МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ

Федеральное государственное бюджетное образовательное учреждение

высшего образования

«Забайкальский государственный университет»

(ФГБОУ ВО «ЗабГУ»)

Институт …

Факультет историко-филологический

Кафедра иностранных языков

**УЧЕБНЫЕ МАТЕРИАЛЫ**

**для студентов заочной формы обучения**

по дисциплине «Профессиональный иностранный язык»

наименование дисциплины (модуля)

для направления подготовки (специальности) 15.03.04 Автоматизация технологических процессов и производств

код и наименование направления подготовки (специальности)

Общая трудоемкость дисциплины (модуля) – 3 зачетные единицы.

Форма текущего контроля в семестре – контрольная работа, устный перевод текстов.

Курсовая работа (курсовой проект) (КР, КП) –нет.

Форма промежуточного контроля в семестре – зачет

**Краткое содержание курса**

1. Функции глаголов to have

2. Функции слова THAT

3. Пассивный залог (The Passive Voice) видо-временных форм Indefinite, Continuous, Perfect.

4. Простые неличные формы глагола (Инфинитив)

 Тексты для чтения и перевода:

1. Trends in the Modern Machine-Building Industry

2. Efficiency in Engineering Operation

3. History of Robotic

4. Automation

5. Fixed and Programmable Automation

6. Robots — the Ideal Workers?

**Форма текущего контроля**

**Контрольные работы**

**Выполнение контрольных заданий и оформление контрольных работ**

 Каждое контрольное задание пред­лагается в пяти вариантах. Вы должны выполнить один из пяти вариантов в соответствии с последними цифрами сту­денческого шифра: студенты, шифр которых оканчивается на 1 или 2, выполняют вариант № 1; на 3 или 4 - № 2; на 5 или 6 - № 3; на 7 или 8 — №4; на 9 или 0 - № 5.

 Выполнять письменные контрольные работы следу­ет в отдельной тетради. На обложке тетради напишите свою фамилию, шифр, предмет, номер контрольной работы

 Контрольные работы должны выполняться аккуратно, четким почерком. На левой странице тетради располагается английский текст, параллельно располагается русский перевод. Каждое задание нужно записывать в контрольной работе.

|  |  |
| --- | --- |
| Левая страница | Правая страница |
| Поля  | Английский текст | Русский текст | Поля  |
|  |  |
|  |  |

 Материал контрольной работы следует располагать в тетради по следующему образцу.

**IVСЕМЕСТР**

**Контрольное задание № 1**

 Для того чтобы правильно выполнить задание 1, необ­ходимо усвоить следующие разделы курса английского языка:

1. Функции слова THAT

2. Функции глагола to HAVE

3. Пассивный залог (The Passive Voice) видо-временных форм Indefinite, Continuous, Perfect.

4. Простые неличные формы глагола( Инфинитив).

|  |  |
| --- | --- |
| 1. His scientific work is much spoken about. | О его научной работе много говорят. |
| is spoken – Present Indefinite Passive |
| 2. The main question has already been discussed. | Главный вопрос уже обсудили. |
| has been discussed – Present Perfect Passive |

ОБРАЗЕЦ ВЫПОЛНЕНИЯ 1 (К УПР. I)

**IV СЕМЕСТР**

**Контрольное задание**

**Выполнение контрольных заданий и оформление контрольных работ**

 Каждое контрольное задание пред­лагается в пяти вариантах. Вы должны выполнить один из пяти вариантов в соответствии с последними цифрами сту­денческого шифра: студенты, шифр которых оканчивается на 1 или 2, выполняют вариант № 1; на 3 или 4 - № 2; на 5 или 6 - № 3; на 7 или 8 — №4; на 9 или 0 - № 5.

 Выполнять письменные контрольные работы следу­ет в отдельной тетради. На обложке тетради напишите свою фамилию, шифр, предмет, номер контрольной работы

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 Для того чтобы правильно выполнить задание , необ­ходимо усвоить следующие разделы курса английского языка:

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|  |  |
| --- | --- |
| 1. His scientific work is much spoken about. | О его научной работе много говорят. |
| is spoken – Present Indefinite Passive |
| 2. The main question has already been discussed. | Главный вопрос уже обсудили. |
| has been discussed – Present Perfect Passive |

ОБРАЗЕЦ ВЫПОЛНЕНИЯ 1 (К УПР. I)

**ВАРИАНТ 1**

I. Перепишите следующие предложения, определите в каждом из них видо-временную форму и залог глагола-ска­зуемого (см. образец).Переведите предложения на русский язык.

