickly and flexibly. At the same time, these prototypes can be used to gauge potential customer acceptance.

Tooling - The direct process eliminates tool-path generation and multiple machining processes such as EDM. Tool inserts are built overnight or even in just a few hours. Also the freedom of design can be used to optimize tool performance, for example by integrating conformal cooling channels into the tool.

This technology is used to manufacture direct parts for a variety of industries including aerospace, dental, medical and other industries that have small to medium size, highly complex parts and the tooling industry to make direct tooling inserts. DMLS is a very cost and time effective technology. The technology is used both for rapid prototyping, as it decreases development time for new products, and production manufacturing as a cost saving method to simplify assemblies and complex geometries.

2. Замените дополнение, выраженное существительным, на местоимение в объектном падеже.

1. We expected Tom to be late.
2. I wouldn't recommend my friends to stay in that hotel.
3. I saw Mary take the pen out of the pocket.
4. I asked my friend to help me.
5. Jane's parents wouldn't let their daughter go out alone.

3. Переведите предложения на английский язык, используя конструкцию Complex Object.

1. Я хочу, чтобы ты знал об этом.
2. Я сказал Алану идти домой.
3. Они пригласили его погостить у них несколько дней.
4. Она не хотела, чтобы я ушел.
5. Я слышал, как она играет на пианино.

Практическое занятие № 13.

Тема: Технология LOM.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Выполнить упр.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

LOM TECHNOLOGY

Laminated object manufacturing (LOM) is a rapid prototyping system developed by Helisys Inc. In it, layers of adhesive-coated paper, plastic, or metal laminates are successively glued together and cut to shape with a knife or laser cutter. Objects printed with this technique may be additionally modified by

machining or drilling after printing. Typical layer resolution for this process is defined by the material feedstock and usually ranges in thickness from one to a few sheets of copy paper.

The process is performed as follows:

Sheet is adhered to a substrate with a heated roller.

Laser traces desired dimensions of prototype.

Laser cross hatches non-part area to facilitate waste removal.

Platform with completed layer moves down out of the way.

Fresh sheet of material is rolled into position.

Platform downs into new position to receive next layer.

The process is repeated.

Laminated Object Manufacturing is a very fast and inexpensive way to 3D print objects in several kinds of materials. Sheets are bonded together and cut in the right geometry according to the 3D model. Laminated Object Manufacturing is mainly used for prototyping, not for production.

Principle

In the LOM technology, the layered material is rolled on the building platform. Usually the material is coated with an adhesive layer and the feeding roller heats in order to melt the adhesive. The layer is then glued to the previous one. A blade or a laser is used to draw the geometry of the object to build and draw crosses on the rest of the surface to facilitate the extraction of the final objects. At the end, the building platform contains a block composed of the final objects and the parallelepipoids that are to be withdrawn.

Materials

This technology is very versatile as almost any material can be glued. The more common material used is paper as it is easily cut. Plastic can also be used, using a blade or a laser during the cutting stage. Metallic sheets are more unusual because the cutting stage is more complicated.

Particularities

This is a very simple process making it easy to use, cheap and fast. The printing precision depends on the layer thickness and thus depends on the material. Compared to other technologies, it is not considered as very precise. The withdrawal of the support parallelepipoids is an exhausting and critical task that can lead to damaged objects.

Application

LOM machines are used mainly for rapid prototyping plastic parts. Its low price and fastness makes it convenient to make prototypes, even though the produced objects are far from end-use parts.

2. Ответьте на вопросы:

1. What is LOM?
2. What are the steps of LOM technology?
3. What is the principle of LOM technology? Where is it applied?

Практическое занятие № 14.

Тема: Технология LOM.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

LOM TECHNOLOGY

Laminated object manufacturing (LOM) is a rapid prototyping system developed by Helisys Inc. In it, layers of adhesive-coated paper, plastic, or metal laminates are successively glued together and cut to shape with a knife or laser cutter. Objects printed with this technique may be additionally modified by machining or drilling after printing. Typical layer resolution for this process is defined by the material feedstock and usually ranges in thickness from one to a few sheets of copy paper.

The process is performed as follows:

Sheet is adhered to a substrate with a heated roller.

Laser traces desired dimensions of prototype.
Laser cross hatches non-part area to facilitate waste removal.
Platform with completed layer moves down out of the way.
Fresh sheet of material is rolled into position.
Platform downs into new position to receive next layer.
The process is repeated.

Laminated Object Manufacturing is a very fast and inexpensive way to 3D print objects in several kinds of materials. Sheets are bonded together and cut in the right geometry according to the 3D model. Laminated Object Manufacturing is mainly used for prototyping, not for production.

Principle

In the LOM technology, the layered material is rolled on the building platform . Usually the material is coated with an adhesive layer and the feeding roller heats in order to melt the adhesive. The layer is then glued to the previous one. A blade or a laser is used to draw the geometry of the object to build and draw crosses on the rest of the surface to facilitate the extraction of the final objects. At the end, the building platform contains a block composed of the final objects and the parallelepipoids that are to be withdrawn.

Materials

This technology is very versatile as almost any material can be glued. The more common material used is paper as it is easily cut. Plastic can also be used, using a blade or a laser during the cutting stage. Metallic sheets are more unusual because the cutting stage is more complicated.

Particularities

This is a very simple process making it easy to use, cheap and fast. The printing precision depends on the layer thickness and thus depends on the material. Compared to other technologies, it is not considered as very precise. The withdrawal of the support parallelepipoids is an exhausting and critical task that can lead to damaged objects.

Application

LOM machines are used mainly for rapid prototyping plastic parts. Its low price and fastness makes it convenient to make prototypes, even though the produced objects are far from end-use parts.

2. Ответьте на вопросы:

1. What is LOM?
2. What are the steps of LOM technology?
3. What is the principle of LOM technology? Where is it applied?

Практическое занятие № 15.

Тема: Технология LOM.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста. Упр.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

LOM TECHNOLOGY

Laminated object manufacturing (LOM) is a rapid prototyping system developed by Helisys Inc. In it, layers of adhesive-coated paper, plastic, or metal laminates are successively glued together and cut to shape with a knife or laser cutter. Objects printed with this technique may be additionally modified by machining or drilling after printing. Typical layer resolution for this process is defined by the material feedstock and usually ranges in thickness from one to a few sheets of copy paper.

The process is performed as follows:

Sheet is adhered to a substrate with a heated roller.
Laser traces desired dimensions of prototype.
Laser cross hatches non-part area to facilitate waste removal.
Platform with completed layer moves down out of the way.
Fresh sheet of material is rolled into position.

Platform downs into new position to receive next layer.

The process is repeated.

Laminated Object Manufacturing is a very fast and inexpensive way to 3D print objects in several kinds of materials. Sheets are bonded together and cut in the right geometry according to the 3D model. Laminated Object Manufacturing is mainly used for prototyping, not for production.

Principle

In the LOM technology, the layered material is rolled on the building platform . Usually the material is coated with an adhesive layer and the feeding roller heats in order to melt the adhesive. The layer is then glued to the previous one. A blade or a laser is used to draw the geometry of the object to build and draw crosses on the rest of the surface to facilitate the extraction of the final objects. At the end, the building platform contains a block composed of the final objects and the parallelepipoids that are to be withdrawn.

Materials

This technology is very versatile as almost any material can be glued. The more common material used is paper as it is easily cut. Plastic can also be used, using a blade or a laser during the cutting stage. Metallic sheets are more unusual because the cutting stage is more complicated.

Particularities

This is a very simple process making it easy to use, cheap and fast. The printing precision depends on the layer thickness and thus depends on the material. Compared to other technologies, it is not considered as very precise. The withdrawal of the support parallelepipoids is an exhausting and critical task that can lead to damaged objects.

Application

LOM machines are used mainly for rapid proptotyping plastic parts. Its low price and fastness makes it convenient to make prototypes, even though the produced objects are far from end-use parts.

2. Ответьте на вопросы:

1. What is LOM?
2. What are the steps of LOM technology?
3. What is the principle of LOM technology? Where is it applied?

Практическое занятие № 16.

Тема: Технология SGC. Сложное подлежащее

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Выполнить упр. 1-4

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

SGC TECHNOLOGY

Solid ground curing (SGC) is a photo-polymer-based additive manufacturing (or 3D printing) technology used for producing models, prototypes, patterns, and production parts, in which the production of the layer geometry is carried out by means of a high-powered UV lamp through a mask. As the basis of solid ground curing is the exposure of each layer of the model by means of a lamp through a mask, the processing time for the generation of a layer is independent of the complexity of the layer. SGC was developed and commercialized by Cubital Ltd. of Israel in 1986 in the alternative name of Solider System. While the method offered good accuracy and a very high fabrication rate, it suffered from high acquisition and operating costs due to system complexity. This led to poor market acceptance. While the company still exists, systems are no longer being sold. Nevertheless, it's still an interesting example of the many technologies other than stereolithography, its predeceasing rapid prototyping process that also utilizes photo-polymer materials.

Technology

Solid ground curing utilizes the general process of hardening of photopolymers by a complete lighting and hardening of the entire surface, using specially prepared masks. In SGC process, each layer of the prototype is cured by exposing to an ultra violet (UV) lamp instead of by laser scanning. So that, every portion in a layer are simultaneously cured and do not require any post-curing processes.

The process contains the following steps.

The cross section of each slice layer is calculated based on the geometric model of the part and the desired layer thickness.

The optical mask is generated conforming to each cross section.

After leveling, the platform is covered with a thin layer of liquid photopolymer.

The mask corresponding to the current layer is positioned over the surface of the liquid resin, and the resin is exposed to a high-power UV lamp.

The residual liquid is removed from the workpiece by an aerodynamic wiper.

A layer of melted wax is spread over the workpiece to fill voids. The wax is then solidified by applying a cold plate to it.

The layer surface is trimmed to the desired thickness by a milling disk.

The current workpiece is covered with a thin layer of liquid polymer and step 4 to 7 are repeated for each succeeding upper layer until the topmost layer has been processed.

The wax is melted away upon completion of the part.

Advantages and disadvantages

The primary advantage of the solid ground curing system is that it does not require a support structure since wax is used to fill the voids. The model produced by SGC process is comparatively accurate in the Z-direction because the layer is milled after each light-exposure process. Although it offers good accuracy coupled with high throughput, it produces too much waste and its operating costs are comparatively high due to system complexity

2. Ответьте на вопросы:

1. What is SGC? What is its technology?
2. What are the steps of SGC technology?
3. What are its advantages and disadvantages?

3. Найдите в предложениях оборот “сложное подлежащее с инфинитивом”. Переведите предложения на русский язык.

1. The President is believed to be in London now. 2. She is supposed to be an experienced secretary. 3. The computer is expected to save the scientists a lot of time. 4. The material loss (материальный ущерб) was estimated to be more than 1 mln dollars. 5. This discovery is considered to be the result of a long and thorough investigation. 6. These phenomena are believed to be interdependent. 7. The expedition is reported to be moving north. 8. This man is said to be a good psychologist. 9. The talks are reported to be in progress. 10. The head of the expedition was held responsible for the accident.

4. Замените сложно-подчиненные предложения на простые, используя оборот “сложное подлежащее с инфинитивом”.

Образец: It is said that he is a good student.

He is said to be a good student.

1. It is known that they will arrive tomorrow.
2. It is expected that the conference will take place in Kiev.
3. It is hoped that the new edition of this book will be of no less interest to the reader.
4. It will be noticed that these poems are of quite a different character.
5. It has been shown in the above examples that the sense of the sentence often depends on the order of words.
6. It is sometimes said that the Nile is longer than all the rivers in the eastern and western hemispheres.
7. It will be seen from the following tables that the sounds do not coincide in quality.

