### **1. Engineering Profession**

Dear students, today’s topic is engineering as a profession.

What do you know about engineers? Can you distinguish between an engineer and a scientist? What are the branches of engineering? Have you already planned your engineering career?

So, what is an engineer?

Engineers are professionals who invent, design, analyze, build and test machines, complex systems, structures, gadgets and materials. These processes often involve new technologies which change the natural world for our own purposes. Thus, engineers make a great impact on our society as a whole.

Engineering and new technologies are closely related to science. At the same time, engineering is not the same thing as science. Both engineers and scientists focus on the natural world; scientists, however, aim at understanding and explaining the natural world phenomena, while engineers try to make things that do not exist in nature using testable ideas, relying on evidence and ongoing research. Engineers design innovations that benefit every sector of society using scientific principles, technology and math to solve problems. We can see engineering everywhere in the world around us, improving the ways we work, travel, communicate, stay healthy, and get entertained.

Today, engineering offers more career choices than any other discipline! In the past, there were four major branches of engineering: mechanical, chemical, civil and electrical engineering. Nowadays, new branches appear, such as aerospace engineering, environmental engineering, computer hardware engineering, petroleum engineering, biomedical engineering, and so on. The number of these branches keeps growing!

Let’s consider the traditional branches of engineering. The oldest engineering discipline is civil engineering. Civil engineers design, construct and maintain public and private infrastructural projects including roads, [railways](http://en.wikipedia.org/wiki/Railways" \o "Railways), [bridges](http://en.wikipedia.org/wiki/Bridge" \o "Bridge), buildings and even water supply systems.

[Electrical engineering](http://en.wikipedia.org/wiki/Electrical_engineering" \o "Electrical engineering) is a very broad area that may include the design and study of various electrical and electronic systems, such as [electrical and electronic  circuits](http://en.wikipedia.org/wiki/Electrical_circuit" \o "Electrical circuit), [generators](http://en.wikipedia.org/wiki/Generator" \o "Generator), [motors](http://en.wikipedia.org/wiki/Motor" \o "Motor), [electronic devices](http://en.wikipedia.org/wiki/Electronic_devices" \o "Electronic devices), [circuits](http://en.wikipedia.org/wiki/Electronic_circuits" \o "Electronic circuits), [optical fibers](http://en.wikipedia.org/wiki/Optical_fiber" \o "Optical fiber), [optoelectronic devices](http://en.wikipedia.org/wiki/Optoelectronic_device" \o "Optoelectronic device), and [computer](http://en.wikipedia.org/wiki/Computer" \o "Computer) systems. Electrical engineers can work on various projects, from household appliances to electrical power stations, and satellite communication systems.

Mechanical engineering deals with the design of physical or mechanical systems, such as [powertrains](http://en.wikipedia.org/wiki/Powertrain" \o "Powertrain), [kinematic chains](http://en.wikipedia.org/wiki/Kinematic_chain" \o "Kinematic chain), and [vacuum technologies](http://en.wikipedia.org/w/index.php?title=Vacuum_technology&action=edit&redlink=1" \o "Vacuum technology (page does not exist)). Mechanical engineers design, develop, build, and test mechanical devices, including tools, engines and machines.

Chemical engineers are sometimes called “universal engineers” because they have very broad STEM-based knowledge and skills in mathematics, physics, chemistry and, sometimes, biology. Their competencies are very comprehensive thus enabling them to work in a wide range of fields. Chemical engineers solve practical problems in manufacturing and production, from food to pharmaceuticals, clothes and fuels.

Although engineers usually get their degree in a certain field, due to the broad set of skills that they develop, they can find career opportunities in multiple engineering fields which keep growing.

Many students choose their education and career in one of the fields of engineering. There is a good reason for this choice because employment opportunities for engineers are expected to grow.

So, think rationally about the sort of person you are and the area of engineering that interests you most.

Will you be happy working in a factory or outdoors? Do you want to work with people or machines?

Remember that engineering can be a truly interesting and rewarding career!

Now it’s your turn to speak about engineering as a profession!

Answer the following questions:

What are the main branches of engineering?

What do civil, mechanical, chemical engineers do?

What would you recommend to someone who wants to become an engineer?

### **1. Engineering**

Dear students, today’s topic is engineering.

Do you think engineering is a profession? Or, may be, it is an art? Have you ever planned your future career in engineering? Do you know how engineers approach different problems? Has engineering become global? And what is the workplace of an engineer?

Engineering is a discipline, an art and a profession at a time. Engineers use technical, scientific, and mathematical knowledge to design and put into practice materials, machines, devices, systems, and processes.

A person who practices engineering is called an engineer. Almost everything we use in our life is made by engineers. For example, if a manufacturer wants a faster car, a smaller personal computer, or a better mobile phone, they will ask a design engineer to find a practical solution.

Engineers use theory to produce practical answers. The solution must be safe, reliable and cost-efficient. A new idea that is expensive, dangerous, or not always working is not a good solution.

Engineers use a very unique approach to solving problems. Engineering problem solving follows certain steps. Firstly, engineers define the problem, and then they generate the ideas. Secondly, they design possible solutions and choose the best of them. Thirdly, they have to test the solution and evaluate it. If the solution isn’t right, the process again starts from the beginning. When a good solution is found, the next step is to communicate the solution. This method of problem-solving is very useful and fruitful.

What does an Engineer do? Engineers design machinery, build skyscrapers, and address society’s needs and problems at many different levels. At a molecular level, they develop drug delivery systems that work inside the cells. At a galactic level, they design spacecraft to explore other planets. At an atomic level, they develop data storage that focuses on the spin of electrons in atoms. Clean drinking water, safe food storage, and the protection of our environment are also under the engineering umbrella.

Engineers also design, build products, structures, or systems for their specific engineering industry. For example, electrical engineers develop, monitor, and test electrical systems. Civil engineers design, construct, and maintain large infrastructural projects, such as highways, bridges, and airports.

Many engineers begin their career with an internship or apprenticeship while they are still in school. As they learn more about the industry, engineers can be appointed in charge of their own projects and they take more responsibilities.

Engineering is the way of achieving the technological progress.  Nowadays we can talk about engineering ‘globalization’. In many engineering activities we see a new kind of challenge emerging – international business structures.  Research and development (R&D) can take place in one location, for example, in the USA. Materials and subassemblies can be taken from Russia. And manufacturing can take place in areas located far from R&D. Final markets, in their turn, can be spread worldwide.

Let’s consider the workplace of an engineer. It depends on the type of engineering profession, their actual job description and the company they work for. Many engineers work in an office environment, or in laboratories, some of them work in the construction sites, while others, like a ship engineer, travel almost 100% of the time.