1. When much material had been looked through and some problems had been solved, the article was published.

2. Electric cars will be widely used in future.

3. Today plastics are being applied for car bodies.

4. This lecturer is listened to with great interest.

II. Переведите следующие предложения на русский язык, обращая внимание на функцию инфинитива

 1. It is necessary for a modern specialist to know a foreign language.

 2. The Soviet science was the first to make great contribution to the development of space technology.

 3. Our idea was to design a new device for automatic control.

 4. The new method to be introduced at our plant will boost labour productivity.

III. Переведите предложения, обращая внимание на функции глагола to HAVE

 1. You have to come to the language laboratory of the Institute to work at your pronunciation.

 2. Scientists had to create new materials for industry.

 3. At present most of the industrial enterprises have their own electric power stations.

 5. He has repaired the engine.

IV. Переведите предложения, обращая внимание на различные значения THAT

 1. The properties of gold are different from those of iron.

 2. The professor that lectures on mechanics is the dean of our faculty

 3. The fact is that they haven’t calculated the speed of the car.

 4. The research on solar radiation as well as that of the earth's magnetic field became possible due to sputniks.

V. Прочитайте и письменно переведите на русский язык текст

**Robots in Manufacturing**

 Today most robots are used in manufacturing operations. The applications of robots can be divided into three categories: material handling, processing operations, 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 from one to another. Many 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 the robot. Machine loading and unloading operations utilize a robot to load and unload parts.

 In robotic processing operations, the 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.

 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. Inspection is another area of factory operations in which the utilization of robots is growing.

VI. Ответьте письменно на вопрос:

What can you say about the industrial applications of robots?

**ВАРИАНТ 2**

I. Перепишите следующие предложения, определите в каждом из них видо-временную форму и залог глагола-ска­зуемого (см. образец). Переведите предложения на русский язык

 1 When much had been done in the study of ecology by our institute it became an important scientific centre.

 2. A curriculum of the new type of secondary school is offered by the Ministry of Education.

 3. The research of planets will be developed with the help of cosmic apparatus.

 4. This material is unaffected by solar radiation.

II. Перепишите следующие предложения и переведите их на русский язык, обращая внимание на функцию инфи­нитива

 1. The teacher told her students to learn the poem by heart.

 2. The Soviet Union was the first country to send man into space.

 3. Scientific discoveries to be practically applied in industry and agriculture are paid special attention to.

 4. To translate a sentence is to discover its meaning.

III. Переведите предложения, обращая внимание на функции глагола to HAVE

1. Man had to learn to obtain electric power directly from the Sun.

2. These computers will have to perform millions of opera­tions per second.

3. Soon our industry will have new and cheap sources of en­ergy.

4. Of late years the production of plastics has greatly increased.

IV. Переведите предложения, обращая внимание на разные значе­ния слова THAT

1. The question that was discussed at the meeting yesterday is of great importance.

2. The work of the new device is much more efficient than that of the old one.

3. It is known that the knowledge of general engineering subjects is the basis for the study of special subjects.

4. Water is one of the few substances that man knows.

 V. Прочитайте и письменно переведите на русский язык текст

**History of Robotics**

The concept of robots dates back to ancient times, when some myths told of mechanical beings brought to life. Such automata also appeared in the clockwork fig­ures of medieval churches, and in the 18th century some clockmakers gained fame for the clever mechanical fig­ures that they constructed. Today the term automaton is usually applied to these handcrafted, mechanical (rather than electromechanical) devices that imitate the motions of living creatures. Some of the «robots» used in advertising and entertainment are actually automata, even with the addition of remote radio control.

The term robot itself is derived from the Czech word robota, meaning «compulsory labour». It was first used by the Czech novelist and playwright Karel Chapek, to describe a mechanical device that looks like a human but, lacking human sensibility, can perform only automatic, mechanical operations. Robots as they are known today do not only imitate human or other living forms. True robots did not become possible, however, until the inven­tion of the computer in the 1940s and the miniaturiza­tion of computer parts. One of the first true robots was an experimental model designed by researchers at the Stanford Research Institute in the late 1960s. It was ca­pable of arranging blocks into stacks through the use of a television camera as a visual sensor, processing this information in a small computer.