8. It was thought useful to apply this method here.
9. It has been estimated that the volume contained 220 pages.
- 10 It is known that dreams reflect our waking life.

Практическое занятие № 17.

Тема: Технология SGC. Сложное подлежащее

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы. Повторить лексический и грамматический материал. Подготовиться к контрольной работе.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1.Прочитайте и переведите текст, составьте словарь к тексту.

SGC TECHNOLOGY

Solid ground curing (SGC) is a photo-polymer-based additive manufacturing (or 3D printing) technology used for producing models, prototypes, patterns, and production parts, in which the production of the layer geometry is carried out by means of a high-powered UV lamp through a mask. As the basis of solid ground curing is the exposure of each layer of the model by means of a lamp through a mask, the processing time for the generation of a layer is independent of the complexity of the layer. SGC was developed and commercialized by Cubital Ltd. of Israel in 1986 in the alternative name of Solider System. While the method offered good accuracy and a very high fabrication rate, it suffered from high acquisition and operating costs due to system complexity. This led to poor market acceptance. While the company still exists, systems are no longer being sold. Nevertheless, it's still an interesting example of the many technologies other than stereolithography, its predeceasing rapid prototyping process that also utilizes photo-polymer materials.

Technology

Solid ground curing utilizes the general process of hardening of photopolymers by a complete lighting and hardening of the entire surface, using specially prepared masks. In SGC process, each layer of the prototype is cured by exposing to an ultra violet (UV) lamp instead of by laser scanning. So that, every portion in a layer are simultaneously cured and do not require any post-curing processes.

The process contains the following steps.

The cross section of each slice layer is calculated based on the geometric model of the part and the desired layer thickness.

The optical mask is generated conforming to each cross section.

After leveling, the platform is covered with a thin layer of liquid photopolymer.

The mask corresponding to the current layer is positioned over the surface of the liquid resin, and the resin is exposed to a high-power UV lamp.

The residual liquid is removed from the workpiece by an aerodynamic wiper.

A layer of melted wax is spread over the workpiece to fill voids. The wax is then solidified by applying a cold plate to it.

The layer surface is trimmed to the desired thickness by a milling disk.

The current workpiece is covered with a thin layer of liquid polymer and step 4 to 7 are repeated for each succeeding upper layer until the topmost layer has been processed.

The wax is melted away upon completion of the part.

Advantages and disadvantages

The primary advantage of the solid ground curing system is that it does not require a support structure since wax is used to fill the voids. The model produced by SGC process is comparatively accurate

in the Z-direction because the layer is milled after each light-exposure process. Although it offers good accuracy coupled with high throughput, it produces too much waste and its operating costs are comparatively high due to system complexity

2. Ответьте на вопросы:

1. What is SGC? What is its technology?
2. What are the steps of SGC technology?
3. What are its advantages and disadvantages?

3. Переведите и найдите complex subject.

1. She is supposed to have been taken to hospital.
2. Things are sure to get better.
3. The book is bound to be remembered.
4. Some emotion seemed to be torturing him.
5. He seems to notice nothing unusual.
6. I happened to be standing at the window.
7. The picture proved to have been stolen.

4. Раскройте скобки

1. She smiled broadly and waved her hand. She seemed (to recognize) me.
2. Even if he is out you needn't worry. He is sure (to leave) the key under the door-mat.
3. At that time I happened (to work) at my first novel.
4. You won't be likely (to miss) the train if you start right away.
5. Don't cry! Everything is bound (to get) right between you.
6. She lost her head and seemed (to forget) the little English she knew.
7. A young woman is supposed (to write) this book.
8. You needn't mention it again. He is not likely (to forget) it.
9. He is believed (to teach) by his father.
- 10 You needn't tell me this. I happen (to give) all the details by Mother.

Практическое занятие № 18.

Тема: Контрольная работа.

Цель: Контроль лексических и грамматических навыков, словарного запаса обучающихся.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

Тест

1. Выберите нужную форму инфинитива или причастия
We can't help laughing looking at them
a) не можем не смеяться
b) не можем не улыбаться
c) не можем не насмеяться
2. Выберите нужную форму инфинитива или причастия
They were happy ... in our expedition
a) take part
b) to take part
c) be taking
d) to taken part
3. Выберите нужную форму инфинитива Simple Active or Passive:
The letter was ... at once.
a) to send
b) to sent
c) sended

- d) to be sent
4. Измените местоимение в общем падеже на местоимение в объективном падеже:
He made (we) do the work again.
5. Отметьте правильные ответы
Укажите номера предложений, где необходимо поставить частицу -to- перед инфинитивом:
- 1) I like ... play the piano.
 - 2) They wanted to cross the river.
 - 3) He did want... play in the street.
 - 4) I shall ...do all.
 - 5) I saw him ... enter the room.
 - 6) She was planning ... do a lot of things yesterday.
 - 7) Do you like ... listen to good music?
 - 8) Her brother can ... speak French.
 - 9) It is time ... go to bed.
 - 10) May I ... use your telephone?
6. Выберите правильный вариант перевода предложения:
She heard him open the door.
- a) она слышала, как он отпирал дверь
 - b) она услышала его шаги
 - c) она слышит, как он открывает дверь
7. Выберите нужную форму инфинитива Simple Active or Passive:
Mother was too tired to ... supper
- a) to cook
 - b) to be cook
 - c) to be cooked
 - d) to be cooking
8. Выберите правильный вариант перевода предложения:
He made us do the work again.
- a) он попросил нас сделать работу
 - b) он заставил нас сделать работу снова
 - c) он заставляет нас сделать работу снова
9. Измените местоимение в общем падеже на местоимение в объективном падеже:
I would like (you) to offer Pete your help.
10. Выберите правильный вариант перевода предложения:
I would like you to offer Pete your help.
- a) мне бы хотелось помочь Петру
 - b) мне нравится помогать Петру
 - c) мне бы хотелось, чтобы вы предложили Петру свою помощь
11. Выберите нужную форму инфинитива или причастия
He made me ... it. .
- a) did
 - b) do
 - c) to do
 - d) doing
12. Измените местоимение в общем падеже на местоимение в объективном падеже:
Let (he) smoke here.
13. Выберите нужную форму инфинитива Simple Active or Passive:
He was the first ... to the finish.
- a) to came
 - b) to come
 - c) to be come

- d) to have been come
14. Выберите нужную форму инфинитива или причастия
It's very different ... a car in a big city
- a) driven
 - b) drove
 - c) to be driven
 - d) to drive
15. Выберите нужную форму инфинитива Simple Active or Passive:
They were happy ... at home.
- a) to leave
 - b) to be leave
 - c) to be left
 - d) to leaving
16. Выберите нужную форму инфинитива Simple Active or Passive:
I have come here to ... to you.
- a) to be talked
 - b) to talk
 - c) to talked
 - d) to be talking
17. Выберите нужную форму инфинитива или причастия
Would you like me ... now?
- a) read
 - b) to read
 - c) to reading
18. Выберите нужную форму инфинитива или причастия
I let him ... late
- a) go
 - b) going
 - c) went
 - d) to go
19. Измените местоимение в общем падеже на местоимение в объектном падеже:
I want (he) to go to food fair.
20. Измените местоимение в общем падеже на местоимение в объектном падеже:
He would like (she) to play with him.
21. Выберите правильный вариант перевода предложения:
We expect him to sign the contract on Monday.
- a) мы рассчитываем подписать контракт в понедельник
 - b) мы хотим, чтобы он подписал контракт в понедельник
 - c) мы ожидаем, что он подпишет контракт в понедельник
22. Измените местоимение в общем падеже на местоимение в объектном падеже:
We expect (he) to do It.
23. Выберите нужную форму инфинитива или причастия
The child wanted ... seriously
- a) to be taken
 - b) to take
 - c) to took
 - d) to be take
24. Измените местоимение в общем падеже на местоимение в объектном падеже:
Let (we) read.
25. Измените местоимение в общем падеже на местоимение в объектном падеже:

- Bad weather made (they) return home.
26. Выберите правильный вариант перевода предложения:
They would like us to learn English.
- им нравится учить английский
 - они хотели бы, чтобы мы учили английский
 - они любят учить нас английскому
27. Выберите правильный вариант перевода предложения:
Let him smoke.
- пусть он курит
 - пусть она курит
 - заставьте его курить
28. Выберите правильный вариант перевода предложения:
She saw the postman climbing up the stairs.
- она видела почтальона
 - она видела, как почтальон поднимался по лестнице

Практическое занятие № 19.

Тема: Дифференцированный зачет.

Цель: Контроль умений и навыков практического владения английским языком

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

Контрольные задания к дифференцированному зачету

Лексические темы	Грамматические темы
1. Технология DMLS	3.Инфинитив
2. Технология SLS	4.Сложное дополнение

Вариант I

1.Прочитайте и переведите текст.

DMLS TECHNOLOGY

Direct metal laser sintering (DMLS) is an additive manufacturing metal fabrication technology, occasionally referred to as selective laser sintering (SLS) or selective laser melting (SLM), that generates metal prototypes and tools directly from computer aided design (CAD) data.

DMLS uses a variety of alloys, allowing prototypes to be functional hardware made out of the same material as production components. Since the components are built layer by layer, it is possible to design organic geometries, internal features and challenging passages that could not be cast or otherwise machined. DMLS produces strong, durable metal parts that work well as both functional prototypes or end-use production parts.

The DMLS process begins with a 3D CAD model whereby a STL file is created and sent to the machine's computer program. A technician works with this 3D model to properly orient the geometry for part building and adds supports structure as appropriate. Once this "build file" has been completed, it is "sliced" into the layer thickness the machine will build in and downloaded to the DMLS machine allowing the build to begin. The DMLS machine uses a high-powered optic laser. Inside the build chamber area, there is a material dispensing platform and a build platform along with a recoater blade used to move new powder over the build platform. The technology fuses metal powder into a solid part by melting it locally using the focused laser beam. Parts are built up additively layer by layer, typically using layers 20 micrometers thick.

Benefits

DMLS has many benefits over traditional manufacturing techniques. The ability to quickly produce a unique part is the most obvious because no special tooling is required and parts can be built in a matter of hours. Additionally, DMLS allows for more rigorous testing of prototypes. Since DMLS can use most alloys, prototypes can now be functional hardware made out of the same material as production components.

DMLS is also one of the few additive manufacturing technologies being used in production. Since the components are built layer by layer, it is possible to design internal features and passages that could not be cast or otherwise machined. Complex geometries and assemblies with multiple components can be simplified to fewer parts with a more cost effective assembly. DMLS does not require special tooling like castings, so it is convenient for short production runs.

2. Ответьте на вопросы:

1. What is DMLS?
2. What does it produce?
3. What are the benefits of using DMLS?

3. Вставьте частицу to где это необходимо:

1. I like ... play the guitar.
2. My brother can ... speak French.
3. We had ... put on our overcoats because it was cold.
4. They wanted ... cross the river.
5. It is high time for you ... go to bed.
6. May I ... use your, telephone?
7. They heard the girl ... cry out with joy.

4. Замените выделенные части предложений инфинитивными оборотами:

Образец: *The boy had many toys **which he could play with**.*

*The boys had many toys **to play with**.*

1. I have no books **which I can read**.
2. Is there anybody **who will help you with your spelling**?
3. Don't forget that she has a baby **which she must take care of**.
4. Have you got nothing **that you want to say** on this subject?
5. There was nothing **that he could do** except go home.
6. I have only a few minutes **in which I can explain these words to you**.
7. I have an examination **which I must take soon**, so I can't go the theatre with you

Вариант II

1. Прочитайте и переведите текст.

