Тема занятия: «Механические свойства материалов»

Цель занятия: выучить новый лексический материал по теме «Механические свойства материалов»; совершенствовать навыки чтения и перевода текста профессионального направления; систематизировать знания, выполнив задания по теме занятия.

Уважаемые студенты! Ознакомьтесь с материалами практического занятия на тему «Механические свойства материалов». Конспект занятия выполняйте **в рабочей тетради письменно**, **обязательно указывая дату занятия, тему занятия, номер упражнения.** Ответы предоставить преподавателю на проверку **до 22. 02. 2023 г.** в электронном виде **(фотоотчёт) на** e-mail mikagol2605@mail.ru. Телефон преподавателя для консультации и возникающих вопросов: 072-14-15-816.

С уважением, Голодюк Марина Викторовна.

1. Запишите новую лексику в словарь, выучите новую лексику.

2. Прочитайте и устно переведите текст «Mechanical properties of materials».

3. Дайте письменно ответы на вопросы.

Mechanical properties of materials

Vocabulary

bar — брусок, прут

completely — полностью, совершенно

compression — сжатие

creep — ползучесть

cross-sectional area — площадь поперечного сечения

cyclic stress — циклическое напряжение

decrease — уменьшение

elastic deformation — упругая деформация

elastic limit — предел упругости

exceed — превышать

external forces — внешние силы

fatigue — усталость металла

fracture — перелом, излом

loosen — ослаблять, расшатывать

permanent deformation — постоянная деформация

remaining — оставшийся

shear — срез

simultaneously — одновременно

to stretch — растягивать

technique — методы

tension — напряженность

to propagate — распространять(ся)

to bend — гнуть, согнуть

to extend — расширять, продолжаться

to meet the needs — отвечать требованиям

torsion — кручение

twisting — закручивание, изгиб

volume — объем, количество

rupture — разрыв

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 metals, 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.

Answer the questions:

1. What are the external forces causing the elastic deformation of materials? Describe those forces that change the form and size of materials.
2. What are the results of external forces?
3. What kinds of deformation are the combinations of tension and compression?
4. What is the result of tension? What happens if the elastic limit of material is exceeded under tension?
5. What do we call fatigue? When does it occur? What are the results of fatigue?
6. What do we call creep? When does this type of permanent deformation take place? What are the results of creep?