Computers today are equipped with microprocessors that can handle the data being fed to them by various sensors of the surrounding environment. Making use of the principle of feedback, robots can change their opera­tions to some degree in response to changes in that envi­ronment. The commercial use of robots is spreading, with the increasing automation of factories, and they have become essential to many laboratory procedures. Japan is the most advanced nation exploring robot technology. Nowadays robots continue to expand their applications. The home-made robots available today may be one sign of the future.

VI. Ответьте письменно на следующий вопрос:

When was one of the first true robots designed?

**ВАРИАНТ 3**

I. Перепишите следующие предложения, определите в каждом из них видо-временную форму и залог глагола-ска­зуемого (см. образец). Переведите предложения на русский язык. 1. Many 16 storey houses with all modern conveniences are being built in this part of Moscow.

 2. The sputniks are used for the research of magnetic fields and cosmic rays.

 3. Scientific and engineering progress opens up wide prospects before man.

 4. The properties of materials are affected by solar radiation.

II. Перепишите следующие предложения и переведите их на русский язык, обращая внимание на функцию инфи­нитива в предложении

 1. They promised to supply us with the necessary equipment.

 2. The purpose of this book is to describe certain properties of metals.

 3. To convert chemical energy into electrical energy we must use an electrical cell.

 4. The experiment to be carried out is of great importance for our research.

III. Переведите предложения, обращая внимание на функции глагола to HAVE

1. The engineers have to study the problem of using cosmic rays.

2. The book has many diagrams.

3. We have to do this work in time.

4. They have built the bridge recently.

IV. Переведите предложения на русский язык, обращая внимание на разные значе­ния слова THAT

1. That the Earth is round was unknown for a long time.

2. The problems of water supply in this city are as important as those of lighting.

3. The simplest materials are those which have only one kind of atoms.

4. The cities that were destroyed during the war were reconstructed.

V. Прочтите и переведите текст

**Metals**

 1. The first metals which were used by primitive men were gold, silver and copper. Iron is the world's most common metal. Metals are mostly solids at ordinary temperature, and have comparatively high melting points with the exception of mercury. They are good conductors of heat and electricity and silver is the best in these respects.

 2. Tin entered the metal picture when someone discovered, that if it was mixed with copper, the resulting substance was harder. So there came into being the alloy that we call bronze. This metal is often used for making various ornaments.

 3. Copper was used in prehistoric times for making weapons and tools and later was alloyed with tin to form bronze. It was replaced for these purposes by iron and steel. The great development of the electric industries has resulted in such extensive uses of the metal that it now ranks next to iron in importance.

 4. The copper alloys are widely employed. The alloying of copper with other elements increases the strength of the metal in some cases and improves the anti-corrosive and anti-friction properties in others.

 5. Titanium was unknown before 1791. Titanium is the fourth most abundant structural metal in nature. Ore deposits and beach sands throughout the world contain large quantities of titanium. Titanium is lightweight, strong, corrosion - resistant. It is finding increasing application in many different fields. Engineers often use titanium in construction as it doesn't lose its properties when used in conditions of high temperature.

VI. Ответьте на следующий вопрос:

Why are the copper alloys widely employed?

**ВАРИАНТ 4**

I. Перепишите следующие предложения, определите в каждом из них видо-временную форму и залог глагола-ска­зуемого (см. образец). Переведите предложения на русский язык.

 1. The radar has been used for the automatic control of ground transport.

2. Today plastics are being widely used instead of metals.

3. The construction of the dam has been completed this month.

4. The alloys were experimented upon in our lab.

II. Перепишите следующие предложения и переведите их на русский язык, обращая внимание на функцию инфи­нитива в предложении

1. То design new buildings is the work of an architect.

 2. To measure volumes we must know the dimensions of a body.

3. Our plant was the first to install the automatic equipment.

4. To attain this end careful attention must be given to the selection of cement, aggregate, and water.

III. Переведите предложения, обращая внимание на функции глагола to HAVE

 1. Students have two exams in January.

 2. He had to work hard to pass this exam.

 3. Russian researchers have just begun to study this phenomenon.

 4. You will have to repeat the material of the lectures before the exam.

IV. Переведите предложения, обращая внимание на разные значе­ния слова THAT

1. Not many scientists understood Einstein's discovery at that time.

2. That air and water pollution by industrialization is reaching dangerous levels is realized by everyone.

3. The essential feature of higher education in this country is that it combines theory with practice.

4. The territory of Moscow is larger than that of London.

V. Прочитайте и письменно переве­дите на русский язык текст

**Science of Today**

Our time is the age of scientific progress. The importance of scientific research and discoveries is growing with every year. Due to the achievements of world science a lot of things are brought to life.