SLS TECHNOLOGY

Selective laser sintering (SLS) is an additive manufacturing (AM) technique that uses a laser as the power source to sinter powdered material, aiming the laser automatically at points in space defined by a 3D model, binding the material together to create a solid structure. It is similar to direct metal laser sintering (DMLS); the two are instantiations of the same concept but differ in technical details. Selective laser melting (SLM) uses a comparable concept, but in SLM the material is fully melted rather than sintered, allowing different properties. SLS (as well as the other mentioned AM techniques) is a relatively new technology that so far has mainly been used for rapid prototyping and for low-volume production of component parts.

History

Selective laser sintering (SLS) was developed and patented by Dr. Carl Deckard and academic adviser, Dr. Joe Beaman at the University of Texas at Austin in the mid-1980s.

As SLS requires the use of high-powered lasers it is often too expensive, not to mention possibly too dangerous, to use in the home. The expense and potential danger of SLS printing means that the home market for SLS printing is not as large as the market for other additive manufacturing technologies, such as Fused Deposition Modeling (FDM). There are, however, a few individuals and companies who are focusing on bringing this technology to the individual consumer. One such individual is Andreas Bastian, an engineering student from Swarthmore College, who recently developed a relatively low-cost SLS printer capable of creating objects from wax or carbon. Another option for at home SLS printing is the Focus SLS printer.

Technology

An additive manufacturing layer technology, SLS involves the use of a high power laser (for example, a carbon dioxide laser) to fuse small particles of plastic, metal, ceramic, or glass powders into a mass that has a desired three-dimensional shape. The laser selectively fuses powdered material by scanning cross-sections generated from a 3-D digital description of the part (for example from a CAD file or scan data) on the surface of a powder bed. After each cross-section is scanned, the powder bed is lowered by one layer thickness, a new layer of material is applied on top, and the process is repeated until the part is completed.

Because finished part density depends on peak laser power, rather than laser duration, a SLS machine typically uses a pulsed laser. The SLS machine preheats the bulk powder material in the powder bed somewhat below its melting point, to make it easier for the laser to raise the temperature of the selected regions the rest of the way to the melting point.

In contrast with some other additive manufacturing processes, such as stereolithography (SLA) and fused deposition modeling (FDM), which most often require special support structures to fabricate overhanging designs, SLS does not need a separate feeder for support material because the part being constructed is surrounded by unsintered powder at all times, this allows for the construction of previously impossible geometries. One design aspect which should be observed however is that with SLS it is 'impossible' to fabricate a hollow but fully enclosed element. This is because the unsintered powder within the element can't be drained.

Since patents have started to expire, affordable home printers have become possible, but the heating process is still an obstacle, with a power consumption of up to 5 kW and temperatures having to be controlled within 2 °C for the three stages of preheating, melting and storing before removal.

2. Ответьте на вопросы:

1. What is SLS? When was it developed?
2. What is the technology of SLS?

3. Переведите на русский язык:

1. Everybody expected her to marry Nick.
2. I would-like them to come as soon as possible.
3. I expect you t join us.
4. I don't want to see you in this company
5. We would like you to visit us.
6. I hate you to play the piano.
7. My mother wants me to study better.

4. Перефразируйте предложения по образцу:

Образец: The boy was playing football in the yard (see).

We saw the boy play football in the yard.

1. They came back at once (make).
2. You must do it yourself (want).
3. The boy said something in a low voice (hear).
4. She is waiting for Mary (believe).
5. He is a very talented actor (know).
6. My son is going to become a surgeon (want).
7. The girl was singing a very lovely song (hear).

4 КУРС 7 СЕМЕСТР ПРОГРАММНОЕ ОБЕСПЕЧЕНИЕ

Практическое занятие № 1.

Тема: Программное обеспечение в аддитивном производстве. Причастие I.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Упр.1-4

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1.Прочитайте и переведите текст, составьте словарь к тексту.

ADDITIVE MANUFACTURING SOFTWARE

Additive manufacturing software is a critical part of the additive manufacturing process. The process starts with a design that often utilizes CAD software to create a digital representation of the part. In some cases, the process may start with a 3-D scan. While the design and use of CAD software is a significant step, it is beyond the scope of the additive manufacturing process. Some CAD software is designed specifically for the additive manufacturing process and should be considered. Once a CAD design has been developed, this data must be processed into a form the printer recognizes. Before the interpretation of the CAD data can happen, it must be determined that the part is physically possible and is also capable of being printed on the desired printer. If the design is not printable, then software for fixing it may be used as well. After the design has been generated and checked, this needs to be converted into a language the machine understands. The most common file type is called G-code and the tool that does this conversion is usually called a slicer. After the slicer software is done, this is sent to the machine for manufacturing. In some cases, host software for the manufacturing machine is required and in other cases the machine can read the file directly. The machine also has software running on its own specialized hardware, which has various levels of functionality depending on the machine.

Features

Other software that may also be used are a mesh maker, a repair tool and or editor, and a viewer to review the file before manufacturing. Software for other more specialized functions also exist.

At each of the stages in the design and development, various decisions need to be made. In an ideal situation, the design done in CAD is exactly what the end result will be. In many cases, this can be achieved, but often requires some additional accommodations that depend on the machine being used. Various considerations need to be made to manufacture a part. One common decision is about support

material, some machines such as those with a powder bed do not require any support when printing as the powder provides the necessary support. Other machines such as FDM or SLA type will require support material as they can't print in thin air. Many other decisions such as material type resolution and size will also need to be made before manufacturing.

2. Ответьте на вопросы:

1. What does additive manufacturing software start with?
2. What is the principle of additive manufacturing software operation?
3. What are the features of additive manufacturing software?

3. Переведите на русский язык, обращая внимание на причастия настоящего времени.

1. The girl standing at the window is my sister.
2. Having been sent to the wrong address the letter didn't reach him.
3. He sat in the arm-chair thinking.
4. She came up to us breathing heavily.
5. The hall was full of laughing people.
6. The singing girl was about fourteen.
7. Having read the book I gave it to Pete.
8. The large building being built in our street is a new school – house.
9. Having finished the experiment the students left the laboratory.
10. Being busy, he postponed his trip.

4. Выберите из скобок требующуюся форму Причастия I:

1. a) The girl (writing, written) on the blackboard is our best pupil.
b) Everything (writing, written) here is quite right.
2. a) The house (surrounding, surrounded) by tall trees is very beautiful.
b) The wall (surrounding, surrounded) the house was very high.
3. a) Who is that boy (doing, done) his homework at that table?
b) The exercises (doing, done) by the pupils were easy.
4. a) The girl (washing, washed) the floor is my sister.
b) The floor (washing, washed) by Helen looked very clean.

Практическое занятие № 2.

Тема: Программное обеспечение в аддитивном производстве. Причастие I.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы. Упр.1-4

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

ADDITIVE MANUFACTURING SOFTWARE

Additive manufacturing software is a critical part of the additive manufacturing process. The process starts with a design that often utilizes CAD software to create a digital representation of the part. In some cases, the process may start with a 3-D scan. While the design and use of CAD software is a significant step, it is beyond the scope of the additive manufacturing process. Some CAD software is designed specifically for the additive manufacturing process and should be considered. Once a CAD design has been developed, this data must be processed into a form the printer recognizes. Before the interpretation of the CAD data can happen, it must be determined that the part is physically possible and is also capable of being printed on the desired printer. If the design is not printable, then software for fixing it may be used as well. After the design has been generated and checked, this needs to be converted into a

language the machine understands. The most common file type is called G-code and the tool that does this conversion is usually called a slicer. After the slicer software is done, this is sent to the machine for manufacturing. In some cases, host software for the manufacturing machine is required and in other cases the machine can read the file directly. The machine also has software running on its own specialized hardware, which has various levels of functionality depending on the machine.

Features

Other software that may also be used are a mesh maker, a repair tool and or editor, and a viewer to review the file before manufacturing. Software for other more specialized functions also exist.

At each of the stages in the design and development, various decisions need to be made. In an ideal situation, the design done in CAD is exactly what the end result will be. In many cases, this can be achieved, but often requires some additional accommodations that depend on the machine being used. Various considerations need to be made to manufacture a part. One common decision is about support material, some machines such as those with a powder bed do not require any support when printing as the powder provides the necessary support. Other machines such as FDM or SLA type will require support material as they can't print in thin air. Many other decisions such as material type resolution and size will also need to be made before manufacturing.

2. Ответьте на вопросы:

1. What does additive manufacturing software start with?
2. What is the principle of additive manufacturing software operation?
3. What are the features of additive manufacturing software?

3. Раскройте скобки, употребив причастие настоящего времени в активной и пассивной форме.

1. (To impress) by the film, they kept silent.
2. (To lose) the book, the student couldn't remember the topic.
3. He spent the whole day (to read) a book.
4. (To travel) around America for a month, she returned to England.
5. He watched Mike (to go) out of the door and (to cross) the street.
6. The question (to discuss) now is very important.
7. (To pack) in the beautiful box the flowers looked very lovely.
8. (To descent) the mountains, they heard a man calling for help.
9. (To reject) by everybody he became a monk.
10. (To show) the wrong direction, the travelers soon lost their way.

4. Раскройте скобки, употребив Indefinite или Perfect Participle I. Переведите.

1. (To write) out all the words, I started to learn them.
2. (To buy) food, they left supermarket.
3. (to bark) dog doesn't bite.
4. She entered the room (to smile).
5. (To drink) coffee she was talking to her friend.
6. (To find) the keys, we were able to open the door.
7. (To make) the report, Tom left the room.
8. (To see) her he raised his hat.
9. My task (to finish), I went to bed.
10. While (to learn) the pronunciation of the words we learned their meaning.

Практическое занятие № 3.

Тема: Программное обеспечение в аддитивном производстве. Причастие I.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста. Выполнить упр. 1-3

1. Прочитайте и переведите текст, составьте словарь к тексту.

ADDITIVE MANUFACTURING SOFTWARE

Additive manufacturing software is a critical part of the additive manufacturing process. The process starts with a design that often utilizes CAD software to create a digital representation of the part. In some cases, the process may start with a 3-D scan. While the design and use of CAD software is a significant step, it is beyond the scope of the additive manufacturing process. Some CAD software is designed specifically for the additive manufacturing process and should be considered. Once a CAD design has been developed, this data must be processed into a form the printer recognizes. Before the interpretation of the CAD data can happen, it must be determined that the part is physically possible and is also capable of being printed on the desired printer. If the design is not printable, then software for fixing it may be used as well. After the design has been generated and checked, this needs to be converted into a language the machine understands. The most common file type is called G-code and the tool that does this conversion is usually called a slicer. After the slicer software is done, this is sent to the machine for manufacturing. In some cases, host software for the manufacturing machine is required and in other cases the machine can read the file directly. The machine also has software running on its own specialized hardware, which has various levels of functionality depending on the machine.

Features

Other software that may also be used are a mesh maker, a repair tool and or editor, and a viewer to review the file before manufacturing. Software for other more specialized functions also exist.

At each of the stages in the design and development, various decisions need to be made. In an ideal situation, the design done in CAD is exactly what the end result will be. In many cases, this can be achieved, but often requires some additional accommodations that depend on the machine being used. Various considerations need to be made to manufacture a part. One common decision is about support material, some machines such as those with a powder bed do not require any support when printing as the powder provides the necessary support. Other machines such as FDM or SLA type will require support material as they can't print in thin air. Many other decisions such as material type resolution and size will also need to be made before manufacturing.

