ИНОСТРАННЫЙ ЯЗЫК В ВУЗЕ

Владимирский государственный университет

МОЯ СПЕЦИАЛЬНОСТЬ – АВТОМАТИЗАЦИЯ ТЕХНОЛОГИЧЕСКИХ ПРОЦЕССОВ И ПРОИЗВОДСТВ

MY SPECIALITY IS AUTOMATION

Учебное пособие по обучению чтению и развитию навыков устной речи на английском языке

Владимир 2022

Министерство науки и высшего образования Российской Федерации
Федеральное государственное бюджетное образовательное учреждение
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«Владимирский государственный университет
имени Александра Григорьевича и Николая Григорьевича Столетовых»

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Цель пособия – сформировать у студентов умения логически мыслить, аргументированно и ясно строить устное и письменное высказывания на иностранном языке, корректно выражать собственную точку зрения в межличностном и повседневном общении.

Предназначено для студентов 2-го курса специальности 15.03.04 «Автоматизация технологических процессов и производств». Составлено в соответствии с требованиями программы обучения иностранным языкам для высших учебных заведений. Рассчитано на аудиторную и самостоятельную работу студентов вузов направления «Бакалавриат». Может быть полезно в качестве справочника для студентов заочной формы обучения с элементами дистанционных образовательных технологий.

Рекомендовано для формирования профессиональных компетенций в соответствии с ФГОС ВО.

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FOREWORD

Учебное пособие нацелено на развитие и совершенствование у студентов практических умений и навыков чтения и говорения в сфере профессионального общения. Цель пособия – научить студентов быстро извлекать информацию при чтении, излагать содержание по-английски просто и понятно, самостоятельно делать сообщения, вести диалог на иностранном языке, обсуждать темы различного характера. Составлено в соответствии с требованиями к результатам освоения основных образовательных программ для студентов 2-го курса.

Структурной единицей пособия является учебный модуль (UNIT), который включает:

– базовый текст, содержащий основную смысловую информацию урока;

– комплекс упражнений, направленных на развитие навыков разговорной речи;

– творческие задания, формирующие умение выразить свое отношение к обсуждаемой проблеме;

– грамматические упражнения как для работы в аудитории, так и самостоятельной работы.

В плане языковой организации тексты выдержаны в стиле достаточно простого, стилистически нейтрального изложения средней степени сложности.

Учебное пособие обеспечивает коммуникативную и профессиональную направленность обучения иностранному языку и нацелено на решение задач межличностного и межкультурного взаимодействия.

Unit 1
AUTOMATION

I. Study and memorize the following words and expressions.

1) to perform – выполнять
2) certain tasks – определенные задачи
3) the sequences of operations – последовательность операций (работ)
4) a highly automated system – высокоавтоматизированная система
5) automation – автоматизация
6) plant – сборочный завод
7) nonmanufacturing – непроизводственный
8) steam engine – паровоз
9) household thermostat – бытовой термостат
10) to facilitate – способствовать
11) punched – перфорированный
12) sensor – датчик, чувствительный элемент
13) environment – окружение
14) dangerous – опасный
15) ability to correct – способность исправлять
16) much faster – намного быстрее
17) widely used – широко распространенный
18) devices – устройства, приборы
19) to design – разрабатывать что-либо
20) speed – скорость
21) factory – завод, фабрика
22) influence – влияние
23) economy – экономика
24) term – термин
25) to describe – описывать

II. Translate the words and word combinations using the dictionary and memorize them.

An assembly plant; for automobiles; complex products; can operate independently; several steps; automatic pilots; automatic telephone equipment; could be done by people; the motions of the worker; human control; feedback principle; transfer machine; position both light and heavy workpieces; simplification of work; made it possible to design and build machines; the areas of the economy; for centuries; an integrated system of production; dangerous to human workers; necessary in the development of automation; microprocessors and computers.

III. Translate the words and word combinations from Russian into English.

1) автоматические устройства
2) автоматизированное производство
3) выполнять простые задачи
4) как легкие, так и тяжелые детали
5) интегрированная система производства
6) принцип обратной связи
7) механизм может разгоняться и тормозить
8) компьютер автоматически посылает команды
9) высокоавтоматизированная система
10) непроизводственная система
11) определенные риски
12) автоматизированная система
13) выполнять работу независимо от людей
14) выполнять различные операции
15) намного быстрее и лучше
16) эффективность производства
17) промышленные роботы
18) механизация
19) производство
20) завод

IV. Find the sentences with the following words and word combinations in the text given below and translate them into Russian.

Automation is performing; the term automation is …; most familiar example; an assembly plant for automobiles or other complex products; all automatically controlled mechanisms; the flyball governor; industrial robots; flexible manufacturing systems (FMS); using feedback devices; in the 1920s the automobile industry; more recently; in some part of their operation; the development of computer-aided design; computers have greatly facilitated; specialized machines; automatic pilots, automatic telephone equipment; many industries are highly automated; in some part of their operation; in the telephone industry dialing and transmission; also controlled by automatic signaling devices; detect carriages passing; a particular point; location of trains can be monitored; mechanization was the first step; made it possible to design and build machines; that resembled the motions of the worker; specialized machines; they had better production efficiency.

V. Read and translate the text A.

WHAT IS AUTOMATION?

Automation is performing certain tasks, previously done people, by machines only. The sequences of operations are controlled automatically. The most familiar example of a highly automated system is an assembly plant for automobiles or other complex products.

The term automation is also used to describe nonmanufacturing systems in which automatic devices can operate independently of human control. Such devices as automatic pilots, automatic telephone equipment and automated control systems are used to perform various operations much faster and better than could be done by people.

Automated manufacturing had several steps in its development. Mechanization was the first step necessary in the development of automation. The simplification of work made it possible to design and build machines that resembled the motions of the worker. These specialized machines were motorized and they had better production efficiency.

Industrial robots, originally designed only to perform simple tasks in environments dangerous to human workers, are now widely used to transfer, manipulate, and position both light and heavy workpieces performing all the functions of a transfer machine.

In the 1920s the automobile industry for the first time used an integrated system of production. This method of production was adopted by most car manufacturers and became known as Detroit automation.

The feedback principle is used in all automatically controlled mechanisms when machines have ability to correct themselves. The feedback principle has been used for centuries. An outstanding early example is the flyball governor, invented in 1788 by James Watt to control the speed of the steam engine. The common household thermostat is another example of a feedback device.

Using feedback devices, machines can start, stop, speed up, slow down, count, inspect, test, compare and measure. These operations are commonly applied to a wide variety of production operations.

Computers have greatly facilitated the use of feedback in manufacturing processes. Computers gave rise to the development of numerically controlled machines. The motions of these machines are controlled by punched paper or magnetic tapes. In numerically controlled machining centres machine tools can perform several different machining operations.

More recently, the introduction of microprocessors and computers has made possible the development of computer-aided design and

computer-aided manufacture (CAD and CAM) technologies. When using these systems a designer draws a part and indicates its dimensions with the help of a mouse, light pen or other input device. After the drawing has been completed the computer automatically gives the instructions that direct a machining centre to machine the part.

Another development using automation are the flexible manufacturing systems (FMS). A computer in FMS can be used to monitor and control the operation of the whole factory.

Automation has also had an influence on the areas of the economy other than manufacturing.

Many industries are highly automated or use automation technology in some part of their operation. In communications and especially in the telephone industry dialing and transmission are all done automatically. Railways are also controlled by automatic signaling devices, which have sensors that detect carriages passing a particular point. In this way the movement and location of trains can be monitored.

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. Railways … also controlled … automatic signaling…, which have sensors that … carriages passing a …point.

2. Many … are highly automated or … automation technology in … part of … operation.

3. A … in flexible manufacturing … can be … to monitor and … the operation of the … factory.

4. Automation is … certain tasks, previously … people, by … only.

5. The … of operations … controlled … .

6. The … familiar … of a highly … system … an assembly … for automobiles or … complex products.

7. Such devices as … pilots, automatic … equipment and automated … systems … used to … various … .

8. … was the first … necessary in the development of … .

9. … … , originally designed only to perform simple tasks in environments … to human workers, are now … used.

10. … gave rise to the … of numerically … machines.

11. Microprocessors and … has made … the development of computer-… design and …-aided manufacture (CAD and CAM) technologies.

12. Using … devices, machines … start, …, speed up, slow … , count, … , test, compare and … .

VIII. Translate into English the text B using the dictionary.

ГЛОБАЛИЗАЦИЯ В СОВРЕМЕННОМ МИРЕ

Глобализация производства представляет собой установление более или менее устойчивых производственных связей между предприятиями различных стран, когда производственный процесс в одной стране становится частью процесса, протекающего в мировом масштабе.

Распространение новых технологий приводит к невероятно быстрым темпам внедрения инноваций, существенному сокращению жизненного цикла продукции. Динамичное развитие знаний, их применение в организациях, обладающих высоким интеллектуальным потенциалом рабочей силы, стало ключевым фактором обеспечения конкурентного преимущества.

При этом информационные технологии используются почти во всех компаниях и являются составной частью многих систем (например, производственных, систем управления запасами, коммуникационных). Информационные технологии выступают в качестве своего рода базы глобализации, поскольку обеспечивают быструю связь с любой точкой мира, позволяя мгновенно узнавать о состоянии спроса и предложения, ориентироваться на рынках сырья, труда и инноваций и т. п. Это сокращает расходы на производство и обеспечивает достижение интеграции производственных и обслуживающих процессов.

https://economy-ru.info/info/133495/

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...

It touches upon ...

The extract from the article is concerned with …

The article is about …

The text centres round the problem of ...

The article focuses on the problem of …

According to the text ...

According to the author ...

It further says that ...

According to the figures (data, information, opinions) from the text ...

It is clear from the text that ...

The problem of the text is of great importance ...

To sum it up, …

On the whole, ...

In conclusion it is possible to say that ...

X. Discuss the following questions.

1. How is the term automation defined in the text?
2. What is the most "familiar example" of automation given in the text?
3. What was the first step in the development of automation?
4. What were the first robots originally designed for?
5. What was the first industry to adopt the new integrated system of production?
6. What is feedback principle?
7. What do the abbreviations CAM and CAD stand for?
8. What are the flexible manufacturing systems?
9. What industries use automation technologies?

XI. Make up your own presentation on the topic: "Automation nowadays".

GRAMMAR FOCUS

THE ARTICLE
АРТИКЛЬ

Артикль является одним из определителей имени существительного и ставится перед существительным или перед словами, являющимися определениями к нему.

Неопределенный артикль a (an – перед словами, начинающимися с гласной) происходит от числительного **one** и означает *один из многих, какой-то, любой.*

I am **a** student. Я студент *(один из многих).*

He is **an** English engineer. Он английский инженер.

Если перед существительным в единственном числе стоит неопределенный артикль, то во множественном числе он опускается.

This is **a book**. These are **books**.

Иногда артикль **a** (an) переводится словом *один.*

in **a** month – через (один) месяц

Определенный артикль the происходит от указательного местоимения **that**. Часто переводится словами *этот, эта, это, эти.* Употребляется перед существительными и в единственном, и во множественном числе.

Определенный артикль употребляется:

1. Когда речь идет об определенном лице или предмете. Where is **the** professor? Где профессор? *(известный нам)*

2. Перед существительным, если ему предшествует прилагательное в превосходной степени или порядковое числительное.

The Moscow Metro is **the** longest in Russia.	Московское метро – самое протяженное в России.
The first examination will be in Mathematics.	Первый экзамен будет по математике.

3. Перед географическими названиями (названиями океанов, морей, рек, горных хребтов, частей света и т. д.).

the Pacific – Тихий океан **the** Volga – Волга

the Black sea – Черное море **the** Urals – Уральские горы

the North – север **the** South – юг

4. Перед названиями ряда стран и местностей.

the United States of America – Соединенные Штаты Америки, **the** Crimea – Крым

5. Перед существительными, единственными в своем роде.

the Sun – солнце, **the** Moon – луна

6. В выражениях:

in **the** afternoon, in **the** daytime – днем

in **the** morning – утром

in **the** evening – вечером

Определенный артикль не употребляется:

1. Перед именами собственными.

England, St. Petersburg, London, Smith, Petrov

Однако перед фамилиями, употребленными во множественном числе для обозначения членов одной и той же семьи, ставится определенный артикль:

the Petrovs – Петровы, **the** Hutts – семья Хаттов

2. Перед названиями времен года, месяцев и дней недели.

We have our exam periods in **winter** and in **summer**. У нас сессии зимой и летом.

English classes are on **Monday**. Занятия по английскому языку состоятся в понедельник.

GRAMMAR EXERCISES

1. Fill in the blanks with definite or indefinite articles.

Jim, … old friend of mine, used to work in downtown Los Angeles. He had … good job in one of … biggest law firms in ... city. He was ... honest, hard-working lawyer, but he hated his job. So he decided to quit, and to become ... surfer instead. Now Jim spends his days surfing ... waves of Malibu. It isn't ... easy life, but it makes him happy. Soon after he quit

his job, Jim met ... beautiful surfer named Jenny. After they went out for ... couple of months, they decided to get married.

2. Fill in the blanks with either definite or indefinite articles or no articles.

1. They usually spend their holidays in ... mountains.
   a) the b) no article c) a
2. Los Angeles has ... ideal climate.
   a) no article b) an c) the
3. This is ... best Mexican restaurant in the country.
   a) no article b) a c) the
4. I can't live on ... 500 dollars a month.
   a) the b) no article c) a
5. Someone call ... policeman!
   a) a b) the c) no article
6. Someone call ... police!
   a) no article b) the c) a
7. He is ... real American hero.
   a) no article b) the c) a
8. I don't like ... dogs, but I like my brother's dog.
   a) a b) no article c) the
9. I haven't seen him in ... five years.
   a) no article b) the c) a
10. Kobe Bryant is ... basketball player.
    a) the b) a c) no article

3. Insert suitable articles where necessary.

1. He studies ... Chinese history at ... college.
2. Before ... people invented ... wheel, they could not transport heavy loads easily.
3. I won’t let you leave in such ... stormy weather.
4. What ... wonderful journey, I’m happy I’ve joined you.
5. Not ... word was said at ... dinner about ... accident that had happened in ... morning.

6. Last year when I was at ... school I never took ... interest in ... ancient art. Now any kind of... information in this field is very interesting to me.

7. Yesterday I came from ... work very tired and went to ... bed immediately.

8. ... nature is usually wrong. (James McNeill Whistler)

9. Without ... music ... life would be ... mistake. (Nietzsche)

10. ... diplomat is ... person who can tell you to go to hell in such ... way that you actually look forward to ... trip. (Caskie Stinnett)

11. ... dog is ... only thing on ... earth that loves you more than you love yourself.

12. ... Americans like ... fat books but ... thin women. (Russel Baker)

13. ... optimist is ... person who thinks ... future is uncertain.

14. ... diplomacy is ... art of saying “nice doggie!” until you can find ... stone.

15. California is ... great place if you happen to be ... orange. (F. Allen).

4. Fill in the blanks with definite or indefinite articles where it is necessary.

Ten months ago Peter and Sarah Moore came back to ... United Kingdom from ... States, where they had run ... language school for ... immigrants for ... last seven years. When ... couple moved into their old house they got ... chance to create ... completely new interior. They decided to design ... kitchen they always wanted, with ... large window, ... double oven, as they are both ... very keen cooks, and ... traditional, country-style cupboards. ... budget wasn't huge so they couldn't afford to hire ... architect to design ... interior. They did everything themselves – Peter painted ... walls pale green using ... mixture of different paints, Sarah found ... furniture and kitchen equipment in ... department stores and ... second-hand shops. ... final result is impressive – ... airy, spacious room with a lot of natural light. ... kitchen is now ... heart of their home and ... family just love it.

5. Use the articles with the proper names. Choose the right answer.

1. ... Lake Baikal is the deepest freshwater lake in the world.

a) a b) an c) the d) nothing

2. ... Nile is the second-longest river in the world.

a) a b) an c) the d) nothing

3. ... Fifth Avenue separates the East Side of Manhattan from the West Side.

a) a b) an c) the d) nothing

4. Bunin was the first Russian to receive ... Nobel Prize for literature in 1933.

a) a b) an c) the d) nothing

5. When ... UN was founded in 1945, it had 51 member states.

a) a b) an c) the d) nothing

6. ... NATO was established in 1949.

a) a b) an c) the d) nothing

7. Amundsen and his companions reached ... South Pole on December 14, 1911.

a) a b) an c) the d) nothing

8. Europe, Asia, Africa, and Australia are in Eastern Hemisphere.

a) a b) an c) the d) nothing

9. Beautiful beaches and mild climate make ... Bahamas a popular tourist resort.

a) a b) an c) the d) nothing

6. Fill in the blanks with the articles where it is necessary.

1. In ... United States of ... America ... national language is ... English. Four hundred years ago ... some English people sailed to ... North America, and they brought ... English language to ... new country. Now in ... USA people speak ... American English. Many ... words are ... same in ... American and in ... British English.

2. One of ... first novels in ... history of ... literature was written in ... England in ... 1719. It was ..., “Robinson Crusoe” by Daniel Defoe. ... Daniel Defoe was born in ... London in ... family of ... rich man. When he was ... schoolboy, he began to write ... stories. At ... age of ... sixty he wrote ... novel “Robinson Crusoe”. ... novel made him famous.

3. All ... world knows William Shakespeare as ... one of ... greatest poets and ... playwrights. He was born in ... small town of Stratford-upon-Avon in ... England. He grew up in ... large family. Not much is known of ... Shakespeare's family and his life. He became ... actor and soon began to write ... plays for his company.

7. Fill in the blanks with the articles where it is necessary.

1. ... Stonehenge is ... circle of ... stones on ... Salisbury Plain in ... England. ... Stonehenge is about 5.000 years old. ... stones are huge and heavy.

2. There are lots of ... pyramids in Egypt. ... most famous is ... Great Pyramid of ... King Cheops ... pyramid is about 5.000 years old.

3. ... London is ... capital of ... Britain. ... London is famous for ... its museums and parks. ... famous clock ... "Big Ben" is also in ... London. Halloween is ... evening of ... October ... 31st. It is ... children's festival in ... Britain and ... USA. ... children dress up in ... witch or ... ghost costumes.

8. Choose the correct sentence.

1. a) There is a good Italian restaurant nearby.
   b) There is good Italian restaurant nearby.
2. a) Smiths have bought a new flat.
   b) The Smiths have bought a new flat.
3. a) I am reading a interesting book.
   b) I am reading an interesting book.
4. a) The largest river in the USA is the Mississippi river.
   b) The largest river in USA is Mississippi river.
5. a) Jane is a student.
   b) Jane is student.
6. a) They went to Alps every summer.
   b) They went to the Alps every summer.
7. a) Jack is a good worker.
   b) Jack is good worker.

Unit 2
MANUFACTURING AND TYPES OF AUTOMATION

I. Study and memorize the following words and expressions.

1) manufacturing – производство

2) application fields – области применения

3) investment – инвестиция, вклад

4) rate – скорость, темп

5) to describe – описывать

6) fixed automation – автоматизация механическими средствами, «жесткая автоматизация»

7) assembly machines – сборочные машины

8) easily changed – легко заменяемая

9) non-productive – непроизводительный

10) changeover – переход, переналадка

11) high investments – большие инвестиции

12) numeral-control machine-tool – станок с числовым программным управлением (ЧПУ)

13) high production rates – высокие темпы производства

14) suitable – подходящий

15) automobile industry – автомобильная промышленность

16) programmable automation – автоматизация средствами ЧПУ (числовое программное управление)

17) equipment – оборудование

18) to facilitate product – облегчить производство чего-либо

19) computer memory – память компьютера

20) controlled by – контролируемый кем-либо

21) flexible automation – гибкая автоматизация (с возможностью перепрограммирования)

22) to require – требовать

23) to reprogram – перепрограммировать

24) to allow – позволять, разрешать

II. Translate the words and word combinations using the dictionary and memorize them.

Automation technology; several types of automation; to refer; machine; equipment; configuration; certain processing operations; easily changed; that is why; suitable; in large volumes; examples; the automobile industry; automatic assembly machines; certain chemical processes; producing products in large quantities; ranging from several dozen to several thousand; units at a time; coded in computer memory; for each different product style; the machine-tool; controlled by the computer programme; for each series; new product; lost production time; expensive; flexible automation.

III. Translate the words and word combinations from Russian into English.

1) примеры автоматизированных систем
2) «жесткая автоматизация»
3) автоматические сборочные машины
4) производство
5) перепрограммирование оборудования
6) может выполняться
7) разнообразная продукция
8) определенные химические процессы
9) несколько видов
10) сфера применения
11) фиксированная последовательность операций
12) последовательность операций
13) гибкая автоматизация
14) количество продуктов ограничено
15) переналадка оборудования
16) потерянное производственное время
17) очень быстро и автоматически
18) станок с числовым программным управлением
19) один за другим
20) самое важное применение
21) ограничения жесткой автоматизации

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

A numeral-control machine-tool; types of automation; certain processing operations; transfer lines; in the automobile industry; automatic assembly machines; certain chemical processes; flexible automation; the number of products; the changeover of the equipment; very quickly and automatically;

reprogramming and changeover; take a period of non-productive time; rates in programmable automation; lower than in fixed automation; to facilitate product; needs high initial investments and high production rates; time which is expensive; described below; designed to facilitate product.

V. Read and translate the text A.

TYPES OF AUTOMATION

Manufacturing is one of the most important application fields for automation technology. There are several types of automation in manufacturing. The examples of automated systems used in manufacturing are described below.

1. Fixed automation, sometimes called “hard automation” refers to automated machines in which the equipment configuration allows fixed sequence of processing operations.

These machines are programmed by their design to make only certain processing operations. They are not easily changed over from one product to another. This form of automation needs high initial investments and high production rates. That is why it is suitable for products that are made in large volumes. Examples of fixed automation are machining transfer lines found in the automobile industry, automatic assembly machines and certain chemical processes.

2. Programmable automation is a form of automation for producing products in large quantities, ranging from several dozen to several thousand units at a time. For each new product the production equipment must be reprogrammed and changed over. This reprogramming and changeover take a period of non-productive time. Production rates in programmable automation are generally lower than in fixed automation because the equipment is designed to facilitate product changeover rather than for product specialization. A numeral-control machine-tool is a good example of programmable automation. The programme is coded in computer memory for each different product style and the machine-tool is controlled by the computer programme.

3. Flexible automation is a kind of programmable automation. Programmable automation requires time to reprogram and change over the production equipment for each series of new product. This is lost production time which is expensive. In flexible automation the number of products is limited so that the changeover of the equipment can be done very quickly and automatically. The reprogramming of the equipment in flexible automation is done at a computer terminal without using the production equipment itself. Flexible automation allows a mixture of different products to be produced one right after another.

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. … automation is a kind of … automation.

2. … automation requires time … reprogram and change over the production … for each series of … product.

3. The reprogramming of the … in flexible automation is … at a computer terminal … using the production … itself.

4. Flexible … allows a mixture of … products to be produced one right after … .

5. This reprogramming and … take a period of … time.

6. Production … in programmable automation … generally lower … in fixed automation … the equipment … designed to … product changeover rather than for … specialization.

7. This … of automation … high initial investments and … production rates.

8. That … why it … suitable for products that … made in … volumes.

9. Fixed automation, sometimes called "… …" refers to automated machines in which the … configuration allows fixed … of processing … .

10. These machines … programmed by their … to make … … processing operations.

11. The programme is … in computer … for each different product … and the machine-tool is … … the computer programme.

VIII. Translate into English the text B using the dictionary.

АВТОМАТИЗАЦИЯ В СОВРЕМЕННОМ МИРЕ

Автоматизация – это интеграция орудий труда в полностью автоматическую, а в некоторых случаях саморегулирующуюся систему. Передовые страны приступили к автоматизации промышленности в начале 1950-х годов. Зародившись как концепция производства, сегодня автоматизация означает много больше, чем координация функционирования ряда станков. Вряд ли найдется вид деятельности, как социальной, так и экономической, не подверженный в той или иной степени внедрению автоматически управляемых устройств или систем.

Перечень направлений автоматизации включает, например, запуск и автоматическое пилотирование летательных аппаратов, производство автомобилей, управление движением транспорта и его маршрутизацию, медицинскую диагностику и автоматическое обновление банковского баланса в соответствии с указаниями, поступающими от компьютера, который может находиться на расстоянии многих километров. На сегодняшний день автоматизация процессов производства является неотъемлемым направлением работы любой промышленной компании. Существует два вида автоматизации: полная и частичная. Рассмотрим каждую из этих видов.

Полная автоматизация процессов производства – это наивысший уровень автоматизации, который подразумевает передачу всех контрольных и управленческих функций техническим приборам. В настоящее время такой вид автоматизации применяется очень редко. Преимущественно контроль над процессом производства производит человек. Близки к этому виду автоматизации предприятия атомной энергетики. Если учитывать характер производственных процессов, то можно выделить следующие виды автоматизации:

1) непрерывные производственные процессы;

2) дискретные производственные процессы;

3) гибридные производственные процессы.

Как известно, внедрение автоматизации достаточно трудоемкий процесс, который требует длительного времени и больших финансовых затрат, поэтому предприятия, которые не обладают достаточными финансовыми возможностями, могут автоматизировать свое предприятие частично. Частичная предполагает автоматизацию какого-либо отдельного оборудования и производственных операций. Автоматизация, включающая одну либо несколько операций технологического процесса, является частичной.

Автоматизация производственных процессов используется в том случае, когда усложняется система управления производств, а условия труда опасны для жизни. Такой вид автоматизации часто используется в компаниях отрасли пищевой промышленности, и обычно его применяют к действующему на производстве оборудованию.

Мы с вами знаем, что автоматизация производства может выполняться на следующих уровнях:

1) нулевой уровень – на этом уровне автоматизация процессов производства называется механизацией;

2) первый уровень – на этом уровне автоматизация технических процессов и производств носит название «автоматизация рабочего процесса в поточном и серийном производстве». На данном этапе не предполагается автоматическая взаимосвязь между рабочим и оборудованием. В этом случае сотрудник производства следит за транспортировкой машин и осуществляет контроль над производственным процессом. Давайте рассмотрим один из примеров. Так, предположим, что новое современное оборудование, которым является «токарный автомат», осуществляет технологический процесс самостоятельно, а именно делает обтачивание, сверление и т. д. Подобное устройство по показателям производительности может равняться десяти обычным машинам. Это происходит благодаря автоматизации многих рабочих моментов и высокому уровню концентрации производственных операций;

3) второй уровень (автоматизация технологических процессов) предполагает осуществление четырех моментов рабочего процесса:

– контроль над оборудованием;

– транспортировка;

– утилизация отходов;

– управление комплексом приборов.

В виде производственных устройств разрабатываются и используются автоматические линии. Что же такое автоматическая линия? Это система автоматически действующих станков, связанных транспортирующими устройствами, и имеющая единое устройство управления. Автоматическая линия осуществляет заданную последовательность ряда технологических операций без участия операторов. Периодический контроль оборудования и его наладку выполняет наладчик. Загрузка заготовок и выгрузка готовых деталей осуществляется оператором или производственным роботом, что не менее важно при производительности труда;

4) третий уровень автоматизации включает в себя все этапы производства от разработки до испытаний и отправки готовой продукции. На этом уровне предполагается комплексное автоматизирование.

Таким образом, комплексная автоматизация производства требует высокого уровня научной организации труда с широким применением разнообразных вспомогательных технических средств на рабочих местах производственного и управленческого персонала.

(Новикова Л. В., Коломмин С. А Студфорум.
https://scienceforum.ru/2018/article/2018003901)

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...
It touches upon ...
The extract from the article is concerned with ...
The article is about ...
The text centres round the problem of ...
The article focuses on the problem of ...
According to the text ...
According to the author ...
It further says that ...
According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up, …
On the whole, ...
In conclusion it is possible to say that ...

X. Discuss the following questions.

1. What is the most important application of automation?
2. What types of automation are used in manufacturing?
3. What is fixed automation?
4. What are the limitations of hard automation?

5. What is the best example of programmable automation?

6. What are the limitations of programmable automation?

7. What are the advantages of flexible automation?

8. Is it possible to produce different products one after another using automation technology?

XI. Make up your own presentation on the topic: "Types of automation nowadays".

GRAMMAR FOCUS

THE NOUN
СУЩЕСТВИТЕЛЬНОЕ

Существительное – это название лица (engineer – инженер), предмета (table – стол), явления (sunrise – восход) или процесса (calculation – вычисление). Род существительного в английском языке, в отличие от русского, определяется только по значению существительного. Название лица мужского пола относится к мужскому роду, вместо него употребляется местоимение **he.** Название лица женского пола относится к женскому роду, вместо него употребляется местоимение **she.** Название неодушевленного предмета относится к среднему роду, вместо него употребляется местоимение **it**.

– What is your **father?**	– Кто твой отец?
– **He** is a driver.	– **Он** шофер.
– Where is my **notebook (magazine)**?	– Где моя **тетрадь (журнал)**?
– **It** is on the shelf.	– **Она** (он) на полке.

Исчисляемые и неисчисляемые существительные. К исчисляемым существительным относятся названия предметов и лиц, которые можно пересчитать, поэтому они употребляются как в единственном, так и во множественном числе:

a room (комната) – two rooms, **a** worker (рабочий) – many workers

К неисчисляемым существительным относятся названия предметов, которые не подлежат счету. Они употребляются только в единственном числе:

1) вещественные существительные: steel (*сталь*), oil (*нефть*), air (*воздух*) и др.;

2) отвлеченные существительные, обозначающие состояния, действия, науки, процессы и т. п.: freedom *(свобода),* labour *(труд),* mathematics *(математика)* и др.

Число существительных. Множественное число существительных образуется путем прибавления окончания **-s** или **-es** к форме единственного числа. Окончание **-s**, **-es** произносится как:

[s] – после глухих согласных: a desk *(стол, парта)* – desks, a subject *(предмет)* – subjects

[z] – после звонких согласных и гласных: an angle *(угол)* – angles, a lecture *(лекция)* – lectures, a boy *(мальчик)* – boys

[iz] – после шипящих и свистящих se, ce, ge, s, ss, sh, ch: a gas *(газ)* – gases, a brush *(щетка)* – brushes, a page *(страница)* – pages, an inch *(дюйм)* – inches.

Правила правописания множественного числа существительных. Если существительное в единственном числе оканчивается на:

-y с предшествующей согласной, то во множественном числе **-y** меняется на **-i** и добавляется **-es**: a property *(свойство)* – properties

-o, то во множественном числе добавляется **-es**, которое произносится [z]: a hero *(герой)* – heroes

-f или **-fe**, то во множественном числе **-f** меняется на **-v** и добавляется окончание **-es** или **-s**: a shelf *(полка)* – shelves.

Несколько существительных сохранили древнюю форму образования множественного числа. Наиболее часто встречаются следующие:

a man – men
a woman – women
a tooth – teeth
a foot – feet
a child – children

Имена существительные, заимствованные из греческого и латинского языков, сохранили форму множественного числа этих языков:

Единственное *число*	***Множественное*** *число*
apparatus – аппарат	apparatus – аппараты
basis – базис, основа	bases – основы

crisis – кризис	crises – кризисы
datum – данная величина	data – данные
phenomenon – явление	phenomena – явления
nucleus – ядро	nuclei – ядра

Падеж существительных. В английском языке два падежа: ***общий*** и ***притяжательный.***

Общий падеж (the Common Case) не имеет специальных окончаний: an example *(пример),* drawings *(чертежи),* data *(данные).*

Притяжательный падеж (the Possessive Case) обозначает принадлежность предмета или лица и отвечает на вопрос **whose?** [hu:z] *чей*? Существительное в притяжательном падеже является определением к другому существительному и всегда стоит перед ним. Существительное в притяжательном падеже имеет окончание:

1) **-'s** (апостроф и буква **s**) в единственном числе: our **teacher's** lectures – лекции нашего преподавателя;

2) **'** (только апостроф) во множественном числе: the **students'** drawings – чертежи студентов.

Примечание. Если существительное во множественном числе не имеет окончания **-s**, прибавляется **'-s:**

the **children's** pictures – рисунки этих детей.

Притяжательный падеж в основном употребляется с одушевленными существительными, однако он может употребляться и с некоторыми неодушевленными, например: the **sun's** rays – *солнечные лучи* (лучи солнца), the **country's** economy – *экономика страны.*

Существительное в притяжательном падеже переводится на русский язык либо соответствующим прилагательным, либо существительным в родительном падеже.

Существительное в функции определения. Для английского языка характерно употребление в роли определения одного или нескольких существительных (в общем падеже), образующих цепочку слов. В такой цепочке последнее существительное является основным, а все предшествующие ему слова являются определениями к нему.