The growing importance of automatic equipment and processing in industry attracts world-wide attention. In our days it is impossible to imagine technical progress without automation, which is the highest stage of mechanization. New machines have greatly widened the range of operations that can be performed automatically and they have mechanized some loading and unloading of machines. There have also been extensive developments in the handling of materials and components between processes and in the mechanical assembly of simple components.

Technical progress is now impossible without high quality materials. Success in this field depends on the achievements of physics and chemistry. Scientists create new synthetic materials. A great economic advantage is already obtained from the uses of polymers and plastic materials in structural elements and different components.

Electronics is of great importance for technical progress. It is no mistake to compare the birth of electronics to such great achievements of mankind as the discovery of fire, the use of the wheel and the penetration into the secrets of atoms. Electronics makes it possible to raise industrial automation to a higher level. It will improve the system of control over mechanisms and production processes. Automation of all industrial processes is of great importance at today's stage of development of engineering. All-round automation makes it possible not only to regulate processes automatically, but also to introduce remote control. It finds an especially wide application in the production processes.

VI. Ответьте письменно на вопрос:

What is the importance of automation?

**ВАРИАНТ 5**

I. Перепишите следующие предложения, определите в каждом из них видо-временную форму и залог глагола-ска­зуемого (см. образец). Переведите предложения на русский язык.

 1. The automatic equipment is being installed in our shop.

 2. The construction of this house will be completed in a month.

 3. The engineer was asked about the new technology used at the plant.

 4. Radioactive isotopes have been made in nuclear reactor.

II. Перепишите следующие предложения и переведите их на русский язык, обращая внимание на функцию инфи­нитива в предложении.

 1. The Russian scientists were the first to construct and launch the space rocket.

 2. In order to make interplanetary flights in the future it is necessary to know factors affecting the human organism.

 3. The main purpose of the computers is to solve complex problems quickly.

 4. The problem to be solved is of great importance for our research.

III. Переведите предложения, обращая внимание на функции глагола to HAVE

1. You have to heat the mixture for two hours.

2. He had to determine the temperature of the air in the container.

3. There are some kinds of cements that have appeared comparatively recently.

4. The University has a five - year course of studies.

IV. Переведите предложения, обращая внимание на разные значе­ния слова THAT

1. One must realize that the increasing number of cars brings about considerable pollution of the air*.*

2. Specialists consider that in future city transport will reject gasoline.

3. That computers and industrial robots are important for industrial uses is well known to scientists and engineers.

4. This metro station was opened last year, and that one will be put into operation in two years.

 V. Прочитайте и письменно переведите на русский язык текст

**Engineering Work**

In any one area of engineering there is a wide range of functions that the engineer may participate in. The spectrum includes research and development, design, pro­duction and construction, installation, operation and maintenance, and sales and management. In general, the research and development engineer requires, besides a firm grounding in the fundamentals of his area, an easy familiarity with analytical and experimental techniques.

A natural curiosity, a creative bent, and considerable stamina is essential.

The design engineer has somewhat similar requirements, with particular accent on creativity. He also needs a broad understanding of such topics as engineering eco­nomics, optimization, and methods of manufacture, along with a particular sensitivity toward human needs. Design activity is extremely broad, so the individual is most likely to find himself one of a large team, particularly in a complex project. The team may, include specialists in theoretical analysis, testing, computation, optimization, and esthetic design. It is production and construction engineers who, on any project, are responsible for the implementation of a completed design. They will have to work initially with design engineers and then with technicians actually to produce the hardware itself from the specified raw materials. A sound knowledge of materials, methods of manufacture, time estimation, and the logistics of movements of materials is important.

The area of installation, operation, and maintenance may need knowledge from civil, mechanical electrical, chemical, or other branches of engineering, depending on the nature of the plant. A large plant may employ specialists from these branches, though a small plant may tend to employ engineers comfortable in several areas. Here the responsibility is to ensure that the equipment is installed correctly, brought into operation, and effectively maintained. The engineer must develop effective maintenance and replacement schedules and requires some knowledge of economics. Aspects of safety and pollution control could be important.

VI. Ответьте письменно на следующий вопрос:

What requirements does a design engineer have?

**Тексты для устного перевода, 4 семестр**

**Текст 1 Machines and Work**

Defined in the simplest terms a machine is a device that uses force to accomplish something. More technically, it is a device that transmits and changes force or motion into work. This definition implies that a machine must have moving parts. A machine can be very simple, like a block and tackle to raise a heavy weight, or very complex, like a railroad locomotive or the mechanical systems used for industrial processes.