2. Ответьте на вопросы:

1. What does additive manufacturing software start with?
2. What is the principle of additive manufacturing software operation?
3. What are the features of additive manufacturing software?

3. Замените придаточные определительные предложения причастными оборотами:

Образец: All the people who live in this house are students.

All the people living in this house are students.

1. The woman who is speaking now is our secretary.
2. The apparatus that stands on the table in the corner of the laboratory is quite new.
3. The young man who helps the professor in his experiments studies at an evening school for laboratory workers.
4. People who take books from the library must return them in time.
5. There are many pupils in our class who take part in all kinds of extra-curricular activities.

Практическое занятие № 4.

Тема: Типы программного обеспечения. Причастие II

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст. Упр. 1-4

1. Прочитайте и переведите текст, составьте словарь к тексту.

TYPES OF SOFTWARE

CAD—Computer aided design software is an important part of the design aspect of additive manufacturing and is often the starting point. CAD software comes in many different forms with some of them being better suited for additive manufacturing. The basics of CAD start with drawing the design with specific dimensions and turning it into a 3-D model. CAD is a very useful engineering design tool and is often used where exact dimensions and tolerance is important.

Modeling and sculpting software—This software is based more around an artistic process, although it can be used with precise measurements. Modeling software takes its inspiration from an artistic process like sculpting to allow users to create a finished design. Often, precise measurements are not important as much as the finished look is, such as in designing a cartoon character or action figure.

Customizing software—This software is not always standalone software, although it sometimes can be used as an app or it may be part of a larger design package. Customizers allow you to take a design and easily customize an element of it. An example might be a customizer for jewelry where a user can modify the base design or add engraving to it.

Mesh software—A mesh is a grid of polygons put together in a mesh to make a larger more complex shape. This is a wireframe type design of a 3-D design. True curves are difficult to represent in a digital format so instead a number of small flat surfaces are used. The greater number of small flat areas, the closer to a true curve the design will be. Mesh software allows a user to edit, create, or otherwise utilize the mesh framework of a design. An example use might be to take a scan output in the form of a point cloud (a series of points that represent a shape) and utilize that to create a mesh type design.

Slicer software—This software originates from Stereolithography, although it is often used for any additive manufacturing machine that builds its part in layers. This applies to fused filament machines as well as Stereolithography. It could also apply to laser sintering and melting type machines as well as other types. The slicer takes a digital model and performs calculations on it. The calculations virtually slice the object into a number of layers that are turned into the necessary machine pathways needed to create that object. This information is outputted in a format that the machine can understand most often in gcode. The resulting output file is a list of movements for each motor and heater in the printer, this allows the printer to simply play the file without requiring much computing power. The slicer software also allows for some decisions in the print. One critical decision made at this stage is the resolution of the part. This determines how fine the layers are. This software will allow for supports to be added to the design if they are required. It may also allow for additional considerations like how the part is adhered to the printing surface. Other options may also be available such as reorienting the part or resizing it. The goal is to enable a user to find the best way to manufacture the part on the machine such that it matches the original design and meets the criteria.

Viewer software—Viewing software allows a user to virtually view the object to be printed. While the object can be viewed in CAD software, it may look slightly different after being prepared for printing. Viewing software will recreate what the part will look like based on the files being sent to the printer. This way, a user can see exactly what changes have been made, the supports added, or other changes various software made for printing. Viewing software is a way to verify what will be printed before it gets manufactured.

Checker—This is software that ensures your design is physically printable and doesn't have any errors that will cause it to be unprintable or have an issue during printing. A common problem with scanned objects is to not have a closed shape. This often occurs if the scanner can't see all sides of the object. In a design, all the surfaces must create a whole shape. Take for example a simple rectangular solid. In the design of this solid shape, the thickness is determined by the top and bottom wall of the rectangle. If one of those sides has a hole in it, then the shape is incomplete. This is different than having a shape like a hollow box, which is really made up of six thinner solid rectangular shapes. This problem may seem trivial in reality as it is impossible to have a hole that goes to nothing in a real-world shape. In a virtual design, it is something that needs to be verified before manufacturing. Software such as repair or checking software will handle this by looking for any open surfaces and offer to repair them.

Repair—This software often works with checker software to repair issues that would cause a print to be unprintable. Repair and checking software look for problems in a design that will cause it to be unprintable. Some shapes can be represented in a virtual environment that will not work in the physical one. Depending on how the design was created, it may not require this. Scanned parts will often have flaws that need to be repaired. Often, the repair is semi-automated so it can fix the issues with only a little interaction from the user.

Editor—This is software for editing the code being sent to the printer. Typically, the code has a format with commands for the motors and heaters. It is possible to understand and to make minor adjustments such as the temperature or speed by directly editing the code.

Conversion software—This software allows you to convert between various formats used in the additive manufacturing process. Examples might be a conversion between a mesh to an STL file. Other conversions may convert between different cad outputs such as an OBJ object file and STL.

Additive manufacturing machine firmware—This is machine specific software that runs on dedicated hardware that is specific to each machine. Many machines share similar hardware and can utilize the same firmware, which have settings that can be adjusted for each machine. The firmware of the machine can perform various functions but vary by machine. Some machine firmware can read a file directly and control the machine without the need of a host computer. Other machine firmware may require a direct connection to a host, while some machines can be controlled over a network interface.

Server—This allows a machine to be used on a network. Some server software may also allow for functions such as slicing and preview or incorporate other software into it. Server software allows for a machine to be run from a remote location or allows a machine to be used without a dedicated computer.

2. Обсудите вопрос:

Discuss the types of software. What is their principle?

3. Переведите на русский язык, обращая внимание на причастие прошедшего времени.

1. He doesn't like boiled milk.
2. I remember well his words said at the meeting.
3. We don't like the book bought last week.
4. The stolen things were returned to the owner.
5. Asked about this event, he replied nothing.
6. The explanation given was not complete.
7. When burnt, coal produces heat.
8. The results received were of great importance for the further work.
9. When reconstructed the theatre looked more beautiful than before.
10. She showed us a list of the newly published books.

4. Раскройте скобки, употребив причастие прошедшего времени. Переведите.

1. The letter (to write) by him was very long.
2. We are interested in the goods (to produce) by this factory.
3. She didn't understand the word (to say) by him.
4. He didn't see the things (to keep) in her box.
5. I don't like the video (to buy) yesterday.
6. This is the house (to build) many years ago.
7. The question (to put) to the professor was important.
8. When (to offer) to work abroad, he refused.
9. The article on agriculture (to publish) in this magazine was written by Smith.
10. You can get the book (to recommend) by our teacher in the library.

Практическое занятие №5.

Тема: Типы программного обеспечения. Причастие II

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Ответить на вопросы. Упр.1-3

1. Прочитайте и переведите текст, составьте словарь к тексту.

TYPES OF SOFTWARE

CAD—Computer aided design software is an important part of the design aspect of additive manufacturing and is often the starting point. CAD software comes in many different forms with some of them being better suited for additive manufacturing. The basics of CAD start with drawing the design with specific dimensions and turning it into a 3-D model. CAD is a very useful engineering design tool and is often used where exact dimensions and tolerance is important.

Modeling and sculpting software—This software is based more around an artistic process, although it can be used with precise measurements. Modeling software takes its inspiration from an artistic process like sculpting to allow users to create a finished design. Often, precise measurements are not important as much as the finished look is, such as in designing a cartoon character or action figure.

Customizing software—This software is not always standalone software, although it sometimes can be used as an app or it may be part of a larger design package. Customizers allow you to take a design and easily customize an element of it. An example might be a customizer for jewelry where a user can modify the base design or add engraving to it.

Mesh software—A mesh is a grid of polygons put together in a mesh to make a larger more complex shape. This is a wireframe type design of a 3-D design. True curves are difficult to represent in a digital format so instead a number of small flat surfaces are used. The greater number of small flat areas, the closer to a true curve the design will be. Mesh software allows a user to edit, create, or otherwise utilize the mesh framework of a design. An example use might be to take a scan output in the form of a point cloud (a series of points that represent a shape) and utilize that to create a mesh type design.

Slicer software—This software originates from Stereolithography, although it is often used for any additive manufacturing machine that builds its part in layers. This applies to fused filament machines as well as Stereolithography. It could also apply to laser sintering and melting type machines as well as other types. The slicer takes a digital model and performs calculations on it. The calculations virtually slice the object into a number of layers that are turned into the necessary machine pathways needed to create that object. This information is outputted in a format that the machine can understand most often in gcode. The resulting output file is a list of movements for each motor and heater in the printer, this allows the printer to simply play the file without requiring much computing power. The slicer software also allows for some decisions in the print. One critical decision made at this stage is the resolution of the part. This determines how fine the layers are. This software will allow for supports to be added to the design if they are required. It may also allow for additional considerations like how the part is adhered to the printing surface. Other options may also be available such as reorienting the part or resizing it. The goal is to enable a user to find the best way to manufacture the part on the machine such that it matches the original design and meets the criteria.

Viewer software—Viewing software allows a user to virtually view the object to be printed. While the object can be viewed in CAD software, it may look slightly different after being prepared for printing. Viewing software will recreate what the part will look like based on the files being sent to the printer. This way, a user can see exactly what changes have been made, the supports added, or other changes various software made for printing. Viewing software is a way to verify what will be printed before it gets manufactured.

Checker—This is software that ensures your design is physically printable and doesn't have any errors that will cause it to be unprintable or have an issue during printing. A common problem with scanned objects is to not have a closed shape. This often occurs if the scanner can't see all sides of the object. In a design, all the surfaces must create a whole shape. Take for example a simple rectangular solid. In the design of this solid shape, the thickness is determined by the top and bottom wall of the rectangle. If one of those sides has a hole in it, then the shape is incomplete. This is different than having a shape like a hollow box, which is really made up of six thinner solid rectangular shapes. This problem may seem trivial in reality as it is impossible to have a hole that goes to nothing in a real-world shape. In a virtual design, it is something that needs to be verified before manufacturing. Software such as repair or checking software will handle this by looking for any open surfaces and offer to repair them.

Repair—This software often works with checker software to repair issues that would cause a print to be unprintable. Repair and checking software look for problems in a design that will cause it to be unprintable. Some shapes can be represented in a virtual environment that will not work in the physical one. Depending on how the design was created, it may not require this. Scanned parts will often have flaws that need to be repaired. Often, the repair is semi-automated so it can fix the issues with only a little interaction from the user.

Editor—This is software for editing the code being sent to the printer. Typically, the code has a format with commands for the motors and heaters. It is possible to understand and to make minor adjustments such as the temperature or speed by directly editing the code.

Conversion software—This software allows you to convert between various formats used in the additive manufacturing process. Examples might be a conversion between a mesh to an STL file. Other conversions may convert between different cad outputs such as an OBJ object file and STL.

Additive manufacturing machine firmware—This is machine specific software that runs on dedicated hardware that is specific to each machine. Many machines share similar hardware and can utilize the same firmware, which have settings that can be adjusted for each machine. The firmware of the machine can perform various functions but vary by machine. Some machine firmware can read a file directly and control the machine without the need of a host computer. Other machine firmware may require a direct connection to a host, while some machines can be controlled over a network interface.

Server—This allows a machine to be used on a network. Some server software may also allow for functions such as slicing and preview or incorporate other software into it. Server software allows for a machine to be run from a remote location or allows a machine to be used without a dedicated computer.

2. Обсудите вопрос:

Discuss the types of software. What is their principle?

3. Выберите правильную форму и вставьте в предложение.

1. interesting/interested

This exercise is _____.

2. exciting/excited

On Christmas Eve, many children are so _____ that they stay up all night.