Существительное в функции определения переводится:

1) прилагательным: **room** temperature – *комнатная* температура, **limit** pressure – *предельное* давление;

2) существительным без предлога или с предлогом: a **physics** teacher – преподаватель *физики.*

the **institute radio equipment** laboratory – *институтская* лаборатория радиооборудования

the **atomic energy** conference – конференция *по проблемам атомной энергии*

GRAMMAR EXERCISES

1. Give the plural of the following nouns.

leaf	mouse	country	piano
child	sheep	goose	lady
man	woman	gooseberry	crisis
tooth	medium	deer	diary
knowledge	fish	dish	news

2. Read the following nouns first in the singular and then in the plural.

1. bag, dog, bird, verb, pan, hen, spoon, noun, room, ring, thing, evening, song, girl, apple, table, article.

2. tree, pie, cow, fly, lady, baby, teacher, letter, mirror, berry, play, toy, city.

3. cake, snake, fork, map, lamp, hat, clock, rat, coat, goat, skirt, shirt, plant, sonant, jacket, object, attribute.

4. shelf, leaf, knife, wife, roof, chief, handkerchief.

5. bus, class, glass, dress, piece, slice, horse, house, rose, nose, blouse, box, fox, match, bench, bridge, cage, cottage, bush, radish.

6. man, woman, child, foot, tooth, goose, mouse, ox, fish, trout, fruit, swine, mouse, louse, deer, sheep.

7. phenomenon, crisis, stimulus, formula, axis, thesis, criterion.

3. Give the plural form of the words underlined.

Pattern: *I met a man at the meeting last night.*
I met some men at the meeting last night.

1. I saw a mouse running across the floor.
2. The baby got a new tooth.
3. I need a match.
4. He cooked a potato for dinner.
5. The professor is reading a thesis.
6. I visited a city in the Ukraine.
7. She photographed a leaf.
8. I caught a fish.
9. I saw a sheep in the farmyard.
10. She talked to a child.
11. The children hid behind the bush.
12. In science class we studied about a species of fish.
13. When I was in the park yesterday, I saw a goose.
14. When we spoke in the cave, we heard an echo.
15. He packed a box.
16. Every day I read in the newspaper about a new crisis in the world.
17. The wagon is being pulled by an ox.
18. I told the children a fable about a wolf and a fox.
19. We read a story about an Indian chief.
20. At the meeting last night, we were listening to a speech.
21. In science class, we studied a phenomenon of nature.

4. Use the nouns in the brackets in the Possessive Case.

1) my (nephew) dog; 2) (Julie) new boyfriend; 3) the (men) room; 4) my (sister-in-law) husband; 5) the (women) leader; 6) the (officers) residence; 7) for (goodness) sake; 8) (Jesus) resurrection; 9) the (prince) palace; 10) my (brother-in-law) new automobile; 11) (Clinton) saxophone; 12) the (children) toys; 13) a (three-hour) drive: 14) the (labourers) union; 15) (Burns) employees; 16) (Beethoven) 9th symphony; 17) (Aristoles) yacht; 18) (Aristotle) work; 19) (Bush) daughter

5. Use the Possessive Case instead of nouns with of.

1) the supporters of Mr Collins; 2) the passports of the drivers; 3) the father of Roy: 4) the parents of everyone else; 5) the shop of the Jones Brothers; 6) the songs of the Pointer Sisters; 7) the child of Mary and Henry; 8) the hats of the ladies; 9) the shop of the florist; 10) the Park of Saint James; 11) the law of Archimedes

6. Choose the right variant.

1) the coats of the ladies –
   a) the lady's coats
   b) the ladies' coats
   c) the ladies's coats
2) the hobbies of the women –
   a) the woman's hobbies
   b) the women's hobbies
   c) the womens' hobbies
3) the shoes of the players –
   a) the players'shoes
   b) the players's shoes
   c) the player's shoes
4) the future of our boys –
   a) our boy's future
   b) our boys' future
   c) our boys's future
5) the bathtub of Archimedes –
   a) Archimedes's bathtub
   b) Archimede's bathtub
   c) Archimedes' bathtub
6) the business of Anne and Francis –
   a) Anne and Francis' business
   b) Anne's and Francis' business
   c) Anne and Francis's business

7) the diary of my boss –
   a) my boss's diary
   b) my boss' diary
   c) my bosses diary
8) the clothes of men –
   a) mens clothes
   b) men's clothes
   c) mens' clothes
9) the girlfriend of my brother-in-law –
   a) my brother-in-law's girlfriend
   b) my brother's-in-law girlfriend
   c) my brother's-in-law's girlfriend

7. What do we call these things and people? Use the structure noun + noun.

1. **A ticket for a concert is a concert ticket.**
2. A magazine about computers is _____.
3. Photographs taken on your holiday are your _____.
4. Chocolate made with milk is_____.
5. Somebody whose job is to inspect factories is _____.
6. A hotel in central London is _____.
7. The results of your examinations are your _____.
8. The carpet in the dining room is _____.
9. A scandal involving a football club is _____.
10. A question that has two parts is _____.
11. A girl who is seven years old is _____.

8. Translate into Russian.

A tennis ball; a bank manager; a television producer; a road accident; income tax; the city centre; a television camera; language problems; a vegetable garden; a television programme; apple juice; trade talks; consumer goods; food sales; exchange rate; wheat consumption; flax production; power station equipment; cane sugar; sugar cane; coal supply situation; a television studio.

Unit 3
ROBOTS IN INDUSTRY

I. Study and memorize the following words and expressions.

1) application – применение
2) conveyor – конвейер
3) transfer – передача, перенос
4) loading – погрузка
5) unloading – разгрузка
6) arrangement – расположение
7) gripper – захват
8) divided into – делится на…
9) to grasp – схватывать
10) frame – рама
11) relatively – сравнительно
12) simple – простой
13) spot welding – точечная сварка
14) spray painting – окраска распылителем
15) spray-painting gun – распылитель краски
16) designed – разработан, сконструирован
17) specifically – конкретно
18) grinding – шлифование
19) calculated by robot – рассчитано роботом
20) polishing – полирование
21) manual labour – ручной труд
22) assembly – сборка (деталей)
23) inspection – контроль, проверка
24) satisfactory – отвечающий требованиям
25) suitable – подходящий
26) cycle – цикл

II. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

Category; machines; require; work parts; from one to another; tasks; to pick up; to place; more complex; such as; to utilize; to load and unload parts; to require; to be equipped with; the particular part geometry; in processing operations; examples; such applications include; spot welding; continuous arc welding; spray painting; automobile bodies; the most common applications of industrial robots; the robot positions; the automobile panels; arc welding; robot moves the welding rod; the welding seam; spray-painting gun; over the surface; grinding and polishing; the robot's tool.

III. Translate the words and word combinations from Russian into English.

1) классификации роботов
2) сфера применения
3) по назначению
4) по способу передвижения
5) промышленные роботы
6) исследовательские роботы
7) роботы, используемые в обучении
8) роботы широкого назначения
9) манипуляционные роботы
10) мобильные роботы
11) манипулятор
12) степени подвижности
13) устройства программного управления
14) двигательные функции
15) управляющие функции
16) машиностроительная отрасль
17) приборостроительная отрасль
18) движущееся шасси
19) автоматически управляемые приводы
20) колесные роботы
21) шагающие роботы
22) гусеничные роботы

23) ползающие роботы
24) плавающие роботы
25) летающие роботы

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

Robots are used; robots can be divided into; the gripper must be designed; can be calculated by robot; material-transfer applications require; loading and unloading of machines; assembly and inspection; use of robots; high cost of manual labour; the design of the product; satisfactory for humans; not always suitable for robots; widely used for fastening in manual assembly; difficult for a one-armed robot; robot manipulates a tool; include spot welding; continuous arc welding and spray painting; the most common applications of industrial robots;frames to join them; the welding rod along the welding seam; the object to be coated; other operations in this category; a rotating spindle; hazardous or uncomfortable for human worker; the robot provides a substitute for human labour.

V. Read and translate the text A.

ROBOTS TODAY

Today most robots are used in manufacturing operations. The applications of robots can be divided into three categories:

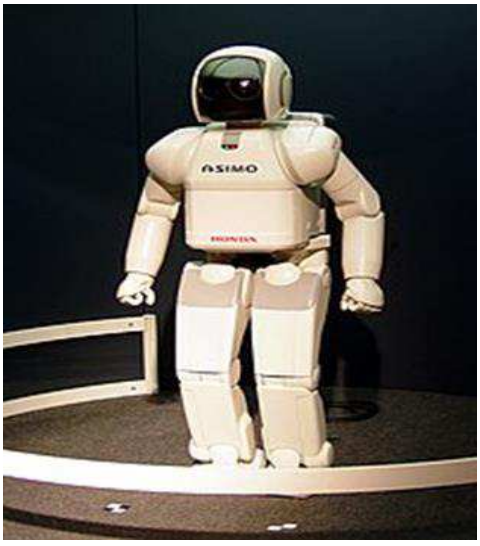
1) material handling;
2) processing operations;
3) assembly and inspection.

Material handling is the transfer of material and loading and unloading of machines. Material-transfer applications require the robot to move materials or work parts. Many from one to another of these tasks are relatively simple: robots pick up parts from one conveyor and place them on another. Other transfer operations are more complex such as placing parts in an arrangement that can be calculated by robot. Machine loading and unloading operations utilize a robot to load and unload parts. This

requires the robot to be equipped with a gripper that can grasp parts. Usually the gripper must be designed specifically for the particular part geometry.

In processing operations robot manipulates a tool to perform a process on the work part. Examples of such applications include spot welding, continuous arc welding and spray painting. Spot welding of automobile bodies is one of the most common applications of industrial robots. The robot positions a spot welder against the automobile panels and frames to join them. Arc welding is a continuous process in which robot moves the welding rod along the welding seam. Spray painting is the manipulation of a spray-painting gun over the surface of the object to be coated. Other operations in this category include grinding and polishing in which a rotating spindle serves as the robot's tool.

The third application area of industrial robots is assembly and inspection. The use of robots in assembly is expected to increase because of the high cost of manual labour. But the design of the product is an important aspect of robotic assembly. Assembly methods that are satisfactory for humans are not always suitable for robots. Screws and nuts are widely used for fastening in manual assembly but the same operations are extremely difficult for a one-armed robot.



Inspection is another area of factory operations in which the utilization of robots is growing. In a typical inspection job the robot positions a sensor with respect to the work part and determines whether the part answers the quality specifications. In nearly all industrial robotic applications the robot provides a substitute for

human labour. There are certain characteristics of industrial jobs performed by humans that can be done by robots:

1) the operation is repetitive involving the same basic work motions every cycle;

2) the operation is hazardous or uncomfortable for human worker (for example: spray painting, spot welding, arc welding and certain machine loading and unloading tasks);

3) the workpiece or tool are too heavy and difficult to handle;

4) the operation allows the robot to be used on two or three shifts.

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. Today most robots are used in … operations.

2. The … of robots can be divided … three … .

3. Material handling … the transfer of … and loading and … of machines.

4. … -transfer applications … the robot to … materials or work … .

5. Many from one to another of these … are relatively … .

6. Other … operations are more … .

7. … loading and unloading operations … a robot… load and unload … .

8. This requires the robot to be … … a gripper that … … parts.

9. Usually the … must be designed … for the particular part … .

10. … is another area of … operations in which the … of robots … growing.

11. In a typical inspection … the robot positions a … with respect to the work part.

12. In nearly all … … applications the robot … a substitute for human … .

13. … … certain characteristics of … … performed by humans that… be … by robots.

14. The third … area of industrial robots is … and … .

15. The … of … in assembly … expected … increase because of the high … of … … .

16. But the … of the product … an important … of robotic … .

17. … methods that … satisfactory … humans … not always … for robots.

18. … and … are widely … for fastening … manual assembly.

19. The robot positions a … … against the automobile… and frames to … them.

20. … … is a continuous process in which robot … the welding rod … the … seam.

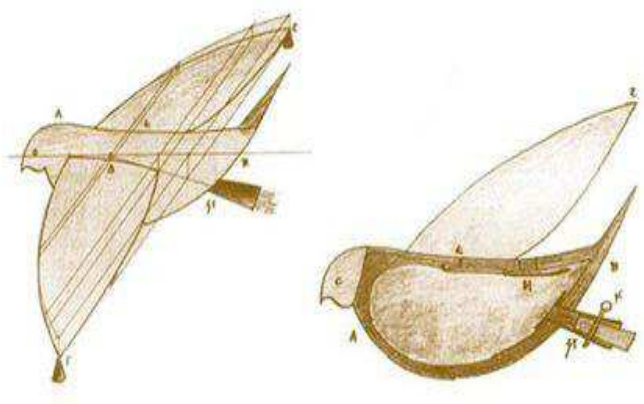
21. Spray … is the manipulation of a … -painting gun over the … of the object … … coated.

22. Other operations in … … include grinding and polishing in … a rotating spindle … as the robot's … .

VIII. Translate into English the text B using the dictionary.

ИСТОРИЯ ПОЯВЛЕНИЯ ПЕРВЫХ РОБОТОВ

Некоторые идеи, положенные позднее в основу робототехники, появились ещё в античную эпоху. Древнегреческому механику и инженеру Архиту Тарентскому приписывают создание механического голубя, способного летать (около 400 г. до н. э.). Более двух тысяч лет назад Герон Александрийский создал водяной автомат «Поющая птица» и ряд систем подвижных фигур для античных храмов. В 270 году древнегреческий изобретатель Ктесибий изобрёл особые водяные часы, получившие название клепсидра (или «крадущие время»), которые своим хитроумным устройством вызвали значительный интерес современников. В 1500 году великий Леонардо да Винчи раз-



работал механический аппарат в виде льва, который должен был открывать герб Франции при въезде короля в город. В XVIII веке швейцарским часовщиком П. Жаке-Дрозом была создана механическая кукла «Писец», которая могла быть запрограммирована с помощью кулачковых барабанов на написание текстовых сообщений, содержащих до 40 букв.

В 1801 году французский коммерсант Жозеф Жаккар представил передовую по тем временам конструкцию ткацкого станка, который можно было «программировать» с помощью специальных карт с отверстиями для воспроизведения на вытканных полотнах повторяющихся декоративных узоров. В начале XIX века эта идея была позаимствована английским математиком Чарлзом Бэббиджем для создания одной из первых автоматических вычислительных машин.

Примерно к 30-м годам XX века появились андроиды, реализующие элементарные движения и способные произносить по команде человека простейшие фразы. Одной из первых таких разработок стала конструкция американского инженера Д. Уэксли, созданная для Всемирной выставки в Нью-Йорке в 1927 году.

В 50-х годах XX века появились механические манипуляторы для работы с радиоактивными материалами. Они были способны копировать движения рук оператора, который находился в безопасном месте.

К 1960-му году были проведены разработки дистанционно управляемых колёсных платформ с манипулятором, телекамерой и микрофоном для обследования и сбора проб в зонах повышенной радиоактивности.

(https://ru.wikipedia.org;
https://dzen.ru/media/id/5df88860ec575b00b05f4de4/antichnyi-robot-mehanicheskii-golub-arhita-350-let-do-ne-5e0f514743863f00b1a60f9a;
https://vseochpu.ru/kak-ustroeny-mini-stanki-s-chpu-dlya-doma/
https://sdelanounas.ru/blogs/76766/;
https://top3dshop.ru/blog/cnc-machines-use-cases-great-overview.html)

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A:

The text deals with (the problem of) ...

It touches upon ...

The extract from the article is concerned with ...

The article is about ...

The text centres round the problem of ...

The article focuses on the problem of ...

According to the text ...

According to the author ...

It further says that ...

According to the figures (data, information, opinions) from the text ...

It is clear from the text that ...

The problem of the text is of great importance ...

To sum it up, …

On the whole, ...

In conclusion it is possible to say that ...

X. Discuss the following questions.

1. How are robots used in manufacturing?
2. What is “material handling”?
3. What does a robot need to be equipped with to do loading and unloading operations?
4. What does robot manipulate in robotic processing operation?
5. What is the most common application of robots in automobile manufacturing?
6. What operations could be done by robot in car manufacturing industry?
7. What are the main reasons to use robots in production?
8. How can robots inspect the quality of production?
9. What operations could be done by robots in hazardous or uncomfortable for the human workers conditions?

XI. Make up your own presentation on the topic: "First Robots".

GRAMMAR FOCUS

TO BE и TO HAVE, ОБОРОТ THERE + TO BE
ГЛАГОЛ TO BE

Глагол **to be** в Present, Past и Future Indefinite имеет следующие формы:

Present Indefinite	Past Indefinite	Future Indefinite
I am	**I был**	**I shall/will be буду**
he, she is	**he, she была**	**he, she will be будет**
it (есть)	**it was было**	**it**
we, you, they are	**we, you, they были**	**we, you shall/will be будем, будете**
	were	**they will be будут**

В вопросительном предложении глагол **to be** ставится перед подлежащим.

Например:

Was he in Africa last year? Он был в Африке в прошлом году?

Where **were** you yesterday? Где вы были вчера?

Отрицательная форма глагола **to be** в Present и Past Indefinite образуется без вспомогательного глагола; отрицание **not** следует непосредственно за глаголом **to be**. Например:

The Institute **isn't** far from the metro station. Институт находится недалеко от станции метро.

Функции глагола *to be*

1. Перед обстоятельством, обычно выраженным наречием или существительным с предшествующим предлогом, выступает в роли смыслового глагола со значением ***быть, находиться***.

His books **were** in the bag. Его книги были в портфеле.

2. В сочетании с Participle II смыслового глагола употребляется для образования всех времен страдательного залога (Passive Voice).

The work **was finished** in time.	Работу закончили вовремя.

3. В сочетании с Participle I смыслового глагола употребляется для образования глагольных времен Continuous и Perfect Continuous.

They **are** still **waiting** for him.	Они все еще ждут его.
They **have been waiting** for him since breakfast.	Они ждут его с завтрака.

4. В сочетании с инфинитивом другого глагола с частицей ***to*** имеет модальное значение долженствования и указывает, что действие должно иметь место в соответствии с намеченным планом.

The teacher **is to come** at five.	Преподаватель должен прийти в 5 часов.

ГЛАГОЛ TO HAVE

Глагол **to have** в Present, Past и Future Indefinite имеет следующие формы:

Present Indefinite	Past Indefinite	Future Indefinite
I, we, you, they — have — у меня, у нас, у вас, у них — есть he, she, it — has — у него, у неё — есть	I, we, you, they, he, she, it — had — у меня, у нас, у вас, у них, у него, у неё — был	I, we — shall/will have — у меня, у нас — будет you, they, he, she, it — will have — у вас, у них, у него, у неё — будет

Вопросительная форма глагола **to have** может быть образована двумя способами:

1) путем постановки глагола **to have** перед подлежащим. Например:

Had you a lecture on philosophy yesterday?	У вас вчера была лекция по философии?

2) с помощью глагола **to do.** Например:

Did you **have** a lecture on philosophy yesterday?	У вас вчера была лекция по философии?

Отрицательная форма глагола **to have** может строиться двумя способами:

1) при помощи отрицательного местоимения ***no*** (или отрицательной группы ***not any*****)** перед существительным. Например:

They have **no** car.	У них нет машины.
I have **not any** car.	У меня нет машины.

2) обычным способом образования отрицательной формы глагола, т. е. при помощи вспомогательного глагола **to do.** Например:

I **did not have** much work to do yesterday.	Вчера у меня было немного работы.

В разговорной речи вместо to have очень часто употребляется **have, has got** (‘ve/’s **got)**:

I**’ve got** a good car.	У меня хорошая машина.
Have you **got** an English dictionary?	У вас есть английский словарь?
I **haven’t got** an English dictionary.	У меня нет английского словаря.

Функции глагола *to have*

1. Перед существительным выступает в роли смыслового глагола со значением ***иметь, обладать*** (часто с **got)**.

They **have (got)** a house in the country.	У них дом (они имеют дом) за городом.

2. В сочетании с Participle II смыслового глагола употребляется для образования глагольных времен группы Perfect.

We **have introduced** a new system of work.	Мы ввели новую систему работы.

3. В сочетании с инфинитивом другого глагола с частицей ***to*** имеет модальное значение долженствования (часто переводится как «приходится, пришлось» и т. п.).

I have to buy another newspaper.	Я должен (мне придётся) купить ещё одну газету.

ОБОРОТ THERE + TO BE

Оборот **there** + **to be** имеет значение ***есть, находится, имеется, существует.*** Глагол **to be** ставится в личной форме **(is, are, was, were, will be)** и согласуется с последующим именем существительным. Перевод таких предложений надо начинать с обстоятельства места или со сказуемого, если обстоятельство отсутствует.

1. **There are** many new books ***at the Institute library.***	1. В институтской библиотеке много новых книг.
2. **There are** different methods of learning English words.	2. Существуют различные методы (способы) заучивания английских слов.

В вопросительном предложении глагол в личной форме ставится на первое место перед **there.**

Is there a school in your street?	На вашей улице есть школа?
Yes, **there is.**	Да, есть.
No, **there is not.**	Нет.

1 ***Общий вопрос:***

Is there anything in the box?

2. Специальный вопрос:

What is there in the box?

3. Разделительный вопрос:

There are some people in the room, aren't there?

С исчисляемыми существительными в единственном числе используется неопределенный артикль; с неисчисляемыми существительными и с исчисляемыми существительными во множественном числе могут использоваться местоимения **some** (в утвердительных) и **any** (в вопросительных и отрицательных предложениях).

Выбор формы глагола *to be* зависит от числа следующего непосредственно за ним существительного:

*There **is a chair** and two armchairs in the room.*

*There **are two armchairs** and a chair in the room.*

В полном отрицательном предложении после оборота **there** + **to be** ставится отрицательное местоимение ***no*.**

There **will be no** lecture **on** physics tomorrow. Завтра лекции по физике не будет.

Перед **many, much, any** и числительными ставится ***not*** вместо ***no***.

GRAMMAR EXERCISES

1. Put the sentences into the future and past tense changing the verb to be and using suitable adverbial modifiers of time*: yesterday, tomorrow, next week, last month, next year, at 5 o'clock, etc.*

1. Victor is free in the evening.
2. John is in America.
3. I am very busy.
4. She is at the lecture.
5. The child is 10 years old.
6. This work is interesting.
7. The expedition is in Africa.
8. The new film is long.
9. My mother is at home.
10. The workers are at the factory.
11. The students are at the Institute.

2. Make the sentences negative and interrogative.

1. You are students.
2. They will be engineers in five years.
3. My father is a very busy man.
4. I was at the university yesterday.
5. She will be free tomorrow.
6. The students are in the classroom now.
7. My sister is 15 today.
8. I was in Moscow yesterday.
9. Her work is very interesting.
10. He is from New York.
11. She is 16.
12. They are married.
13. Jane was ill last week.
14. I am a student.
15. It was cold last winter

3. Explain the use of the verb** to be **in the sentences below and translate them into Russian.

1. They were at home last night. 2. He is a well known scientist. 3. They are to leave Moscow to night. 4. The children were walking down the street. 5. She is an experienced teacher. 6. The letter will be posted at once. 7. He is in Kiev now. 8. We were to part that day. 9. The letter was written by the secretary. 10. They were to have arrived at seven o'clock. 11. The purpose of his visit was to negotiate for the purchase of timber.

4. Translate into English.

1. Ее нет здесь сейчас, она дома.
2. Его не было дома вчера вечером.
3. Он один из лучших врачей нашей больницы.
4. Его задача заключается в том, чтобы собрать материал по этому вопросу к 1 июня.
5. Он находится сейчас в Крыму.
6. Она будет там в пять часов.
7. Пароход должен прийти в 6 часов вечера.
8. Его брат инженер.
9. Я должен был встретиться с ним в 8 часов вечера.
10. Он будет рад вас видеть.

5. Explain the use of the verb** to have **in the sentences below and translate them into Russian.

1. She has come home. 2. He has a large family. 3. We have to leave home early in the morning. 4. He had the letter typed. 5. He has dinner at home. 6. They had to complete their work on Monday. 7. We shall have plenty of fruit in the autumn. 8. He will have read the story by ten o'clock. 9. They will have the book you need in 5 days.

6. Translate into English.

1. У меня нет ее адреса.
2. У меня был вчера очень интересный разговор с профессором Д.
3. У него есть очень интересные книги по автоматизации.

4. Я должен буду пойти туда еще раз.
5. У нас завтра будет собрание.
6. Я должен вставать теперь очень рано.
7. Вы вчера обедали в ресторане?
8. Есть ли у вас красный карандаш?
9. У меня не было времени навестить его вчера.
10. Нужно ли вам идти в библиотеку сегодня?

7. Put the sentences into the future and past tenses changing the verb *to have* ***and using suitable adverbial modifiers of time:*** *yesterday, tomorrow, next week, last month, next year, at 5 o'clock, etc.*

1. They have a big house in the country.
2. My friend has many interesting books.
3. His mother has a nice garden.
4. She has a good map of London.
5. We have a good dog.
6. I have a beautiful picture.
7. These students have five examinations.
8. His parents have a comfortable flat.
9. John had good work.
10. These pupils have four lessons every day.

8. Put the sentences into the future and past tenses changing the verb *to be.*

1. There are twelve students in our group.
2. There is a beautiful garden near the house.
3. There is a big blackboard in the classroom.
4. There is a letter for him on the table.
5. There are two lifts in the house.
6. There is a new stadium in the town.
7. There is a table in the middle of the room.
8. There is a hospital in the village.
9. Are there many sentences in this exercise?
10. Is there much work to do at home?
11. There are no pictures in the book.

9. Paraphrase according to the pattern using suitable forms of the verb *to have.*

Pattern: There are no books in his bag. – ***He has no books in his bag.***

1. There is no TV-set in his room.
2. There are no mistakes in his dictation.
3. There is no garden near his house.
4. There are no pictures in her room.
5. There are no French books in her library.
6. There is no English newspaper on her table.
7. There is no coffee in my cup.
8. There is no telephone in my flat.
9. There are no maps on the walls of our classroom.
10. There is no sugar in Peter's tea.

10. Put general and special questions to the sentences below using *any* ***where it is necessary.***

1. There is a tea-pot on the table.
2. There are some flowers in the vase.
3. There are some English books on the shelf.
4. There is somebody in the garden.
5. There is a lot of milk in the jug.
6. There are some mistakes in your test.
7. There is some ink in your pen.
8. There are some pictures on the wall of the room.
9. There is some coffee in the cup.
10. There are six continents in the world.
11. There are a lot of flowers in the garden.
12. There is something in the box.
13. There are some new words in the text.
14. There is a lot of snow in the forest.

11. Translate into English using *there is /there are;* ***pronouns*** *any, some, no* ***and words formed from them.***

1. В вашей семье есть дети?
2. На улице много народу.
3. В кувшине нет молока.
4. За вашим домом есть сад?
5. За вашим садом есть площадь, не так ли?
6. В вашем городе есть парки?
7. У вас есть вопросы?
8. На столе около окна стоят часы.
9. На полке мои книги и тетради.
10. В моем столе ничего нет.
11. В этом журнале есть что-нибудь интересное?
12. Что там на столе? Там стоит чашка и три стакана.
13. Есть кто-нибудь в соседней комнате?
14. На столе есть соль, но мало.
15. Времени нет.

12. Fill in the proper form of *to be* ***in present, past or future.***

1. She travels a lot. Yesterday she … in Paris. Today she ... in London. Tomorrow she … in New York.
2. … you at home yesterday?
3. ... you … at home tomorrow?
4. I … in Great Britain last week.
5. … you ready yet? – Not yet. I … ready in five minutes.
6. The weather … nice today.
7. My sister is going away for a few days, so she … at home tomorrow
8. I … a pupil. I go to school.
9. … You in the country last summer?
10. It’s Tom’s birthday next Sunday. He ... ’ll.
11. I … cold. Can you close the window, please?
12. You may visit Jane tomorrow. She ... busy.
13. Where … Ann yesterday?
14. My brother and I … good tennis players. We like to play tennis very much.
15. … the soup … ready soon? – Yes, it ... ready in a few minutes.

13. Fill in is, are, was, were.

1) There … three people in the photo.
2) There … a woman, a man and their child in our garden now.
3) There … an exhibition in our town last month.
4) I didn't like the hotel because there … a lot of furniture in the room.
5) He was thirsty but there …no drinks in the fridge.
6) The furniture was very old, there … two chairs and a table in the room.
7) She is at her office now. There …a lot of people waiting to see her.
8) Today there … a lot of snow on the ground.
9) There … some chicken and fish in the fridge now.
10) … there any furniture in the room?
11) … somebody in the kitchen now.
12) There … no one on the roof of the house at the moment.
13) There … no flowers in our garden last summer.
14) There … a sports centre near our house.
15) There … 26 letters in the English alphabet.

14. Fill in *is/are/was/were/have/has.*

1. Tom ... lost his note-book.
2. This bridge … built ten years ago.
3. … you finished your work yet?
4. This town is always clean. The streets … cleaned every day.
5. Where … you born?
6. I … just made some coffee. Would you like some?
7. Cheese … made from milk.
8. This is a very old photograph. It … taken a long time ago.
9. Mike … bought a new car.
10. … Ann working today?

Unit 4
ROBOTIC ENGINEERING

I. Study and memorize the following words and expressions.

1) robot production – производство роботов

2) the average robot price – средняя цена робота

3) maintain robotic production systems – обслуживание роботизированных производственных систем

4) robotic vehicle – робототехническое средство передвижения

5) acoustic transducer – акустический датчик

6) mobile robotic minnions – мобильные роботы миньоны

7) autonomous underwater vehicles – автономное подводное средство передвижения

8) robotics engineers – инженеры-робототехники

9) simulation packages – пакеты моделирования

10) era of robots – эпоха роботов

11) mechanical agents – механические агенты

12) to create – изобретать

13) to help people – помогать людям

14) hazardous work – опасная работа

15) daily chores – повседневная работа

16) humanoid robots – человекоподобные роботы

17) artificial intelligence – искусственный интеллект

18) robotic engineering – робототехника

19) servo robot – робот с сервоуправлением

20) non-servo robot – робот без сервосистемы

21) continuous path robot – робот с контурной системой управления

22) artificial sense – искусственный орган очувствления

23) limit switch – концевой выключатель

24) to trip a switch – приводить в действие выключатель

25) pick-and-place robot – цикловой (перегрузочный) робот

26) point-to-point movement – позиционное движение

27) bang-bang robot – робот с релейным управлением

28) articulated manipulator – манипулятор шарнирной конструкции
29) sensory robot – очувствленный робот
30) three-wire snare – трехпроволочное захватывающее устройство

II. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

To accomplish robotic motions; four basic configurations of manipulator arms; rectangular; cylindrical; spherical; anthropomorphic; articulated or jointed arm; design features; freedom; to refer to each direction; an arm is capable of moving; a simple linear or straight line movement; to follow a two-dimensional curved path; more complicated motions; require many degrees of freedom; to locate an end effector; in a particular work; degrees might be required; to avoid other equipment; the joint, rotary or linear; to increase the versatility of the manipulator arm; design, two or more of the four basic configurations; combined on the same manipulator; pneumatic; hydraulic; electrical; pressurized gas to move the joint; a particular joint; inexpensive and simple; usually reserved for “pick-and-place” robots.

III. Translate the words and word combinations from Russian into English.

1) перемещение
2) манипулятор
3) осуществляться
4) исполнительные механизмы
5) пневматический
6) гидравлический
7) электрический
8) использование пневмоприводов
9) выполнять роботизированне движения
10) использовать четыре основные конфигурации
11) изобретать руки-манипуляторы
12) прямоугольные
13) цилиндрические
14) сферические

15) антропоморфные
16) каждое движение руки
17) способность двигаться
18) простое линейное, или прямолинейное, движение
19) следовать по двумерному криволинейному пути
20) вверх и вниз, вправо и влево
21) более сложное движение
22) большая степень свободы
23) ориентировать
24) конкретное задание
25) препятствие
26) выполнять определенные задачи
27) шарнир
28) увеличить универсальность руки-манипулятора
29) конфигурации
30) совмещать

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

Capable of point-to-point motions; the manipulator moves at full speed; limits of travel are reached; non-servo robots are often referred to as “limit sequence”; reach the end of a particular motion; limit switch is tripped, stopping the motion; robot – robots of several categories; and end effector to alter direction; motion is common, depending on the number of joints in the manipulator; this kind of robot is programmed by; as they are known, may include the ability; a computerized robot; with one or more artificial senses; information to the controller; a computerized robot, probably with sensors; that is designed for assembly line jobs; consists of one or more manipulators (arms); to provide environmental feedback; use today are for industrial purposes; based upon their industrial function; continuous path servo robots; constant motion; controlled without the use of stops or switches; programmable robot; that memorizes a sequence of movements; programmed by “walking” the manipulator.

V. Read and translate the text A.

TYPES OF ROBOTS

A typical robot consists of one or more manipulators (arms), end effectors (hands), controller, power supply, and possibly an array of sensors to provide environmental feedback. Because the majority of robots in use today are for industrial purposes, classification of them is based upon their industrial function.