A machine receives input from an energy source and transforms it into output in the form of mechanical or electrical energy. Machines whose input is a natural source of energy are called prime movers. Natural sources of energy include wind, water, steam, and petroleum. Windmills and waterwheels are prime movers; so are the great turbines driven by water or steam that turn the generators that produce elec­tricity; and so are internal combustion engines that use petroleum prod­ucts as fuel. Electric motors are not prime movers, since an alternating current of electricity which supplies most electrical energy does not exist in nature.

Terms like work, force, and power are frequently used in mechanical engineering, so it is necessary to define them precisely. Force is an effort that results in motion or physical change. If you use your muscles to lift a box you are exerting force on that box. The water which strikes the blades of a turbine is exerting force on those blades, thereby setting them in motion. In a technical sense work is the combination of the force and the distance through which it is exerted. To produce work, a force must act through a distance. If you stand and hold a twenty-pound weight for any length of time, you may get very tired, but you are not doing work in an engineering sense because the force you exerted to hold up the weight was not acting through a distance. However, if you raised the weight, you would be doing work.

Power is another term used in a special technical sense in speaking of machines. It is the rate at which work is performed. The rate of doing work is sometimes given in terms of horsepower, often abbreviated hp. This expression resulted from the desire of the inventor James Watt to describe the work his steam engines performed in terms that his customers could easily understand. After much experimentation, he settled on a rate of 33,000 foot-pounds per minute as one horsepower. In the metric system power is measured in terms of watts and kilowatts. The kilowatt, a more widely used term, equals a thousand watts or approximately l'/з horsepower in the English system.

**Текст 2 Efficiency in Engineering Operation**

Unlike the scientist, the engineer is not free to solve problems which interest him. He must solve problems as they arise, his solution must satisfy conflicting requirements. Efficiency costs money, safety adds complexity, performance increases weight. The engineering solution is the optimum solution, taking into account many factors. It may be the cheapest for a given performance, the most reliable for a given weight, the simplest for a given safety, or the most efficient for a given cost. Engineering is optimizing.

To the engineer, efficiency means output divided by input. His job is to secure a maximum output for a given input or to secure a given output with a minimum input. The ratio may be expressed in terms of energy, materials, money, time or men. Efficiency is achieved by using efficient methods, devices, and personnel organizations.

The need for efficiency leads to the large, complex operations which are characteristic of engineering. The processing of the new antibiotics in the test-tube stage belongs in the field of biochemistry. But when great quantities must be produced at low cost, it becomes an engineering problem. It is the need for efficiency and economy that differentiates ceramic engineering from the work of the potter, textile engineering from weaving, and agricultural engineering from farming.

Since output is input minus losses, the engineer must keep losses and waste to a minimum. One way is to develop uses for products which otherwise would be waste. Losses due to friction occur in every machine and in every organization. Efficient functioning depends on good design, careful attention to operating difficulties, and lubrication.

The raw materials with which engineers work seldom are found in useful forms. Engineering of the highest type is required to conceive, design and achieve the conversion of the energy of a mountain stream into the powerful torque of an electric motor. Similarly, many engineering operations are required to change the sands of the seashore into the precise lenses which enable us to observe the microscopic amoeba in a drop of water. In a certain sense, the successful engineer is a person always trying to change things for the better.

**Текст 3 Flexible Production and Industrial Robots**

This country’s machine-building industry is now facing the task of restructuring on a large scale engineering production, and developing new methods of organization, new equipment and new technologies. This is a global process. Swift production automation, the introduction of microprocessors, robotics, rotary and rotary-conveyer lines, flexible readjustable production is vital for today’s industry.

Industrial robots play an important part in the process. Many institutes are currently engaged in developing them. The concept of designing robot modules is making successful headway.

The task today is to raise their reliability, speed and failure-free operation.

Russian engineers cooperate in the development of flexible production systems with experts from different countries.

Also needed for the operation of flexible systems are robots which will transport billets and parts between machine-tools, i.e. transport robots, robot trailers, as well as measuring robots. Experts from the Institute of Machine Studies are developing measuring manipulators and coordinate- measuring machines.

It is hard to enumerate all the problems facing our engineers and designers in the development of flexible productions. Automated systems of adjusting, controlling instruments, machined parts and many other things are needed.

The combination of flexible systems with the general system of programmed production, the spreading of flexibility to the processes of preparatory productions — foundry, forging and welding — are also very complicated problems. The flexible system must embrace all the stages of machine building, all its processes.