3. annoying/annoyed

My friend has a very _____ habit.

4. tiring/tired

I had such a _____ day I went straight to bed.

5. relaxing/relaxed

We were _____ after our holidays.

6. disgusting/disgusted

Their hamburgers are _____.

7. satisfying/satisfied

I'm not _____ with my job.

8. boring/bored

George always talks about the same things, he is so _____.

9. disappointing/disappointed

I like this actor but the film was _____.

10. confusing/confused

English grammar can be _____.

Практическое занятие №6.

Тема: Типы программного обеспечения. Причастие II

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Подготовить пересказ текста/презентацию. Упр.1-4

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту.

TYPES OF SOFTWARE

CAD—Computer aided design software is an important part of the design aspect of additive manufacturing and is often the starting point. CAD software comes in many different forms with some of them being better suited for additive manufacturing. The basics of CAD start with drawing the design with specific dimensions and turning it into a 3-D model. CAD is a very useful engineering design tool and is often used where exact dimensions and tolerance is important.

Modeling and sculpting software—This software is based more around an artistic process, although it can be used with precise measurements. Modeling software takes its inspiration from an artistic process like sculpting to allow users to create a finished design. Often, precise measurements are not important as much as the finished look is, such as in designing a cartoon character or action figure.

Customizing software—This software is not always standalone software, although it sometimes can be used as an app or it may be part of a larger design package. Customizers allow you to take a design and easily customize an element of it. An example might be a customizer for jewelry where a user can modify the base design or add engraving to it.

Mesh software—A mesh is a grid of polygons put together in a mesh to make a larger more complex shape. This is a wireframe type design of a 3-D design. True curves are difficult to represent in a digital format so instead a number of small flat surfaces are used. The greater number of small flat areas, the closer to a true curve the design will be. Mesh software allows a user to edit, create, or otherwise utilize the mesh framework of a design. An example use might be to take a scan output in the form of a point cloud (a series of points that represent a shape) and utilize that to create a mesh type design.

Slicer software—This software originates from Stereolithography, although it is often used for any additive manufacturing machine that builds its part in layers. This applies to fused filament machines as well as Stereolithography. It could also apply to laser sintering and melting type machines as well as other types. The slicer takes a digital model and performs calculations on it. The calculations virtually slice the object into a number of layers that are turned into the necessary machine pathways needed to create that object. This information is outputted in a format that the machine can understand most often in gcode. The resulting output file is a list of movements for each motor and heater in the printer, this allows the printer to simply play the file without requiring much computing power. The slicer software also allows for some decisions in the print. One critical decision made at this stage is the resolution of the part. This determines how fine the layers are. This software will allow for supports to be added to the design if they are required. It may also allow for additional considerations like how the part is adhered to the printing surface. Other options may also be available such as reorienting the part or resizing it. The goal is to enable a user to find the best way to manufacture the part on the machine such that it matches the original design and meets the criteria.

Viewer software—Viewing software allows a user to virtually view the object to be printed. While the object can be viewed in CAD software, it may look slightly different after being prepared for printing. Viewing software will recreate what the part will look like based on the files being sent to the printer. This way, a user can see exactly what changes have been made, the supports added, or other changes various software made for printing. Viewing software is a way to verify what will be printed before it gets manufactured.

Checker—This is software that ensures your design is physically printable and doesn't have any errors that will cause it to be unprintable or have an issue during printing. A common problem with scanned objects is to not have a closed shape. This often occurs if the scanner can't see all sides of the object. In a design, all the surfaces must create a whole shape. Take for example a simple rectangular solid. In the design of this solid shape, the thickness is determined by the top and bottom wall of the rectangle. If one of those sides has a hole in it, then the shape is incomplete. This is different than having a shape like a hollow box, which is really made up of six thinner solid rectangular shapes. This problem may seem trivial in reality as it is impossible to have a hole that goes to nothing in a real-world shape. In a virtual design, it is something that needs to be verified before manufacturing. Software such as repair or checking software will handle this by looking for any open surfaces and offer to repair them.

Repair—This software often works with checker software to repair issues that would cause a print to be unprintable. Repair and checking software look for problems in a design that will cause it to be unprintable. Some shapes can be represented in a virtual environment that will not work in the physical one. Depending on how the design was created, it may not require this. Scanned parts will often have flaws

that need to be repaired. Often, the repair is semi-automated so it can fix the issues with only a little interaction from the user.

Editor—This is software for editing the code being sent to the printer. Typically, the code has a format with commands for the motors and heaters. It is possible to understand and to make minor adjustments such as the temperature or speed by directly editing the code.

Conversion software—This software allows you to convert between various formats used in the additive manufacturing process. Examples might be a conversion between a mesh to an STL file. Other conversions may convert between different cad outputs such as an OBJ object file and STL.

Additive manufacturing machine firmware—This is machine specific software that runs on dedicated hardware that is specific to each machine. Many machines share similar hardware and can utilize the same firmware, which have settings that can be adjusted for each machine. The firmware of the machine can perform various functions but vary by machine. Some machine firmware can read a file directly and control the machine without the need of a host computer. Other machine firmware may require a direct connection to a host, while some machines can be controlled over a network interface.

Server—This allows a machine to be used on a network. Some server software may also allow for functions such as slicing and preview or incorporate other software into it. Server software allows for a machine to be run from a remote location or allows a machine to be used without a dedicated computer.

2. Обсудите вопрос:

Discuss the types of software. What is their principle?

3. Open the brackets using the verbs in Present Participle and translate the expressions into Russian.

1. _____ dogs (bark)
2. _____ children (play)
3. _____ girls (scream)
4. _____ women (dance)
5. _____ ducks (swim)
6. _____ babies (cry)
7. _____ water (run)
8. _____ watches (repair)
9. _____ computers (break)
10. _____ students (bore)
11. _____ doctors (worry)
12. _____ boys (confuse)
13. _____ exercises (write)

4. Open the brackets using the verbs in Present Participle and translate the expressions into Russian.

1. _____ dogs (bark)
2. _____ children (play)
3. _____ girls (scream)
4. _____ women (dance)
5. _____ ducks (swim)
6. _____ babies (cry)
7. _____ water (run)
8. _____ watches (repair)
9. _____ computers (break)
10. _____ students (bore)
11. _____ doctors (worry)
12. _____ boys (confuse)
13. _____ exercises (write)

Практическое занятие № 7.

Тема: Применение программного обеспечения. Подготовка к контрольной работе.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить словарь к тексту. Перевести текст.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

1.Прочитайте и переведите текст, составьте словарь к тексту.

Application of additive software

STL data for a part consist of a set of points defined in space, based on an arbitrarily selected point of origin. This origin point may not be appropriate to the machine the part is to be built on. Furthermore, even if the part is correctly defined within the machine space, the user may wish to move the part to some other location or to make a duplicate to be built beside the original part. Other tasks, like scaling, changing orientation, and merging with other STL files are all things that are routinely done using the STL manipulation tools on the AM machine. Creation of the support structures is also something that would normally be expected to be done on the AM machine. This would normally be done automatically and would be an operation applied to downward-facing triangles. Supports would be extended to the base of the AM machine or to any upward facing triangle placed directly below. Triangles that are only just veering away from the vertical may be ignored for some AM technologies. Note, for example, the supports generated around the cup handle. With some AM operating systems there is little or no control over placement of supports or manipulation of the model STL data. Considering Fig. 13.4 again, it may be possible to build the handle feature without so many supports, or even with no supports at all. A small amount of sagging around the handle may be evident, but the user may prefer this to having to clean up the model to remove the support material. If this kind of control is required by the user, it may be necessary to purchase additional third party software, like the MAGICS and 3-matic systems from Materialise. Such third party software may also be used to undertake additional roles. MAGICS, for example, has a number of modules useful to many AM technologies. Other STL file manipulators may have similar modules:

- Checking the integrity of STL files based on the problems described above.
- Incorporating support structures including tapered features on the supports that may make them easier to remove.
- Optimizing the use of AM machines, like ensuring the machine is efficiently filled with parts, the amount of support structures is minimized, etc.
- Adding in features like serial numbers and identifying marks onto the parts to ensure correct identification, easy assembly, etc.
- Remeshing STL files that may have been created using Reverse Engineering software or other non-CAD based systems. Such files may be excessively large and can often be reduced in size without compromising the part accuracy.
- Segmenting large models or combining multiple STL files into a single model data set.

Практическое занятие № 8.

Тема: Применение программного обеспечения.. Подготовка к контрольной работе.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Составить вопросы. Подготовиться к контрольной работе.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1.Прочитайте и переведите текст, составьте вопросы к тексту.

Application of additive software

STL data for a part consist of a set of points defined in space, based on an arbitrarily selected point of origin. This origin point may not be appropriate to the machine the part is to be built on. Furthermore, even if the part is correctly defined within the machine space, the user may wish to move the part to some other location or to make a duplicate to be built beside the original part. Other tasks, like scaling, changing orientation, and merging with other STL files are all things that are routinely done using the STL manipulation tools on the AM machine. Creation of the support structures is also something that would normally be expected to be done on the AM machine. This would normally be done automatically and would be an operation applied to downward-facing triangles. Supports would be extended to the base of the

AM machine or to any upward facing triangle placed directly below. Triangles that are only just veering away from the vertical may be ignored for some AM technologies. Note, for example, the supports generated around the cup handle. With some AM operating systems there is little or no control over placement of supports or manipulation of the model STL data. Considering Fig. 13.4 again, it may be possible to build the handle feature without so many supports, or even with no supports at all. A small amount of sagging around the handle may be evident, but the user may prefer this to having to clean up the model to remove the support material. If this kind of control is required by the user, it may be necessary to purchase additional third party software, like the MAGICS and 3-matic systems from Materialise. Such third party software may also be used to undertake additional roles. MAGICS, for example, has a number of modules useful to many AM technologies. Other STL file manipulators may have similar modules:

- Checking the integrity of STL files based on the problems described above.
- Incorporating support structures including tapered features on the supports that may make them easier to remove.
- Optimizing the use of AM machines, like ensuring the machine is efficiently filled with parts, the amount of support structures is minimized, etc.
- Adding in features like serial numbers and identifying marks onto the parts to ensure correct identification, easy assembly, etc.
- Remeshing STL files that may have been created using Reverse Engineering software or other non-CAD based systems. Such files may be excessively large and can often be reduced in size without compromising the part accuracy.
- Segmenting large models or combining multiple STL files into a single model data set.

Практическое занятие № 9.

Тема: Применение программного обеспечения. Подготовка к контрольной работе.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Повторить пройденный материал. Подготовиться к контрольной работе.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, перескажите текст.

Application of additive software

STL data for a part consist of a set of points defined in space, based on an arbitrarily selected point of origin. This origin point may not be appropriate to the machine the part is to be built on. Furthermore, even if the part is correctly defined within the machine space, the user may wish to move the part to some other location or to make a duplicate to be built beside the original part. Other tasks, like scaling, changing orientation, and merging with other STL files are all things that are routinely done using the STL manipulation tools on the AM machine. Creation of the support structures is also something that would normally be expected to be done on the AM machine. This would normally be done automatically and would be an operation applied to downward-facing triangles. Supports would be extended to the base of the AM machine or to any upward facing triangle placed directly below. Triangles that are only just veering away from the vertical may be ignored for some AM technologies. Note, for example, the supports generated around the cup handle. With some AM operating systems there is little or no control over placement of supports or manipulation of the model STL data. Considering Fig. 13.4 again, it may be possible to build the handle feature without so many supports, or even with no supports at all. A small amount of sagging around the handle may be evident, but the user may prefer this to having to clean up the model to remove the support material. If this kind of control is required by the user, it may be necessary to purchase additional third party software, like the MAGICS and 3-matic systems from Materialise. Such third party software may also be used to undertake additional roles. MAGICS, for example, has a number of modules useful to many AM technologies. Other STL file manipulators may have similar modules:

- Checking the integrity of STL files based on the problems described above.
- Incorporating support structures including tapered features on the supports that may make them easier to remove.
- Optimizing the use of AM machines, like ensuring the machine is efficiently filled with parts, the amount of support structures is minimized, etc.