Robot classes: Non-servo robot is the simplest form of robot. This robot picks up an object and places it in another location. Freedom of movement is usually limited to two or three directions. Non-servo robots are capable of point-to-point motions. For each desired motion, the manipulator moves at full speed until the limits of travel are reached. Non-servo robots are often referred to as “limit sequence”, “bang-bang”, or “pick-and-place”. When non-servo robots reach the end of a particular motion, a mechanical stop or limit switch is tripped, stopping the motion. Servo robot are robots of several categories that employ servomechanisms for the manipulator and end effector to alter direction in midair without tripping a mechanical switch. Five to seven directions of motion are common, depending on the number of joints in the manipulator.

Servo robots are also capable of point-to-point motions but movements of manipulators are accomplished with controlled variable velocities and trajectories. More common are continuous path servo robots which are appropriate when a robot must follow a desired trajectory in a smooth, constant motion. Motions of servo robots are controlled without the use of stops or switches.

Programmable robot is driven by a programmable controller that memorizes a sequence of movements and repeats these perpetually. This kind of robot is programmed by "walking" the manipulator and end effector through the desired movement.

This kind of robot is programmed by instructions fed into the controller electronically. "Smart" robots, as they are known, may include the ability to improve upon their work instructions.

Sensory robot is a computerized robot with one or more artificial senses to sense its environment and feed back information to the controller. Senses are usually sight or touch. Assembly robot is a computerized robot, probably with sensors, that is designed for assembly line jobs.

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. This kind of robot … programmed … instructions … … the controller … .

2. "Smart" robots, as they … …, may include the … to improve upon their work … .

3. … … are robots of several categories that … servomechanisms for the … and end effector to alter … in midair without … a mechanical … .

4. Five to seven … of motion … common, … on the number of … in the … .

5. Servo robots are also capable of … -to-… motions but … of manipulators … accomplished …controlled … velocities and … .

6. More common … continuous … servo robots … are appropriate … a robot … follow a … trajectory in a … , constant motion.

7. Motions of … … are controlled … the use of … or switches.

8. Non-servo … … the simplest … of robot.

9. This robot … … an object and … it in another … .

10. Freedom of … is usually … to two or three … .

11. Non-servo robots are … of point-…-point … .

12. For each … motion, the manipulator … at full speed until the … of travel … reached.

13. Non-servo … are often referred to as "… …", "bang-bang", or "…-and-… ".

14. When …-… robots reach … … of a particular motion, a … stop or … switch … tripped, stopping … … .

15. A typical robot consists of … or … … (arms), end … (hands), …, power supply, and … an array of … to provide … feedback.

16. … the majority of … in use today … for industrial … , classification of … is based … their industrial … .

17. … robot is a servo … run by a computer.

18. Sensory robot is a … robot with one or more artificial … to sense its … and feed back information to … … .

19. Senses are usually … or … .

20. … robot is a computerized …, probably with …, that is designed for … line … .

VIII. Translate into English the text B using the dictionary.

РОБОТЫ ДЛЯ ОБСЛУЖИВАНИЯ СТАНКОВ И ПЕРЕМЕЩЕНИЯ ЗАГОТОВОК

Лучшим решением для замещения оператора при загрузке/разгрузке станков является использование промышленных роботов.

Промышленный робот может обеспечить загрузку, перемещение и выгрузку заготовок и готовых изделий с высочайшей точностью и на высокой скорости, что, в свою очередь, будет способствовать повышению качества продукции и производительности предприятия.

Программное обеспечение роботов обладает высокой гибкостью, позволяя использовать специальные сенсоры и программные алгоритмы, которые могут компенсировать погрешности, допущенные при изготовлении и позиционировании заготовок. Как правило, контроллер робота должен быть связан с системой управления станка, обеспечивая синхронизацию работы. Также станок и робот могут быть размещены на одном жестком основании (раме), что минимизирует затраты времени на программирование и конфигурирование при перемещении комплекса.

На данный момент существует большое количество видов захватных устройств. Промышленные роботы также выпускаются несколькими линейками с различной грузоподъемностью и скоростными характеристиками. Это дает возможность подобрать оптимальную конфигурацию манипулятора для работы с различным обрабатывающим оборудованием, таким как токарные станки, фрезерные станки, деревообрабатывающие станки, оборудование для гибки и раскроя листового материала, прессы и штампы.

(https://www.robomatic.ru/robots/obsluzhivanie-stankov-i-peremeshchenie-zagotovok)

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...

It touches upon ...

The extract from the article is concerned with ...

The article is about ...

The text centres round the problem of ...

The article focuses on the problem of ...

According to the text ...
According to the author ...
It further says that ...
According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up …
On the whole ...
In conclusion it is possible to say that ...

X. Discuss the following questions.

1. What criterion is used for the robot classification given in the text?
2. What devices are used to control the motion of non-servo robots?
3. What are other names for a non-servo robot?
4. What are the most common “senses” of a sensory robot?
5. What kind of robots are called “smart” and why?
6. How can robots be programmed?
7. What are the differences between the non-servo robot and the Servo robot?

XI. Make up your own presentation on the topic: “Machine tool robots”.

GRAMMAR FOCUS

THE ADJECTIVE AND ADVERB

Прилагательное – часть речи, выражающая качество или свойство предмета (явления, лица). В английском языке прилагательные не изменяются ни по числам, ни по падежам, ни по родам и переводятся в соответствии с родом, числом и падежом существительного, к которому относятся:

a **young** man – молодой человек; a **young** woman – молодая женщина; **young** people – молодые люди.

В предложении прилагательное выполняет роль определения или именной части сказуемого. В функции определения прилагательное

стоит перед определяемым словом, а в функции составной части сказуемого – после глагола-связки.

He used a **new** method in his work.	Он использовал *новый* метод в своей работе.
This method is **new.**	Этот метод – *новый.*

Некоторые прилагательные – **present** *присутствующий,* **dependent** *зависящий,* **essential** *существенный,* **different** *различный,* **able** *способный* – в функции именной части составного сказуемого переводятся на русский язык соответствующим глаголом.

Water **is** always **present** in the air.	Вода всегда *присутствует* в воздухе.

Наречие – это часть речи, указывающая на признак действия или качества. По форме наречия делятся на две группы: простые и производные.

***Простые наречия*: here** – *здесь, сюда,* **now** – *теперь,* **soon** – *скоро* и др.

Производные наречия образуются от прилагательных или других частей речи при помощи суффикса ***-ly***: **easily** – *легко,* **daily** – *ежедневно.*

Некоторые наречия совпадают по форме с прилагательными, но часто отличаются от них по значению.

Степени сравнения прилагательных. Сравнительная степень односложных и некоторых двусложных прилагательных образуется при помощи суффиксов ***-er, -r***.

high – higher – высокий – *более* высокий
late – later – поздний – *более* поздний

Суффиксы превосходной степени -est, -st. Перед прилагательным в превосходной степени обычно стоит определенный артикль.

the highest – *самый* высокий
the latest – *самый* поздний

Многосложные прилагательные образуют степени сравнения при помощи наречий **more** и **most** (сравнительная и превосходная степени наречия **much**).

This instrument is **more accurate** than that one. Этот прибор *более точный,* чем тот (точнее того).

This instrument is **the most accurate.** Этот прибор *самый точный.*

В английском языке есть ряд прилагательных, образующих степени сравнения от других корней.

Исходная форма	Сравнительная степень	Превосходная степень
good – хороший	better – лучше	best – лучший, самый лучший
bad – плохой	worse – хуже	worst – худший, самый плохой
little – маленький, мало	less – меньше, менее	least – самый маленький, наименьший
much – много many	more – больше, более	most – самый большой, наибольший
far – дальний, далекий	farther – более отдаленный further	farthest – самый отдаленный furthest

GRAMMAR EXERCISES

1. Choose between the adverb and the adjective given in the brackets to complete the sentences.

1. It is (correct/correctly).
2. Spell the word (correct/correctly).
3. You know it (well/good).
4. Of course it is (well/good).
5. It is (cold/coldly) in the room.
6. Don’t look so (cold/coldly) at me.
7. I can do it (easy/easily).
8. I always worry if you come home (late/lately).
9. You are tired. You mustn’t work so (hard/hardly).
10. She looks just (wonderful/wonderfully) in that new dress.
11. I can’t hear the actors (well/good) from the last row.
12. I think it a (real/really) good play.
13. This soup makes me feel (bad/badly).

14. The actress is speaking (soft/softly), but I can hear her (clear/clearly).

15. The roses will (sure/surely) smell (sweet/sweetly).

16. The victim of the accident looked (helpless/helplessly) across the road.

2. Give the comparative and the superlative degree of the following adjectives.

Thin, joyful, yellow, free, comfortable, polite, shy, dry, just, recent, free, narrow, deep, wicked, right, real, sweet, grey, complete, glad, happy, strong-willed, good-natured, wide-spread, far-fetched, kind-hearted, broad-minded, well-known.

3. Add the missing forms of the adjectives and adverbs.

Positive	Comparative	Superlative
well	…	…
…	worse	…
…	…	farthest
…	…	best
…	older	…
near	…	…
…	…	biggest
…	happier	…
little	…	…

4. Translate into Russian.

1. He thought he was the happiest man in the world.
2. The new car is more comfortable than the previous one.
3. The Neva is wider and deeper than the Moskva river.
4. Last year he spent less time on English than this year.
5. The sooner they finish the construction of the plant the better.
6. The book is not so interesting as you think.

7. The more time you spend in the open air the sooner you will recover after your illness.

8. He has much more free time than I have.

9. Tom runs fast. Dick runs faster, but Harry runs fastest.

10. This road is the worst I've ever travelled over.

11. If you listen to the teacher more attentively you'll understand better.

12. Tennis and football are the games I like best.

13. This is the hottest day we have had for several weeks.

14. Smiles is the longest word in the English language because there is a mile between two ***s***.

15. Yesterday was hotter than any other day we had this summer.

5. Use the suitable form of the adjectives given in the brackets.

1. Kate is (young) than Mary. 2. John is the (clever) boy in the class. 3. The weather is (dull) today than it was yesterday. 4. London is one of the (big) cities in the world. 5. This sentence is (difficult) than the first one. 6. My dog is as (good) as yours. 7. His dog is (good) than yours. 8. Her dog is the (good) of the three. 9. The cat is much (happy) in her new home. 10. My cold is (bad) today than it was yesterday. 11. This mountain is the (high) in Europe. 12. This piece of homework is as (bad) as your last one. 13. This piece of homework is (bad) than your last on 14. This piece of homework is the (bad) you have ever done. 15. Richard is not as (tall) as Tom. 16. Tom is (tall) than Richard. 17. Tom is the (tall) boy in the class. 18. Athens is (far) from London than Rome is. 19. Jack is (rich) than Richard, but I don't think he is (happy) than Richard. 20. Summer is (warm) than winter. 21. Robert and Paul are the (noisy) boys that I know. 22. Boys are always (noisy) than girls. 23. Summer is the (warm) of the four seasons. 24. Winter in London is (foggy) than in Paris.

6. Translate into English.

1. Последний поезд прибывает в полночь.

2. Моя старшая сестра на два года старше меня.

3. Этот текст гораздо труднее, чем тот, который мы переводили на днях.

4. Комната хорошая, но всё же не такая хорошая, как мне бы хотелось.

5. Я не так молод, как вы.

6. Этот мальчик – старший сын моего старейшего друга.

7. Скажите, пожалуйста, где ближайшая остановка автобуса.

8. Ждите дальнейших распоряжений.

9. Эта проблема не так серьезна, как вам кажется.

10. Ваша сестра очень талантлива. Пожалуй, самая талантливая из молодых художников.

11. Сибирь – один из самых богатых районов нашей страны.

12. Нам нужен стол поменьше, так как комната небольшая.

13. Вам нужны обои посветлее, тогда ваша комната будет не такой мрачной.

14. Я читала обе статьи. Первая значительно занимательнее второй.

15. Ей столько же лет, сколько мне, хотя она и выглядит значительно моложе.

16. Чем внимательнее вы будете выполнять задания, тем успешнее будет ваша учеба.

17. Чем труднее задача, тем больше времени занимает решение ее.

7. Fill in the correct form of the words in brackets (comparative or superlative).

1. My house is (big) than yours.
2. This flower is (beautiful) than that one.
3. This is the (interesting) book I have ever read.
4. Non-smokers usually live (long) than smokers.
5. Which is the (dangerous) animal in the world?
6. A holiday by the sea is (good) than a holiday in the mountains.
7. It is strange but often a coke is (expensive) than a beer.

8. Who is the (rich) woman on earth?
9. The weather this summer is even (bad) than last summer.
10. He was the (clever) thief of all.

8. Fill in the comparison with *as ... as ... .*

1. John is (tall) Glen.
2. Janet is (beautiful) Jennifer.
3. You are (crazy) my sister.
4. We can run (fast) they can.
5. My mom is (not / strict) your mum.
6. Your mobile phone is (not / trendy) mine.
7. Matrix II was (not / interesting) Matrix I.
8. This yoghurt (not / taste / good) the one I bought yesterday.
9. I can do (many / press-ups) you.
10. I (not / earn / much / money) you do.

9. *Fill in the correct form of the following adjectives.*

1. London is the (large) city in Great Britain.
2. No other British city has as (many) inhabitants as London.
3. The London underground, the tube, is the (old) underground in the world.
4. The Tower of London is one of the (famous) London sights.
5. Another sight is the London Eye. With its 135 meters, it is (tall) than any other big wheel in the world.

Unit 5
MACHINE ELEMENTS

I. Study and memorize the following words and expressions

1) Machine – механизм
2) device – прибор, устройство
3) to perform – выполнять
4) activity – действие
5) usage – использование
6) part – элемент, деталь
7) to assist – помогать, способствовать
8) to transform – преобразовывать, переходить
9) direction – направление
10) magnitude – величина
11) force – сила
12) to consume – потреблять, расходовать
13) to derive – извлекать
14) expedient – целесообразный
15) remedy – средство
16) wedge – клин
17) pulley – шкив
18) levers – рычаги
19) machine tool – станок
20) join – соединять
21) to achieve – достигать
22) shaft – вал
23) to rotate – вращаться
24) motion – движение
25) to mount – монтировать
26) bearing – подшипник
27) to reduce – сокращать
28) to require – требовать
29) to couple – подцеплять, прицеплять

II. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

To perform; some activity; to assist in performing any type of work; to transform; the direction or magnitude; a force instruments; consisting of many elements; join into one piece by welding; to be done by either gas welding; electric welding; to be achieved; by means of nuts and bolts; to make this motion possible; to reduce friction; to require; less lubrication; to engage; to disengage; to be mounted on shafts by means of keys; the main part; every machine; can be joined; two pieces of metal; a bolt; couplings.

III. Translate the words and word combinations from Russian into English.

1) употребление
2) целесообразный
3) средство
4) устройство
5) часть
6) выполнять определенную операцию
7) передавать деталь от одного к другому
8) сила тока
9) использовать энергию
10) заменить механизм
11) производить замену деталей
12) рычаги и шкивы
13) выполнить определенные действия
14) потреблять много энергии
15) укрепить клин
16) помогать в работе
17) опустить рычаг
18) большая величина
19) неверное направление
20) соединять все части механизма
21) достигать цели
22) убрать шкив

23) новый станок
24) холодная сварка
25) вал
26) вращать вокруг оси
27) движение вверх и вниз
28) устанавливать правильное положение рычага
29) заменить подшипник
30) уменьшать давление

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

Any device; to perform some activity; in common usage; assist in performing any type of work; a simple machine; magnitude of a force; the word “machine”; expedient, remedy; an elementary machine; to a steam turbine; levers, wedges or pulleys; for instruments consisting of many elements; an enormous number of different machines; different parts and elements; a frame on which the other parts; the same in all machines; two pieces of metal; gas welding or electric welding; by means of nuts and bolts; if we want to connect; couplings are flange coupling; not permanently coupled to each other; jaw clutches are widely used; mounted on shafts; by means of keys.

V. Read and translate the text A.

MACHINE ELEMENTS

A machine is any device that uses energy to perform some activity. In common usage, the meaning is that of a device having parts that perform or assist in performing any type of work. A simple machine is a device that transforms the direction or magnitude of a force without consuming any energy. The word “machine” is derived from the Latin word “machine”, which means expedient, remedy. It may be anything from such an elementary machine as a wedge or a lever to a steam turbine. In practice such simple machines as levers, wedges or pulleys are not spoken of as machines. This name is used for instruments consisting of many elements.

There is, of course, an enormous number of different machines, such as printing machines, machine tools, sewing machines, combustion engines, refrigerators, etc. Although each of this consists of different parts and elements, there are some machine elements that are common to most machines.

Every machine has a frame on which the other parts are mounted and the method of joining these parts to each other is more or less the same in all machines. Two pieces of metal can be joined into one piece by welding them together, which is done by either gas welding or electric welding. A bolted joint is achieved by means of nuts and bolts. A bolt consists of the head and the shank with the thread.

Many parts of a machine are mobile. A shaft, for instance, rotates about its axis, and in order to make this motion possible, it is mounted in bearings. Ball bearings and rolled bearings are, of course, preferable, since they reduce friction and require less lubrication. If we want to connect two shafts together, we couple them. Some well-known couplings are flange coupling and the sleeve or muff. If the two shafts are not permanently coupled to each other, but can be made to engage and disengage, the coupling is called a clutch. Jaw clutches are widely used, but friction clutches are also used where the shafts require to be connected while running. Wheels are mounted on shafts by means of keys.

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. … , of course, an enormous number of … machines.

2. Although each of this … … different parts and … .

3. The word "…" is derived from the … … "machine", which means, expedient, … .

4. It … … anything from such an … machine as a wedge or a … to a steam … .

5. In practice such … machines as …, … or … are not spoken of as … .

6. This name … … for instruments consisting of … elements.

7. A machine is … … that uses energy to perform some … .

8. In common … , the meaning … that of a … having parts that … or assist in performing… type of …

9. A simple machine … a … that transforms … … or magnitude of a … without consuming any … .

10. Many parts of a machine are … .

11. A …, for instance, rotates about … …, and in order to make this … possible, it is … in bearings.

12. … bearings and … bearings are, of course, …, since they reduce … and require less… .

13. If we want to … two … together, we … them.

14. Some …-… couplings are … coupling and … … or muff.

15. If the … shafts … … permanently coupled … each other, but can be made to … and …, the coupling … … a clutch.

16. Jaw … are widely …, but friction … are also used … the shafts … to be connected while … .

17. … are mounted on … by means of … .

VIII. Translate into English the text B using the dictionary.

ИСТОРИЯ РОБОТОТЕХНИКИ

Станина является основной несущей частью станка, на которой монтируются другие его элементы и механизмы. Для жесткого крепления неподвижных узлов – шпиндельных бабок, коробок скоростей и подач и тому подобного – станины имеют лапы, фланцы и другие конструктивные элементы.

Суппорт токарного станка перемещается по комбинированным направляющим, одна из которых выполнена плоской, а другая призматической, чем обеспечивается правильное расположение резца относительно продольной оси заготовки. Регулирование зазоров в направляющих осуществляется с помощью клиньев, планок и т. п.

В средних и легких станках с ЧПУ, в координатно-расточных, шлифовальных, копировальных и других станках все большее распространение находят направляющие качения (II). Они обеспечивают

малую силу сопротивления движению, отсутствие скачков при малых скоростях движения, высокую точность установочных перемещений и долговечность. В зависимости от тел качения направляющие качения могут быть шариковыми или роликовыми.

Шпиндельный узел – важнейшая часть станка с вращательным главным движением. Он включает в себя собственно стальной вал, часто пустотелый, с опорами и установленные на нем детали привода вращения и патрон или оправку для крепления обрабатываемой заготовки или режущего инструмента. От шпиндельного узла в большой степени зависит точность обработки, производительность и надежность всего станка.

Муфты служат для соединения валов и передачи вращения от одного вала к другому. Наряду с постоянными муфтами, не разъединяемыми в процессе работы станка, широкое применение находят сцепные муфты, играющие важную роль в управлении станками.

Системы управления станками. В процессе выполнения заданных технологических операций обработки заготовок на станке требуется производить такие действия, как включение, изменение скорости и выключение движения; включение, изменение и выключение подачи; реверсирование, перемещения для деления, установки и т. п. Осуществление этих действий обеспечивается механизмами управления, совокупность которых определяет систему управления станка.

(*https://studfile.net/preview/9990301/page:5/*)

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...

It touches upon ...

The extract from the article is concerned with ...

The article is about ...

The text centres round the problem of ...

The article focuses on the problem of …

According to the text ...

According to the author ...

It further says that ...

According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up, …
On the whole, ...
In conclusion it is possible to say that ...

X. Discuss the following statements.

1. To perform an action, the mechanism uses energy.
2. Levers and pulleys are not called mechanisms.
3. Any mechanism consists of many parts and elements.
4. Some mechanical elements are common to most mechanisms.
5. The basis of any machine is its more or less large body parts.
6. Despite the large number and variety of machine designs, there is much in common in their design.
7. The main supporting element of any machine is the bed, on which the rest of the units and mechanisms of the machine are mounted.
8. The control system can be manual or automatic.
9. Any detail is a closed space limited by real geometric surfaces, which are formed as a result of processing in one way or another (casting, stamping, cutting, etc.).
10. Machine tools are classified according to the degree of versatility, degree of automation, degree of accuracy and weight.

XI. Make up your own presentation on the topic: "Modern machines".

GRAMMAR FOCUS

THE INDEFINITE TENSES
THE PRESENT INDEFINITE (SIMPLE) TENSE

The Present Simple широко используется в устной речи и употребляется:

1) для выражения обычных, регулярных, повторяющихся или постоянных действий в настоящем времени, факта:

The sun rises every morning. / Penguins live in the Antarctica.

Часто употребляются обстоятельства времени, выражающие частоту и повторность действия (**always, often, usually, regularly, every day** etc.**)** или редкую повторяемость и её отсутствие **(never, seldom, sometimes,** etc.):

*We **often** go to the movies on Sundays.*

*My friend **sometimes** lends me his book;*

2) для выражения мыслей и чувств: *I **think** so, I **like** it.* Во фразах типа: **I promise, I agree,** etc. *I **promise** I'll pay you back;*

3) для выражения заранее намеченных действий в ближайшем будущем, по расписанию, программе (главным образом с глаголами **to leave**, **to start**, **to come**, **to return**, **to go**, **to arrive** и т. д.):

*What time **does** your train **leave** tomorrow?*

*The match **starts** at half past seven.*

*The new supermarket **opens this Friday**.*

В утвердительных предложениях используется глагол в форме инфинитива без частицы **to**. Если подлежащее 3-го лица единственного числа (**he**, **she**, **it**), то к форме глагола-сказуемого присоединяется окончание **-es/s.**

I / we / you / they	**drive / work / do**
He / she / it	**drives / works / does**

Мы используем вспомогательный глагол **do/does** в вопросительных и отрицательных предложениях.

QUESTION			NEGATIVE		
Do	I / we / you / they	***work**?* ***drive**?*	I / we / you / they	***don't***	***work*** ***drive***
Does	He / she / it	***do**?*	He / she / it	***doesn't***	***do***

GRAMMAR EXERCISES

1. Put the verb in the brackets into the correct form of the Present Simple.

1. Ann ... doesn't drink ... (not/drink) tea very often.

2. What time … (the library/close) here?

3. I’ve got a computer, but I … (not/use) it much.
4. Where … (your friend/come) from? He’s British.
5. What … (you/do)? I’m a tutor.

2. Translate into English.

1. Моя семья обычно обедает в ресторане.
2. Наши друзья всегда пьют кофе на завтрак.
3. Днём у неё масса работы.
4. Я занимаюсь английским по вечерам.
5. Мы никогда не едим мясо.

3. Make the sentences negative and interrogative.

1. He goes to school every day.
2. My sister works here.
3. They eat a lot.
4. We work every day.
5. He comes from Germany.
6. They live in the USA.
7. He plays football every day.
8. His father works at an office.
9. I visit my parents very often.
10. They live in Great Britain.
11. He goes to school by bus.
12. She lives in this house.
13. He wants to be a doctor.
14. They play tennis every Sunday.
15. We work every day.
16. My sister goes to bed at nine.
17. Usually I have dinner very late.
18. My brother watches TV every evening.
19. She likes classical music.
20. We go to the theatre once a month.

4. Complete the sentences by putting in the verbs. Use positive or negative meanings of the present simple.

Model: *Claire is very sociable. She knows (know) lots of people.*

We've got plenty of chairs, thanks. We don't want (not/want) any more.

1. My friend is finding life in Paris a bit difficult. He … (not/speak) French.
2. Most students live quite close to the college, so they … (walk) there.
3. I've got four cats and two dogs. I … (love) animals.
4. No breakfast for Mark, thanks. He … (not/eat) breakfast.
5. What's the matter? You … (not/look) very happy.

5. Put the verb into the correct form. Write sentences about yourself. Use *always/never/often/ sometimes/ usually***.**

Model: (watch television) *I never watch television. / I usually watch television in the evening. (etc.)*

1) read in bed
2) get up before 7 o'clock
3) go to university / by bus
4) drink coffee
5) watch soap operas

6. Put the verb into the correct form.

1. Alice (to have) a sister.
2. Her sister's name (to be) Ann.
3. Ann (to be) a student.
4. She (to get) up at seven o'clock.
5. She (to go) to the institute in the morning.
6. Jane (to be) fond of sports.
7. She (to do) her morning exercises every day.
8. For breakfast she (to have) two eggs, a sandwich and a cup of tea.
9. After breakfast she (to go) to the institute.
10. Sometimes she (to take) a bus.

11. It (to take) her an hour and a half to do her homework.
12. She (to speak) English well.
13. Her friends usually (to call) her at about 8 o'clock.
14. Ann (to take) a shower before going to bed.
15. She (to go) to bed at 11 p. m.

7. Put the verb into the correct form.

1. My working day (to begin) at seven o'clock.
2. I (not to walk) to work every morning.
3. She (to do) her morning exercises every day.
4. He (to speak) German.
5. I (to visit) my friend every week.
6. Her first class (to start) at eight o'clock.
7. Ann (not to read) a lot.
8. He always (to invite) his friends to his birthday party.
9. I (to go) for a walk every day.
10. She (to wash) her car once a week.

8. Translate sentences from Russian into English. Put the verb in the brackets into the correct form of the Present Simple.

1. Она занята. (to be busy)
2. Я не занят.
3. Вы заняты?
4. Они дома? (to be at home)
5. Его нет дома.
6. Я не знаю.
7. Они знают?
8. Она не знает.
9. Кто знает?
10. Никто не знает.
11. Он читает английские книги? (to read English books)
12. Они никогда не читают. (never / to read)
13. У неё есть квартира? (to have a flat)
14. У него ничего нет.
15. Это кто?

Unit 6
MACHINE-TOOLS. LATHE

I. Study and memorize the following words and expressions.

1) to undergo – подвергать
2) trimming – обрезка
3) spinning – кручение
4) to provide – обеспечивать
5) groove – канавка
6) thread – резьба
7) source – источник
8) lathe – токарный станок
9) cutting tool – режущий инструмент
10) headstock – передняя бабка токарного станка
11) chuck – зажим, патрон
12) tailstock – задняя бабка
13) bed – станина
14) to adjust – регулировать
15) carriage – салазки
16) saddle – суппорт
17) tool holder – резцедержатель
18) turret lathe – револьверный токарный станок
19) broaching machine – протяжной станок

II. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

Casting; rolling; forging; welding; piercing; bending; drawing; the metal piece; usually reserved for tools; used a power source; human movement; offered for sale; to construct; machine-tool; found; workshop; the lathe; to spin; axis; a cutting tool; main parts; usually contains; the gearing mechanism; to use; made of high-speed steel; grinding machines; on the other hand; use abrasives; diamonds; diamond dust; corundum; silicon carbide; honing and lapping machines; to obtain; speed; to regulate the speed; the motor; the automatic turret lathe; automatically; skills; a turner.

III. Translate the words and word combinations from Russian into English.

1) множество скоростей
2) детали с круглым поперечным сечением
3) не вращающийся инструмент
4) по направлению к детали
5) посредством передней бабки
6) деталь закреплена
7) вращая деталь
8) срезая поверхность
9) резец может двигаться в сторону и по направлению к детали
10) деталь закреплена с помощью планшайбы или зажима
11) токарный станок оснащен электроприводом
12) токарный станок приводится в движение посредством передней бабки
13) чистовая обработка
14) шпиндель
15) заготовка
16) ось
17) смазывать механизм
18) внутри
19) снаружи
20) гидравлический

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

Important machine-tool; circular cross-section; the workpiece on its axis; a sharp stationary tool; moved sideways; to control the depth of cut; power-driven; by electric motors; continuous rotation; at a variety of speeds; the modern lathe; a hollow spindle; a chuck or a faceplate; the workpiece is clamped; the movement of the tool; both along the lathe bed; accurately controlled; to close tolerances; under numerical control; an ancient tool; by the Egyptians around 1300 BC; the industrial revolution;

to be created in less time; a greater rotational speed; computer operated; with accurate precision; different materials and works; different diameter; different speeds; the gear box; to run the lathe at various speeds; the lathe centers; must be on one line; the alignment of the lathe centers; the cut with a micrometer.

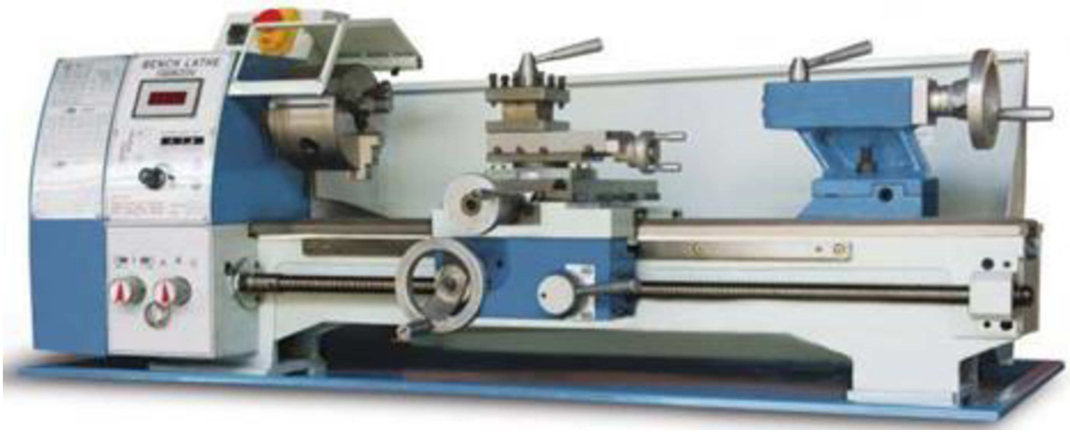
V. Read and translate the text A.

LATHER

A lathe is a machine tool which spins a block of material to perform various operations such as cutting, sanding, drilling, or deformation with tools that are applied to the work piece to create an object which has symmetry about an axis of rotation.

Lathes are used in woodturning, metalworking, metal spinning, and glass working. Lathes can be used to shape pottery, the best-known design being the potter's wheel. Most suitably equipped metalworking lathes can also be used to produce plane surfaces and screw threads.

The lathe is an ancient tool; it was first developed by the Egyptians around 1300 BC. During the industrial revolution the lathe was motorized, allowing wooden turned items to be created in less time and allowing the working of metal on a lathe. The motor produced a greater rotational speed, makes it easier to quickly produce qualified work. Today most lathes are computer operated allowing for mass-production that can be created with accurate precision and without the cost of employing craftsmen.



The largest part of the lathe is called the bed on which the headstock and the tailstock are fastened at opposite ends. On the upper part of the bed there are special ways upon which the carriage and tailstock slide.

The two lathe centers are mounted in two spindles: one (the live center) is held in the headstock spindle while the other (the dead center) – in the tail-stock spindle.

The lathe chuck is used for chucking the work that is for clamping it so that it will rotate without wobbling while turning. The chucks usually mounted on the headstock spindle, may have different size and constructions.

If the work is perfectly round, it may be chucked in the so-called three-jaw universal chuck all the jaws of which are moved to the center by turning the screw. But if the work is not perfectly round, the four-jaw independent chuck should be used.

In turning different materials and works of different diameter, lathes must be run at different speeds. The gear box contained in the headstock makes it possible to run the lathe at various speeds.

Before turning a work in the lathe, the lathe centers are to be aligned, that means that the axes of both centers must be on one line.

The alignment of the lathe centers may be tested by taking a cut and then measuring both ends of the cut with a micrometer.

Not all works should be fastened between the two centers of the lathe. A short work may be turned without using the dead center, by simply chucking it properly at the spindle of the head-stock.

