PLTW Engineering

# 12/Career Exploration – Materials Engineer

May 8, 2020

12/EDD

Lesson: **5/8/2020**

**Objective/Learning Target: Students will be able to explain the career path of a Materials engineer**

# What do materials engineers do?

Materials engineers develop, process, and test materials used to create a range of products, from computer chips and aircraft wings to golf clubs and biomedical devices. They study the properties and structures of metals, ceramics, plastics, composites, nanomaterials (extremely small substances), and other substances in order to create new materials that meet certain mechanical, electrical, and chemical requirements. They also help select materials for specific products and develop new ways to use existing materials.

# Typical duties of materials engineers

- Plan and evaluate new projects, consulting with other engineers and managers as necessary
- Prepare proposals and budgets, analyze labor costs, write reports, and perform other managerial tasks
- Supervise the work of technologists, technicians, and other engineers and scientists
- Design and direct the testing of processing procedures

# Typical duties of materials engineers

- Determine causes of product failure and develop ways of overcoming such failure
- Evaluate technical specifications and economic factors relating to the design objectives of processes or products
- Evaluate the impact of materials processing on the environment
- Monitor how materials perform and evaluate how they deteriorate

# Typical duties of materials engineers

Materials engineers create and study materials at the atomic level. They use computers to understand and model the characteristics of materials and their components.

They solve problems in several different engineering fields, such as mechanical, chemical, electrical, civil, nuclear, and aerospace.

Materials engineers may specialize in understanding specific types of materials.

# Types of materials engineers

***Ceramic engineers*** develop ceramic materials and the processes for making them into useful products, from high-temperature rocket nozzles to glass for LCD flat-panel displays.

***Composites engineers*** develop materials with special, engineered properties for applications in aircraft, automobiles, and related products.

***Metallurgical engineers*** specialize in metals, such as steel and aluminum, usually in alloyed form with additions of other elements to provide specific properties.

# Types of materials engineers

***Plastics engineers*** develop and test new plastics, known as polymers, for new applications.

***Semiconductor processing engineers*** apply materials science and engineering principles to develop new microelectronic materials for computing, sensing, and related applications.

# Work environment for materials engineers

Materials engineers often work in offices where they have access to computers and design equipment. Others work in factories or research and development laboratories. Materials engineers may work in teams with scientists and engineers from other backgrounds.

## Work Schedules

Materials engineers generally work full time. Some materials engineers work more than 40 hours per week.

# How to become a materials engineer

Students interested in studying materials engineering should take high school courses in math, such as algebra, trigonometry, and calculus; in science, such as biology, chemistry, and physics; and in computer programming.

Entry-level jobs as a materials engineer require a bachelor’s degree. Bachelor’s degree programs include classroom and laboratory work focusing on engineering principles.

# Important qualities for a materials engineer

***Analytical skills***. Materials engineers often work on projects related to other fields of engineering. They must determine how materials will be used and how they must be structured to withstand different conditions.

***Math skills***. Materials engineers use the principles of calculus and other advanced topics in math for analysis, design, and troubleshooting in their work.

***Problem-solving skills***. Materials engineers must understand the relationship between materials' structures, their properties, how they are made, and how these factors affect the products they are used to make. They must also figure out why a product might have failed, design a solution, and then conduct tests to make sure that the product does not fail again.

# Important qualities for a materials engineer

***Speaking skills***. While working with technicians, technologists, and other engineers, materials engineers must state concepts and directions clearly. When speaking with managers, these engineers must also communicate engineering concepts to people who may not have an engineering background.

***Writing skills***. Materials engineers must write plans and reports clearly so that people without a materials engineering background can understand the concepts

# How much do materials engineers make?

The median annual wage for materials engineers was $93,360 in May 2019.

The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less.

The lowest 10 percent earned less than $57,340, and the highest 10 percent earned more than $148,960.

# Quiz yourself

1. List 3 typical duties for a materials engineer.

2. List 2 applications composites engineers work on.

3. Do materials engineers work in offices, in labs or manufacturing floors, or both?

4. What is the minimum education requirement to become a materials engineer?

# Helpful links

Video description of materials engineers

Iowa State University department of Materials Science