– Adding in features like serial numbers and identifying marks onto the parts to ensure correct identification, easy assembly, etc.

– Remeshing STL files that may have been created using Reverse Engineering software or other non-CAD based systems. Such files may be excessively large and can often be reduced in size without compromising the part accuracy.

– Segmenting large models or combining multiple STL files into a single model data set.

Практическое занятие № 10.

Тема: Контрольная работа.

Цель: Контроль лексических и грамматических навыков, словарного запаса обучающихся.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

Контрольная работа

Вариант I

1. **Образуйте от данных глаголов причастие II и составьте с ними и с данными существительными словосочетания:**

To show, to close, to translate, to cut, to ask, to send.

Article, letter, film, bread, window, question.

2. **Выберите подходящую форму причастия:**

1. The girl (wash, washed) the floor is my sister.
2. The (losing, lost) book was found at last.
3. I picked up the pen (lying, lain) on the floor.
4. Translate the words (writing, written) on the blackboard.

3. **Раскройте скобки, употребляя глаголы в *Present Participle* or *Perfect Participle*:**

1. (to do) this task, he was thinking hard.
2. (to read) the story, she closed the book and put it on the shelf.
3. (to eat) all the potatoes, she drank a cup of tea.
4. (to sit) near the fire, he felt very warm.

4. **Сделайте из двух предложений одно, используя причастие I.**

Пример: *Jim was playing tennis. He hurt his arm. – Jim hurt his arm playing tennis.*

1. I was watching TV. I fell asleep. I
2. The man slipped. He was getting off the bus. The man
3. I was walking home in the rain. I got wet. I
4. Margaret was driving to work yesterday. She had an accident....

Вариант II

1. **Образуйте от данных глаголов причастие II и составьте с ними и с данными существительными словосочетания:**

To offer, to excite, to hear, to smoke, translate, to write.

Song, student, book, pen, text, cigarette.

2. **Выберите подходящую форму причастия:**

1. The girl (writing, written) on the blackboard is our best student.
2. The tasks (doing, done) by the students were easy.
3. The wall (surrounding, surrounded) the house was very high.
4. I will show you a picture (painting, painted) by my brother.

3. **Раскройте скобки, употребляя глаголы в *Present Participle* or *Perfect Participle*:**

1. (to eat) all the potatoes, she drank a cup of tea.
2. (to sit) near the fire, he felt very warm.
3. (to do) this task, he was thinking hard.
4. (to read) the story, she closed the book and put it on the shelf.

4. **Сделайте из двух предложений одно, используя причастие I.**

Пример: *Jim was playing tennis. He hurt his arm. – Jim hurt his arm playing tennis.*

1. Two firemen were overcome by smoke. They were trying to put up the fire.
2. Margaret was driving to work yesterday. She had an accident....
3. I was walking home in the rain. I got wet. I
4. The man slipped. He was getting off the bus. The man

Практическое занятие № 11.

Тема: Итоговое занятие.

Цель: Контроль умений и навыков практического владения английским языком.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь.

Задание: Прочитать, перевести текст, выполнить упражнения к тексту, ответить на вопросы.

Контрольные задания к зачету

Лексические темы	Грамматические темы
1. Программное обеспечение в аддитивном производстве	3. Причастие I
2. Типы программного обеспечения	4. Причастие II

Вариант I

1. Прочитайте и переведите текст.

ADDITIVE MANUFACTURING SOFTWARE

Additive manufacturing software is a critical part of the additive manufacturing process. The process starts with a design that often utilizes CAD software to create a digital representation of the part. In some cases, the process may start with a 3-D scan. While the design and use of CAD software is a significant step, it is beyond the scope of the additive manufacturing process. Some CAD software is designed specifically for the additive manufacturing process and should be considered. Once a CAD design has been developed, this data must be processed into a form the printer recognizes. Before the interpretation of the CAD data can happen, it must be determined that the part is physically possible and is also capable of being printed on the desired printer. If the design is not printable, then software for fixing it may be used as well. After the design has been generated and checked, this needs to be converted into a language the machine understands. The most common file type is called G-code and the tool that does this conversion is usually called a slicer. After the slicer software is done, this is sent to the machine for manufacturing. In some cases, host software for the manufacturing machine is required and in other cases the machine can read the file directly. The machine also has software running on its own specialized hardware, which has various levels of functionality depending on the machine.

Features

Other software that may also be used are a mesh maker, a repair tool and or editor, and a viewer to review the file before manufacturing. Software for other more specialized functions also exist.

At each of the stages in the design and development, various decisions need to be made. In an ideal situation, the design done in CAD is exactly what the end result will be. In many cases, this can be achieved, but often requires some additional accommodations that depend on the machine being used. Various considerations need to be made to manufacture a part. One common decision is about support material, some machines such as those with a powder bed do not require any support when printing as the powder provides the necessary support. Other machines such as FDM or SLA type will require support

material as they can't print in thin air. Many other decisions such as material type resolution and size will also need to be made before manufacturing.

2. Ответьте на вопросы:

1. What does additive manufacturing software start with?
2. What is the principle of additive manufacturing software operation?
3. What are the features of additive manufacturing software?

4. Переведите на русский язык, обращая внимание на причастия настоящего времени.

1. The girl standing at the window is my sister.
2. Having been sent to the wrong address the letter didn't reach him.
3. He sat in the arm-chair thinking.
4. She came up to us breathing heavily.
5. The hall was full of laughing people.
6. The singing girl was about fourteen.
7. Having read the book I gave it to Pete.
8. The large building being built in our street is a new school – house.
9. Having finished the experiment the students left the laboratory.
10. Being busy, he postponed his trip.

5. Выберите из скобок требующуюся форму Причастия I:

1. a) The girl (writing, written) on the blackboard is our best pupil.
b) Everything (writing, written) here is quite right.
2. a) The house (surrounding, surrounded) by tall trees is very beautiful.
b) The wall (surrounding, surrounded) the house was very high.
3. a) Who is that boy (doing, done) his homework at that table?
b) The exercises (doing, done) by the pupils were easy.
4. a) The girl (washing, washed) the floor is my sister.
b) The floor (washing, washed) by Helen looked very clean.

Вариант II

1. Прочитайте и переведите текст.

TYPES OF SOFTWARE

CAD—Computer aided design software is an important part of the design aspect of additive manufacturing and is often the starting point. CAD software comes in many different forms with some of them being better suited for additive manufacturing. The basics of CAD start with drawing the design with specific dimensions and turning it into a 3-D model. CAD is a very useful engineering design tool and is often used where exact dimensions and tolerance is important.

Modeling and sculpting software—This software is based more around an artistic process, although it can be used with precise measurements. Modeling software takes its inspiration from an artistic process like sculpting to allow users to create a finished design. Often, precise measurements are not important as much as the finished look is, such as in designing a cartoon character or action figure.

Customizing software—This software is not always standalone software, although it sometimes can be used as an app or it may be part of a larger design package. Customizers allow you to take a design and easily customize an element of it. An example might be a customizer for jewelry where a user can modify the base design or add engraving to it.

Mesh software—A mesh is a grid of polygons put together in a mesh to make a larger more complex shape. This is a wireframe type design of a 3-D design. True curves are difficult to represent in a digital format so instead a number of small flat surfaces are used. The greater number of small flat areas, the closer to a true curve the design will be. Mesh software allows a user to edit, create, or otherwise utilize the mesh framework of a design. An example use might be to take a scan output in the form of a point cloud (a series of points that represent a shape) and utilize that to create a mesh type design.

Slicer software—This software originates from Stereolithography, although it is often used for any additive manufacturing machine that builds its part in layers. This applies to fused filament machines as well as Stereolithography. It could also apply to laser sintering and melting type machines as well as other types. The slicer takes a digital model and performs calculations on it. The calculations virtually slice the object into a number of layers that are turned into the necessary machine pathways needed to create that object. This information is outputted in a format that the machine can understand most often in gcode. The resulting output file is a list of movements for each motor and heater in the printer, this allows the printer to simply play the file without requiring much computing power. The slicer software also allows for some decisions in the print. One critical decision made at this stage is the resolution of the part. This determines how fine the layers are. This software will allow for supports to be added to the design if they are required. It may also allow for additional considerations like how the part is adhered to the printing surface. Other options may also be available such as reorienting the part or resizing it. The goal is to enable a user to find the best way to manufacture the part on the machine such that it matches the original design and meets the criteria.

Viewer software—Viewing software allows a user to virtually view the object to be printed. While the object can be viewed in CAD software, it may look slightly different after being prepared for printing. Viewing software will recreate what the part will look like based on the files being sent to the printer. This way, a user can see exactly what changes have been made, the supports added, or other changes various software made for printing. Viewing software is a way to verify what will be printed before it gets manufactured.

Additive manufacturing machine firmware—This is machine specific software that runs on dedicated hardware that is specific to each machine. Many machines share similar hardware and can utilize the same firmware, which have settings that can be adjusted for each machine. The firmware of the machine can perform various functions but vary by machine. Some machine firmware can read a file directly and control the machine without the need of a host computer. Other machine firmware may require a direct connection to a host, while some machines can be controlled over a network interface.

Server—This allows a machine to be used on a network. Some server software may also allow for functions such as slicing and preview or incorporate other software into it. Server software allows for a machine to be run from a remote location or allows a machine to be used without a dedicated computer.

2. Обсудите вопрос:

Discuss the types of software. What is their principle?

3. Переведите на русский язык, обращая внимание на причастие прошедшего времени.

1. He doesn't like boiled milk.
2. I remember well his words said at the meeting.
3. We don't like the book bought last week.
4. The stolen things were returned to the owner.
5. Asked about this event, he replied nothing.
6. The explanation given was not complete.
7. When burnt, coal produces heat.
8. The results received were of great importance for the further work.
9. When reconstructed the theatre looked more beautiful than before.
10. She showed us a list of the newly published books.

4. Раскройте скобки, употребив причастие прошедшего времени. Переведите.

1. The letter (to write) by him was very long.
2. We are interested in the goods (to produce) by this factory.
3. She didn't understand the word (to say) by him.
4. He didn't see the things (to keep) in her box.
5. I don't like the video (to buy) yesterday.
6. This is the house (to build) many years ago.
7. The question (to put) to the professor was important.
8. When (to offer) to work abroad, he refused.

9. The article on agriculture (to publish) in this magazine was written by Smith.

10. You can get the book (to recommend) by our teacher in the library.

4 КУРС 8 СЕМЕСТР ОБОРУДОВАНИЕ В АДДИТИВНОМ ПРОИЗВОДСТВЕ

Практическое занятие № 1.

Тема: 3D принтеры. Герундий/инфинитив.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Выучить лексику урока.. Перевести текст. Упр.1-3.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1.Прочитайте и переведите текст, составьте словарь к тексту, задайте вопросы.

**3D printers
Stereolithography (SLA)**

Stereolithography is a 3d printing method that can be used to implement your projects that involve 3D printing of objects. Although this method is the oldest one in history of 3D printing it's still being used nowadays. The idea and application of this method are amazing. Whether you are a mechanical engineer, who needs to verify if the part can fit to your design, or creative person who wants to make a plastic prototype of new coming project, Stereolithography can help you to turn your models into a real 3D printed object.