Lather is still the most important machine-tool. It produces parts of circular cross-section by turning the workpiece on its axis and cutting its surface with a sharp stationary tool. The tool may be moved sideways to produce a cylindrical part and moved towards the workpiece to control the depth of cut. Nowadays all lathes are power-driven by electric motors. That allows continuous rotation of the workpiece at a variety of speeds. The modern lathe is driven by means of a headstock supporting a hollow spindle on accurate bearings and carrying either a chuck or a faceplate, to which the workpiece is clamped. The movement of the tool, both along the

lathe bed and at right angle to it, can be accurately controlled, so enabling a part to be machined to close tolerances. Modern lathes are often under numerical control.

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. Not all … should … fastened between the … centers of the lathe.
2. A … work may be … without using the … center, by simply … it properly at the … of the … - … .
3. … is still the most … machine-tool.
4. It produces parts of … cross-… by turning the workpiece on its … and cutting its … with a sharp … tool.
5. The tool may be … sideways to …a cylindrical part and moved … the workpiece to … the … of cut.
6. … all lathes are power-… by electric … .
7. A … is a machine tool which … a block of material to … various operations such as …, sanding, …, or deformation with … .
8. Lathes are used in …, metalworking, … …, and glass working.
9. … can be used to … …, the best-known … being the potter's … .
10. Most suitably … metalworking … can also be used to produce … … and screw threads.
11. If the workpiece work is perfectly …, it may be … in the so-called …-jaw universal … .
12. But if the work is not perfectly round, the four-… independent chuck … be … .
13. In … different materials and … of different …, lathes must be run at … speeds.
14. The … … contained in the … makes it possible to… the lathe at … speeds.
15. The … of the lathe centers… … tested by taking a … and then … both ends of the … with a micrometer.

VIII. Translate into English the text B using the dictionary.

ТОКАРНЫЙ СТАНОК

Токарный станок – это станок для обработки резанием (точением) заготовок из металлов, древесины и других материалов в виде тел вращения. На токарных станках выполняют черновое и чистовое точение цилиндрических, конических и фасонных поверхностей, нарезание резьбы, подрезку и обработку торцов, сверление, зенкерование и развёртывание отверстий и т. д. Заготовка получает вращение от шпинделя, а резец, режущий инструмент, перемещается вместе с салазками суппорта от ходового вала или ходового винта, получающих вращение от механизма подачи.

Значительную долю станочного парка составляют станки токарной группы. Она включает, согласно классификации экспериментального научно-исследовательского института металлорежущих станков, девять типов станков, отличающихся по назначению, конструктивной компоновке, степени автоматизации и другим признакам.

Применение на станках дополнительных специальных устройств (для шлифования, фрезерования, сверления радиальных отверстий и других видов обработки) значительно расширяет технологические возможности оборудования.

Токарные станки, полуавтоматы и автоматы, в зависимости от расположения шпинделя, несущего приспособление для установки заготовки обрабатываемой детали, делятся на горизонтальные и вертикальные. Вертикальные предназначены в основном для обработки деталей значительной массы, большого диаметра и относительно небольшой длины.

(https://ru.wikipedia.org/wiki/)

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A:

The text deals with (the problem of) ...

It touches upon ...

The extract from the article is concerned with ...
The article is about ...
The text centres round the problem of ...
The article focuses on the problem of ...
According to the text ...
According to the author ...
It further says that ...
According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up, …
On the whole, ...
In conclusion it is possible to say that ...

X. Discuss the following questions.

1. What parts can be made with the lathes?
2. How can the cutting tool be moved on the lathe?
3. How is the workpiece clamped in the lathe?
4. Can we change the speeds of workpiece rotation in the lathe? Why?
5. By what means is the modern lathe driven?
6. What machine tool is the lathe?
7. What operations can the lathe perform?
8. When was the first lathe constructed?
9. What is the largest part of the lathe?
10. What is the lathe chuck used for? Where is it mounted?
11. How many work centers are there on the lathe?
12. Where is the dead center mounted?
13. How many spindles are there on a lathe?
14. What two general kinds of chucks are used for clamping the work that has to be turned on a lathe?
15. What mechanism changes the speeds the lathe is run at?

XI. Make up your own presentation on the topic: "Types of modern lathes".

GRAMMAR FOCUS

THE PAST SIMPLE (INDEFINITE) TENSE

Правильные глаголы (Regular Verbs) образуют прошедшее время путём добавления к основной форме глагола окончания ***-ed***.

Неправильные глаголы (Irregular Verbs) имеют три основные формы: 1) инфинитив, 2) прошедшее неопределенное время (Past Simple (Indefinite)), 3) причастие прошедшего времени.

Отрицательная и вопросительная формы образуются при помощи вспомогательного глагола прошедшего времени **did(not)** и глагола-сказуемого в форме инфинитива без частицы **to**.

*He **liked** the film / He **didn't like** the film /**Did** he **like** the film?*

The Past Simple используется:

– для описания факта прошлого, описания привычки, занятий:

*Emma **passed** her exam **last year. / When** she **was** young she **played** football.*

– для перечисления прошедших действий, происходивших один за другим:

*She **put** on her coat, **took** her bag and **left** the house.*

POSITIVE			QUESTION			NEGATIVE	
I/ we you she/ he it they	*enjoyed* *saw* *went*	Did	I/ we you she/ he it they	*enjoy?* *see?* *go?*	I/ we you she/ he it they	didn't	*enjoy* *see* *go*

Часто употребляются такие обстоятельства времени, как **yesterday** – вчера; **last** week – на прошлой неделе; a year **ago** – год назад; **in 1999** – в 1999; **then** – тогда; **when** – когда.

GRAMMAR EXERCISES

1. Complete the sentences with the Simple Past tense of the verbs in the brackets.

1. The boys (whisper) secrets to each other.
2. Uncle Ben (hurry) to catch his bus.
3. We (return) our books to the library.
4. She (kiss) the frog and it (change) into a prince.
5. Someone (tap) me on the shoulder.

2. Write these sentences in the positive, interrogative and negative forms of the Past Simple.

Model: He teaches history at the university. ***He taught history at the university. Did he teach history at the university? He didn't teach history at the university.***

1. My parents leave home at 8 o'clock.
2. You smoke a lot.
3. I look very tired.
4. We stop at Oxford.
5. The restaurant closes at 11 o'clock.
6. I do morning exercises.
7. He works at a factory.
8. She sleeps after dinner.
9. We work part-time.
10. They drink tea every day.
11. Mike is a student.
12. Helen has a car.
13. You are good friends.
14. It is difficult to remember everything.

3. Translate into English.

1. Мой отец родился в 1965 году.
2. Когда мне было 7 лет, я пошёл в школу.

3. Все наши друзья хорошо окончили школу, поступили в университет, нашли вечернюю работу.

4. Летом мы ездили отдыхать на юг.

5. Где ты был вчера?

6. Погода была солнечной и теплой.

7. Мои родители и я катались на теплоходе по Москве-реке.

8. Мой друг приезжал ко мне на каникулы два раза в год.

9. На прошлой неделе я ходил в кино.

10. Вчера я видел радугу.

11. Они поженились пять лет назад.

12. Начальник всегда приходил на работу вовремя.

13. Сестра писала мне письма каждый месяц.

14. На каникулы мы уезжали к дедушке в деревню.

15. Максим открыл книгу, прочитал пять страниц и отложил её.

16. Николай зашёл и закрыл за собой дверь на замок.

17. Светлана проснулась, полежала ещё десять минут и только потом встала.

4. Complete the conversation. Put in the Past Simple negatives and questions.

Model: Nina: ***<u>Did you have</u>*** (you / have) a nice weekend in Paris?

Mick: Yes, thanks. It was good. We looked around and then we saw a show.

(we/not/try) to do too much.

Nina: What sights (you/see)?

Nick: We had a look round the Louvre. (I/not/know) there was so much in there.

Nina: And what show (you/go) to?

Park: Oh, a musical. I forget the name. (I/not/like) it.

Nina : Oh, dear. And (Marah/enjoy) it?

Park: No, not really. But we enjoyed the weekend. Sarah did some shopping, too, but (I/not/want) to go shopping.

5. Complete the sentences with the Simple Past tense of the verbs in the brackets. Translate the sentences.

1. Alice (to have) a sister.
2. Her sister's name (to be) Ann.
3. Ann (to be) a student.
4. She (to get) up at seven o'clock.
5. She (to go) to the institute in the morning.
6. Jane (to be) fond of sports.
7. She (to do) her morning exercises every day.
8. For breakfast she (to have) two eggs, a sandwich and a cup of tea.
9. After breakfast she (to go) to the institute.
10. Sometimes she (to take) a bus.
11. It (to take) her an hour and a half to do her homework.
12. She (to speak) English well.
13. Her friends usually (to call) her at about 8 o'clock.
14. Ann (to take) a shower before going to bed.
15. She (to go) to bed at 11 p. m.

6. Complete the sentences with the Simple Past tense of the verbs in the brackets.

1. My working day (to begin) at six o'clock.
2. I (to get) up, (to switch) on the TV and (to brush) my teeth.
3. It (to take) me about twenty minutes.
4. I (to have) breakfast at seven o'clock.
5. I (to leave) home at half past seven.
6. I (to take) a bus to the institute.
7. It usually (to take) me about fifteen minutes to get there.
8. Classes (to begin) at eight.
9. We usually (to have) four classes a day.
10. I (to have) lunch at about 2 o'clock.

11. They ... football at the institute. (to play)
12. She ... emails. (not / to write)
13. ... you... English? (to speak)
14. My mother ... fish. (not / to like)
15. ... Ann ... any friends? (to have)
16. His brother ... in an office. (to work)
17. She … very fast. (cannot / to read)
18. ... they ... the flowers every 3 days? (to water)
19. His wife ... a motorbike. (not / to ride)
20. ... Elizabeth ... coffee? (to drink)

7. Complete the sentences with the verb "to be", use Past Simple tense.

1. I ... a student.
2. My father ... not a shop assistant, he ... a scientist.
3. ... your aunt a nurse? – Yes, she ... .
4. ... they at home? – No, they ... not. They ... at school.
5. ... you an engineer? – Yes, I....
6. ... your friend a photographer? No, she ... not a photographer, she ... a student.
7. ... your brothers at school? – Yes, they ... .
8. ... this her watch? – Yes, it ... .
9. Max ... an office worker.
10. We ... late, sorry!

Unit 7
MACHINE-TOOLS. MILLING MACHINES

I. Study and memorize the following words and expressions.

1) to feed – подавать (здесь: детали; заготовки)
2) cutter – фреза
3) cutting edges – режущая края
4) to mount – устанавливать
5) to revolve – вращаться
6) to reciprocate – двигаться взад и вперед
7) self-contained – независимый
8) resting – подпирать; состояние покоя
9) to swing – вращаться
10) precision – точность
11) arbor – шпиндель
12) knee-type – консольный (о станке)
13) project – выдвигаться
14) ride – скользить по поверхности
15) reamer – развертка
16) arbor support – кронштейн
17) ram-type – ползунковый о шпиндельной бабке; выдвижной о шпинделе
18) advanced turning – многошпиндельная обработка
19) bed type milling maschine – станок фрезерный бесконсольный (с крестовым столом)
20) broaching machine – станок протяжной
21) broaching tool – инструмент протяжной
22) climb (down) milling – попутное фрезерование
23) combined milling and boring machine – станок фрезерно-расточный
24) copy milling machine (gantry-type) – станок фрезерный портальный копировальный
25) gear milling machine – станок зубофрезерный

26) high speed milling centre (HSC) – центр обрабатывающий фрезерный высокоскоростной

27) horizontal knee-type milling machine – станок фрезерные консольный горизонтальный

28) horizontal milling and boring machine – станок фрезерно-расточный горизонтальный

29) horizontal plano milling machine – станок фрезерный продольный горизонтальный

30) knee-and-column type milling machine – станок консольно-фрезерный

(http://stanki-katalog.ru/dictionary.htm)

II. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

Machining flat, curved, or irregular surfaces feeding the work piece; against a rotating cutter containing a number of cutting edges; to mount and revolve the milling cutter; to reciprocate adjustable worktable, which mounts and feeds the work piece; to have self-contained electric drive motor; a massive casting; to be properly adjusted vertically for operation can be fed up and down by hand or power; can swivel; to permit working on angular surfaces; to contain one or more arbor supports; to project forward from the top of the column; to be desired depending on the position of the milling cutter or cutters; to ride up or down the column on a rigid track; a rotating cutter; a number of cutting edges; a spindle; to mount; to revolve; the milling cutter; to use; for forming flat surfaces; forming and fluting milling cutters; to locate; vertically; parallel to the column face; to design for making precision cuts.

III. Translate the words and word combinations from Russian into English.

1) точность размеров

2) фартук (станка)

3) устройство автоматической смены инструмента

4) время автоматической смены инструмента

5) линия автоматическая

6) инструмент слесарный

7) лента

8) ветвление, переход (программы)

9) разрушение, поломка

10) система автоматизированного проектирования САПР

11) CAD, CAM программные системы

12) система автоматизированного инжиниринга

13) система автоматизированного проектирования зажимных устройств

14) система автоматизированного управления производством АСУП

15) межцентровое расстояние

16) устройства цифрового управления

17) числовое программное управление

(http://stanki-katalog.ru/dictionary.htm)

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

Knee-type mills; a saddle; supported by a knee; vertically on the milling machine column; adjusted vertically for operation; a spindle located vertically, parallel to the column face; modern vertical milling machines; to permit working on angular surfaces; is designed for making precision cuts; to the horizontal plane; angle within a 180° arc; contains the drive motor; milling machine spindle; containing one or more arbor supports projects; are used to stabilize long arbors; rides up or down the column on a rigid track; excellent for forming flat surfaces, forming and fluting milling cutters; special operations can be performed with; rests upon the knee and supports the worktable; the worktable traverses to the right or left upon the saddle; may be manually controlled or power fed; special safety precautions while being used; do not make contact with; suitable cover over the table surface; use the buddy system; do not attempt

to tighten arbor nuts; when installing or removing milling cutters; install the cutter last to avoid being cut; when the machine is operating ; appropriate rake and a brush; should be fabricated to the size of the T-slots; the machine off; prevent splashing by using appropriate splash guards; cutting oil on the floor can cause.

V. Read and translate the text A.

KNEE-TYPE MILLS

Milling is the process of machining flat, curved, or irregular surfaces by feeding the work piece against a rotating cutter containing a number of cutting edges. The usual Mill consists basically of a motor driven spindle, which mounts and revolves the milling cutter, and a reciprocating adjustable worktable, which mounts and feeds the work piece.

Milling machines are basically classified as vertical or horizontal. These machines are also classified as knee-type, ram-type, manufacturing or bed type, and planer-type. Most milling machines have self-contained electric drive motors, coolant systems, variable spindle speeds, and power-operated table feeds.

Knee-type mills are characterized by a vertically adjustable worktable resting on a saddle which is supported by a knee. The knee is a massive casting that rides vertically on the milling machine column and can be clamped rigidly to the column in a position where the milling head and milling machine spindle are properly adjusted vertically for operation.

The plain vertical machines are characterized by a spindle located vertically, parallel to the column face, and mounted in a sliding head that can be fed up and down by hand or power. Modern vertical milling machines are designed so the entire head can also swivel to permit working on angular surfaces.

The turret and swivel head assembly is designed for making precision cuts and can be swung 360° on its base. Angular cuts to the horizontal plane may be made with precision by setting the head at any required angle within a 180° arc.

The plain horizontal milling machine's column contains the drive motor and gearing and a fixed position horizontal milling machine spindle. An adjustable overhead arm containing one or more arbor supports projects forward from the top of the column. The arm and arbor supports are used to stabilize long arbors. Supports can be moved along the overhead arm to support the arbor where support is desired depending on the position of the milling cutter or cutters.

The milling machine's knee rides up or down the column on a rigid track. The milling machine is excellent for forming flat surfaces, forming and fluting milling cutters and reamers, cutting gears. Many special operations can be performed with the attachments available for milling machine use. The knee is used for raising and lowering. The saddle rests upon the knee and supports the worktable. The saddle controls cross feed of the worktable. The worktable traverses to the right or left upon the saddle for feeding the work piece past the milling cutter. The table may be manually controlled or power fed.

SAFETY RULES FOR MILLING MACHINES

Milling machines require special safety precautions while being used.

Do not make contact with the revolving cutter.

Place a wooden pad or suitable cover over the table surface to protect it from possible damage.

Use the buddy system when moving heavy attachments.

Do not attempt to tighten arbor nuts using machine power.

When installing or removing milling cutters, always hold them with a rag to prevent cutting your hands.

While setting up work, install the cutter last to avoid being cut.

Never adjust the work piece or work mounting devices when the machine is operating.

Chips should be removed from the work piece with an appropriate rake and a brush.

NOTE. Chip rake should be fabricated to the size of the T-slots.

Shut the machine off before making any adjustments or measurements.

When using cutting oil, prevent splashing by using appropriate splash guards. Cutting oil on the floor can cause a slippery condition that could result in operator injury.

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. Not all … should … fastened between the … centers of the lathe.

2. A … work may be … without using the … center, by simply … it properly at the … of the …- … .

3. … is still the most … machine-tool.

4. It produces parts of … cross-… by turning the workpiece on its … and cutting its … with a sharp … tool.

5. The tool may be … sideways to …a cylindrical part and moved … the workpiece to … the … of cut.

6. … all lathes are power-… by electric … .

7. A … is a machine tool which … a block of material to … various operations such as …, sanding, …, or deformation with … .

8. Lathes are used in …, metalworking, … … g, and glass working.

9…. can be used to … …, the best-known … being the potter's … .

10. Most suitably … metalworking … can also be used to produce … … and screw threads.

11. If the … … is perfectly …, it may be … in the so-called …-jaw universal … .

12. But if the work is not perfectly round, the four-… independent chuck … be … .

13. In … different materials and … of different …, lathes must be run at … speeds.

14. The … … contained in the … makes it possible to… the lathe at … speeds.

15. The … of the lathe centers… … tested by taking a … and then … both ends of the … with a micrometer.

VIII. Translate into English the text B using the dictionary.

ФРЕЗЕРНЫЙ СТАНОК

На современном рынке представлены фрезерные станки разных типов и конфигураций. Основные части фрезерного станка:

Основание (опорная плоскость). Представляет собой неподвижную цельнолитую конструкцию из серого чугуна. Опорная плоскость необходима для крепления станины. В подстанинное пространство размещают емкость для сбора охлаждающей жидкости и электронасос.

Станина. Эта сварная или литая неподвижная конструкция является одним из самых важных элементов оборудования. Она предназначена для соединения всех узлов и механизмов станка и оснащена ребрами жесткости.

Направляющие. Эти элементы перемещают обрабатывающие инструменты и заготовки по осям оборудования. Направляющие крепятся непосредственно к станине. Материалом изготовления служит высоколегированная сталь.

Салазки. Эта деталь перемещает рабочий стол и консоль.

Консоль. Деталь фрезерных станков консольного типа. Двигается параллельно станине по вертикальным направляющим. Консоль изготавливают из чугуна.

Стол. Двигается по салазкам в продольном, поперечном, вертикальном направлении и подает заготовки к режущему инструменту. Оборудован прижимной оснасткой для фиксации заготовок.

Электрооборудование. Эти элементы обеспечивают подвижность механических деталей и работу вспомогательных узлов.

Шпиндель. Важный узел станка, который закрепляет фрезерный инструмент и придает ему вращательное движение. Изготавливается из легированной стали.

Ползун (хобот). Необходим для правильной установки оправки с фрезерным инструментом. Место установки – горизонтальные салазки в верхней плоскости станины.

Современное фрезерное оборудование – это не просто станки. Это программно-управляемые комплексы, которые работают самостоятельно и требуют минимального участия человека. Фрезерные станки повышают эффективность производства, снижают процент выпуска бракованных изделий и травм на рабочих местах.

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...
It touches upon ...
The extract from the article is concerned with ...
The article is about ...
The text centres round the problem of ...
The article focuses on the problem of ...
According to the text ...
According to the author ...
It further says that ...
According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up, …
On the whole, ...
In conclusion it is possible to say that ...

X. Discuss the following questions.

1. What process is called milling?
2. What main parts does the milling machine consist of?
3. How are milling machines classified?
4. What part is called knee?
5. What is the knee used for?
6. What part rests upon the knee?
7. What parts can be made with the milling machines?
8. How is the workpiece clamped in milling machines?
9. Can we change the speeds of workpiece rotation in milling machines? Why?
10. By what means is the modern milling machines driven?
11. What machine tool is the milling machines?
12. What operations can the milling machines perform?
13. When was the first milling machines constructed?
14. What is the largest part of the milling machines?
15. Where is the milling machines mounted?
16. How many work centers are there on the lathe?
17. Where is the dead center mounted?

XI. Make up your own presentation on the topic: "Types of modern milling machines".

GRAMMAR FOCUS

THE FUTURE SIMPLE (INDEFINITE) TENSE

The Future Simple образуется при помощи вспомогательного глагола **will** и основы инфинитива основного глагола.

POSITIVE		NEGATIVE		QUESTION		
I/you we/they he/she/it	***will wash***	*I/you we/they he/she/it*	***will not (won't) wash***	***Will***	*I/you we/they he/she/it*	***wash?***

The Future Simple время употребляется для обозначения:

– **действия**, которое, возможно, произойдёт в будущем, **предположения** по поводу будущего:

*We**'ll travel** around the world one day. / You**'ll be** a great doctor one day;*

– **намерения**, решения, принятого **спонтанно**, в момент разговора:

*The bag is too heavy. – I**'ll help** you;*

– будущего действия после: **hope, think, expect, I'm sure, I'm afraid, probably, perhaps:**

*We hope we**'ll see** them tonight.*

Часто употребляются такие обстоятельства времени, как: **tomorrow** – завтра; **next** week – на следующей неделе; **soon** – скоро; **in** many years – через много лет; **tonight** – сегодня вечером; **the day after tomorrow –** послезавтра.

GRAMMAR EXERCISES

1. Write down the sentences using the verbs in brackets in Future Simple

1. I (to see) them next Saturday.
2. They (to be) here tomorrow.
3. We (to have) the test in a week.
4. She (to spend) holidays in the country.
5. The journey (to take) three hours.
6. I (to open) the door for you.
7. I (to go) to school tomorrow?
8. They (to come) back next week?
9. Alice (to have) a sister.
10. Her sister's name (to be) Ann.
11. Ann (to be) a student.
12. She (to get) up at seven o'clock.
13. She (to go) to the institute in the morning.
14. Jane (to be) fond of sports.
15. She (to do) her morning exercises every day.

16. For breakfast she (to have) two eggs, a sandwich and a cup of tea.
17. After breakfast she (to go) to the institute.
18. Sometimes she (to take) a bus.
19. It (to take) her an hour and a half to do her homework.
20. She (to speak) English well.
21. Her friends usually (to call) her at about 8 o'clock.
22. Ann (to take) a shower before going to bed.
23. She (to go) to bed at 11 p. m.

2. Put in *will ('ll)* ***or*** *won't.*

Model: Can you wait for me? I … ***won't*** … be very long.

1. There is no need to take an umbrella with you. It … rain.
2. If you don't eat anything now, you … be hungry later.
3. I'm sorry about what happened yesterday. It … happen again.
4. I've got some incredible news! You … never believe what happened.
5. Don't ask Amanda for advice. She … know what to do.

3. Make the following interrogative and negative.

1. The meeting will begin at eight.
2. They will be in Brussels the day after tomorrow.
3. She will cook breakfast for us
4. We shall start at dawn.
5. The boy will be seven next year.
6. The plane will take off in five minutes.
7. We shall climb the mountain next week.
8. I shall see you on Monday.
9. I'll buy a camera next month.
10. They'll tell us about it.
11. We'll have packed our luggage by the time the taxi comes.
12. The government will close the old jail.
13. My son will be meeting me at the airport at 8 on Tuesday.

14. I’ll go roller-skating next weekend.

15. Bob will have left India by this time tomorrow.

16. By 2050 they’ll have been living in the country for forty years.

17. The baby will be sleeping at 9 tonight.

18. They’ll have been working for this company for 10 years next September.

4. Translate into English.

1. Мой друг окончит университет в следующем году.
2. Кто будет переводить этот текст?
3. Вероятно, я получу вскоре интересную работу.
4. Как долго твои родственники пробудут в нашем городе?
5. У нас не будет экзаменов зимой.
6. Она будет занята завтра.
7. Они приедут на следующей неделе?
8. Завтра Лены не будет дома.
9. Он будет читать английские книги?
10. Мы приедем к вам в следующее воскресенье.
11. Кто будет читать лекцию завтра?
12. Вероятно, профессор Новикова будет принимать у нас экзамен в четверг, на следующей неделе.
13. Завтра я принесу тебе билеты на этот спектакль.
14. Я думаю, погода будет хорошая.
15. Завтра я пойду в кино с друзьями.
16. На следующей неделе я не буду работать.
17. В следующем месяце начну заниматься английским языком.
18. В следующем году я куплю машину.
19. Через 10 лет я стану известным человеком.
20. Это случится скоро.
21. Я не забуду этот день.
22. Он не будет читать эту книгу.
23. Они не поедут за город.
24. Она не скажет правду.

25. Что ты будешь делать завтра?
26. Почему она не напишет ему письмо?
27. Когда она поедет в Англию?

5. Write down the sentences using the verbs in brackets in Present Simple or Future Simple. All the sentences refer to future.

1. When I (to see) him, I (to phone) you.
2. If he (to decide) not to do it, he (to be) right.
3. Tell me when she (to come) to visit you.
4. I (to give) it to him when he (to visit) us.
5. You (to pass) your exam if you (to work) hard.
6. We (to go) to the country next week if the weather (to be) fine.
7. As soon as we (to know) results, we (to inform) you.
8. Don't open the car door before it (to stop).
9. You (not like) this film when you (to see) it.
10. Wait for me till I (to return).

6. Write down the sentences using the verbs in brackets in Present, Past, Future Simple.

1. She (not/ to teach) English at school.
2. You (to meet) him yesterday?
3. The firm (to buy) new computers next month.
4. The Dean (to ask) many questions at the lecture last week.
5. Where you (to go) next summer?
6. They (to use) new scientific data for their last experiment.
7. When the concert (to be over) all the people (to leave) the hall.
8. Every year students (to take part) in scientific research.
9. The first computer (to appear) in the 1960-s.
10. If the weather (to be) fine, we (to go) to the village.

Unit 8
MACHINE-TOOLS. DRILLING

I. Study and memorize the following words and expressions.

1) a drill bit – сверло
2) to enlarge a hole – увеличить отверстие
3) multipoint – многоточечный
4) torque – вращающийся момент
5) to be gripped – захватываться
6) tip – наконечник
7) offset – отклоненный
8) pillar – вертикальная станина
9) to restrain – ограничить
10) advantage – преимущество
11) invention – изобретение
12) power sources – источники энергии
13) workbench – верстак
14) a rack – опора
15) effort – усилие
16) to cut – резать
17) drilling – сверление
18) drilling centre – центр сверлильный
19) drilling machine – станок сверлильный
20) drilling, milling and boring machine – станок сверлильно-фрезерно-расточный
21) bench type drilling machine – станок настольный сверлильный
22) centre drilling machine – станок центровально-сверлильный
23) column-type drilling machine – станок сверлильный на колонне
24) combined milling and boring machine – станок фрезерно-расточный
25) coordinate drilling machine – станок координатно-сверлильный

26) coordinate precision drilling machine – прецизионный координатно-сверлильный станок

27) deep drilling machine – станок для глубокого сверления

28) deep hole drilling machine – станок для сверления глубоких отверстий

29) flexible assembling system – гибкая система сборки

30) high speed drilling centre (HSC) – центр сверлильный высокоскоростной

(http://stanki-katalog.ru/dictionary.htm)

II. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

To cut or enlarge a hole; solid materials; by applying; rotation; to create cylindrical holes; to provide torque and axial force; to be gripped by a chuck; at one end of the drill; to be pressed; against; the target material; to be powered by; various power sources over the centuries; to be mounted on a stand; floor; a number of advantages; to apply the drill to the work piece; column; competitively; cylindrical gear cutters; floor space; floor-type; gage; gang drilling machine; indexing drum drilling automatics; indexing table drilling automatics; jaw; joint; lubrication systems; machining accuracy; various power sources; modular unit drilling machine; multi spindle drilling machine.

III. Translate the words and word combinations from Russian into English.

1) многоточечный, концевой режущий инструмент

2) образует стружки режущими краями

3) образовывать отверстие

4) отверстия нецилиндрической формы

5) просверливать отверстия в различных материалах

6) наконечник режущего инструмента

7) можно регулировать

8) просверливать точно

9) вертикальная колонна (станина)

10) электродвигатель
11) сверлильная головка
12) рукоятка переключения коробки скоростей и подач
13) штурвал ручной подачи
14) лимб контроля глубины обработки
15) шпиндель
16) сопло подачи охлаждающей жидкости
17) стол
18) закрепление обрабатываемого изделия
19) проточки для закрепления захватных приспособлений
20) струбцина
21) тиски
22) рукоятка подъема стола
23) уровень стола
24) подводить заготовку к шпинделю
25) отдалять заготовку от шпинделя
26) фундаментная плита
27) массивная устойчивая конструкция
28) отверстия под болты
29) шкаф электрооборудования

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

Drilling is a cutting process; bit is a multipoint; applying; at the cutting edge; to create cylindrical holes; rotates them and provides torque; also available; a tool fitted with a rotating cutting tool; gripped by a chuck at one end; into the target material; construction and most “do it yourself”; space missions; used by the ancient Egyptians; such as human effort, water wheels, and windmills; the electric motor in the late 19th century; the first electric drill; in 1889, at Melbourne, Australia; a fixed style of drill; to the floor or workbench; a base, column, table, spindle, and drill head; has a set of handles; move the spindle and chuck vertically; parallel to the axis of the column; can be adjusted vertically; by a rack and pinion; may also be

offset from the spindle's; to a position perpendicular to the column; a number of advantages; required to apply the drill; to the work piece; by a lever working on a rack and pinion; considerable mechanical advantage; table allows a vise; the spindle is fixed relative to the table; to be drilled accurately.

V. Read and translate the text A.

DRILLING

Drilling is a cutting process that uses a drill bit to cut or enlarge a hole in solid materials. The drill bit is a multipoint, end cutting tool. It cuts by applying pressure and rotation to the work piece, which forms chips at the cutting edge. Drill bits are cutting tools used to create cylindrical holes. Bits are held in a tool called a drill, which rotates them and provides torque and axial force to create the hole. Specialized bits are also available for non-cylindrical-shaped holes.

A drill or drill motor is a tool fitted with a rotating cutting tool, usually a drill bit, used for drilling holes in various materials. The cutting tool is gripped by a chuck at one end of the drill and rotated while pressed against the target material. The tip of the cutting tool does the work of cutting into the target material.

Drills are commonly used in woodworking, metalworking, and construction and most do-it-yourself projects. Specially designed drills are also used in medicine, space missions and other applications.

The earliest drills were used by the ancient Egyptians. The drill press as a machine tool is many centuries old. It was powered by various power sources over the centuries, such as human effort, water wheels, and windmills, often with the use of belts. With the coming of the electric motor in the late 19th century, there was a great rush to power machine tools with such motors, and drills were among them.

The invention of the first electric drill is credited to Arthur James Arnot and William Blanch Brain, in 1889, at Melbourne, Australia.

There are many types of drills: some powered manually, others using electricity or compressed air as the motive power.

A drill press is a fixed style of drill that may be mounted on a stand or bolted to the floor or workbench. A drill press consists of a base, column, table, spindle, and drill head, usually driven by an induction motor. The head has a set of handles (usually 3) radiating from a central hub that, when turned, move the spindle and chuck vertically, parallel to the axis of the column. The table can be adjusted vertically and is generally moved by a rack and pinion. The table may also be offset from the spindle's axis and in some cases rotated to a position perpendicular to the column.

A drill press has a number of advantages over a hand-held drill:

Less effort is required to apply the drill to the work piece. The movement of the chuck and spindle is by a lever working on a rack and pinion, which gives the operator considerable mechanical advantage.

The table allows a vise or clamp to be used to position and restrain the work, making the operation much more secure.

The angle of the spindle is fixed relative to the table, allowing holes to be drilled accurately.

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. … a cutting process that uses a … … to cut or enlarge a hole in … materials.

2. The drill bit is a …, end cutting … .

3. It cuts by applying … and … to the work piece, which forms chips at the … edge.

4. … … are cutting tools used … … cylindrical holes.

5. Bits are held in a … called a … , which rotates them and provides … and axial force … … the hole.

6. Specialized … are also … for non-…-shaped holes.

7. A drill or … … is a tool fitted with a … cutting … , usually a drill bit, used for drilling … in various … .

8. The cutting tool is … by a … at one end of the drill and rotated while … against the … material.

9…. are commonly … in woodworking,… , and construction and most "… … …" projects.