Present-day industry, in particular engineering, is defined by the fact that its products — machine-tools, devices, instruments, etc.— are normally produced for a very short period of time and replaced by other more advanced products. The range of products is growing and the size of batches is decreasing. The new production environment has brought about new requirements. Thus, for example, earlier functionally “rigid” automatic production lines require considerable changes to be introduced or the line to be fully dismantled when the factory switches to a new product. Unlike the above lines, flexible production lines can be switched over to a new product virtually instantaneously. When operated on a 24- hour basis, these lines need only a minimal team of operators to attend the production.

A set of modules can be combined by a transport-and-storage system and a control system into a production line (or a production area).

The highest level of a flexible production facility, an automatic factory, incorporates several flexible production workshops. Such a factory has both automated equipment and automated services, including computer-aided design of products and processes, and software development for its control systems. Such automated factories are being designed and are expected to become fully operational in the near future. All the industrialized countries are currently making use of flexible modules and workshops.

**Текст 4 Automation**

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

The term automation is also used to describenon-manufacturing systems in which automaticdevices 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 automatic-con­trol mechanisms when machines have ability to correct themselves. The feedback principle has been used for centuries. An outstanding early example is theflyball governor, invented in 1788 by James Watt to control the speed of thesteam engine. The commonhousehold 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 greatlyfacilitated the use of feedback in manufacturing processes. Computers gave rise to the development of numerically controlled machines. The motions of these machines are controlled bypunchedpaper or magnetic tapes. In numerically controlled ma­chining centres machine tools can perform several dif­ferent machining operations.

More recently, the introduction of microprocessors and computers have 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 itsdimensions 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 is 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. Small comput­ers are used in systems called word processors, which are rapidly becoming a standard part of the modern office. They are used to edit texts, to type letters and so on.

**Текст 5 Automation 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 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.

Not all industries require the same degree of automa­tion. Sales, agriculture, and some service industries are difficult to automate, though agriculture industry may become more mechanized, especially in the processing and packaging of foods.

The automation technology in manufacturing and as­sembly is widely used in car and other consumer product industries.

Nevertheless, each industry has its own concept of automation that answers its particular production needs.

Manufacturing is one of the most important applica­tion area 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 style 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 numerical-control machine-tool is a good example of programmable automation. The program 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 re-program 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.

**Текст 6** Robots — the Ideal Workers?

We hear many complaints about work in factories; the work is often boring, heavy and repetitive; the operative doesn’t have to think about the work; he gets no job satisfaction.

The answer is a robot. For many jobs a robot is much better than human operative. Once it has been programmed, it will do its job over and over again. It never gets bored; it works at a constant speed; it doesn’t make mistakes; its work is always of the same standard; it doesn’t get tired; it can work 24 hours a day without breaks for food, rest or sleep.

Robots have other advantages, too. They can be designed to do almost any job. You can’t change the human body, but a robot’s arms, for example, can be made to move in any direction. Robots also can do very heavy work and they can operate in conditions that are too dangerous, too hot or too cold for people to work in. They can work underwater, in poisonous gas and in radioactive areas.

It is obvious that robots have many advantages over human beings. However, it is also true that humans can do many things that robots can’t. For example, humans can carry out a task without having to be told exactly how to do it first — in other words, they don’t always have to be programmed. Humans can move, but robots are usually fixed in one place. If they are able to move, robots can do it only in a very limited way. Unlike robots, people can know whether what they are doing is good or bad, and whether it is boring or interesting. Also robots are now able to understand speech and writing, but humans can communicate easily with each other by these methods, and by many others — telephone, drawing, radio, and so on — as well.

And we should not forget that robots owe their existence to humans— we make them, repair them and control them, not the other way round.

**Зачет**

К зачету допускаются студенты, выполнившие контрольную работу № 1

( контрольная работа выполняется письменно и защищается в устной форме) и сдавшие тексты учебника или учебных пособий по английскому языку (устная форма ответа) по профилю вуза в объеме 5 с. за каждый семестр.

Для получения зачета студент должен уметь прочитать со словарем незнакомый текст на англий­ском языке, содержащий изученный грамматический материал.

Форма проверки — письменный перевод. Норма перевода — 600-800 печатных знаков в час пись­менно со словарем на бумажном носителе.

**Учебно-методическое и информационное обеспечение дисциплины**

**Основная литература**

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**Дополнительная литература**

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