**Практическое занятие № 21**

**Прочтите текст и выполните задания после текста:**

**Machine Tools**

1. Machine tools are the machinery used to process various materials in order to get desired shapes and properties.

2. The first generation of modern machine tools was introduced during the industrial revolution in the 18th century with the invention of steam engines. Machine tools opened an era of automation by providing the means to replace human work with mechanical work. In the early days automation with machine tools was performed using various kinematic mechanisms, but it evolved into programmable automation with the use of computer numerical control. Today, many machine tools are operated with electrical or hydraulic power and controlled by a computer.

3. The major application of automation using machine tools in the early years was in transfer lines. Many special-purpose machines were grouped together with a part-moving system, such as a conveyor, providing the transfer of parts from one machine to another. A specific operation was performed on each station, and the part was moved to the next station until the finished product was obtained. Recently, flexible automationhas been actively pursued to cope with continuous and rapid change of product designs and cycles. In such systems, several numerically controlled machines are clustered together to perform a variety of jobs. Programs are used, instead of inflexible mechanisms, to control the machines, so that the system can easily adapt to different job requirements.

**Задание 1. Переведите 2 абзац текста письменно.**

**STEEL**

The most important metal in industry is iron and its **alloy** — steel. Steel is an alloy of iron and carbon. It is strong and **stiff**, but **corrodes** easily through **rusting**, although **stainless** and other special steels **resist** corrosion.

The amount of carbon in a steel influences its properties **considerably**. Steels of low carbon **content** (mild steels) are quite ductile and are used in the manufacture of sheet iron, wire, and pipes. Medium-carbon steels containing from 0.2 to 0.4 per cent carbon are **tougher** and stronger and are used as structural steels. Both mild and medium-carbon steels are suitable for forging and **welding**. High-carbon steels contain from 0.4 to 1.5 per cent carbon, are hard and **brittle** and are used in **cutting tools**, **surgical instruments**, razor **blades** and **springs**.

Tool steel, also called silver steel, contains about 1 per cent carbon and is strengthened and toughened by quenching and tempering.

The **inclusion** of other elements **affects** the properties of the steel. **Manganese** gives extra strength and toughness. Steel containing 4 per cent **silicon** is used for transformer **cores** or electromagnets because it has large grains acting like small magnets. The addition of chromium gives extra strength and corrosion resistance, so we can get **rust-proof** steels. Heating in the presence of carbon **or nitrogen-rich** materials is used to form a hard surface on steel (case-hardening). High-speed steels, which are extremely important in machine-tools, contain chromium and **tungsten** plus smaller amounts of vanadium, molybdenum and other metals.

***Vocabulary:***

**alloy** — сплав

**carbon**— углерод

**stiff** — жесткий

**to corrode** — разъедать, ржаветь

**rusty** — ржавый

**stainless** — нержавеющий

**to resist** — сопротивляться

**considerably** — значительно, гораздо

**tough** — крепкий, жесткий, прочный, выносливый

**forging** — ковка

**welding** — сварка

**brittle** — хрупкий, ломкий

**cutting tools —** режущие инструменты

**surgical instruments** — хирургические инструменты

**blade** — лезвие

**spring** — пружина

**inclusion** — включение

**to affect** — влиять

**manganese** — марганец

**silicon** — кремний

**rust-proof** — нержавеющий

**nitrogen** — азот

**tungsten** — вольфрам

**Задание 2. Ответьте на вопросы по тексту**

1. What is steel?
2. What are the main properties of steel?
3. What are the drawbacks of steel?
4. What kinds of steel do you know? Where are they used?
5. What gives the addition of manganese, silicon and chromium to steel?
6. What can be made of mild steels (medium-carbon steels, high-carbon steels)?
7. What kind of steels can be forged and welded?
8. How can we get rust-proof (stainless) steel?
9. What is used to form a hard surface on steel?
10. What are high-speed steels alloyed with?

**Задание 3. Найдите в тексте перевод слов и словосочетаний**

1. сплав железа и углерода
2. прочный и жесткий
3. легко коррозирует
4. нержавеющая сталь
5. низкое содержание углерода
6. ковкость
7. листовое железо, проволока, трубы
8. конструкционные стали
9. пригодны для ковки и сварки
10. твердый и хрупкий
11. режущие инструменты
12. хирургические инструменты
13. инструментальная сталь
14. упрочнять
15. добавление марганца (кремния, хрома, вольфрама, молибдена, ванадия)

**Задание 4. Прочитайте текст и напишите, верны ли утверждения после текста (Т) или нет (F). Исправьте неверные утверждения.**

The second main category of steel is alloy steels, which consist of iron, carbon and one or more alloying metals. Specific grades of alloy steel include:

• low alloy steels, which contain 90% or more iron, and up to approximately 10% of alloying metals such as chromium, nickel, manganese, molybdenum and vanadium

• high strength low alloy steels (HSLA), which contain smaller quantities of the above metals (typically less than 2%)

• stainless steels, which contain chromium as well as other metals - such as nickel - and which do not rust.

• tool steels, which are extremely hard, and are used in cutting tools. They contain tungsten and/or cobalt. A widely used grade of tool steel is high-speed steel, which is used in cutting tools that operate at high temperatures, such as drill bits.

1. Steel is an alloy of iron and carbon.
2. Alloy steels contain carbon.
3. Chromium and nickel are used as alloying metals in steel.
4. Low alloy steels contain more chromium than iron.
5. Stainless steel is an alloy steel.
6. Tungsten is added to steel to make it softer.