10. The … drills were used … the … Egyptians.

11. The drill press as a … tool is many … old.

12. It was … … various power … over the centuries, such as … effort, water …, and …, often with the … of … .

13. The … of the first … drill is credited to … …. Arnot and William Blanch …, in 1889, at Melbourne, … .

14. … … many types of drills: some … manually, others using … or compressed … as the … power.

15. A drill press is a … … of drill that may be mounted on a stand or … to the floor or … .

16. A … … consists of a base, …, table, … , and drill head, usually driven by an … motor.

17. The table … … … vertically and is generally moved by a rack and … .

18. … … may also be offset from the … … and in some cases rotated to a … perpendicular to … … .

19. A drill press has a … … … over a hand-held drill.

20. Less … is required … … the drill to the … … .

21. The … of the … and spindle is by a … … on a rack and … , which … the operator … mechanical … .

22. The table … a vise or … to be … to position and … the work, making … … much more … .

23. The … of the … is fixed … to the … , allowing … to be drilled … .

VIII. Translate into English the text B using the dictionary.

СВЕРЛИЛЬНЫЙ СТАНОК

Сверлильный станок необходим для создания сквозных и глухих отверстий. Для этого используют сверла. Специальный режущий инструмент снимает стружку с обрабатываемой заготовки.

Названия базовых компонентов сверлильного станка:

Вертикальная колонна (станина). Представляет собой опору, на которой размещают все основные узлы станка.

Электродвигатель. Необходим для запуска шпиндельной головки. Может быть фазным или асинхронным. Сверление начинается только после набора двигателем проектной скорости вращения.

Сверлильная головка. Это основной блок. Сверлильная головка оснащена коробкой скоростей с механизмом изменения частоты передач, механизмом вертикальной подачи с рукояткой, лимбом для точной подачи, шпинделем с патроном.

Рукоятка переключения коробки скоростей и подач. Позволяет изменять скорость рабочих движений.

Штурвал ручной подачи. Отвечает за ручную вертикальную подачу.

Лимб контроля глубины обработки. Эта кольцевая головка с размеченной шкалой необходима для настройки вертикальной подачи. Лимб применяют для сверления отверстий определенной глубины.

Шпиндель. Деталь необходима для закрепления патрона и передачи вращательного движения на сверло. Может вертикально двигаться по направляющей в сверлильной головке.

Сопло подачи охлаждающей жидкости. Представляет собой часть механизма охлаждения обрабатываемого изделия и сверла.

Стол. Необходим для закрепления обрабатываемого изделия. В поверхности есть проточки для закрепления захватных приспособлений: струбцин, тисков и т. д.

Рукоятка подъема стола. Позволяет изменять уровень стола, подводить заготовку к шпинделю или, наоборот, отдалять ее от него.

Фундаментная плита. Является основанием станка. Представляет собой массивную устойчивую конструкцию с отверстиями под болты.

Шкаф электрооборудования. Укомплектован электрическими схемами, управляющими реле, предохранительными элементами. На современных станках есть панель управления автоматизацией рабочего процесса.

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...
It touches upon ...
The extract from the article is concerned with ...
The article is about ...
The text centres round the problem of ...
The article focuses on the problem of ...
According to the text ...
According to the author ...
It further says that ...
According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up, …
On the whole, ...
In conclusion it is possible to say that ...

X. Discuss the following questions.

1. What process is called drilling?
2. What main parts does the drilling machine consist of?
3. How are drilling machines classified?
4. What is drilling used for?
5. What is a drill bit?
6. What operations is a drill used in?

7. When was the first electric drill invented?
8. What main parts does a drill press consist of?
9. What advantages does a drill press have over a hand-held drill?
10. What parts can be made with the drilling machines?
11. How is the workpiece clamped in drilling machines?
12. Can we change the speeds of workpiece rotation in drilling machines? Why?
13. By what means is the modern milling machines driven?
14. What machine tool is the drilling machines?
15. What operations can the drilling machines perform?
16. When was the first drilling machines constructed?
17. What is the largest part of the drilling machines?
18. Where is the drilling machines mounted?
19. How many work centers are there on the drilling machines?

XI. Make up your own presentation on the topic: "Types of modern drilling machines".

GRAMMAR FOCUS

ГЛАГОЛ. THE CONTINUOUS TENSES

The Present Continuous (Progressive) Tense

The Present Continuous образуется при помощи вспомогательного глагола ***to be*** в соответствующем времени, лице и числе (I – ***am***; He/she/it – ***is***; They/we/you – ***are***) и глагола-сказуемого в форме инфинитива без частицы **to** с ***-ing*** окончанием.

The Present Continuous означает:

1) длящийся процесс, действие которого происходит в момент речи:

I'm waiting *for the train.* ***(I'm*** *at the station now)*;

2) мы также используем Present Continuous, когда находимся в середине процесса чего-либо, пусть даже не в момент речи:

I'm quite busy these days. ***I'm doing*** *a course at university*;

3) используем Present Continuous, говоря о встречах, событиях, запланированных на ближайшее **будущее**, о том, что, возможно, занесено в ваш ежедневник; часто с глаголами **go, come, see, meet, stay, have, leave**:

I'm meeting Henry at six o'clock. We're having a party tomorrow.

POSITIVE / NEGATIVE			QUESTION		
I **he/she/it**	**am(not)** **is (isn't)**	***living*** ***doing*** ***watching***	**Am** **Is**	**I** **he/she/it**	***living?*** ***doing?*** ***watching?***
we/you/they	**are (aren't)**		**Are**	**we/you/they**	

Часто употребляются такие обстоятельства времени, как: **now** – сейчас; **at the moment** – в данный момент; **at present** – в настоящее время; теперь; **these days** – теперь.

С глаголами, которые обозначают не действие, а состояние (***non-continuous verbs***), Present Continuous обычно не употребляется: **to be, to feel, to forget, to live, to love, to like, to want, to think, to hear, to see, to remember, to know, to stay, to mean, to understand, to believe, to belong, to sound, to smell, to prefer, to have(= possess)** и т. д.

GRAMMAR EXERCISES

1. What's happening at the moment? Make up true sentences.

Model: (I/eat) **I'm *not* eating.**

1. (I/learn/English).
2. (The sun/shine).
3. (My teacher/sit/on a chair)
4. (You /listen/to music)
5. (Students/wear/shoes)

2. Fill in the blank spaces with the Present Continuous tense of the verbs in the brackets.

1. He (fix) my bike in the garage.
2. I (help) Mom in the kitchen.
3. My sister and I (watch) television in our bedroom.
4. They (come) with us to the museum.
5. We (paint) some pictures for Aunt Susan.

3. Translate into English.

1. Не входите в аудиторию! Студенты пишут там контрольную работу.
2. Этот писатель пишет новую книгу.
3. Не мешайте мне. Я готовлюсь к докладу.
4. О чем вы думаете?
5. Осторожно! Та машина едет с огромной скоростью!

4. What can you say in these situations? Add a sentence with the Present Continuous.

Model: A friend rings you up in the middle of your favourite film. – *Is it important? I'm watching the most impressive blockbuster.*

1. A friend is at your flat and suggests going out, but you can see rain outside. *I don't want to go out now. Look, ...*
2. A friend rings you up at work. – *Sorry, I can't talk now. ...*
3. You want to get off the bus, but the old lady next to you is sitting on your coat. – *Excuse me, ...*
4. A friend of yours wants to discuss the latest news with you, but you've just started to make a report. – *Can I talk to you later? ...*
5. You have been ill, but you're better now. – *I'm OK now. ...*

Present Continuous or Present Simple?

5. Complete the sentences. Put in the Present Continuous or Present Simple of the verbs in the brackets.

Model: **I'm writing** (I/write) to my parents. **I write** (I/write) to them every weekend.

1. (It/snow) outside. (It/come) down quite hard, look.

2. Normally (I/start) work at eight o'clock, but (I/start) at seven this week. We're very busy at the moment.

3. I haven't got a car at the moment, so (I/go) to work on the bus this week. Usually (I/drive) to work.

4. The sun (rise) in the east, remember. It's behind us so (we/travel) west.

5. I'm afraid I have no time to help just now (I/write) a report. But (I/promise) I'll give you some help later.

6. (I/want) a new car (I/save) up to buy one.

6. Complete the following sentences with either the Simple Present form or the Present Continuous form of the verbs in the brackets.

1. The teacher always (give) us interesting project work.
2. The wind (blow) very strongly today.
3. I (like) chocolate ice cream.
4. Be quiet! We (try) to listen to the radio.
5. Let's go inside now. It (begin) to rain.
6. Penguins (eat) fish.
7. Dad never (let) us play in the street when it's dark.
8. The children (go) swimming every day.
9. We're trying to catch the ball that (roll) down the hill.
10. My teacher (know) a lot about plants and animals.

Unit 9
AN ENGINEER

I. Study and memorize the following words and expressions.

1) a mechanical engineer – инженер-механик
2) future profession – будущая профессия
3) production – производство
4) to encompass – включать, охватывать
5) to enhance – улучшать, увеличивать
6) safety – безопасность, сохранность
7) vitality – жизнеспособность; жизнестойкость
8) force – сила
9) motion – движение
10) enjoyment – использование
11) manufacture – производство, изготовление, обработка
12) aircraft – авиация; самолет
13) equipment – оборудование
14) computer-aided design (CAD) – система автоматизированного проектирования
15) tools – станки
16) implantable – имплантируемый
17) to spur efforts – прикладывать усилия
18) recyclable – утилизированный
19) refinement – очищение, очистка
20) energy – энергия
21) manufacturing – промышленный, обрабатывающая промышленность
22) automation – автоматизация
23) mechanical system – механическая система
24) thermal device – тепловой механизм, тепловой прибор
25) process – процесс
26) high-tech field of nanotechnology – наукоемкие нанотехнологии
27) to develop efficient solutions – развивать эффективные решения

28) consequences – последствия, результат чего-либо

29) to require – требовать

30) specific skills – профессиональные навыки

II. Learn the word "engineering" and expressions with it. Translate sentences with them from English into Russian.

Engineering

1. 1) прикладной (о науке); 2) технический, инженерный engineering brain – технический склад ума

engineering library – инженерная библиотека

engineering data – технические данные, технические параметры

2. 1) а) инженерное искусство, машиностроение

engineering worker – рабочий-машиностроитель

chemical engineering – химическое машиностроение (технология)

civil engineering – строительное дело (техника)

computer engineering – компьютерная техника, вычислительная техника (как область знаний)

electrical engineering – электротехника

heating engineering – теплотехника

highway engineering – дорожная техника, дорожное строительство

hydraulic engineering – проектирование гидротехнических сооружений, гидротехника, гидравлика

marine engineering – судовое машиностроение, морское строительство

mechanical engineering – машиностроение, техническое проектирование

sanitary engineering – санитарная техника; коммунальные службы (водопровод, канализация); проектирование санитарно-технических сооружений

systems engineering – системная разработка, разработка систем

traffic engineering – дорожное дело, организация движения транспортных потоков, регулирование трафика

transportation engineering – техника уличного движения

engineering plant – машиностроительный завод Syn: machine-building, machinery construction машиностроение

б) разработка и управление (о процессах, механизмах); инженерия

genetic engineering – генная инженерия

software engineering – разработка программного обеспечения

2) техника, аппаратура

3) махинации, происки

1. ***Engineering*** is the branch of science and technology concerned with the design, building, and use of engines, machines, and structures.

2. ***Engineering*** is the work involved in designing and constructing engines and machinery, or structures such as roads and bridges.

3. Some people have ***an engineering*** brain.

4. ***Genetic engineering***, also called genetic modification or genetic manipulation, is the direct manipulation of an organism's genes using biotechnology.

5. ***Civil engineering*** is a professional engineering discipline that deals with the design, construction, and maintenance of roads, bridges, canals, dams, airports, pipelines, and railways.

6. ***Highway engineering*** is an engineering discipline branching from civil engineering that involves the planning, design, construction, operation, and maintenance of roads, bridges, and tunnels to ensure safe and effective transportation of people and goods.

7. There are connections between ***engineering*** and art, for example, architecture, landscape architecture and industrial design.

8. She found work with ***an engineering*** firm.

9. This control panel is a good example of smart ***engineering***.

10. The bridges across Bosphorus are an example of ***an engineering*** triumph.

III. Read and translate the text. Pay attention to exercise II.

THE ENGINEERING PROFESSION

Engineering is one of the oldest occupations in history. Without the skills included in the broad field of engineering, our present-day

civilization could have never evolved. Engineering is often defined as making practical application of theoretical sciences such as physics and mathematics. Many of the early branches of engineering were based not on science but on empirical information that depended on observation and experience rather than on theoretical knowledge. This kind of experimentation eventually led to what is known as the Industrial Revolution, which began in the eighteenth century. One result of the rapid expansion of scientific knowledge was an increase in the number of engineering specialties. By the end of the nineteenth century there was established not only mechanical, civil, and mining and metallurgical engineering, but also emerged the newer specialties of chemical and electrical engineering. This growth in the number of specialties was continuing with the establishment of such disciplines as aerospace, nuclear, petroleum, and electronic engineering.

Because there is the large number of engineering fields today there are many different kinds of engineers working on large projects such as the development of nuclear power or new aircraft. In design of a new aircraft mechanical engineers work not only on the plane engines but on other mechanical aspects such as the braking system. When the aircraft goes into production mechanical and industrial engineers are involved in designing the machines necessary to fabricate different parts and the entire system for assembling them. In both phases of such a project mechanical engineers work with specialists in such fields as aerospace and electronic engineering.

Another result of the increase of scientific knowledge is that engineering has become a profession. Today it requires at least four or five years of university study leading to a Bachelor of Science degree. More and more often engineers, especially those engaged in research; get an advanced master's or doctor's degree. Even those engineers who do not study for advanced degrees must keep up with changes in their profession and those related to it. A mechanical engineer who does not know about new materials cannot successfully compete with one who does. All this means that an engineering education is never really finished because the students might be willing to continue the learning process.

In English the word engineer is used in two senses. One, as it has just been indicated, refers to the professional engineer who has a university degree and an education in mathematics, science, and one of the engineering specialties. An engineer, however, is also used to describe a person who operates or maintains an engine or machine. An excellent example of this is a locomotive engineer who operates a train on a railroad. Engineers in this sense are essentially highly-trained technicians rather than professional engineers.

Especially in the last decade public has become more and more aware of the social and environmental consequences of engineering projects. Countless cars and other mechanical devices are the part of our engineered environment. Engineers are working to solve the problems of environmental pollution by designing devices that reduce pollution and improve fuel efficiency.

Engineering is described as a profession that is a practical application of theoretical science. The work of every successful engineer must increase the practical significance of the work that is safe and necessary for our society.

IV. Answer the following questions. Give a short summary of the text "The Engineering Profession".

1. What is the importance of engineering?
2. What is the definition of engineering?
3. What were many early branches of engineering based on?
4. What did this kind of experimentation eventually lead to? When was it?
5. What changes took place in the society at that time?
6. What was a result of the rapid expansion of scientific knowledge?
7. What kinds of engineer were there established in course of time?
8. Why are there many different kinds of engineers working on different projects today?
9. What does a new aircraft mechanical engineers do in design of a new aircraft?
10. Why are there many different kinds of engineers working on large projects today?

11. What do mechanical engineers work on in design of a new aircraft?

12. What do mechanical engineers work on when the aircraft goes into production?

13. What is another result of the increase of scientific knowledge?

14. How long is it required to become a Bachelor of Science?

15. Is the university education enough to be a good engineer or not?

16. What is the first and second sense of the word engineer in English?

17. What are the social and environmental consequences of engineering projects? How are they solved?

18. What is the essence of engineering as a profession?

V. Discuss the following statements.

1. It is easy to find job in Russia.

2. There are many interesting and useful professions and it is really not an easy task to choose the right one.

3. The profession should be chosen according to the character and hobbies of the person.

4. I hope that I'll never regret my choice and get a well-paid and interesting job afterwards.

5. So, by now I haven't made a final decision regarding my future profession yet.

VI. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

Mechanical engineering; to include; machines; materials; energy; manufacturing; automation; biomedical engineering; aerospace; enhancing safety; economic vitality; the spheres of mechanical engineers'; to deal with; the principles of force; the principles of energy; the principles of motion; hardly changed; the development of computer technology; every aspect of life; to touch by mechanical engineering; the drawing board; an important role in designing; ultraminiature machines; to develop; efficient solutions; technical problems; to use; computational software tools; tiny implantable medical devices; to protect; equipment; to clean-up existing

environmental problems; to acquire; through education; through training; through experience; a very broad field.

VII. Translate the words and word combinations from Russian into English.

1) лидирующее положение в обществе
2) увеличивать опасность
3) жизнеспособность, энергичность
4) удовольствие
5) качество жизни
6) на протяжении всей жизни
7) по всему миру
8) профессионалы
9) знаток, эксперт, мастер, специалист
10) знания
11) конструировать, изобретать
12) примеры продуктов производства
13) развивать, совершенствовать
14) включать в себя, содержать в себе
15) контролировать
16) автомобильная промышленность
17) самолетостроение
18) энергетика
19) электростанции
20) медицинское оборудование
21) потребительские товары
22) кондиционеры
23) спортивное оборудование
24) применяться в любой сфере жизни
25) компьютерные технологии
26) давать возможность заниматься чем-либо
27) вероятно
28) появляться, возникать (о новых разработках)
29) воплощать идеи в жизнь
30) люди, принимающие решения

VIII. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

A very broad field; encompasses machines; aerospace and more; plays a dominant role; throughout the world; concerned with the principles; the men and women; professionals with expert; some examples of products; include engines and control systems; ranging from; mass-produce these products; virtually; touched by; if something moves or uses energy; the explosive development; has literally changed the face; the drawing board; sophisticated computational software tools; to complex technical problems; attracting mechanical engineers to design; tiny implantable medical devices; the growing concern for; to clean-up existing environmental problems; technologies and a host; the 21st century; refinement require the skills; intuition and creative ability; at the same time; convey the real-world consequences; a profession requiring specific skills; acquired through education; throughout high school; for acceptance into engineering programs; a solid foundation; strong mathematics preparation; the basic science foundation; ability in oral and written communications; courses in; technology-related subjects; the important practicalities of technological projects.

IX. Read and translate the text A.

WHAT IS A MECHANICAL ENGINEER?

Mechanical engineering is a very broad field. It encompasses machines, materials, energy, manufacturing, automation, biomedical engineering, aerospace and more. Mechanical engineering plays a dominant role in enhancing safety, economic vitality, enjoyment and overall quality of life throughout the world. Mechanical engineers are concerned with the principles of force, energy and motion. The men and women who work as mechanical engineers are professionals with expert

knowledge of the design and manufacture of mechanical systems and thermal devices and processes.

Some examples of products and processes developed by mechanical engineers include engines and control systems for automobiles and aircraft, electric power generation plants, lifesaving medical devices and consumer products ranging from air conditioners to personal computers and athletic equipment. They also design the machines that mass-produce these products. Virtually every aspect of life is touched by mechanical engineering. If something moves or uses energy, a mechanical engineer was probably involved in its design or production. The explosive development and expansion in computer technology has literally changed the face of mechanical engineering.

The drawing board has given way to computer-aided design (CAD), and sophisticated computational software tools have enabled mechanical engineers to develop efficient solutions to complex technical problems. For example, the emerging high-tech field of nanotechnology is attracting mechanical engineers to design ultraminiature machines and tiny implantable medical devices that navigate the human body searching for disease and damaged tissue.

Also, the growing concern for the planet and the quality of life for future generations have spurred continuing efforts by mechanical engineers to design resource efficient and recyclable products and develop equipment and processes to clean-up existing environmental problems and prevent their reoccurrence. These technologies and a host of others will have an impact on lives in the 21st century, and their development and refinement require the skills, intuition and creative ability of mechanical engineers. At the same time, mechanical engineers are expected to understand and convey the real-world consequences of technology development alternatives to decision-makers and the public. Mechanical engineering is a

profession requiring specific skills. These skills are acquired through education, training and experience. Throughout high school, students must enroll in certain courses as preparation for acceptance into engineering programs at a college or university. A solid foundation in mathematics, science and the language arts is critical. Strong mathematics preparation includes algebra, geometry, trigonometry and calculus.

Chemistry, biology and physics form the basic science foundation. Ability in oral and written communications is important to success in mechanical engineering studies, and courses in mechanical or computer-aided drafting/drawing and other technology-related subjects can help students begin to understand the important practicalities of technological projects.

(https://www.prof-serovmet.ru/moj-zavod-moja-professija-moj-profsojuz/; https://earchive.tpu.ru/bitstream/11683/59165/1/m-2020-m33.pdf)

X. Make up your own questions to the text.

XI. Insert the missing words and word combinations. Translate the sentences.

1. … , … and … form the basic science foundation.
2. … in oral and written … is important to success in … engineering studies.
3. Other technology-related … can help … begin to understand the important … of technological … .
4. Mechanical engineering is a profession … specific … .
5. These … are acquired through …, training and … .
6. … high school, students must … in certain courses as … for acceptance into … programs at a college or … .
7. A solid … in mathematics, science and … … arts is critical.
8. Strong mathematics … includes algebra, …, trigonometry and … .
9. Mechanical engineering … a dominant … in enhancing …, economic vitality, … and overall quality of life … the … .
10. … … are concerned with the … of force, energy and motion.

11. The … and … who work as mechanical … are professionals with expert … of the design and … of mechanical systems and … devices and … .

12. Some examples of … and … developed by mechanical engineers.

13. … … is a very broad field.

14. It encompasses … , materials, …, manufacturing, …, biomedical engineering, … and more.

15. The … development and … in … technology has literally changed the face of … engineering.

16. The drawing board … … … to computer-… design (CAD).

17. Sophisticated computational … tools have … mechanical … to develop … solutions to complex … problems.

18. … … , the emerging …-tech … of … is attracting mechanical engineers.

19. … … design … machines and … implantable … devices that … the human … searching for … and … tissue.

20. … the … time, mechanical … are expected to understand and … the real-… consequences of … development … to decision-… and the public.

21. Also, the … concern for the … and the quality of … for future … have spurred … efforts by … … to design … efficient and … products and develop … and processes to …-up existing … problems and … their reoccurrence.

XII. Translate into English the text B using the dictionary.

МОЯ ПРОФЕССИЯ – ИНЖЕНЕР

Востребованная, актуальная и действительно нужная профессия, которая не всегда достойно оплачивается. В зависимости от специализации и направления деятельности инженер может заниматься проектированием, организацией производственных процессов, конструированием, подготовкой технической документации и так до бесконечности. Профессия насчитывает не менее 25 узких специальностей, каждая из которых жизненно необходима человечеству. Какую из них

выбрать, где учиться, как строить карьеру и добиваться достойной оплаты труда?

Инженеры – это специалисты, вовлеченные в процессы разработки и контроля функционирования технических устройств, объектов и сооружений, а также в проектирование, конструирование, создание технической документации, проведение пуско-наладочных и испытательных работ, ремонт и техническое обслуживание, а также в управление качеством. Преимущественно специалисты разрабатывают новые инженерные решения или оптимизируют уже существующие, опираясь на научную и техническую базу.

Само название профессии происходит от латинского ingenium – изобретательность. Данный термин лучше всего отражает суть специальности. В зависимости от направления деятельности инженер разрабатывает или оптимизирует профильные решения, готовит техническую документацию. Многие специалисты осуществляют проектирование и несут персональную ответственность за реализованные проекты. Даже деятельность опытных профессионалов подвергается строгому регулированию и контролю со стороны уполномоченных инстанций.

(https://info-profi.net/professiya-inzhener/)

XIII. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...

It touches upon ...

The extract from the article is concerned with ...

The article is about ...

The text centres round the problem of ...

The article focuses on the problem of ...
According to the text ...
According to the author ...
It further says that ...
According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up, …
On the whole, ...
In conclusion it is possible to say that ...

XIV. Discuss the following questions.

1. Why did you decide to become an engineer?
2. What do you know about your future profession?
3. Mechanical engineering touches every aspect of life.
4. Experimental models attract young engineers.
5. Engineers obtain technical experience in the workshop.
6. An engineer showed the new machines.
7. Faraday made many discoveries.
8. The practical engineers will improve this heat engine.
9. The laboratory assistant will study the problem.
10. The researchers are carrying out an experiment.
11. Engineers have invented a new device.
12. The profession of an engineer is a profession requiring specific skills.

XV. Make up your own presentation on the topic: "The Engineering Professions"

GRAMMAR FOCUS

THE PAST CONTINUOUS (PROGRESSIVE) TENSE

The Past Continuous образуется при помощи вспомогательного глагола **to be** в соответствующем прошедшем времени, лице и числе (I/he/she/it – **was**; They/we/you – **were**) и глагола-сказуемого в форме инфинитива без частицы **to** с **-ing** окончанием.

Прошедшее продолженное время означает:

1) действие в процессе, которое совершалось в определенный момент или протекало в течение четко ограниченного периода времени в прошлом:

*I **was watching** television **at 17.30** yesterday*;

*We **were** all **dancing** at the party **the whole** night*;

2) используется для двух и более действий, которые происходили в одно время в прошлом:

*They **were dancing** while he **was playing** the guitar*;

3) говоря о прошлом действии, которое было в процессе **(**Past Continuous), когда другое однократное действие его прервало (Past Simple):

*He **was painted** the bedroom* (процесс прошлого) *when suddenly he **fell off** the ladder* (однократное действие);

4) Глаголы состояния (*non-continuous verbs*) в Past Continuous также не употребляются.

POSITIVE / NEGATIVE			QUESTION		
I He/she/it	***was* *(wasn't)***	*liv**ing*** *do**ing*** *watch**ing***	***Was***	I he/she/it	*liv**ing**?* *do**ing**?* *watch**ing**?*
We/you/they	***were* *(weren't)***		***Were***	we/you/they	

Часто употребляются такие обстоятельства времени, как: **at … o'clock** yesterday – вчера в … часов; **at that time** – в то время; **from** 5 **till** 6 last Sunday (**from** 5 **to** 6 **o'clock**) – с 5 до 6 в прошлое воскресенье; **the whole** evening – весь вечер.

GRAMMAR EXERCISES

1. Answer the questions using the words from the round brackets.

Model: – Where were you at 6 o'clock? (library/ read a book)

– ***I was reading a book in the library***.

1. Where were you at this time last week? (Spain/ stay at the hotel)

2. What was your grandmother doing the whole yesterday evening? (armchair/ watch a serial)

3. What were you doing from 2 to 3? (home/ make lunch)
4. Where was your brother at midday? (walk with his dog/ park)

2. Complete the sentences with the Past Progressive tense of the verbs in brackets.

1. At the party lots of people (dance) in the street while our neighbours (have) a barbecue.
2. I (sit) in my bedroom and (read) a book from 4 till midnight.
3. Someone (make) a very loud noise in the street.
4. Why you all (laugh) when I came in?
5. Sally (practice) the piano the whole morning.

3. Translate into English.

1. Где вы работали сегодня в 9 часов утра?
2. Он с друзьями занимался английским весь день.
3. Мы смотрели телевизор, а они слушали радио.
4. Во время обеда она читала научный журнал.
5. Автобус стоял на остановке с 3 до 4, а затем уехал.

4. Add a sentence with the Past Continuous to say that an action lasted a long time.

Model: You had to work yesterday. The work went on all day.
I was working all day

1. You had to make phone calls. The calls went on all evening.
2. Students had to wait in the rain. The rain lasted for half an hour.
3. We had to make sandwiches. This went on all afternoon.
4. The lorry had to stay in a traffic jam. It was there for two hours.
5. Your neighbour played loud music. This went on all night.

Past Continuous or Past Simple?

1. Put in the correct form of the verbs in the brackets using the Past Continuous or Past Simple.

Model: When Martin **arrived** (arrive) home, Anna **was talking** (talk) to someone on the phone. Martin **started** (start) to get the tea.

1. I (lie) in the bath when the phone (ring). It (stop) after a few rings.

2. It (be) cold when we (leave) the house that day, and a light snow (fall).

3. Your friend who (come) here the other day (seem) very nice. I (enjoy) meeting her.

4. When I (open) the cupboard door, a pile of books (fall) out.

5. I (walk) along the street when I suddenly (feel) something hit me in the back. I (not / know) what it was.

2. Each of these sentences has a mistake, correct them.

Model: The hotel were very quite. **The hotel was very quiet.** (correct)

1. It was peaceful, and the birds were sing.
2. I washed my hair when the phone rang.
3. You came to the club last night?
4. As I was watching him, the man was suddenly running away.
5. Everything was seeming OK.
6. Where bought you that bag?

THE FUTURE CONTINUOUS (PROGRESSIVE) TENSE

The Future Continuous образуется при помощи вспомогательного глагола **to be** в соответствующем будущем времени (**will be**) и глагола-сказуемого в форме инфинитива без частицы **to** с **-ing** окончанием.

The Future Continuous употребляется:

– для выражения действия, которое будет длиться в точно указанный момент или период в будущем:

This time tomorrow I'll be working *at home*;

– глаголы состояния (*non-continuous verbs*) в Future Continuous не употребляется.

POSITIVE / NEGATIVE			QUESTION			
I he/she/it we/you/they	will be (won't be)	liv**ing** do**ing** watch**ing**	Will	I he/she/it we/you/they	be	liv**ing**? do**ing**? watch**ing**?

Часто употребляются такие обстоятельства времени, как: **this time** tomorrow – в это время завтра; **from** 8 **till** 9 – с 8 до 9 завтра; **tomorrow at** 6 **o'clock –** завтра в 6.

GRAMMAR EXERCISES

1. Write these sentences in question and negative forms.

1. We will be relaxing on the beach at this time on Saturday.
2. Students will be answering the teacher's questions at 10 o'clock tomorrow.
3. You will be taking an exam from 8 to 12 on Wednesday.
4. Bill will be making a report on economy the whole day tomorrow.
5. I will be fixing a car at 5.

2. Describe your tomorrow day. Begin with:

1. Tomorrow at 9 am I will be …
2. At midday I …
3. My best friend from10 to 2pm …
4. At 6 o'clock in the evening my parents …
5. At midnight our group mates …

3. Make the questions according to the answers.

1. … will you be doing at 6? – I'll be taking an exam.
2. … will Steve be writing the article? – Tomorrow.
3. … will they be making the presentation tomorrow at 1 o'clock? – They were absent yesterday.
4. … will my mother be planting flowers after breakfast? – In the garden.
5. … will we be watching after supper? – A new documentary about our planet.

Unit 10
AUTOMATION IN INDUSTRY

I. Study and memorize the following words and expressions.

1) automation – автоматизация
2) mechanization – механизация
3) simplification – упрощение
4) without human intervention – без вмешательства человека
5) technical innovations – технические инновации
6) to extend – расширять
7) nonmanufacturing systems – непроизводственные системы
8) independently – не зависимо от …; самостоятельно
9) automatic control device – автоматическое управляющее устройство
10) automated guidance – автоматическое управление на расстоянии
11) arose out – возникать; являться результатом
12) feedback control system – система автоматизированного управления с замкнутой обратной связью
13) work pieces – заготовка
14) specialized machines – специальные станки
15) ingot – слиток, болванка
16) step-by-step manufacture – постепенное, ступенчатое производство
17) telephone industry – отрасль телефонной связи
18) dialing – набор номера
19) billing – составление счетов
20) packaging of foods – упаковка продуктов
21) refinery – нефтеперерабатывающий завод
22) crude oil – сырая нефть
23) cracking – разгонка; выгонка
24) raw materials – сырье
25) an array – ряд
26) to govern – управлять, руководить

27) valve – клапан, вентиль, задвижка

28) heater – нагревательный прибор

29) steel – здесь: металлургия

30) beverage – ликеро-водочная промышленность

31) canned – консервированный (о продуктах)

32) to load – загружать

33) consumer product – потребительские товары

34) assembly – монтаж, сборка

35) approximate – приблизительный, примерный

36) daily life – повседневная жизнь

37) workstation – рабочее место

38) transfer system – система передачи

39) automated production line – автоматизированная поточная линия

40) raw work part – необработанная деталь

41) programmable logic controllers – программируемые логистические диспетчеры

II. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

To perform certain tasks; the next step in the development of automation; to describe nonmanufacturing systems; can operate independently or nearly independently; programmed or automatic devices; telephone switching equipment; became known as Detroit automation; most people think; a number of separate machines; the division of labor; developed in the latter half of the 18th century; the level of skills required workers; the British economist Adam Smith; to extend the capacity; control sequences of operations; can operate independently; in the fields of communications; arose out; the intimate relationship; economic forces; technical innovations; the division of labor; made possible; design machines; to build; to transfer; to evolve; manner; work piece; originally designed; to perform simple tasks; environment; dangerous; extremely dexterous; both light and heavy work pieces; workstation; raw work part.