This method was patented by Charles Hull, co-founder of 3D Systems, Inc in 1986. The process of printing involves a uniquely designed 3D printing machine called a stereolithograph apparatus (SLA), which converts liquid plastic into solid 3D objects.

Most printing techniques require computer aid design (CAD) file to process the object. This file contains information about dimensional representation of an object. CAD file must be converted into a format that a printing machine can understand. There is Standard Tessellation Language (STL) format that is commonly used for stereolithography, as well as for other additive manufacturing processes. The whole process consists of consequent printing of layer by layer hence STL file that printing machine uses should have the information for each layer.

SLA printing machines don't work as usual desktop printers which extrude some amount of ink to the surface. SLA 3D printers work with excess of liquid plastic that after some time hardens and forms into solid object. Parts built with 3D printers type like this usually have smooth surfaces but its quality very depends on the quality of SLA machine used.

The process of printing includes several steps. It starts from creation of 3D model in CAD program, special piece of software processes the CAD model and generates STL file that contains information for each layer. There could be up to ten layers per each millimeter. Then SLA machine exposes the liquid plastic and laser starts to form the layer of the item.

After plastic hardens a platform of the printer drops down in the tank a fraction of a millimeter and laser forms the next layer until printing is completed. Once all layers are printed the object needs to be rinsed with a solvent and then placed in an ultraviolet oven to finish processing.

The time required to print an object depends on size of SLA 3d printers used. Small items can be printed within 6-8 hours with small printing machine, big items can be several meters in three dimensions and printing time can be up to several days long.

Stereolithography is widely used in prototyping as it doesn't require too much time to produce an object and cost is relatively cheap comparing to other means of prototyping. Although this 3d printing method is rarely used for printing of the final product.

2. Переведите на русский язык, обращая внимание на герундий.

1. She has always dreamt of living in a small house by the sea.
2. She disliked living in her old house.
3. She was thinking of buying a new one.
4. Now, she enjoys living in a beautiful new house.
5. She misses seeing the neighbours of course.
6. Usually she enjoyed talking to them and didn't mind helping them.
7. She likes cooking and is very good at it.
8. But she doesn't like washing and ironing.
9. She hates getting up early, but she has to.
10. She doesn't mind working a lot, you know.

3. Заполните пропуски, используя герундий следующих глаголов.

to shop — to drink — to eat to get up — to visit — to talk to open — to swim — to travel

EXAMPLE: I like shopping at big stores.

1. ice cream is bad if you 're on a diet.
2. I enjoy coffee in the morning.
3. I'm not an early riser. I prefer up at 10:00 A.M.
4. Antonio likes around the world.
5. is good for your health.
6. I don't like to the chairman of the company. He's always very serious.
7. On Christmas, people are excited about their presents.
8. He always enjoys San Francisco. It's a beautiful city.

Практическое занятие № 2.

Тема: 3D принтеры. Герундий/инфинитив.

Цель: Закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Выполнить упр. 1-4. Задать вопросы к тексту.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту, задайте вопросы.

3D printers

Fused deposition modeling (FDM)

Fused deposition modeling (FDM) technology was developed and implemented at first time by Scott Crump, Stratasys Ltd. founder, in 1980s. Other 3D printing companies have adopted similar technologies but under different names. A well-known nowadays company MakerBot coined a nearly identical technology known as Fused Filament Fabrication (FFF).

With help of FDM you can print not only functional prototypes, but also concept models and final end-use products. What is good about this technology that all parts printed with FDM can go in high-performance and engineering-grade thermoplastic, which is very beneficial for mechanic engineers and manufactures. FDM is the only 3D printing technology that builds parts with production-grade thermoplastics, so things printed are of excellent mechanical, thermal and chemical qualities.

3D printing machines that use FDM Technology build objects layer by layer from the very bottom up by heating and extruding thermoplastic filament. The whole process is a bit similar to stereolithography. Firstly special software “cuts” CAD model into layers and calculates the way printer’s extruder would build each layer. Along to thermoplastic a printer can extrude support materials as well. Then the printer heats thermoplastic till its melting point and extrudes it throughout nozzle onto base, that can also be called a build platform or a table, along the calculated path. A computer of the 3d printer translates the dimensions of an object into X, Y and Z coordinates and controls that the nozzle and the base follow calculated path during printing. To support upper layer the printer may place underneath special material that can be dissolved after printing is completed.

When the thin layer of plastic binds to the layer beneath it, it cools down and hardens. Once the layer is finished, the base is lowered to start building of the next layer. Printing time depends on size and complexity of an object printed. Small objects can be completed relatively quickly while bigger or more complex parts require more time. Comparing to stereolithography this technique is slower in processing. When printing is completed support materials can easily be removed either by placing an object into a water and detergent solution or snapping the support material off by hand. Then objects can also be milled, painted or plated afterwards.

Different kind of thermoplastic can be used to print parts. The most common of those are ABS (acrylonitrile butadiene styrene) and PC (polycarbonate) filaments. There are also several types of support materials including water-soluble wax or PPSF (polyphenylsulfone).

Pieces printed using this technology have very good quality of heat and mechanical resistance that allows to use printed pieces for testing of prototypes. FDM is widely useful to produce end-use products, particularly small, detailed parts and specialized manufacturing tools. Some thermoplastics can even be used in food and drug packaging, making FDM a popular 3D printing method within the medical industry.

The price for those 3D printers depends on size and model. Professional ones usually cost from \$10,000 and more. 3D Printers designed for home use are not so expensive. There are several models like Replicator of MakerBot, Mojo of Stratasys and Cube of 3D Systems. The price for these models varies from \$1,200 to \$10,000. However, new start-ups offer more and more affordable versions of FDM 3D printers, the price of which can be just about \$300-\$400.

Also there are many fans of 3D printing or DIY’ers that prefer to create their own 3D printers from the very scratch. There are websites that offer big variety of DIY kits and parts for RepRap printers. For more information please refer to the following article where you can find basic things about how to build 3d printers from scratch.

2. Чтобы закончить следующие предложения, используйте инфинитив или герундий.

Иногда возможны оба варианта.

EXAMPLE: Smoking is bad for your health.

1. Chicken is not very difficult, (to cook) 2. I usually enjoy television at night, (to watch) 3. Laura convinced her husband the kitchen, (to paint) 4. Sharon hates more than eight hours a day. (to work) 5. I thought about your sister for lunch, (to invite)

3. Раскройте скобки, употребив герундий в нужной форме:

1. I can't remember ... him before (to see).
2. The machine needs ... (to clean).
3. She is angry at ... for (to send).
4. You should avoid ... rules (to break).
5. She entered the office without ... (to notice).
6. I am sorry for ... you (to disturb).
7. We can't excuse their not ... our invitation (to answer).
8. The cat was punished for ... the cup (to break)
9. The cat was afraid of ... and hid itself under the sofa. (to punish).
10. After ... through and ... the student's papers, the teacher handed them back. (to look),(to mark).

Практическое занятие № 3.

Тема: Производители 3D принтеров. Герундий/инфинитив. Повторение.

Цель: Введение и закрепление лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Перевести текст. Составить тематический словарь. Упр.1- 3.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1.Прочитайте и переведите текст, составьте словарь к тексту, задайте вопросы.

Manufacturers of 3D printers

Here are the 40 most innovative 3D printing companies in 2017, from pioneering 3D printer manufacturers to the best filament producers.

As the 3D printing industry continues to grow, the capabilities of this emerging technology continues to shift and evolve. Across the 3D printing ecosystem, innovative new start-ups and ideas are fueling this growth. On the other hand, more established companies have continued to conquered the industry with extensive R&D and decades of experience.

Desktop Metals

What does this 3D printing company do? Affordable metal 3D printing.

Why is it one of the most innovative 3D printing companies? As one of the youngest companies to make the list, Desktop Metal has emerged as one of the few startups that are pushing the boundaries of 3D printing technology. Initially launched in 2015 by a handful of MIT professors, Desktop Metal has been working to make metal 3D printing cheaper, smaller, safer to operate, and capable of producing parts much more quickly than traditional methods allow. After two years of development, the result of their endeavors have surfaced in the form of the "Studio System" and "Production System."

The Studio System is a printer that can fit on the desktop. It uses Desktop Metal's patented Bound Metal Deposition (BMD) extrusion process, a technique that is similar to FDM 3D printing. It has a 50-micron layer resolution, automated bed leveling, and also a heated build area. The Production System uses a process called "single pass jetting," taking less than three seconds to print a single layer. The printer deposits metal powder, followed by binding agent droplets that are "jetted" onto the powder. After heat is applied to bind the layer, the process quickly repeats itself. These printers are still quite expensive (\$120,000 for Studio, \$360,000 for Production), but compared to other industrial metal 3D printers, these machines are affordable considering what they offer.

It clear that Desktop Metal has a lot of support from major companies. Earlier this year, the startup raised \$45 million from the venture capital arms of Alphabet (Google), BMW, and Lowe's.

Formlabs

What does this 3D printing company do? Accessible desktop Stereolithography (SL) 3D printer.

Why is it one of the most innovative 3D printing companies? Founded by MIT graduates after a very successful Kickstarter run, Formlabs was the first 3D printer company to bring an SLA 3D printer to a mass market. Today, it has offices and two assembly plants in the Massachusetts and Berlin. Currently, the company is responsible for one of the most popular and highly related desktop printers on the market, the Form 2.

This resin-based printer offers magnificent quality prints in a wide range of top-notch materials. Whether you're a jewelry designer or dentist, the Form 2 is well suited for a number of applications. The \$3,500 printer boasts a simple design and state-of-the-art user interface. This year, Formlabs has gone above and beyond by expanding their product line, keeping them at the forefront of 3D printing innovation. In May, the company unveiled the Form Wash and Form Cure, two products that will enhance the overall workflow for Form 2 users.

The Form Wash is an automatic cleaning unit that "agitates" the printed object in isopropyl alcohol (IPA). Once the process is complete, the clean part is ready for post-curing in the Form Cure. Shortly after the announcement of these new products, Formlabs took things a step further with the new Fuse 1 SLS 3D printer and Form Cell. This compact SLS 3D printer is designed for the benchtop, and will offer the industrial power of selective laser sintering at 20x less the cost.

On the other hand, the Form Cell will enable users to setup a row of Form 2 printers, the Form Wash, and a curing unit all in one integrated place. The system uses an industrial robotic gantry system to automate the entire printing process from start to finish. All in all, it's clear that Formlabs isn't just resting on the laurels of the Form 2's success, but is instead expanding its reach to enhance user workflow and reach new areas of the 3D printing market.

2. Выберите из скобок герундий или инфинитив.

1. I am planning ... (to visit/visiting) my granny next week.
2. When they finish ... (to eat/eating) their lunch, they'll go to the office.
3. He suggested ... (to buy/buying) some food.
4. Does Sally enjoy ... (to go/going) to the gym?
5. Don't put off ... (to write/writing) a report till the end of the month.
6. John refused ... (to answer/answering) my question.
7. My brother intends ... (to get/getting) married soon.
8. I think she didn't mean ... (to hurt/hurting) you.
9. Keep ... (to beat/beating) the eggs.
10. Fred can't afford ... (to travel/travelling) this year.

3. Составьте предложения, выбрав начало из первого столбца и окончание – из второго.

