

Engineering Functions

Engineering – the art of making things work

Engineering is the application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people in structures, machines, products, systems and processes.

Teamwork

Engineers typically work in a team environment with constant communication – you may have one person from each functional area or several depending on the size and complexity of the project.

Organization of Functional Groups

- Research and Development
- Design
- Manufacturing
- Sales
- Purchasing
- Service
- Subcontractors

Organization of Skills

- Engineers – responsible for ensuring that systems and devices are specified to operate within their theoretical limits, specify materials and sizes of parts & assemblies so failures do not occur.
- Designers – responsible for product's fit and finish – ergonomics & aesthetics.
- Packaging Engineers – ensure the product is packaged properly to avoid damage, etc.
- Drafters – responsible for documentation.
- Fabricators – making parts according to specifications.
- Inspectors – ensure that the products meet the specifications.
- Technicians – responsible for operation and maintenance – they assemble various components to create working devices or structures, operate them, and maintain them.

What Does an Engineer Do?

Engineering Functions

Research

- Research engineers are knowledgeable in principles of chemistry, biology, physics, and mathematics.
- Computer know-how is also recommended.
- A Masters Degree is almost always required, and a Ph. D is often strongly recommended.

Development

- Development engineers bridge the gap between the laboratory and the production facility.
- They also identify problems in a potential product by building prototypes.
- An example is the development of concept cars for companies like Ford and GM.

Testing

- Testing engineers are responsible for testing the durability and reliability of a product and making sure that it performs how it is supposed to. Testing engineers simulate instances and environments in which a product would be used.
- Crash testing of a vehicle to observe effects of an air bag and crumple zone are examples of a testing engineer's duties.

Design

- The design aspect is where largest number of engineers are employed.
- Design engineers often work on components of a product, providing all the necessary specifics needed to successfully manufacture the product.
- Design engineers regularly use computer design software as well as computer aided drafting software in their jobs.
- Design engineers must also verify that the part meets reliability and safety standards required for the product.
- A concern always on the mind of design engineers is how to keep the development of a part cost effective, which is taken into account during the design process.

Analysis

- Analysis engineers use computational tools and mathematical models to enrich the work of design and research engineers.
- Analysis engineers typically have a mastery of: heat transfer, fluid flow, vibrations, dynamics, acoustics, and many other system characteristics.

Systems

- Responsible on a larger scale for bringing together components of parts from design engineers to make a complete product.
- Responsible for making sure all components of a product work together as was intended by the design engineers.

Manufacturing & Construction

- Work individually or in teams
- Responsible for transforming raw materials into finished product.
- Keep records of processes and equipment.
- Help with design process to keep costs low.

Operations & Maintenance

- Responsible for setting up and maintaining the production line.
- Must have technical know-how to deal with problems.
- Responsible for inspecting the facility and equipment. Must be certified in various inspection methods.

Technical Support

- Works between sales, customers and producers.
- Typically will have knowledge of the technical aspects of product.
- Must have good interpersonal skills.

Sales

- Sales engineers have technical background, but are also able to communicate effectively with customers.
- The job market for sales engineers is growing, due to the fact that products are becoming more and more technically complex.

Consulting

- Consultants are either self-employed, or work for a firm that does not directly manufacture products.
- Consulting engineers might be involved in design, installation, and upkeep of a product.
- Sometimes required to be a registered professional engineer in the state where he/she works.
- Consultants are typically required to have expertise within the areas where they are consulting.

Note: At smaller companies, a single engineer will tend to do most of these functions. At larger companies, especially if working on large scale projects, an engineer will tend to work mostly within one functional area.