III. Translate the words and word combinations from Russian into English.

1) термин
2) ликероводочная промышленность
3) нефтеперерабатывающая промышленность
4) автомобилестроение
5) сельское хозяйство
6) переработка мусора
7) автоматизированная линия производства
8) различные операции
9) специальные станки
10) развитие отрасли
11) обсуждать
12) продвигаться вперед
13) единая система производства
14) завод
15) фабрика
16) промышленные роботы
17) выполнять
18) быстро
19) несмотря на
20) большинство людей думают, что …
21) электричество
22) источник энергии
23) современные автоматизированные системы
24) виды операций
25) обработка деталей
26) перемещение деталей
27) расположение деталей
28) система производства
29) увеличение производительности
30) машины и механизмы

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

Chemical industries; continuous-flow method; the raw materials; crude oil enters; through pipes in cracking; gasoline and fuel oil; automatic-control devices; a central computer; both the flow and reaction rates; on the other hand; some of the products; are produced in batches; highly automated; in some part of their operation; in the telephone industry; all done automatically; railroads; signaling devices; passing a particular point; canned food industries; produced in batches; brought up to heat; in this phase; ingots; into sheet or structural shapes; until the desired shape is achieved; other consumer product industries; step-by-step manufacture; approximates; concept; involves; machines; agriculture industry; packaging of foods; many service industries; a checkout counter; supply bins; doctors may consult; in diagnosis; the final decision; prescribe therapy; as a result; each industry; particular production needs; more examples; phase of commerce; the widespread use; on daily life; expressed by many; on society and the individual.

V. Read and translate the text A.

AUTOMATION TECHNOLOGY IN INDUSTRY

Many industries are highly automated or use automation technology in some part of their operation. In communications and especially in the telephone industry, dialing, transmission, and billing are all done automatically. Railroads too are controlled by automatic signaling devices, which have sensors that detect cars passing a particular point.

In this way the movement and location of trains can be monitored. Not all industries require the same degree of automation. Agriculture, sales, and some service industries are difficult to automate. The agriculture industry may become more mechanized, especially in the processing and packaging of foods; however, in many service industries such as supermarkets, for example, a checkout counter may be automated and the shelves or supply bins must still be stocked by hand. Similarly, doctors may consult a computer to assist in diagnosis, but they must make the final

decision and prescribe therapy. The concept of automation is involving (developing; growing) rapidly, partly because the applications of automation techniques vary both within a plant or industry and also between industries. The oil and chemical industries, for example, have developed the continuous-flow method of production, owing to the nature of the raw materials used. In a refinery, crude oil enters at one point and flows continuously through pipes in cracking, distillation, and reaction devices as it is being processed into such products as gasoline and fuel oil. An array (range, group, selection) of automatic-control devices governed by microprocessors and coordinated by a central computer is used to control valves, heaters, and other equipment, thereby regulating both the flow and reaction rates. The steel, beverage, and canned food industries, on the other hand, some of the products are produced in batches. For example, a steel furnace is charged (loaded with the ingredients), brought up to heat, and a batch of steel ingots produced. In this phase very little automation is evident. These ingots, however, may then be processed automatically into sheet or structural shapes by being squeezed through a series of rollers until the desired shape is achieved.

The automobile and other consumer product industries use the mass production techniques of step-by-step manufacture and assembly. This technique approximates the continuous-flow concept but involves transfer machines; thus, from the point of view of the auto industry, transfer machines are essential to the definition of automation. Each of these industries uses automated machines in all or part of its manufacturing processes. As a result, each industry has a concept of automation that fits its particular production needs. More examples can be found in almost every phase of commerce. The widespread use of automation and its influence on daily life provides the basis for the concern expressed by many about the influence of automation on society and the individual.

VI. Comprehension check. Answer the following questions on the text A.

1. Are many industries use automation technology in their production process and to what extend this technology is used?

2. What operations are automated in communications and telephone industry?

3. By means of what automatic signaling devices railroads are controlled?

4. What industries require less degree of automation?

5. Can we state that the concept of automation is developing rapidly?

6. How can you explain the continuous-flow method of production, and in what fields of industry this method is used?

7. Can valves, heaters and similar equipment be operated automatically? If yes, how?

8. How automation is used in certain stages of steel industry?

9. How do you understand step-by-step manufacture and assembly?

10. What is the main principle of the continuous-flow concept in industry?

11. What industries use automated machines in all or part of their manufacturing processes?

12. Can you give examples of automation technologies used in commerce?

13. Do you think that the widespread use of automation influences on individual's and society's daily life?

14. Does automation provide the basis for the concern of society and the individual?

VII. Make up your own questions to the text.

VIII. Insert the missing words and word combinations. Translate the sentences.

1. As a result, each … has a concept of … that fits its particular … needs.

2. More… can be found … almost every phase of … .

3. The widespread … of automation and its … on daily … provides the basis … the … expressed by many the … of automation on … and the individual.

4. The steel, … , and canned … industries, on the … hand, some of the products are … in batches.

5. For example, a … furnace is … (loaded with the ingredients), brought … to heat, and a … of steel … produced.

6. In … … very little automation … evident.

7. These ingots, …, may then … processed … into sheet or structural … by being … through a series of … until the … shape … achieved.

8. In this way … … and location of trains … … monitored.

9. … … industries … the same degree of automation.

10. Agriculture, …, and some … industries … difficult to automate.

11. The … industry … become more … , especially in the processing and … of foods.

12. However, in many service … such as supermarkets, for example, a … … may … automated and the … or supply bins … still … stocked … hand.

13. Many … are highly automated or … … technology in some part of their … .

14. In … and especially in … … industry, dialing, … , and billing … all done … .

15. … too are controlled … … signaling devices, which … sensors that … cars … a particular point.

16. The concept of … is involving rapidly, … because the … of automation techniques … both … a plant or … and also … industries.

17. The … and … industries, for …, have developed the …-flow method of …, owing to the nature of … … materials used.

18. In a refinery, … … enters … one … and flows … through … in cracking, … .

19. An array of automatic-… … governed … microprocessors and coordinated … a central … is used to … valves, …, and other …, thereby regulating … the flow and … rates.

IX. Define whether the following statements correspond to the content of the text.

1. All industries are highly automated or use automation technology in some part of their operation.

2. In communications and especially in the telephone industry, dialing, transmission, and billing are all done.

3. Railroads are controlled by automatic signaling devices.

4. Agriculture, sales, and some service industries are easy to automate.

5. Doctors consult a computer to assist in diagnosis and computer also make the final decision and prescribe therapy.

6. The concept of automation is growing rapidly.

7. In petrochemical industry an array of automatic-control devices are used to control valves, heaters, and other equipment.

8. The automobile industry uses the mass production techniques of step-by-step manufacture and assembly.

9. In auto industry the volume of power consumed is essential to the definition of automation.

10. The widespread use of automation doesn't influence our daily life

X. Translate the following sentences into Russian.

1. Mechanization is often used to refer to the simple replacement of human labor by machines.

2. Automation generally implies the integration of machines into a self-governing system.

3. Automation has revolutionized those areas in which it has been introduced.

4. There is scarcely an aspect of modern life that has been unaffected by automation.

5. The term automation was coined in the automobile industry about 1946 to describe the increased use of automatic devices and controls in mechanized production lines.

6. The origin of the word is attributed to D.S. Harder, an engineering manager at the Ford Motor Company.

7. In general usage, automation can be defined as a technology concerned with performing a process by means of programmed commands combined with automatic feedback control to ensure proper execution of the instructions.

8. The automatic system is capable of operating without human intervention.

9. Advanced systems represent a level of capability and performance that surpass in many ways the abilities of humans to accomplish the same activities.

XI. Translate the following sentences into English.

1. Автоматизация производства – это процесс в развитии машинного производства, при котором функции управления и контроля, ранее выполнявшиеся человеком, передаются приборам и автоматическим устройствам.

2. Введение автоматизации на производстве позволяет значительно повысить производительность труда, обеспечить стабильное качество выпускаемой продукции, сократить долю рабочих, занятых в различных сферах производства.

3. До внедрения средств автоматизации замещение физического труда происходило посредством механизации основных и вспомогательных операций производственного процесса.

4. Числовое программное управление (ЧПУ – англ. Computer numerical control, CNC) – область техники, связанная с применением цифровых вычислительных устройств для управления производственными процессами.

5. Промышленные роботы в производственном процессе способны выполнять основные и вспомогательные технологические операции.

6. Промышленный контроллер – подсистема, управляющая работой подключенных к ней устройств, возможно форматирование потока данных для передачи или записи на носитель.

7. Человеко-машинный интерфейс (ЧМИ – англ. Human-machine interface, HMI) – широкое понятие, охватывающее инженерные решения, обеспечивающие взаимодействие человека-оператора с управляемыми им машинами.

8. Нанороботы, или наноботы, – роботы, размером сопоставимые с молекулой (менее 100 нм), обладающие функциями движения, обработки и передачи информации, исполнения программ.

9. Гибкая производственная система (FMS – Flexible manufacturing system) – это производственная система, в которой существует определенная гибкость, позволяющая системе реагировать в случае изменений номенклатуры продукции или технологии, независимо от того, были ли они предсказаны или непредсказуемы.

10. Система автоматизированного проектирования – автоматизированная система, реализующая информационную технологию выполнения функций проектирования (САПР).

XII. Translate into English the text B using the dictionary.

МОЯ ПРОФЕССИЯ – ИНЖЕНЕР-ТЕХНОЛОГ

Профессия инженер-технолог в том виде, в котором мы ее знаем, появилась всего пару столетий назад. Однако сам технологический процесс, за который и отвечают эти специалисты, возник в глубокой древности, задолго до появления письменности. Наши первобытные предки вручную изготавливали орудия труда, разрабатывали способы обработки сначала камня, а потом и металла. Вместе с развитием человека совершенствовались и технологии, первые письменные упоминания о которых относятся ко временам Античности.

Настоящий же прорыв произошел сравнительно недавно, во времена научно-технической революции и тотальной индустриализации. В наши дни, когда производство почти полностью автоматизировалось, инженеры-технологи по-прежнему востребованы. При этом благодаря разнообразию производственных сфер с их особенностями профессия разделилась на ряд узких специализаций.

Инженер-технолог – это специалист, основная задача которого заключается в грамотной организации процесса производства. Он разрабатывает его методы с учетом уже имеющегося оборудования, а также проектирует или подбирает новое оснащение. Кроме того, представитель этой профессии определяет, какие потребуются материалы, устройства и инструменты, следит за бесперебойностью технологического процесса в целом, отвечает за его эффективность и, как следствие, за качество производимого продукта. Технолог уста-

навливает временные нормативы для отдельных этапов и операций, делая производство стабильным, ритмичным и не допуская срывов плана. Специальность востребована в самых разных отраслях промышленности:

(https://edunews.ru/professii/obzor/inzhenernye/tehnolog.html)

XIII. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...
It touches upon ...
The extract from the article is concerned with ...
The article is about ...
The text centres round the problem of ...
The article focuses on the problem of ...
According to the text ...
According to the author ...
It further says that ...
According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up, …
On the whole, ...
In conclusion it is possible to say that ...

XIV. Discuss the following questions.

1. Automation generally implies the integration of machines into a self-governing system.

2. Automation has revolutionized those areas in which it has been introduced.

3. Many industries use automation technology in their production process.

4. What operations are automated in communications and telephone industry?

5. By means of what automatic signaling devices railroads are controlled?

6. What industries require less degree of automation?

7. The concept of automation is growing rapidly.

8. In petrochemical industry an array of automatic-control devices are used to control valves, heaters, and other equipment.

9. The automobile industry uses the mass production techniques of step-by-step manufacture and assembly.

10. In auto industry the volume of power consumed is essential to the definition of automation.

11. How do you understand step-by-step manufacture and assembly?

12. What is the main principle of the continuous-flow concept in industry?

13. What industries use automated machines in all or part of their manufacturing processes?

14. Can you give examples of automation technologies used in commerce?

15. Do you think that the widespread use of automation influences on individual's and society's daily life?

XV. Make up your own presentation on the topic: "Automation in Industry".

GRAMMAR FOCUS

THE PERFECT TENSES

The Present Perfect Tense

The Present Perfect образуется при помощи вспомогательного глагола ***to have*/ *has*** (в 3-м лице ед. ч.) и причастия прошедшего времени Participle II (**-ed** /III форма неправильного глагола) глагола сказуемого.

Мы употребляем **Present Perfect**:

– когда виден результат того, что происходило в прошлом (опыт, события, новости):

*I **have done** my report on history.*

*She **has** already **cooked** the birthday cake*;

– чтобы рассказать о действиях, которые начались в прошлом и все ещё продолжаются в настоящем:

*I **have known** Mary **for** ten years*.

*Bob **has been** in love **since** last year*;

– говоря о событии, которое произошло в неистекший отрезок времени (today, this week, this month):

*I **have bought** a book today.*

POSITIVE		NEGATIVE		QUESTION		
I/you/ we/they	***have*** **washed**	I/you/ we/they	***haven't*** **washed**	***Have***	I/you/ we /they	**washed*?***
he/she/it	***has*** **washed**	he/she/it	***hasn't*** **washed**	***Has***	he/she/it	**washed*?***

Часто употребляются такие обстоятельства времени, как: **already** – уже (что-то сделано, произошло); **yet –** уже (что-то сделано, произошло), еще не; *вопрос и отрицание*; **just –** только что (что-то произошло); **never** – никогда (не делал, не совершал за все это время); **ever –** когда-либо (за все это время) – *вопросительные предложения*; **for** *(ten years)* в течение (*десяти*) лет; **recently** – недавно, за последнее время; **so far** – до сих пор, пока, до настоящего времени; **since** *Friday* – с пятницы(и до настоящего времени); **How long** *have you known* him? **–** *I have known him* **for** *ten years.* – Как долго/Сколько лет ты его знаешь? – Я знаю его десять лет.

GRAMMAR EXERCISES

***1*. Change the sentences into Present Perfect and translate them.**

1. Students are writing a dictation.
2. They are having tea.
3. We are looking for more CDs with good music.

4. Molly is translating a difficult article from German into Russian.
5. I'm telling my friends an interesting story.

2. Complete the sentences using word in brackets.

Model: My friend … ***has opened*** … (open) a shop in the village.

1. I … (not /do) my homework yet.
2. … (you / send) aunt Mary a birthday card yet?
3. Nalini … (not/hear) from his brother for two months.
4. We … (have) a lot of work to do recently.
5. They … (be) in France for two years.

3. Translate into English.

1. Я никогда не видел таких прекрасных картин.
2. Мы только что говорили с деканом о моём новом проекте.
3. Твой друг когда-нибудь был в Волгограде?
4. Студенты недавно успешно сдали сложный экзамен.
5. Где вы были всё это время?

4. Make a sentence. Use the Present Perfect.

Model: I'm tired. (I/walk/miles) – ***I've walked miles.***

1. Emma's computer is working now. (she/repair/it)
2. It's cooler in here now. (I/open/the window)
3. The visitors are here at last. (they/arrive)
4. Mark's car isn't blocking us in now. (he/move/it)
5. We haven't got any new videos. (we/watch/all these)

Present Perfect or Past Simple?

5. Put in the correct verb form.

Model: **I've done** (I/do) all the housework. The flat is really clean now.

A young couple **bought** (buy) the house next door. But they didn't live there long.

1. Our visitors (arrive). They're sitting in the garden.

2. There’s still a problem with the television. Someone (repair) it, but then it broke down again.

3. (I/lose) my bank card. I can't find it anywhere.

4. The match (start). United are playing well.

5. My sister (run) away from home. But she came back two days later.

6. (we/plant) an apple tree in the garden. Unfortunately it died.

7. Prices (go) up. Everything is more expensive this year.

8. (I / make) a cake. Would you like a piece?

6. Choose the best sentence a) or b).

Model: Have you heard about the woman walking across the US?

– Yes, she’s reached the Rockies.

a) The walk is continuing. b) **The walk has finished**.

1. Have you ever played beach volleyball? – Yes, we played it on holiday.

a) The holiday is still going on. b) The holiday is over.

2. Did you know old Mr. Green? – No, I never met him.

a) Mr. Green is probably alive. b) Mr. Green is probably dead.

3. Wayne Johnson is a great footballer. – Yes, he’s scored 200 goals for United.

a) Wayne Johnson still plays for United. b) Wayne Johnson has left United.

Unit 11
MATERIAL SCIENCE AND TECHNOLOGY

I. Study and memorize the following words and expressions.

1) bar – брусок, прут
2) compression – сжатие
3) creep – ползучесть
4) cross-sectional area – площадь поперечного сечения
5) cyclic stress – циклическое напряжение
6) elastic deformation – упругая деформация
7) elastic limit – предел упругости
8) fatigue – усталость металла
9) fracture – перелом, излом
10) to loosen – ослаблять, расшатывать
11) shear – срез
12) to stretch – растягивать
13) tension – напряженность, растяжение
14) to propagate – распространять, распространяться
15) to bend – гнуть, согнуть
16) to extend – расширять, продолжаться
17) to occur – случаться, происходить
18) to suffer – страдать
19) torsion – кручение
20) twisting – закручивание, изгиб
21) rupture – разрыв, разрушение
22) external forces – внешние силы
23) materials science and technology – материаловедение и технологии
24) independently – независимо от чего-либо
25) to disappear – исчезать
26) original condition – исходное состояние
27) never exceeds – никогда не превышает

28) a long time – долгое время
29) finally leads to – наконец приводит к …
30) theoretical methods – теоретические методы

II. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

Scientists; to find a new method; must know how; results of external forces; a pressure; to cause; tension; to grow up; no deformation; slow; at high temperature; to extend over a long time; finally; to respond; a decrease in volume; usually; suffer from creep; ways of using materials; permanent deformation; leads to the rupture of the material; a pulling force; under stress; during; to meet; external; elastic; original; cyclic; basic; gradual; the needs; importance; loosening; size; to refer; remain; internal; return; recall; simultaneously; particularly; homogeneously; to project; exceeds; succeeds; proceeds; extremely; completely; especially; through; though; thorough; lessening.

III. Translate the words and word combinations from Russian into English.

1) отвечать требованиям
2) новые способы использования металлов
3) используя лабораторные методы
4) сжатие
5) растяжение
6) изгиб
7) срез
8) кручение
9) возвращать первоначальный размер
10) возвращать первоначальную форму
11) внешняя сила
12) постоянная деформация
13) уменьшение объема
14) растягивающие силы
15) сжимающие силы

16) превышать предел упругости материала
17) повторяющееся или циклическое напряжение
18) разрушение материала
19) развитие мелких трещин
20) распространение мелких трещин
21) сопротивление материалов ползучести и усталости
22) инженеры должны знать
23) вызывать постоянную деформацию
24) одновременно
25) деталь
26) обработка
27) применять
28) недостаток, дефект
29) хрупкий, ломкий
30) свойство металлов

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

Materials science and technology; to meet the needs of modern technology; techniques and knowledge; finding new ways of using materials; engineers must know; bending, and shear; to these forces by elastic deformation; return their original size and form; the materials may also have; may fracture; creep and fatigue; a pressure causing a decrease in volume; to a bending, shearing, or torsion (twisting) force; simultaneously at work; one side of it; the other side; is a pulling force; a cable holding a weight; a material usually stretches; the force does not exceed; the material does not return completely; material ruptures; the growth of cracks under stress; mechanical part is subjected; such as vibration; the maximum stress never exceeds; after a short time; seen during fatigue; through the material; stress of the cyclic force; knowledge of tensile stress; basic importance in engineering; permanent deformation; acting on a material; at high temperatures; this deformation; loosening of bolts; all the examples of creep; the slow deformation stops; eliminates the force causing the creep; over a long time; the rupture of the material.

V. Read and translate the text A.

HOW MATERIALS REACT TO EXTERNAL FORCES

Materials science and technology is the study of materials and how they can be fabricated to meet the needs of modern technology. Using the laboratory techniques and knowledge of physics, chemistry, and metallurgy scientists are finding new ways of using materials, plastics and other materials. Engineers must know how materials respond to external forces, such as tension, compression, torsion, bending, and shear. All materials respond to these forces by elastic deformation. That is, the materials return their original size and form when the external force disappears. The materials may also have permanent deformation or they may fracture. The results of external forces are creep and fatigue.

Compression is a pressure causing a decrease in volume. When a material is subjected to a bending, shearing, or torsion (twisting) force, both tensile and compressive forces are simultaneously at work. When a metal bar is bent, one side of it is stretched and subjected to a tensional force, and the other side is compressed.

Tension is a pulling force; for example, the force in a cable holding a weight. Under tension, a material usually stretches, returning to its original length if the force does not exceed the material's elastic limit. Under larger tensions, the material does not return completely to its original condition, and under greater forces the material ruptures.

Fatigue is the growth of cracks under stress. It occurs when a mechanical part is subjected to a repeated or cyclic stress, such as vibration. Even when the maximum stress never exceeds the elastic limit, failure of the material can occur even after a short time. No deformation is seen during fatigue, but small localized cracks develop and propagate through the material until the remaining cross-sectional area cannot support the maximum stress of the cyclic force. Knowledge of tensile stress, elastic limits, and the resistance of materials to creep and fatigue are of basic importance in engineering.

Creep is a slow, permanent deformation that results from a steady force acting on a material. Materials at high temperatures usually suffer from this deformation. The gradual loosening of bolts and the deformation

of components of machines and engines are all the examples of creep. In many cases the slow deformation stops because deformation eliminates the force causing the creep. Creep extended over a long time finally leads to the rupture of the material.

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. ... … is seen during fatigue, but … localized cracks … and propagate through … material … the remaining cross-… area cannot support the … … of the cyclic … .

2. Knowledge of … stress, … limits, and the … of materials to creep and … are of basic … in engineering.

3. Creep is … … , permanent deformation … results … a steady force … on a material.

4. Materials … high … usually … from … deformation.

5…. must … how materials … … external forces, … … tension, compression, … , bending, and … .

6. All materials … … these forces by … deformation.

7. That is, … … return their original … and … when the external force … .

8. The materials … … have permanent … or they may fracture.

9. The … of external forces … creep… fatigue.

10. Materials … and … is the study of materials and … they … … fabricated … meet the … of modern … .

11. … the … techniques and … of physics, … , and metallurgy … are finding … ways of … materials, … and other … .

12. The … loosening of … and … … of components … … and engines … all the … of creep.

13. In … … the slow deformation … because … eliminates the … causing the … .

14. Creep … … a long time … leads to … rupture of … material.

15. … is a pressure causing a … in volume.

16. When a material is … … a bending, …, or torsion (…) force, … tensile and … forces … … at work.

17. When a metal … is … , one side of … … stretched and … … a tensional …, and the … side is … .

18. … is a pulling force; … …, the force in a … holding a… .

19…. tension, a material … stretches, returning … … original … if the force … … exceed the material's … … .

20. Under … tensions, the … does not return … to its … condition, and under … forces the material … .

VIII. Translate into English the text B using the dictionary.

СТАНКОСТРОИТЕЛЬНАЯ И ИНСТРУМЕНТАЛЬНАЯ ПРОМЫШЛЕННОСТЬ

Станкостроительная и инструментальная промышленность – отрасли машиностроения, создающие для всех отраслей промышленности металлообрабатывающие и деревообрабатывающие станки, автоматические и полуавтоматические линии, комплексно-автоматические производства для изготовления машин, оборудования и изделий из металла и других конструкционных материалов, кузнечно-прессовое, литейное и деревообрабатывающее оборудование. Станкостроение является зеркалом развития машиностроения, и по развитию этой отрасли во многом можно судить о развитии промышленного потенциала страны.

В настоящее время в станкоинструментальной отрасли России насчитывается около 100 предприятий. В 2011 году отмечалось, что, по официальным данным, в составе станкоинструментальной промышленности России 46 предприятий, выпускающих металлорежу-

щие станки, 25 заводов, специализирующихся на изготовлении кузнечно-прессового оборудования, 29 производителей режущего, измерительного, слесарно-монтажного инструмента, а также семь научно-исследовательских институтов и 45 конструкторских бюро.

Во Владимирской области, на ОАО «Ковровский электромеханический завод», открыто сборочное производство станков японской компании TAKISAWA. Takisawa передает Ковровскому электромеханическому заводу право на использование технической информации для сборки, продажи, проведения пусконаладочных работ и сервисного обслуживания токарных станков с ЧПУ модели TS-4000 в России и странах СНГ. На первом этапе объем производства может составить до 600 единиц в год, в последующем – в кооперации со станкостроительными предприятиями региона – до 1700 единиц.

(https://topwar.ru/127513-stankostroenie-v-sovremennoy-rossii.html)

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...
It touches upon ...
The extract from the article is concerned with ...
The article is about ...
The text centres round the problem of ...
The article focuses on the problem of ...
According to the text ...
According to the author ...
It further says that ...
According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up, …
On the whole, ...
In conclusion it is possible to say that ...

X. Discuss the following questions.

1. Materials science and technology is the study about materials and their ability to be fabricated according to the needs of modern technology.

2. Metallurgy scientists are finding new ways of using materials with the help of theoretical methods.

3. It is very important for engineers to know how materials respond to external forces.

4. Not all materials have any deformation subjected to external forces.

5. A decrease in volume is caused by compression.

6. When a material is subjected to a bending, shearing, or torsion force, neither tensile nor compressive forces are simultaneously at work.

7. The material does not return completely to its original condition under larger tensions.

8. Fatigue occurs when a mechanical part is subjected to vibration.

9. Failure of the material can occur only when the maximum stress exceeds the elastic limit.

10. Creep occurs when a steady force acts a material.

XI. Make up your own presentation on the topic: "Modern machine tool industry".

GRAMMAR FOCUS

THE PERFECT TENSES

The Past Perfect Tense

Образуется с помощью вспомогательного глагола ***to have*** в прошедшем времени ***had*** и Participle II (-**ed** /III форма неправильного глагола) глагола-сказуемого.

Глагол в ***Past Perfect*** обозначает:

– действие, законченное к определенному моменту в прошлом или до начала другого действия:

He had read the book by 10 o'clock yesterday.

When we came to the airport the plane had already landed;

– употребляется в предложениях, в которых одно действие завершилось до другого действия, длящегося в прошлом:

*He **had read** the book and was watching TV when I came.*

POSITIVE		NEGATIVE		QUESTION		
I/you/ we/they	***had washed***	I/you/ we/they	***hadn't* washed**	***Had***	I/you/ we /they	***washed?***
he/she/it		he/she/it			he/she/it	***washed?***

Часто употребляются такие обстоятельства времени, как: **by the time** – к этому времени; **already –** уже; **till/until** – до (какого-то времени).

GRAMMAR EXERCISES

1. Put these sentences in the question and negative forms.

1. You had studied English before you entered the University.
2. They had arrived at the station by 6 o'clock.
3. James had finished reading the book by last Sunday.
4. I had done my lessons by the time you called me up.
5. The teacher had given the students their homework before the bell rang.

2. Read the situation and write the sentences from the words in brackets.

Model: You went to Sue's house, but she wasn't there.

(she/go/out) **She had gone out** …

1. You went back to your home town after many years. It wasn't the same as before. (It/change/a lot).
2. I invited Ian to the partry but he couldn't come. (He/arrange/to do something else).

3. You went to the cinema last night. You got to the cinema late. (the film/already/begun)

4. It was nice to see Dan again after such a long time. (I/not/see/ him/for five years)

5. I offered my parents something to eat, but they weren't hungry. (They/just/have breakfast)

3. Translate into English.

1. Когда вы пришли, я уже перевел весь текст.
2. К тому времени как вы позвонили, гости ещё не собрались.
3. Вы изучали английский перед тем, как поступили на эти курсы?
4. Дождь уже прекратился, когда мы вышли из дома.
5. Сколько страниц этой книги твой брат прочитал к концу прошлой недели?

4. Make the questions to the underlined words.

1. The people went home after they had finished their work.
2. The young man has decided to buy the new vase after the old one had fallen down and broken to pieces.
3. The lecture has begun by the time I entered the room.

The Future Perfect Tense

The Future Perfect – сложная временная форма, образующаяся при помощи вспомогательного глагола **to have** в Future Simple (will have) и Past Participle (**-ed** /III форма неправильного глагола) глагола сказуемого.

POSITIVE		NEGATIVE		QUESTION			
I/you/ we/they he/she it	***will have*** **asked**	I/you we/they he/she it	***will not (won't) have*** **asked**	***Will***	I/you we/they he/she it	***have***	***asked?***

Future Perfect обозначает действие, которое будет закончено до определенного момента в будущем.

*By the end of the term we**'ll have read** four English books.*

GRAMMAR EXERCISES

1. Put these sentences in the question and negative forms.

1. Trevor and Laura **will have lived** here for four years next April.

2. This chess game is going to last ages. They **won't have finished** it until midnight.

3. **I will have read** this book by the time it's due back to the library.

4. My husband **will have finished** his work by half past eight, so he should be home about nine.

5. Phone me after 8 o'clock. We**'ll have finished** dinner by then.

2**. **Translate into English.

1. Моя сестра вернется домой к 10 часам. Перезвоните позднее.

2. К концу сентября мы получим хорошую премию.

3. Я плохо себя чувствую, но к концу надели я выздоровлю.

4. На следующей неделе у меня будет больше времени, так как я сдам все экзамены.

5. Когда мой папа вернется домой, он будет очень усталым.

3. Paul wants to be an artist. He's reading about a famous artist called Winston Plummer.

Winston Plummer was a great artist, who had a wonderful career. He won lots of prizes before he was twenty. By the age of twenty-five he had had his own exhibition. He was the subject of a TV documentary by the time he was thirty. By the age of thirty-five he had become world-famous. He made millions of pounds from his pictures before he was forty.

Paul is daydreaming about his own future career. What is he thinking?

Model: I hope I'll *have won lots of prizes* before I'm twenty.

1. Perhaps … my own exhibition by the age of twenty-five.
2. I wonder if … by the time I'm thirty.
3. Maybe … by the age of thirty-five.
4. I hope … by the age of forty.

4. How good is your maths? Can you work out the answers?

Model: It's quarter to six. Melanie is putting something in the oven. It needs to be in the oven for an hour and a half. When will it have cooked? **It will have cooked at quarter past seven.**

1. It's seven o'clock in the evening, and Andrew is starting to write an essay. He writes one page every fifteen minutes. He plans to finish the essay at midnight. How many pages will he have written? He will have written … pages.

2. It's Monday morning, and Sarah is travelling to work. It's twenty miles from her home to the office. How far will she have travelled to and from work by the time she gets home on Friday? She will have traveled … miles.

3. Matthew is doing press-ups – one every two seconds. How many will he have done after five minutes? He will have done … press-ups.

THE PRESENT PERFECT CONTINUOUS (PROGRESSIVE) TENSE

Present Perfect Continuous образуется при помощи вспомогательного глагола **to be** в Present Perfect (have been, has been) и глагола-сказуемого с ***-ing*** окончанием.

Обозначает действие или состояние, которое началось в прошлом и продолжалось в течение определенного периода до момента речи и либо все ещё продолжается в этот момент, либо закончилось непосредственно перед ним.

I have been waiting for him for two hours.

Глаголы состояния (*non-continuous verbs*) в *Present Perfect Continuous не употребляются.*

POSITIVE		NEGATIVE		QUESTION			
I/you/we/ they	***have been washing***	I/you/ we/they	***haven't been washing***	***Have***	I/you/ we/ they	***been***	***washing?***
He she/it	***has been washing***	He/she/ it	***hasn't been washing***	***Has***	he/she/ it	***been***	***washing?***

Часто употребляются такие обстоятельства времени, как: **for** *(ten years)* – в течение (*десяти*) лет; **for a long time** – на протяжении долгого времени; **all day long** – в течение всего дня; **since** *Friday* – с пятницы (и до настоящего времени).

GRAMMAR EXERCISES

1. Write a question for each situation.

1. You meet Sam as he is leaving the swimming pool.

Model: You ask: (you/swim?) ***Have you been swimming*?**

2. You have just arrived to meet a friend who is waiting for you.
   You ask: (you/wait/long) … ?
3. You meet a friend in the street. His clothes are completely wet.
   You ask: (what/you/do) … ?
4. A friend of yours is now working in a supermarket.
   You ask: (how long/you/work/there) … ?
5. The fellow student tells you about his job – he sells computers. You want to know how long.
   You ask: (how long/you/sell / computers) … ?

2. Translate into English.

1. Как долго вы изучаете испанский язык?

2. Мы живем здесь только год.

3. Дождь идёт с раннего утра.

4. Чем он занимается с тех пор, как мы виделись с ним в последний раз?

5. Я пытаюсь отремонтировать компьютер на протяжении всего дня.

3. Put in the verbs. Use the Present Perfect Continuous.

Ilona: Sorry I'm late.

Model: Emma: It's OK**. … I haven't been waiting…** (I/not/wait) long. What … (you/do)?

Nelly: I've been with Mrs. King. … (she/help) me with my English.

Nelly: Your English is very good. You don't need lessons, surely.