- | | |
|------------------------|--------------------------------|
| 1. She is interested | a) drinking alcohol. |
| 2. I would like | b) to seeing my daughter. |
| 3. You should give up | c) being ill. |
| 4. We really enjoy | d) laughing at her. |
| 5. I'm looking forward | e) to living in a dirty house. |
| 6. He is used | f) talking to drunk people. |
| 7. She pretended | g) swimming in the sea. |
| 8. Pamela is good | h) to have a cup of coffee. |
| 9. I couldn't help | i) in surfing the Internet. |
| 10. She avoids | j) at riding a horse. |

Практическое занятие №4.

Тема: Производители 3D принтеров. Герундий/инфинитив. Повторение.

Цель: Закрепление и систематизация лексического и грамматического материала, совершенствование навыков говорения, чтения, письма.

Задание: Перевести текст. Составить тематический словарь. Упр.1-3.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

1. Прочитайте и переведите текст, составьте словарь к тексту, задайте вопросы.

Carbon

What does this 3D printing company do? 3D printing process (CLIP) and 3D printer platform (M1) with a palette of unprecedented industrial-grade materials.

Why is it one of the most innovative 3D printing companies? After building up an insurmountable amount of hype after revealing the CLIP printing process, the 3D printing startup Carbon delivered with the M1 3D printer. This machine is capable of processing true elastomer materials and producing isotropic parts with mechanical properties and surface finish that have not been achievable with 3D printing prior to its release. In addition, the CLIP process can demonstrably print parts up to 100 times faster than comparable 3D printing processes.

Since the product launch last year, Carbon has continued to roll out an impressive list of beta testers that are all reporting impressive results, including Ford, Legacy Effects, BMW and a number of services. In the same vein, the CLIP process is available to consumers via long-standing 3D printing service provider Sculpteo. The company's ultra-fast and reliable process has helped Carbon secure \$81 million in funding back in September 2016.

In 2017, Carbon has continued to impress. The startup has already released a new "SpeedCell" system and the industrial-grade M2 3D printer, setting up its customers with the ability to mass produce products and parts. Most impressively, Carbon has been working with Adidas on the new 3D printed Futurecraft 4D performance footwear. The sportswear company is planning to produce over 100,000 pairs by the end of 2018.

HP

What does this 3D printing company do? A professional 3D printer with a new proprietary process — MultiJet Fusion.

Why is it one of the most innovative 3D printing companies? While HP is obviously not a 3D printing start-up, the tech giant's venture into 3D printing has stirred up excitement throughout the entire industry. In 2015, HP introduced a completely new, and proprietary process that is set to change the landscape of the industry dramatically in the coming year. HP's Multi Jet Fusion platform promises to improve strength and functionality — at the voxel level — with increased printing speeds and reduced costs (both capital and consumables).

In December 2016, the company released its two printer models, the HP Jet Fusion 3D 3200 and HP Jet Fusion 3D 4200. The 3200 model is aimed for prototype design, while the 4200 is engineered for fast and efficient production. This year, their breakthrough technology has spread across the globe, and has also made a home in various 3D printing service bureaus, including Shapeways and 3D Hubs. HP's 3D printing technology will potentially change the landscape of professional 3D printing, and we should definitely hear more about their printers throughout the rest of year.

2. Use Infinitive or -ing form.

1. It was quite late when they saw Martin ... (come) up the other side of the street. They saw him ... (pause) in front of his house, ... (look) up at it and ... (knock) at the door.
2. My parents let me (stay) at Molly's house last weekend. They agreed ... (take) me to his place in the car and they made me (promise) to behave myself.
3. Mel hates (answer) the phone. And very often Mel just lets it ... (ring).
4. At first Jenny enjoyed ... (listen) to Steven but after a while she got tired of ... (hear) the same story.
5. Polly can't (go) to the cinema today. She's busy ... (study) for her exam, which is next week, but she's decided ... (take) a break and ... (phone) Megan.
6. I tried ... (listen) carefully and in order (not/show) how I was embarrassed, I did my best ... (keep) the conversation ... (go) on one topic and another.

3. Прочитайте предложения. Выберите один из предложенных вариантов ответа.

1. Peace activist Baroness Bertha von Suttner encouraged Alfred Nobel ... a prize for peace. (establish / to establish / establishing / to be established)

2. The police officer made Neil get out of the car and demanded ... his driver's licence. (see / seeing / to see / to be seen)
3. In the time of Peter the Great the noblemen were not allowed ... beards. (have / to have / having / having had)
4. They wouldn't let ... the country without the entry visa, would they? (him to enter / he enters / him enter / him entering)
5. Fred couldn't make ... that he had caught the huge fish himself. (I believed / me believe / me believed / me to believe)
6. Nick was very close to the phone-box and Mary noticed him ... the number, and then she heard him ... something to passer-by. (to dial, to say / dialing, to say / to dial, say / dial, say)
7. Nick was seen ... the hall and then Jane watched him ... (enter, go away / be entered, to go away / enter, go away / to have entered, to be gone away)

Практическое занятие №5.

Тема: Дифференцированный зачет.

Цель: Контроль умений и навыков практического владения английским языком.

Перечень оборудования для проведения работы: тетрадь, письменные принадлежности, словарь

Тест

1. Выберите правильную форму герундия или инфинитива:

She agreed ... her friend.

- a) marrying
- b) marry
- c) to marry

2. Выберите правильную форму герундия или инфинитива:

He decided ... his first trip.

- a) to plan
- b) planning
- c) to planning

3. Выберите правильную форму герундия или инфинитива:

I don't remember ... the poem.

- a) to learning
- b) to learn
- c) learning

4. Выберите правильную форму герундия или инфинитива:

Don't stop, please! Go on

- a) reading
- b) read
- c) to read

5. Выберите правильную форму герундия или инфинитива:

You are not allowed ... here.

- a) parking
- b) to park
- c) park

6. Выберите правильную форму герундия или инфинитива:

They go on ...

- a) working
- b) to work
- c) to working

7. Выберите правильную форму герундия или инфинитива:

Mum won't let me ... to the beach today.

- a) to go
- b) go
- c) going

8. Выберите правильную форму герундия или инфинитива:

I heard her ... in New York.

- a) to sing
- b) singing
- c) to singing

9. Выберите правильную форму герундия или инфинитива:

He made her son ... down the music

- a) to turn
- b) turn
- c) turning

10. Выберите правильную форму герундия или инфинитива:

I want him ... to the party.

- a) invite
- b) to be invited
- c) inviting

11. Выберите правильную форму герундия или инфинитива:

Will you let me ... to the party?

- a) go
- b) going
- c) to go

12. Выберите правильную форму герундия или инфинитива:

She agreed ... her boyfriend.

- a) marrying
- b) to be married
- c) to marry

13. Выберите правильную форму герундия или инфинитива:

He decided ... his first trip.

- a) to plan
- b) to planning
- c) planning

14. Выберите правильный вариант перевода, обращая внимание на герундий:

My hobby is driving a car.

- a) Он водит машину.
- b) Мое хобби – вождение машины.
- c) Он умеет водить машину.

15. Выберите правильный вариант перевода, обращая внимание на герундий:

Excuse me for not answering your letter.

- a) Простите, что не ответил на ваше письмо.
- b) Простите, что не написал вам письмо.
- c) Извините, что не отправил письмо.

16. Выберите правильный вариант перевода, обращая внимание на герундий:

He liked reading adventure books.

- a) Он любит читать о приключениях.
- b) Он любил читать.
- c) Ему нравилось читать приключенческие книги.

17. Выберите правильный вариант перевода, обращая внимание на герундий:

He didn't like being looked at.

- a) Он не любил смотреть.
- b) Он не любил, когда на него смотрят.
- c) Ему нравилось смотреть.

18. Выберите правильный вариант перевода, обращая внимание на герундий:

They spoke about travelling to the South.

- a) Они поехали на юг.
- b) Они хотели поехать на юг
- c) Они говорили о поездке на юг.

19. Выберите правильный вариант перевода, обращая внимание на герундий:

Did you have any difficulty in solving this problem?

- a) Ты смог решить эту проблему.
- b) У тебя были трудности при решении этой проблемы?
- c) Эту проблему трудно было решить?

20. Выберите правильный вариант перевода, обращая внимание на герундий:

He avoided being seen.

- a) Он избегал встреч.
- b) Он избегал, чтобы его видели.
- c) Его избегали.

5. Информационное обеспечение обучения

Основные источники:

1. Гарагуля, С.И. Английский язык в сфере информационных систем и технологий=English for Information Systems and Technology : учебник / Гарагуля С.И. — Москва : КноРус, 2018. — 421 с.
2. Голубев, А.П. Английский язык для всех специальностей. : учебник / Голубев А.П., Балюк Н.В., Смирнова И.Б. — Москва : КноРус, 2020. — 385 с. — (СПО).
3. Карпова, Т.А. English for Colleges = Английский язык для колледжей. Практикум + Приложение : тесты. : учебно-практическое пособие / Карпова Т.А., Восковская А.С., Мельничук М.В. — Москва : КноРус, 2020. — 286 с. — (СПО).
4. Кукушкин, Н.В. Английский язык для колледжей : учебное пособие / Кукушкин Н.В. — Москва : Русайнс, 2018. — 296 с.
5. Радовель, В.А. Английский язык в программировании и информационных системах. : учебное пособие / Радовель В.А. — Москва : КноРус, 2019. — 239 с. — (СПО)

Дополнительные источники:

1. Агабекян И. П. Английский язык для технических вузов: учебное пособие, Ростов н/Д: Феникс, 2017. – 347с.
2. Голицынский Ю.Б. Грамматика: Сборник упражнений.- 6-е изд.,-СПб, 2017.
3. Луговая А.Л. Английский язык для студентов энергетических специальностей: Учеб. Пособие.- 4-е изд.- «Издательский центр «Академия», 2017-150 с.
4. Луговая А.Л. Современные средства связи: Учеб.пособие по английскому языку/А.Л. Луговая.- 2-изд., испр.-М.: Высш.шк., 2016.-213 с.
5. Elementary students book. Face2face. Cambridge University Press, 2015.
6. Raymond Murphy. English Grammar in Use.Cambridge University Press, 2015
7. Cunningham J., Redston C. Face2face by Cambridge University Press: Elementary Student's book /Cunningham J., Redston C. - The Edinburgh Building, Cambridge CB2 8RU, UK, 2005.-160 p.
8. Cunningham J., Redston C. Face2face by Cambridge University Press: Elementary Workbook/ Cunningham J., Redston C. - The Edinburgh Building, Cambridge CB2 8RU, UK, 2005.- 88 p.
9. Murphy R. English grammar in use by Cambridge University Press: A self-study reference and practice book for intermediate learners of English. Third edition/ Murphy R. - The Edinburgh Building, Cambridge CB2 8RU, UK, 2004.-379 p.
10. Murphy R. English grammar in use by Cambridge University Press: A self-study reference and practice book for intermediate learners of English. Fourth edition/ Murphy R. - The Edinburgh Building, Cambridge CB2 8RU, UK, 2012.-380 p.
11. Evans V., Dooley J. New round-up 3 by Pearson Education Limited: English grammar practice. Student's book/ Evans V., Dooley J.- Pearson Education Limited, Edinburgh Gate, Harlow, Essex CM20 2JE, England, 2010.-175 p.
12. Evans V., Dooley J. New round-up 4 by Pearson Education Limited: English grammar practice. Student's book/ Evans V., Dooley J.- Pearson Education Limited, Edinburgh Gate, Harlow, Essex CM20 2JE, England, 2010.-208 p.

Интернет- ресурсы:

<http://education.com>

<https://resh.edu.ru/>

www.britishcouncil.org/learnenglish

<http://lessons.study.ru>

<https://elearning.academia-moscow.ru/personal/courses/>

<http://www.lyricstraining>