How long … (you/study) English?

Ilona: Er, eight years now. But my accent wasn't so good before I came to England. … (I/try) to improve it. I think … (it/get) better lately.

Nelly: Your accent is fine, Ilona. Honestly.

Unit 12
THE SCIENTIFIC AND TECHNOLOGICAL PROGRESS IN MODERN INDUSTRY

I. Study and memorize the following words and expressions.

1) high technologies – высокие технологии

2) development of science and technology – развитие науки и техники

3) unpredictable discoveries – непредсказуемые открытия

4) become an inseparable part of our life – стать неотъемлемой частью нашей жизни

5) imagine without various gadgets – представить без разнообразных гаджетов

6) heated arguments – горячие споры

7) make more comfortable and safe – сделать удобнее и безопаснее

8) scaring and unpredictable results – пугающие и непредсказуемые результаты

9) consequences of modern science and technical progress – последствия современной науки и технического прогресса

10) automation – автоматизация

11) reliability – надежность

12) the basis of scientific and technical progress – основы научно-технического прогресса

13) to trace – проследить

14) coal-digging complexes – угольно-добывающие комплексы

15) much faster – намного быстрее

16) casting – литье

17) treatment – обработка (деталей)

18) welding equipment – сварочное оборудование

19) huge databases – огромные базы данных

20) numerous fresh ideas – многочисленные свежие идеи

21) to evolve – выявлять

22) to reinforce – укреплять

23) vulnerable – уязвимый
24) wear – изнашивание (запасных частей оборудования)
25) tear – разрывание
26) to proceed – продолжать, исходить
27) grain harvester – зерноуборочная машина
28) to last – длиться, продолжаться, сохраняться
29) individual enterprises – индивидуальные предприятия
30) new innovations – новые изобретения
31) breakthrough – открытие, достижение, научный прорыв
32) highly qualified – высококвалифицированный
33) to regenerate – восстанавливаться, возрождаться
34) up-to-date – новейший, современный
35) values – ценности

II. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

Main headlines; scientific; progress; continue; engineering; include; the creation of "unmanned" industries; firstly; secondly; to raise the reliability; take up a workpiece and pass it; to require new technology; can identify objects; electrochemical treatment of metals; coal-digging complexes; methods have been designed for; reinforcing machine parts; most vulnerable; to wear and tear; such as; in grain harvesters; last several times; thus; merely quantity; engineers and scientists; major characteristics; in other words; this is a matter of quality; number of new machines; apparatus and materials; new technologies and equipment; most branches of engineering; in the shortest time; to start producing; new generations of machines and equipment; to increase productivity; several times; large reserves; the process of designing; at present; advanced methods; a number of criteria.

III. Translate the words and word combinations from Russian into English.

1) искусственный интеллект
2) современные методы

3) точное описание инструкции
4) обрабатывать специальным станком
5) двигатель (чаще всего электрический)
6) электрический двигатель
7) намерение, цель
8) цель исследования
9) фактор, вызывающий определенные последствия
10) изобретать
11) совершать открытие
12) исследование
13) опыт, эксперимент
14) прогресс, развитие
15) прорыв
16) наблюдение
17) оборудование, снаряжение
19) прибор, оборудование
20) спутник
21) кибер, связь с компьютерными технологиями
22) открывать, обнаруживать
23) оценивать
24) метод проб и ошибок
25) переоценивать роль науки и техники
26) изобретения начала XX столетия
27) выдающиеся открытия
28) аргументы и факты
29) прогрессивная роль науки в нашей жизни
30) ответственность ученого

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

Large reserves; service life for machines; in the process of designing; for designing machines; proceeding from a number of criteria; allow an optimizing; in the blueprint stage; strengthening treatment; efficient methods; designed and manufactured; modern engineering thinking;

to create new automated coal-digging complexes; casting of steel; machine-tools for electro-physical; unique welding equipment; machine-tool modules; for most branches of engineering; to start producing; would allow manufacturers; to find a way for the application; foremost of them; the vacuum plasma methods; such as nitrides and carbides of titanium; tungsten and boron; have been designed for reinforcing machine parts; such as in grain harvesters; several times longer; merely quantity engineers and scientists; in other words; the mere number of new machines; the scientific and technological progress; two main headlines; secondly, raising the reliability; requires new technology; well suited for "unmanned" industries; on new robots; can take up a workpiece; can identify objects; we also need machines; entire process of machining.

V. Read and translate the text A.

THE SCIENTIFIC AND TECHNOLOGICAL PROGRESS

The scientific and technological progress will continue in engineering along two main headlines. Firstly, it is automation, including the creation of "unmanned" industries. Secondly, raising the reliability and extending the service life of machines. This certainly requires new technology. The machine modules on a large scale are well suited for "unmanned" industries. Intense work is being carried out on new robots. What we need is not merely manipulators which can take up a workpiece and pass it on, but robots which can identify objects, their position in space, etc. We also need machines that would trace the entire process of machining. Some have been designed and are manufactured.

Modern engineering thinking has created new automated coal-digging complexes and machine systems, installations for the continuous casting of steel, machine-tools for electrophysical and electrochemical treatment of metals, unique welding equipment, automatic rotor transfer lines and machine-tool modules for flexible industries. New technologies and equipment have been designed for most branches of engineering. In the shortest time possible the engineers are to start producing new

generations of machines and equipment which would allow manufacturers to increase productivity several times and to find a way for the application of advanced technologies.

Large reserves in extending service life for machines can be found in the process of designing. At present, advanced methods have been evolved for designing machines proceeding from a number of criteria. Automatic design systems allow an optimizing of the solutions in design and technology when new machines are still in the blueprint stage.

A promising reserve in increasing the life of parts is strengthening treatment. In recent years new highly efficient methods have been found. First and foremost, of them are the vacuum plasma methods for coating components with hard alloy compounds, such as nitrides and carbides of titanium, tungsten and boron. Methods have been designed for reinforcing machine parts most vulnerable to wear and tear, such as in grain harvesters, to make them last several times longer. Thus, it is not merely quantity engineers and scientists it is a matter of major characteristics. In other words, this is a matter of quality, and not of the mere number of new machines, apparatus and materials.

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. Modern engineering … has created new … coal-digging … and machine systems.
2. New … and equipment have been … for most … of engineering.
3. In … shortest… possible the … are to … producing new generations of … and equipment.
4. A … reserve in increasing … … of parts … strengthening … .
5. In … … new highly … methods … … found.
6. First and … of them … the vacuum … methods for … components.
7. … have been designed … reinforcing … parts most … to wear and tear.
8. Thus, it is not merely … engineers and … it is a matter of major … .

9. In other … , this is a … of quality, and … of the … number of … machines, … and materials.

10. The … and technological … will continue … engineering … two main …

11. Firstly, it is … , including the … of “unmanned” industries.

12. Secondly, … the reliability and … the service … of machines.

13. This certainly … new technology.

14. The machine … on a large … are well … for “unmanned” … .

15. Intense work… being … out on … robots.

16. What we … is not merely …. which can … up a… and pass it on.

17. We also … machines that … … the entire … of machining.

18. Some have been … and are … .

19. Large reserves in … service life for … can be found … … process of … .

20. At present, advanced … have been … for designing … proceeding from a … of criteria.

21. Automatic … … allow an optimizing of the … in design and … when new machines … still in the … stage.

VIII. Translate into English the text B using the dictionary.

НАУЧНО-ТЕХНИЧЕСКИЙ ПРОГРЕСС

Соответствие научно-технических ресурсов современному этапу развития научно-технического прогресса в XXI веке становится таким же насущным условием деятельности современного социума, как и природные ресурсы. Научно-технический прогресс затрагивает все без исключения элементы производительных сил и оказывает заметное воздействие на структуру и экономический рост мирового хозяйства.

Научно-техническая революция на современном этапе основывается на достижениях науки и техники. НТР характеризуется применением современных источников энергии, широким использованием электроники, разработкой и применением прогрессивных технологических процессов и материалов с заранее заданными свойствами. Что

способствует стремительному развитию отраслей, определяющих техническое перевооружение народного хозяйства. Следовательно, проявляется обратное влияние НТР на ускорение научно-технического прогресса. Это и есть проявление взаимосвязи и взаимозависимости научно-технического прогресса и научно-технической революции.

Научно-технический прогресс играет основополагающую роль в развитии и интенсификации промышленного производства. Он затрагивает все этапы процесса, который включает в себя фундаментальные теоретические исследования, опытно-конструкторские разработки, освоение и промышленное производство новой техники, а также внедрение ее в народное хозяйство. Происходит обновление материально-технической базы промышленных предприятий, как следствие, повышается эффективность производства, растет производительность труда.

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...
It touches upon ...
The extract from the article is concerned with ...
The article is about ...
The text centres round the problem of ...
The article focuses on the problem of ...
According to the text ...
According to the author ...
It further says that ...
According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up, …
On the whole, ...
In conclusion it is possible to say that ...

X. Discuss the following questions.

1. Scientific and technological progress affects our whole life.

2. The scientific and technological revolution at the present stage is based on the achievements of science and technology.

3. Scientific and technical revolution (NTR) is characterized by the use of modern energy sources, extensive use of electronics, the development and application of advanced technological processes.

4. It's difficult to overestimate the role of science and technology in our life.

5. Let's compare our life nowadays with the life of people at the beginning of the 20th century.

6. The great inventions of the beginning of the 20th century, such as radio, airplanes, combustion and jet engines have become usual things and we can't imagine our life without them.

7. A century is a long period for scientific and technological progress, as it's rather rapid. Millions of investigations, the endless number of outstanding discoveries have been made.

8. Now we live in the information era when the computer network embraces the globe and connects not only the countries and space stations but a lot of people all over the world.

9. The rapid scientific progress has aroused a number of problems that are a matter of our great concern.

10. The life of people has taken a completely new turn, and this, of course, has both positive and negative aspects.

11. The great point about technological development is that they brought wide opportunities to us and they are easy to access for the representatives of the modern generation.

12. There are areas of our life where technological development plays only a positive role.

XI. Make up your own presentation on the topic: "The scientific and technological progress".

GRAMMAR FOCUS

ГЛАГОЛ. THE PASSIVE VOICE

Глагол-сказуемое в ***Passive Voice (страдательный залог)*** показывает, что подлежащее предложения является объектом действия со стороны другого лица или предмета.

*I **wrote** three letters yesterday./Past Simple of the **Active Voice**/ –*

*Three letters **were written** yesterday. /**the Past Simple Passive**/*

Времена страдательного залога образуются при помощи вспомогательного глагола ***to be*** в соответствующем времени действительного залога и глагола-сказуемого в форме причастия прошедшего времени Participle II (***-ed*** /III форма неправильного глагола) глагола-сказуемого.

	Active	**Passive**
Present Simple	*We **bake** the bread here.*	*The bread **is baked** here.*
Present Continuous	*We **are baking** the bread.*	*The bread **is being baked.***
Present Perfect	*We **have baked** the bread.*	*The bread **has been baked.***
Past Simple	*We **baked** the bread yesterday.*	*The bread **was baked** yesterday.*
Past Continuous	*We **were baking** the bread.*	*The bread **was being baked.***
Past Perfect	*We **had baked** the bread.*	*The bread **had been baked.***
Future simple ***To be going to***	***We will bake*** *the bread next.* *We **are going to bake** the bread.*	*The bread **will be baked** next.* *The bread **is going to be baked.***
Modals	*We **should bake** the bread soon.*	*The bread **should be baked** soon.*

Объект действия выражен подлежащим, а субъект действия либо совсем не упоминается, либо указан с предлогами **by** или **with**.

*Football **is played** all over the world. / The sky **was covered with** clouds.*

Времена Perfect Continuous и Future Continuous в страдательном залоге не употребляются.

GRAMMAR EXERCISES

1. Open the brackets.

1. Those magazines (return) to the library yesterday.
2. Why your home task (not/do)?
3. The children (take) to the circus this afternoon.
4. Dictionaries may not (use) at the examination.
5. This room (not/ use) for a long time.

2. Translate into English.

1. Его часто посылают за границу.
2. Телеграмма была получена вчера.
3. Когда будет переведена эта книга?
4. Кому поручили это задание?
5. Мне предложили очень интересную работу.

3. Rewrite these sentences beginning with the underlined words.

Model: Thieves robbed a <u>woman</u>. – ***A woman was robbed***.

1. They may ban <u>the film</u>.
2. They offered <u>Nancy</u> a pay increase.
3. We need to correct <u>the mistakes</u>.
4. Someone reported that <u>the situation</u> was under control.
5. They are testing <u>the new drug</u>.

Unit 13
AUTOMATIC CONTROL SYSTEMS

I. Study and memorize the following words and expressions.

1) major – главный
2) crucial – ключевой; решающий
3) rigorous – тщательный
4) circumstance – обстоятельства
5) generic – общий
6) exact – точный
7) techniques – оборудование
8) unique – уникальный
9) disturbance – нарушение
10) margin – ленточка (сверла, развертки)
11) development – развитие
12) apply – применять
13) describe – описывать
14) significant – значительный
15) difference – разница
16) extension – напряжение
17) advantageous – выгодный
18) measure – мера (измерения)
19) alternative – альтернативный
20) temperature – температура
21) energy – энергия
22) speed – скорость
23) feedback – обратная связь
24) voltage – напряжение
25) rate – показатель, коэффициент
26) intensity – напряженность, сила
27) oscillations – колебания

28) the generic term – общий термин
29) the frequency – частота
30) the describing function – описывающая функция

II. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

Major steps forward; crucial events in history; burst of development; unexpected results; exact description; multivariable problems; engineering intuition; sophisticated level; rigorous analysis; differential equations; pioneering work; controls designer; autotuning control; substance; pressure; various conditions; solution; special circumstances; properties; action; state; influence; assumption; to encounter unexpected results; to be couched in the frequency domain and the s-plane; to carry out the design by hand; engineering art; claimed theory; to shift emphasis to other reached issues; working procedure; machine control operations; control target; non-interaction automatic control system; interaction automatic control system; control devices for automatic regulation systems; regular signal; non regular signal; control engineering.

III. Translate the words and word combinations from Russian into English.

1) управление
2) теория управления
3) системы автоматического управления (САУ)
4) информация о задаче управления
5) информация о результате управления
6) полученная информация
7) выполнение решения (воздействие на объект управления)
8) датчики
9) измерительные устройства
10) детекторы
11) объект управления
12) регулятор
13) двигатели

14) усилительно-преобразующие устройства

15) замкнутая система управления

16) управление техническим объектом с использованием информации

17) без участия человека (оператора)

18) промышленные автоматы

19) конвейерные линии

20) роторные линии

21) станки с числовым программным управлением

22) резец

23) изготовление детали

24) системы автоматического регулирования (САР)

25) следящие системы (СС)

26) усилительно-преобразующее устройство (УПУ)

27) режим управления

28) линейные и нелинейные системы (САУ или САР)

29) непрерывные системы (системы непрерывного действия)

30) релейные системы (системы релейного действия)

31) системы дискретного действия (импульсные и цифровые)

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

Approach to control; the publication of work; on optical estimation and control; work allowed multivariable problems; not impossible, in the classical framework; this set of developments; power and advantages; lacking in some aspects; various approaches; a sophisticated level and emphasis; effect of model error; can be classified as the period; numerous other developments; autotuning and intelligent control; classical control theory; the s-plane; it is primarily applicable for linear time-invariant systems; nonlinear systems were made using; for controls design is the magnitude and phase of the frequency response; advantageous since the frequency response; function can then be computed; the transfer function is needed; performance obtained by solving matrix design equations; without

gaining any engineering intuition; a modern control system with any compensation dynamics; robustness is built in with a frequency; exact description; is not needed for classical design; the system is of importance; may be carried out by hand; impart a great deal of intuition; and afford the controls designer; the resulting control systems are not unique; an engineering art; has taken several major steps; each of these steps has been matched by a corresponding burst of development in the underlying theory of control; the compelling concept of feedback was applied; catalysts for rigorous analysis; we go back to Watt's fly-ball governor; could produce self-sustaining oscillations; the end of the 19th century; showed how these oscillations could be described.

V. Read and translate the text A.

CONTROL THEORY

Control engineering has taken several major steps forward at crucial events in history. Each of these steps has been matched by a corresponding burst of development in the underlying theory of control.

Early on, when the compelling concept of feedback was applied, engineers sometimes encountered unexpected results. These then became catalysts for rigorous analysis. For example, if we go back to Watt's fly-ball governor, it was found that, under certain circumstances, these systems could produce self-sustaining oscillations. Toward the end of the 19th century, several researchers (including Maxwell) showed how these oscillations could be described via the properties of ordinary differential equations.

The developments around the period of the Second World War were also matched by significant developments in Control theory. For example, the pioneering work of Bode, Nyquist, Nichols, Evans and others appeared at that time. This resulted in simple graphical means for analyzing single-input, single-output feedback control problems. These methods are now generally known by the generic term Classical Control theory.

Classical Control theory was naturally couched in the frequency domain and the s-plane. Relying on transform methods, it is primarily applicable for linear time-invariant systems, though some extensions to nonlinear systems were made using, for instance, the describing function.

The system description needed for controls design is the magnitude and phase of the frequency response. This is advantageous since the frequency response can be experimentally measured. The transfer function can then be computed. For root locus design, the transfer function is needed. An exact description of the internal system dynamics is not needed for classical design; that is, only the input/output behavior of the system is of importance. The design may be carried out by hand using graphical techniques. These methods impart a great deal of intuition and afford the controls designer with a range of design possibilities, so that the resulting control systems are not unique. The design process here is an engineering art.

The 1960's saw the development of an alternative state space approach to control. This followed the publication of work on optical estimation and control by Wiener, Kalman, etc. This work allowed multivariable problems to be treated in a unified fashion. This had been difficult, if not impossible, in the classical framework. This set of developments is loosely termed Modern Control theory. With all its power and advantages, modern control was lacking in some aspects.

The guaranteed performance obtained by solving matrix design equations means that it is often possible to design a control system that works in theory without gaining any engineering intuition about the problem.

Another problem is that a modern control system with any compensation dynamics can fail to be robust to disturbances, unmodelled dynamics and measurement noise. On the other hand, robustness is built in with a frequency-domain approach using notions like the gain and phase margin.

Thus these various approaches to control reached a sophisticated level and emphasis then shifted to other related issues, including the effect of model error on the performance of feedback controllers. This can be classified as the period of Robust Control theory.

There have been numerous other developments including adaptive control, autotuning and intelligent control.

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. The guaranteed performance … … solving matrix design equations means that … … often possible to … a control system … … in theory without … any … intuition about the… .

2. … problem … that a modern … system with … compensation dynamics … fail … … robust to disturbances, … dynamics and … noise.

3. On … … hand, robustness … built in … a frequency- … approach using … like the gain and … margin.

4. Early on, when the … concept of … was applied, engineers … encountered … results.

5. These then … catalysts for rigorous … .

6. … … , if we go back to.

7. Watt's fly-ball governor, it was … that, under certain … , these systems could … self-sustaining … .

8. Toward the end of … … century, several … (including Maxwell) showed how these … could be described … the properties of ordinary … equations.

9. The … around the period of the … … … were also matched by … developments in … theory.

10. For example, the … … of Bode, Nyquist, Nichols, Evans and others appeared at … … .

11. This … in simple graphical … for analyzing … -input, single-… feedback … problems.

12. These methods … now generally … by the generic … Classical … … .

13. Control … has taken several … … forward at crucial events in… .

14. Each of these steps has been … … a corresponding … of development in the … theory of … .

15. Thus these … … to control reached a sophisticated … and emphasis then … to other … issues, including the … of model … on the performance of… controllers.

16. This … … classified … … … of Robust Control theory.

17. There … … numerous … developments … adaptive control, … and intelligent … .

18. Classical … … was naturally … in the frequency … and the s-plane.

19. Relying … transform … , it is primarily … for … time-invariant … , though some extensions to … systems … made using, for … , the describing … .

20. The … … needed … controls … is the magnitude and … of the frequency … .

21. This is … since the frequency … can be experimentally … .

22. The … … can then be … .

23. For root … design, the transfer function … needed.

24. An … … of the internal system dynamics is not … for classical … .

25. The design may … … … by hand using graphical … .

26. These methods … a great … of intuition and … the controls … with a range of … possibilities, so that the … control … are not … .

27.The design … here is an engineering … .

VIII. Translate into English the text B using the dictionary.

ОСНОВНЫЕ ПОНЯТИЯ ТЕОРИИ УПРАВЛЕНИЯ ТЕХНИЧЕСКИМИ СИСТЕМАМИ. ВИДЫ СИСТЕМ УПРАВЛЕНИЯ

Развитие и совершенствование промышленного производства – энергетики, транспорта, машиностроения, космической техники – требует непрерывного увеличения производительности машин и агрегатов, повышения качества продукции, снижения себестоимости.

Реализация поставленных целей невозможна без внедрения современных систем управления, включая как автоматизированные с участием человека-оператора, так и автоматические без участия человека-оператора системы управления (СУ).

Управление – это такая организация того или иного технологического процесса, которая обеспечивает достижение поставленной цели.

Теория управления является разделом современной науки и техники. Она базируется как на фундаментальных, общенаучных дисциплинах, таких как математика, физика, химия, так и на прикладных дисциплинах, таких как электроника, микропроцессорная техника, программирование.

Любой процесс управления (автоматического) состоит из следующих основных этапов (элементов):

- получение информации о задаче управления;
- получение информации о результате управления;
- анализ получаемой информации;
- выполнение решения (воздействие на объект управления).

Для реализации процесса управления система управления (СУ) должна иметь:

- источники информации о задаче управления;
- источники информации о результатах управления (различные датчики, измерительные устройства, детекторы);
- устройства для анализа получаемой информации и выработки решения;
- исполнительные устройства, воздействующие на объект управления, содержащие: регулятор, двигатели, усилительно-преобразующие устройства и т. д.

Автоматические системы управления подразделяются на три типа:

- системы автоматического управления (САУ);
- системы автоматического регулирования (САР);
- следящие системы (СС).

Первый в мире автоматический регулятор (XVIII в.) – регулятор Уатта – был изобретен Уаттом в Англии для поддержания постоянной скорости вращения колеса паровой машины и соответственно для поддержания постоянства скорости вращения (движения) шкива (ремня) трансмиссии.

(Введение в теорию автоматического управления.
Основные понятия теории управления техническим системами
https://habr.com/ru/post/503820/)

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...

It touches upon ...

The extract from the article is concerned with ...

The article is about ...

The text centres round the problem of ...

The article focuses on the problem of ...

According to the text ...

According to the author ...

It further says that ...

According to the figures (data, information, opinions) from the text ...

It is clear from the text that ...

The problem of the text is of great importance ...

To sum it up, …

On the whole, ...

In conclusion it is possible to say that ...

X. Discuss the following questions.

1. Crucial events in history connected with control engineering.
2. How could unexpected results sometimes become catalysts for new analysis?
3. In what way did the Second World War influence the developments in control theory?
4. Why can the frequency response be regarded as advantageous?
5. Why is intuition so important for controls designer?
6. Describe disadvantages of Modern Control Theory.
7. Speak about different methods of Control Theory.
8. Describe advantages of Modern Control Theory .
9. Prove the necessity of Robust Control Theory.
10. Speak about new control theory developments.

XI. Make up your own presentation on the topic: "Modern Control Theory".

GRAMMAR FOCUS

MODAL VERBS. МОДАЛЬНЫЕ ГЛАГОЛЫ

Модальные глаголы обозначают не само действие, а указывают на отношение к нему говорящего лица. Модальные глаголы **can**, **may**, **must** выражают способность, возможность, допустимость, долженствование.

Модальные глаголы употребляются только в сочетании с инфинитивом смыслового глагола без частицы **to**, исключения составляют эквиваленты модальных глаголов **to be able to**, **to be allowed**, **to have to**, **to be to**, **ought to**. Эти глаголы часто называют недостаточными, так как они:

1) не имеют неличных форм – инфинитива, причастия, герундия;

2) не изменяются ни по лицам, ни по числам (не имеют окончания в 3-м лице единственного числа).

3) образуют вопросительную форму путём постановки модальных глаголов **can**, **may**, **must** перед подлежащим, а отрицательную форму – путём добавления отрицания **not** к модальному глаголу.

Для выражения необходимости, допустимости, способности выполнения какого-нибудь действия после подлежащего ставится модальный глагол **can**, **may**, **must**, затем смысловой глагол в первой форме.

Shall, **will** в модальном значении могут употребляться со всеми лицами. Однако, чтобы отличить их от вспомогательных глаголов, **shall** употребляется со 2-м и 3-м лицом в значении долженствования, необходимости; **will** с 1-м лицом употребляется в значении желания, намерения. **Will** в модальном значении может выражать также тенденцию к исполнению действия.

Should употребляется как модальный глагол для выражения долженствования или совета для всех лиц единственного и множественного числа.

Would придаёт намерение, повторяемость и систематичность действия в прошлом и переводится на русский язык «бывало, обычно», а в отрицательной форме передаёт нежелание, противодействие усилиям человека. В технической литературе употребляется для выражения обычности или неизбежности действия.

Варианты употребления модальных глаголов в сочетании с Passive и Perfect Infinitive

Сочетание модальных глаголов **с Infinitive Passive** указывает на то, что подлежащее является объектом, на который направлено действие.

Модальные глаголы **must**, **may**, **might** в сочетании с **Perfect Infinitive** выражают возможность или вероятность действия, относящегося к прошлому, и обычно переводятся словами «должно быть», «возможно».

Глаголы **can** и **could** в отрицательной форме в сочетании с **Perfect Infinitive** выражают сомнение в возможности совершения действия в прошлом и обычно переводятся при помощи словосочетания «не может быть».

Модальные глаголы **ought (to)**, **should**, **might** в сочетании с **Perfect Infinitive** указывают на то, что действие, которое могло или должно было бы совершиться, не совершилось.

Модальные глаголы и их эквиваленты

Модальный глагол и его эквивалент	**Значение**	**Present**	**Past**	**Future**
1. Can *To be able (to)*	Физическая, умственная способность, возможность или умение совершения действия Удивление, сомнение по поводу возможности совершения действия Быть в состоянии совершить действие	Can *Am/is/are able (to)*	Could *Was/were able (to)*	– *Shall/will be able (to)*

Окончание

Модальный глагол и его эквивалент	**Значение**	**Present**	**Past**	**Future**
2. May	Разрешение, предположение (с оттенком сомнения) или допускаемая возможность совершения действия	May	Might	–
To be allowed (to)	Допущение возможности, разрешение совершить действие	*Am/is/are allowed (to)*	*Was/were allowed (to)*	*Shall/will be allowed (to)*
3. Must	Выражает долженствование, предположение, которое граничит с уверенностью, необходимостью и неизбежностью совершения действия	Must	–	–
To have (to)	Вынужденная необходимость (в силу непредвиденных обстоятельств)	*To have (to)*	*Had (to)*	*Shall/will have (to)*
To be (to)	Необходимость, предусмотренная планом; по расписанию; по договорённости	*To be (to)*	*Was, were (to)*	–
Should	Необходимость как нечто требуемое; совет	*Should*	–	–
Ought (to)	Необходимость как моральный долг, как нечто отвечающее общепринятым взглядам или когда мы говорим о законе, правилах	*Ought (to)*	–	–
Needn't	Нет никакой необходимости (нужды) выполнения действия	*Needn't*	–	–

GRAMMAR EXERCISES

1. Rephrase the following situations using an appropriate modal verb.

1. I advise you to stop eating chocolate. You … stop eating chocolate.
2. I insist that you do your homework. You ... do your homework.
3. Will you let me speak to David, please? ... I speak to David, please?
4. She can hear you well enough. You ... shout.
5. Talking is not permitted during the test. You ... talk during the test.
6. It isn't right to speak to your mother like that. You ... speak to your mother like that.
7. It isn't possible for him to come to the party. He ... come to the party.
8. He is obliged to go to the police station once a week. He ... to go to the police station once a week.
9. It's forbidden to feed the animals in the Zoo. You ... feed the animals in the Zoo.
10. It's necessary to dust the furniture. You ... dust the furniture.
11. Would you mind if I read your book? ... I read your book?
12. Perhaps they'll come with us. They ... come with us.
13. Would you mind if I use your glasses? ... I use your glasses?
14. Let's try doing this exercise. ... we try doing this exercise.
15. He can do it himself. Why ... he ask anybody for help?
16. Perhaps, she will phone them today. She ... phone them today.

2. Choose the correct modal verb.

1. Mike ... play the piano very well. And what about you? (*a) can; b) should; c) must*)
2. I ... skate when I was little. (*a) can't; b) couldn't; c) mustn't*)
3. We ... hurry. We've got plenty of time. (*a) can't; b) needn't; c) must*)
4. ... you help me with this task? (*a) could; b) must; c) may*)

5. I’m sorry I’m late. ... I come in? (*a) must; b) should; c) may*)

6. ... you speak any foreign languages? (*a) can; b) should; c) may*)

7. It’s raining. You ... take an umbrella. (*a) can’t; b) don’t have to; c) should*)

8. I’m afraid I ... come to the party on Friday. (*a) can; b) can’t; c) may*)

9. You ... go there at once. It’s really very urgent. (*a) don’t have to; b) needn’t; c) must*)

10. When I was young, I ... run for miles. (*a) could; b) must; c) should*)

11. ... I translate this sentence? – No, you needn’t. (*a) can; b) may; c) must*)

12. ... I smoke here? – No, you mustn’t. (*a) can; b) may; c) should*)

13. I looked everywhere for the book but I ... find it. (*a) couldn’t; b) mustn’t; c) shouldn’t*)

14. You ... drive carefully on a busy road. (*a) can; b) may; c) should*)

15. There’s nothing I ... do about it. (*a) can; b) may; c) don’t have to*)

16. Schools ... teach children the difference between right and wrong. (*a) can’t; b) mustn’t; c) must*)

17. I don’t feel well today. ... I leave earlier? (*a) should; b) may; c) must*)

18. That ... be true! It’s absolutely impossible. (*a) can’t; b) must; c) needn’t*)

19. Yesterday I stayed at home because I ... help my father. (*a) must; b) had to; c) can*)

20. You ... use my dictionary as long as you like. (*a) must; b) have to; c) may*)

3. Fill in the necessary modal verbs.

1. Sally’s husband ... play football, tennis but he ... not cook or iron.

2. ... I ask you a question? – You certainly ....

3. You ... not put so much sugar in your tea.

4. You ... stay in town for the whole summer or you ... go to the seaside with us if you want.

5. ... I do anything for you?

6. We ... to meet at 5, but I ... put off the meeting till later.

7. Sorry, madam. You ... not smoke here.

8. We ... phone her at her office. She ... be still working.

9. You ... be more attentive next time.

10. In many countries people ... drive the car at the age of 16.

11. I'm sorry. I ... not come at 6 o'clock tomorrow. I ... attend a meeting which begins at the same time.

12. I'm afraid something is wrong. They ... be back an hour ago.

13. – ... you help me with Math? – No, I ... not. I ... read a whole chapter in Geography.

14. We ... hear some music through the open window.

15. I'm late. I ... hurry.

16. You ... not eat so much sweets. You ... become fat.

17. Mother leaves home early on Mondays and he ... make his breakfast himself.

18. Every child ... know traffic rules.

19. It's dark outside, it ... be about 7 o'clock now

20. The doctor says I ... stay in bed for a week.

4. Choose the correct modal verb.

1. I don't want anyone to know it. You (*mustn't/ don't have to*) tell anyone.

2. Listen! I (*can/must*) hear someone crying.

3. When we were at school, we (*had to/ ought to*) wear a uniform.

4. You (*don't have/mustn't*) wear your seatbelt during the whole of the flight.

5. You (*should/have to*) tell her that you are sorry.

6. You (*need/must*) be a member of the library before you can borrow books.

7. I (*needn't/shouldn't*) wear glasses because my eyesight is still quite good.

8. When I first come to Madrid, I (*could/couldn't*) say only a few words in Spanish.

9. Helen (*must/had to*) leave the meeting early because she had a train to catch.

10. I (*didn't need to/couldn't*) get tickets after all – they were sold out.

11. I left my bike outside the house last night and this morning it isn't there any more. Somebody (*can't/must*) have stolen it.

12. I can't find my umbrella. – You (*should/might*) have left it in the restaurant last night.

13. (*Must/May*) I see your passport, please?

14. He's not working tomorrow, so he (*doesn't have to/should*) get up early.

15. Ann was in a very difficult situation. It (*must/can't*) have been easy for her.

16. That shirt is dirty. You (*have to/needn't*) wash it.

17. Last year I got a lot of money, so we (*had to/were able to*) buy a new house.

18. I had forgotten to bring my camera, so I (*couldn't/shouldn't*) take any pictures.

19. Don't tell anybody what I said. You (*must/can*) keep it secret.

20. I'm really hungry. I (*could/might*) eat a horse!

5. Complete this text using the verbs below.

should can ought have to need

There are many simple things we ... all do to stop the destruction of the environment. First of all, we ... not dump our rubbish without thinking which things, such as bottles and paper, ... be recycled. We ... put objects that we ... recycle in recycling bins. Secondly, instead of taking our car wherever we go, we ... to leave it at home whenever possible, and go on foot or by public transport. If there is something wrong with our car's

exhaust pipe, we ... get it fixed immediately. When we ... to drive to the supermarket to do our shopping, we ... always remember to take our own bag, so that we don't ... to use the supermarket's plastic bags.

6. Translate the sentences using modal verbs.

1. Он, наверное, учит это стихотворение уже час.
2. Тебе следовало бы давно забыть об этом.
3. Автобус должен был прийти пять минут назад.
4. Не может быть, чтобы он был занят сейчас.
5. Возможно, он сможет помочь тебе.
6. Вам не надо приходить завтра.
7. Должно быть, ему пришлось сделать это.
8. Не могли бы Вы повторить свой вопрос?
9. Может быть, мне придётся работать в воскресенье.
10. Вероятно, он всё ещё ждёт меня.
11. Тебе следует закончить эту работу.
12. Через год я смогу говорить по-английски очень хорошо.
13. Что тебе пришлось делать вчера?
14. Можно мне выйти?
15. Он должен был прийти час назад.
16. Неужели он забыл про мой день рождения?
17. Учитель сказал, что мы можем идти домой.
18. Ты не должен читать эту книгу.
19. В прошлом году я не умел плавать, а теперь могу.
20. Возможно, он всё ещё ждёт меня.

7. Translate the sentences into Russian.

1. Carol can speak three foreign languages.
2. Could you help me with my translation?
3. We were to meet at the railway station at 12 o'clock.
4. You may take a day off whenever you like.

5. Jim said that he might go home for the holidays.
6. You must tell me the truth.
7. I have to do some shopping today.
8. You don’t have to answer my question if you don’t want to.
9. Students should be well prepared for every exam.
10. Do you think Paul ought to see a doctor?
11. If you don’t take your umbrella, you can get wet.
12. When Bob was a child he could play the piano wonderfully.
13. It can’t true.
14. May I have my test on Tuesday?
15. It’s 7 o’clock now. They must be at home now.
16. Do we have to stay in town the whole summer?
17. Children shouldn’t smoke.
18. You oughtn’t to eat cakes.
19. He might be ill. He ate too much yesterday.
20. Parents must take care of their children.

Unit 14
GRINDING MACHINE

I. Study and memorize the following words and expressions.

1) grinding machine (grinder) – шлифовальный станок

2) vibrating sanding machine – вибрационный шлифовальный станок

3) grinding machine specialty – специализированный шлифовальный станок

4) grinding machine for drill bits – сверлозаточный станок

5) grinding machine for scraper blades – станок для шлифовки ракельных ножей

6) grinding machine with rotating column – шлифовальный станок с поворотной колонной

7) workshop – цех, мастерская

8) to mount – крепить

9) holder – держатель

10) to execute – выполнять

11) simultaneous – одновременный

12) multiple – многочисленный

13) wheel – круг, колесо

14) bonded – скрепленный

15) to remove – удалять

16) pass – проход

17) fine – точный

18) conventional – обычный

19) fragile – хрупкий

20) an abrasive wheel – шлифовальный круг

21) the cutting tool – резец

22) deformation – деформация

23) high accuracy – с высокой точностью

24) a finishing operation – чистовая обработка

25) comparatively – сравнительно

26) to remove – снимать (металл), удалять (металл)
27) high volumes – многопроходный (о станочной операции)
28) quite rapidly – достаточно быстро
29) a bed – станина
30) the grinding head – шлифовальная головка, заточная головка

II. Translate the words and word combinations from English into Russian using the dictionary and memorize them.

To imply; a variety of uses; primary function; grinding holes for drill; bushings and grinding pins; to finish work; usually employed; the final machining process; a high-precision gear; to remove; an inch; by other manufacturing methods; usually used as a machining method; to process metals and other materials; a belt sander; a versatile process; suitable for all kind of applications; deburring and stock removal; two wheels of different grain sizes; for roughing and finishing operations; floor stand; tool bits; manually operated; a machining process; all kinds of high-precision shafts; to grind the centers; accurate; with high repeat accuracy on the live centers; a high-speed hand-held rotary tool; grinding bit; air driven; a small electric motor; directly; a flexible shaft; another handheld power tool; often used in fabrication and construction work.

III. Translate the words and word combinations from Russian into English.

1) шлифовальный станок
2) электроинструмент (или станок)
3) использовать для шлифования
4) механическая обработка
5) абразивный круг
6) режущий инструмент
7) зерно абразива
8) поверхность круга
9) срезать стружку с заготовки
10) за счет деформации сдвига
11) отделка заготовок

12) высокое качество
13) поверхность
14) шероховатость поверхности
15) высокая точность формы и размеров
16) в большинстве случаев
17) удалять металл
18) черновые операции
19) довольно быстро
20) необходимая скорость
21) диаметр колеса
22) шлифовальная головка
23) неподвижная заготовка
24) фиксированное положение
25) маховик
26) числовое программное управление
27) охлаждение заготовки
28) охлаждающая жидкость
29) высокоточные шлифовальные станки
30) круглошлифовальные станки
31) плоскошлифовальные станки
32) этапы шлифования

IV. Find the sentences with the following words and word combinations in the text A given below and translate them into Russian.

Rotary surface grinders; which rotates the grinding wheel; while a table rotates the work piece; the most common surface grinders; the circumference of the grinding wheel; to make and sharpen metal; flat shear blades; flat and parallel surfaces; manually operated or have CNC controls; removes large amounts of material; with noted spiral grind marks; a head that is lowered to a work piece; a controllable permanent magnet; magnetic stock; a vacuum chuck; often shortened to grinder; used for grinding; using an abrasive wheel; on the wheel's surface; the workpiece via shear deformation; to finish workpieces; quality and high accuracy; in most

applications; comparatively little metal; some roughing applications; high volumes of metal; is a diverse field; the grinding machine consists of a bed; a power-driven grinding wheel; determined by the wheel's diameter; the grind head stays in a fixed position; possible using a vernier calibrated hand wheel; can generate substantial amounts of heat; go outside its tolerance; the coolant also benefits the machinist; high-precision grinding machines.

V. Read and translate the text A.

A GRINDING MACHINE

A grinding machine, often shortened to grinder, is a power tool (or machine tool) used for grinding. It is a type of machining using an abrasive wheel as the cutting tool. Each grain of abrasive on the wheel's surface cuts a small chip from the workpiece via shear deformation.

Grinding is used to finish workpieces that must show high surface quality (e. g., low surface roughness) and high accuracy of shape and dimension. As the accuracy in dimensions in grinding is of the order of 0.000025 mm, in most applications it tends to be a finishing operation and removes comparatively little metal, about 0,25 to 0,50 mm depth. However, there are some roughing applications in which grinding removes high volumes of metal quite rapidly. Thus, grinding is a diverse field.

The grinding machine consists of a bed with a fixture to guide and hold the workpiece, and a power-driven grinding wheel spinning at the required speed. The speed is determined by the wheel's diameter and manufacturer's rating. The grinding head can travel across a fixed workpiece, or the work piece can be moved while the grind head stays in a fixed position.

Fine control of the grinding head or table position is possible using a vernier calibrated hand wheel, or using the features of numerical controls.

Grinding machines remove material from the workpiece by abrasion, which can generate substantial amounts of heat. To cool the workpiece so that it does not overheat and go outside its tolerance, grinding machines incorporate a coolant. The coolant also benefits the machinist as the heat generated may cause burns. In high-precision grinding machines (most cylindrical and surface grinders), the final grinding stages are usually set up so that they remove about 200 nm (less than 1/10000 in) per pass - this generates so little heat that even with no coolant, the temperature rise is negligible. These machines include:

Belt grinder, which is usually used as a machining method to process metals and other materials, with the aid of coated abrasives. Analogous to a belt sander (which itself is often used for wood but sometimes metal). Belt grinding is a versatile process suitable for all kind of applications, including finishing, deburring, and stock removal.

Bench grinder, which usually has two wheels of different grain sizes for roughing and finishing operations and is secured to a workbench or floor stand. Its uses include shaping tool bits or various tools that need to be made or repaired. Bench grinders are manually operated.

Cylindrical grinder, which includes both the types that use centers and the center less types. A cylindrical grinder may have multiple grinding wheels. The work piece is rotated and fed past the wheel(s) to form a cylinder. It is used to make precision rods, tubes, bearing races, bushings, and many other parts.

Surface grinder, which has a head that is lowered to a work piece, which is moved back and forth under the grinding wheel on a table that typically has a controllable permanent magnet (magnetic chuck) for use with magnetic stock (especially ferrous stock) but can have a vacuum chuck or other fixture means. The most common surface grinders have a grinding wheel rotating on a horizontal axis cutting around the circumference of the grinding wheel.

Rotary surface grinders, commonly known as "Blanchard" style grinders, have a grinding head which rotates the grinding wheel on a vertical axis cutting on the end face of the grinding wheel, while a table rotates the work piece in the opposite direction underneath. This type of

machine removes large amounts of material and grinds flat surfaces with noted spiral grind marks. It can also be used to make and sharpen metal stamping die sets, flat shear blades, fixture bases or any flat and parallel surfaces. Surface grinders can be manually operated or have CNC controls.

Tool and cutter grinder, which usually can perform the minor function of the drill bit grinder, or other specialist toolroom grinding operations.

Jig grinder, which as the name implies, has a variety of uses when finishing jigs, dies, and fixtures. Its primary function is in the realm of grinding holes for drill bushings and grinding pins. It can also be used for complex surface grinding to finish work started on a mill.

Gear grinder, which is usually employed as the final machining process when manufacturing a high-precision gear. The primary function of these machines is to remove the remaining few thousandths of an inch of material left by other manufacturing methods (such as gashing or hobbin).

Centre grinder, which is usually employed as a machining process when manufacturing all kinds of high-precision shafts. The primary function of these machines is to grind the centers of a shaft very precisely. Accurate round center holes on both sides ensure a position with high repeat accuracy on the live centers.

Die grinder, which is a high-speed hand-held rotary tool with a small diameter grinding bit. They are typically air driven (using compressed air), but can be driven with a small electric motor directly or via a flexible shaft.

Angle grinder, another handheld power tool, often used in fabrication and construction work.

(https://en.wikipedia.org/wiki/Grinding_machine)

VI. Make up your own questions to the text.

VII. Insert the missing words and word combinations. Translate the sentences.

1. … , which is usually used as a … … to process metals and other …, with the aid of … abrasives.

2. Analogous to a … … .

3. Belt grinding is a … process suitable for all kind of …, including finishing, … , and stock … .

4. Bench grinder, which usually has … … of different grain sizes for … and … operations and is secured to a… or floor … .

5. Its uses … shaping tool bits or … tools that … to be made or … .

6. … grinders are manually operated.

7. … … , which includes … the types that … centers and the … less types.

8. A cylindrical grinder … have multiple … wheels.

9. The … … is rotated and … past the … to form a cylinder.

10. It is … to make … rods, tubes, … races, … , and many other parts.

11. … … , which has a … that is … to a work piece.

12. The most common … … have a grinding … rotating on a horizontal … cutting … the circumference of the … wheel.

13. … … **,** which as the name … , has a variety of … when finishing … , dies, and … .

14. Its … function … in the realm of … holes for … bushings and … pins.

15. It can also … … for complex … grinding to … work started on a mill.

16. … … , which is usually employed as the final machining process when manufacturing a …-… … .

17. The primary function of these … is to … the remaining few … of an … of material left by other … methods.

18. … … , which is usually … as a machining process when … all kinds of high-… … .

19. The … function of these machines is … … the centers of a … … precisely.

20. Accurate round … … on both sides … a position with … repeat … on the … centers.

21. A … … **,** often shortened … … , is a power tool used for … .

22. It is a type of machining … … … wheel as the cutting tool.

23. Each … of … on the wheel's … cuts a small chip from the workpiece via … … .

24. However, … … some roughing … in which … removes … volumes of metal … rapidly.

25. Thus, grinding … a diverse … .

26. The grinding … consists … a bed with a … to guide and … the workpiece, and a …-driven grinding … spinning at the … speed.

27. The speed is … … the wheel's … and manufacturer's … .

28. The … head can … … a fixed workpiece, or the … … can be moved while the … … stays in a fixed … .

29. … … , which is a high-… hand-… rotary … with a small diameter … … .

30. They … typically … … , but can be … with a small … … directly or via a … … .

31. … …, another … power tool, often … in … and … work.

VIII. Translate into English the text B using the dictionary.

ШЛИФОВАЛЬНАЯ ГРУППА МЕТАЛЛОРЕЖУЩИХ СТАНКОВ

Металлорежущие станки, предназначенные для обработки заготовок абразивными инструментами, составляют шлифовальную группу. Шлифовальные станки имеют широкую номенклатуру и отличаются по назначению, устройству, конструктивным параметрам, универсальности, степени автоматизации, точности и виду инструмента.

По степени универсальности металлорежущие станки подразделяют на универсальные для обработки деталей широкой номенклатуры в единичном и мелкосерийном производстве; специализированные для обработки однотипных деталей различных размеров в крупносерийном и массовом производстве; специальные для обработки деталей одного типоразмера в массовом производстве.

Все металлорежущие станки, в том числе и шлифовальные, в соответствии с ГОСТ 8-82Е изготовляют пяти классов точности: Н – нормальной; П – повышенной; В – высокой; А – особо высокой; С – особо точные.

По массе различают станки легкие – массой до 1 т, средние – массой до 10 т, тяжелые – массой свыше 10 т. Особо тяжелые станки массой свыше 100 т называют универсальными.

Условное обозначение модели станка состоит из сочетания трех-пяти цифр и одной-трех букв (например, 3Л722В).

Первая цифра обозначает шифр группы станков. Цифра 3 соответствует шлифовальным, полировальным и доводочным станкам (1 – токарным станкам; 2 – сверлильным и расточным станкам, 4 – комбинированным станкам; 5 – зубо- и резьбообрабатывающим станкам; 8 – разрезным станкам и 9 – разным станкам).

Вторая цифра обозначает типы шлифовальных станков:

1 – круглошлифовальные;

2 – внутришлифовальные;

3 – обдирочно-шлифовальные;

4 – специализированные шлифовальные;

5 – не применяется;

6 – заточные;

7 – плоскошлифовальные;

8 – притирочные и доводочные;

9 – разные.

Третья, а иногда и четвертая цифры характеризуют основные параметры станка или детали. Так, на станке 3М151 обрабатывают заготовки диаметром 200 мм и длиной 700 мм, а на станке 3М152 соответственно 200 и 1000 мм.

Буквы, стоящие после цифр, указывают на модернизацию базовой модели станка, степень точности и особенности станка.

Обычно первая из букв стоит после первой или второй цифры и указывает на то, что рассматриваемая конструкция станка усовершенствована, т. е. принадлежит к новому поколению станков (например, модель 3К229).

(https://stanok-kpo.ru/stati/61.html)

IX. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...
It touches upon ...
The extract from the article is concerned with ...
The article is about ...
The text centres round the problem of ...
The article focuses on the problem of ...
According to the text ...
According to the author ...
It further says that ...
According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up, …
On the whole, ...
In conclusion it is possible to say that ...

X. Discuss the following questions.

1. Grinding machine is one of the types of metal cutting equipment.
2. Grinding machines are similar to milling and turning equipment in their design.
3. What working tools are used in grinding machines?
4. Name the main areas of application of grinding machines.
5. Give examples of grinding machines for special applications.
6. The classification of grinding machines is based on the basic types of grinding, is this true?
7. What is the main classification feature of grinding machines?

8. What do the terms accuracy and level of automation mean?

9. Why, when grinding, the product is clamped into the headstock chuck and, if necessary, pressed by the center of the tailstock?

10. Are there a number of specialized types of cylindrical grinding machines for the manufacture of certain products?

XI. Make up your own presentation on the topic: "Types of Grinding Machines".

GRAMMAR FOCUS

THE INFINITIVE. ИНФИНИТИВ

Инфинитив, являясь неличной формой глагола, имеет свойства как существительного, так и глагола. Инфинитив может выполнять функции подлежащего, дополнения, обстоятельства, определения, а также может быть именной частью составного сказуемого.

To make mistakes is easy **It** is easy **to make** mistakes	Ошибиться легко (в функции ***подлежащего)***
His task was **to complete** the work in time	Его задача состояла в том, чтобы закончить работу вовремя (в функции ***именной части сказуемого)***
He likes **to read** English	Ему нравится читать по-английски (в функции ***дополнения***)
He stopped for a minute **to rest** **(in order to rest)**	Он остановился, чтобы передохнуть (в функции ***обстоятельства цели)***
He's looking for a place **to live in**	Он ищет себе жилье (в функции ***определения)*** (*букв.*: место, где он может жить)

Если определение выражено инфинитивом в пассивной форме, то на русский язык оно переводится придаточным определительным предложением с оттенком долженствования:

The texts **to be typed** today are **on** your desk.	Тексты, которые следует напечатать сегодня, на вашем столе. (в функции ***определения)***

Формы инфинитива

Voice / Tense	Active	Passive
Indefinite	He is glad to help his friend Он рад *помочь* своему другу	He is glad to be helped Он рад, что ему *помогают*
Continuous	He is glad to be helping his friend Он рад, что *помогает* своему другу (сейчас)	
Perfect	He is glad to have helped his friend Он рад, что *помог* своему другу	He is glad to have been helped Он рад, что ему *помогли*

Инфинитив в функции определения после слов **the first, the last** и т. п. переводится на русский язык глаголом в личной форме в том времени, в каком стоит глагол-сказуемое английского предложения:

He was the first **to come.** Он **пришел** первым.

Употребление форм инфинитива

Инфинитив может выражать характер действия (длительность, законченность) и имеет залог.

1. Indefinite Infinitive (Active и Passive) обозначает действие, одновременное действию, выраженному глаголом-сказуемым:

I want **to show** you a new picture. (Active)	**Я** хочу ***показать*** вам новую картину.
I want **to be shown** a new picture. (Passive)	Я хочу, чтобы **мне *показали*** новую картину.

2. Continuous Infinitive (Active) обозначает действие, которое развивается одновременно с действием, выраженным глаголом-сказуемым:

Why’s she so late? She can’t still **be working.**	Почему она опаздывает? Не может быть, чтобы она все еще работала.

3. Perfect Infinitive (Active и Passive) обозначает действие, предшествовавшее действию, выраженному глаголом-сказуемым:

She said she was sorry **to** have **missed** you.	Она сказала, что сожалеет, что не встретилась с вами.

Unit 15
MY FUTURE PROFESSION IS AUTOMATION

I. Study and memorize the following words and expressions.

1) to extend the capacity – расширить возможности

2) to perform certain tasks – выполнять определенные задачи

3) to control sequences of operations – контролировать последовательность операций

4) to describe nonmanufacturing systems – описать непроизводственные системы

5) programmed or automatic devices – программируемые или автоматические устройства

6) aviation – авиация

7) astronautics – астрономия

8) much faster or better – намного быстрее и лучше

9) could be accomplished by humans – могут быть выполнены людьми

10) economic forces – экономические факторы

11) the division of labor – разделение труда

12) power transfer – передача энергии

13) to increase production – увеличить производство

14) to reduce production – сократить производство

15) skills of workers – мастерство рабочих

16) simplification of work – упрощение работы

17) to design and build machines – разработать и построить станки

18) to duplicate the motions of the worker – повторять движения рабочего

19) efficiency improve – повышение эффективности

20) located near the power source – расположен рядом с источником питания

21) to properly position the work piece – правильно расположить деталь

22) dangerous to human workers – опасно для работающих людей

23) extremely dexterous – чрезвычайно ловкий

24) to transfer and manipulate – передавать и манипулировать

25) both light and heavy work pieces – и легкие, и тяжелые заготовки

26) to perform all the functions – выполнять все функции

27) a transfer machine – автоматическая сборочная линия

28) in actual practice – на практике

29) integrated into one large machine – объединенный в один большой станок

30) the auto industry – автомобильная отрасль

31) to combine concepts – объединять концепции

32) the goal – цель

33) assembly-line system – конвейерная линия сборки

34) to make automobiles – делать автомобили

35) available to people – доступный для людей

36) previously – ранее

37) could not afford – не могли позволить себе

38) to be adopted by – быть принятым (кем-либо/чем-либо)

39) most automobile manufacturers – большинство производителей автомобилей

40) rapidly became known – быстро стало известно

41) recent advances – последние достижения

II. Train the pronunciation of the following words.

Automation [ˌɔːtə'meɪʃ(ə)n], manufacture [ˌmænjə'fækʧəˌ ˌmænju'fækʧə], designed [dɪ'zaɪnd], capacity [kə'pæsətɪ], done [dʌn], humans ['hjuːmənz], control [kən'trəul], sequence ['siːkwən(t)s], astronautics [ˌæstrə(u)'nɔːtɪks], switching [swɪʧi], equipment [ɪ'kwɪpmənt], pilot ['paɪlət], guidance ['gaɪd(ə)n(t)s], system ['sɪstəm], require [rɪ'kwaɪə], duplicate ['djuːplɪkət], diagnosis [ˌdaɪəg'nəusɪs], prescribe [prɪ'skraɪb], therapy ['θerəpɪ], continuously [kən'tɪnjuəslɪ], through [θruː] , pipe [paɪp], gasoline ['gæs(ə)liːn], fuel [fjuːəl, 'fjuəl], govern ['gʌv(ə)n], valve [vælv], heater ['hiːtə], thereby [ˌðeə'baɪ], beverage [bɐ̲vərɪʤ], canned [kænd], squeezed [skwiːzd], assembly [ə'semblɪ], approximate[ə'prɔksɪmət], mechanization [ˌmekənaɪ'zeɪʃ(ə)n].

III. Find the sentences with the following words in the text A and translate them into Russian.

To perform certain tasks; the next step in the development of automation; to describe nonmanufacturing systems; can operate independently or nearly independently; programmed or automatic devices; telephone switching equipment; became known as Detroit automation; most people think of as automation; a number of separate machines; the division of labor; developed in the latter half of the 18th century; the level of skills required of workers; the British economist Adam Smith.

IV. Read and translate the text A.

MY FUTURE PROFESSION

Automation is a system of manufacture designed to extend the capacity of machines to perform certain tasks formerly done by humans, and to control sequences of operations without human intervention. The term automation has also been used to describe nonmanufacturing systems in which programmed or automatic devices can operate independently or nearly independently of human control. In the fields of communications, aviation, and astronautics, for example, such devices as automatic telephone switching equipment, automatic pilots, and automated guidance and control systems are used to perform various operations much faster or better than could be accomplished by humans.

Automated manufacture arose out of the intimate relationship of such economic forces and technical innovations as the division of labor, power transfer and the mechanization of the factory, and the development of transfer machines and feedback systems as explained below. The division of labor (that is, the reduction of a manufacturing or service process into its smallest independent steps) developed in the latter half of the 18th century and was first discussed by the British economist Adam Smith in his book An Inquiry into the Nature and Causes of the Wealth of Nations (1776). In manufacturing, the division of labor results in increased production and a reduction in the level of skills required of workers.

Mechanization was the next step necessary in the development of automation. The simplification of work made possible by the division of labor also made it possible to design and build machines that duplicated the motions of the worker. As the technology of power transfer evolved, these specialized machines were motorized and their production efficiency was improved. The development of power technology also gave rise to the factory system of production, because all workers and machines had to be located near the power source. The transfer machine is a device used to move a work piece from one specialized machine tool to another, in such a manner as to properly position the work piece for the next machining operation. Industrial robots, originally designed only to perform simple tasks in environments dangerous to human workers, are now extremely dexterous and are being used to transfer, manipulate, and index (that is, to

position) both light and heavy work pieces, thus performing all the functions of a transfer machine. In actual practice, a number of separate machines are integrated into what may be thought of as one large machine.

In the 1920s the auto industry combined these concepts into an integrated system of production. The goal of this assembly-line system was to make automobiles available to people who previously could not afford them. This method of production was adopted by most automobile manufacturers and rapidly became known as Detroit automation. Despite more recent advances, it is this system of production that most people think of as automation.

V. Comprehension check. Answer the following questions on the text A.

1. How do you understand the term “automation”?
2. What devices are used to perform various operations much faster or better than could be accomplished by humans?
4. How do you understand the term “division of labor”?
3. What main factors pushed the development of automated manufacture?
5. What are the main results of the division of labor for society?
6. What were the main steps in the development of automation?
7. Why the development of power technology gave rise to the factory system of production?
8. How can you describe the transfer machine?
9. What are the fields of industrial robots application nowadays?
10. What was the initial goal of automation in auto industry?

VI. Find English equivalents to the Russian words and word combinations.

Термин; ликеро-водочная промышленность; нефтеперерабатывающая промышленность; автомобилестроение; сельское хозяйство; переработка мусора; автоматизированная линия производства; различные операции; специальные станки; развитие отрасли; обсуждать; продвигаться вперед; единая система производства; завод; фабрика; промышленные роботы; выполнять; быстро; несмотря на; большинство людей думают, что … .

VI. Find Russian equivalents to the English words and word combinations.

Available to people; previously; these concepts; an integrated system of production; environments dangerous; in actual practice; a number of separate machines; arose out; feedback system; technical innovations; manufacture designed; to control sequences of operations; much faster or better; accomplished by humans.

VII. Translate into English.

1. Электричество является наиболее широко используемым источником энергии в современных автоматизированных системах.

2. Автоматизированные системы выполняют в основном два вида операций:

1) обработка;

2) перемещение и расположение.

3. Автоматизация – это система производства, предназначенная для увеличения производительности машин и механизмов.

4. Связь, авиация и космонавтика являются отраслями, наиболее широко использующими автоматизацию.

5. Разделение труда, передача энергии и механизация производства ускорили процесс развития автоматизации.

6. Следующим шагом, необходимым в развитии автоматизации, стала механизация.

7. Развитие технологии передачи энергии, способствовало развитию автоматизации.

8. Промышленные роботы изначально были разработаны для выполнения простых задач в опасных для человека окружающих средах.

9. В 1920-е годы автопром объединил эти понятия в единую систему производства.

10. По мере развития технологии передачи энергии эти специализированные машины были моторизованы, и их эффективность производства была повышена.

11. В производстве разделение труда приводит к увеличению производства и снижению уровня квалификации работников.

VIII. Be ready to give the summary of the text. Pay attention to the following expressions and using them make up your own sentences based on the text A.

The text deals with (the problem of) ...
It touches upon ...
The extract from the article is concerned with ...
The article is about ...
The text centres round the problem of ...
The article focuses on the problem of …
According to the text ...
According to the author ...
It further says that ...
According to the figures (data, information, opinions) from the text ...
It is clear from the text that ...
The problem of the text is of great importance ...
To sum it up, …
On the whole, ...
In conclusion it is possible to say that ...

IX. Discuss the following questions.

1. Automation of production is a process in the development of machine production, is it?
2. As automation technology continues to evolve, it is becoming an integral part of many modern business processes.
3. Thus, automation will affect the job market in certain industries more than others.
4. Those who embrace and adopt automation will provide and receive better service, lower costs, higher margins and more efficiency.
5. Businesses that embrace new technology, digitization, virtualization, dematerialization and democratization will win.
6. People will still be needed in all areas of business, but automation will create rapid change.
7. There is no doubt that automation will help businesses streamline their systems and processes, helping to cut down on delivery times and production.

8. A profession related to technology and mechanisms requires an extremely responsible attitude to work.

9. What qualities should a specialist have?

10. A qualified specialist with experience will always be in demand in the labor market.

X. Make up your own presentation on the topic: "I Will Be A Good Specialist In My Profession".

GRAMMAR IN FOCUS

THE GERUND. ГЕРУНДИЙ

Герундий – неличная форма глагола, имеющая грамматические особенности как глагола, так и существительного и всегда выражающая действие как процесс.

Например: increasing – увеличение; obtaining – получение; heating – нагревание и т. д.

Глагольные свойства герундия.

1. Герундий имеет две грамматические категории глагола: залог (действительный и страдательный) и относительное время.

2. Герундий переходного глагола употребляется с прямым дополнением.

3. I like translating the articles. – Мне нравится переводить статьи.

4. Герундий может определяться наречием:

I was frightened by his opening the door so suddenly.	Я испугался, когда он так неожиданно открыл дверь.

Формы герундия

Voice / Tense	Active	Passive
Indefinite	writing	being written
Perfect	having written	having been written

Синтаксические функции герундия в предложении и способы его перевода на русский язык

Герундий, как и существительное, может выполнять в предложении все функции, кроме функции глагольного сказуемого.

Функция	Пример	Перевод
1. Подлежащее	Smoking is not allowed here.	*Курить (курение)* здесь не разрешается.
2. Именная часть составного сказуемого	His hobby is driving a car.	Его любимое занятие – *водить (вождение)* машину.
3. Дополнение a) прямое b) предложное	The car needs repairing. They spoke about their travelling to the North.	Машина нуждается *в ремонте.* Они говорили *о поездке* на север.
4. Определение	There are different ways of obtaining this substance.	Существуют различные способы *получения* этого вещества
5. Обстоятельство	After receiving good results they stopped experiments.	*Получив* (после того как получили) хорошие результаты, они прекратили эксперименты.

1. В функции подлежащего, определения, именной части сказуемого и прямого дополнения герундий переводится существительным или инфинитивом (см. примеры 1, 2, 3a, 4).

2. В функции предложного дополнения герундий переводится существительным или придаточным предложением (см. пример 3b).

3. В функции обстоятельства герундий переводится существительным с предлогом, деепричастием или придаточным предложением (см. пример 5).

4. Сложные формы герундия чаще всего переводятся придаточным предложением:

I know of his **having been appointed** to **a** new job.	Я знаю, что его назначили на новую работу.

Герундиальный оборот (The Gerundial Construction)

В сочетании с существительным (в притяжательном или общем падеже) или притяжательным местоимением герундий образует сложные члены предложения, которые могут выполнять в предложении различные функции, и на русский язык обычно переводятся придаточными предложениями, вводимыми словами: ***то, что; в том, что; тем, что; о том, что:***

1. The man's coming so early surprised us.	1. То, что этот человек пришел так рано, удивило нас.
2. We objected to your going there.	2. Мы возражали против того, чтобы вы пошли туда.
3. They insist on this experiment being made once more.	3. Они настаивают на том, чтобы этот эксперимент был сделан еще раз.

GRAMMAR EXERCISES

1. Translate the sentences below paying attention to the gerunds.

1. Reading English technical magazines is important for an engineer.
2. He remembers having added some water to the mixture.
3. They finished installing the apparatus only on Saturday.
4. They began making the experiment in May.
5. After failing his examination in January he had to take it again in February.
6. After graduating from the Institute he worked in the Far North.
7. At the meeting they discussed different ways of improving their work.
8. There are different ways of obtaining the substance.
9. He improved his report by changing the end.
10. Instead of restoring the old theatre they decided to build a new one in the centre of the town.

2. Translate the sentences below paying attention to the gerundial constructions.

1. I know of his having been sent to work to the Far East.
2. What is the reason for his having left our city so suddenly?
3. We heard of the experiment having been started last week.
4. The organizers of the conference were informed of his refusing to take part in it.
5. I remember his having been interested in languages in his childhood.
6. They objected to his staying at home.

3. Translate the sentences paying attention to gerunds and gerundial constructions

1. I remember your having objected to this schedule.
2. He entered the room without noticing her.
3. We were surprised at hearing his name among the winners.
4. Nothing could prevent him from playing tennis practically every day.
5. Did you have any difficulty in solving this problem?
6. He improved his report by changing the end.
7. She is against being sent to this faraway place.
8. Is there any possibility of their finding a suitable building material so soon?
9. They insisted on the question being reconsidered.
10. Flying is better for long journeys but travelling by car is more interesting.
11. Wood has many uses. We use it for making chairs and tables. It is used for building houses. It is used for making matches.
12. Thank you for doing this work for me.

CONCLUSION

В ходе работы над учебным пособием автор-составитель ставил целью научить студентов владеть технической английской терминологией по своей специальности.

Пособие поможет студентам усовершенствовать навыки чтения и перевода литературы на английском языке по специальности «Автоматизация», уметь общаться на английском языке, строить монологические высказывания, а также вести диалог в пределах тем по своей специальности, применять полученные знания на практике, используя образцы и клише, представленные в пособии.

Изучение и повторение грамматического материала предполагает совершенствование навыков написания аннотаций, деловых писем и сообщений партнерам за рубежом.

Учебный материал четко систематизирован и раскрывает тематику дисциплины «Иностранный язык», имеются иллюстрации разных моделей станков, способствующие лучшему изучению основных принципов работы в автоматизированных промышленных комплексах.

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