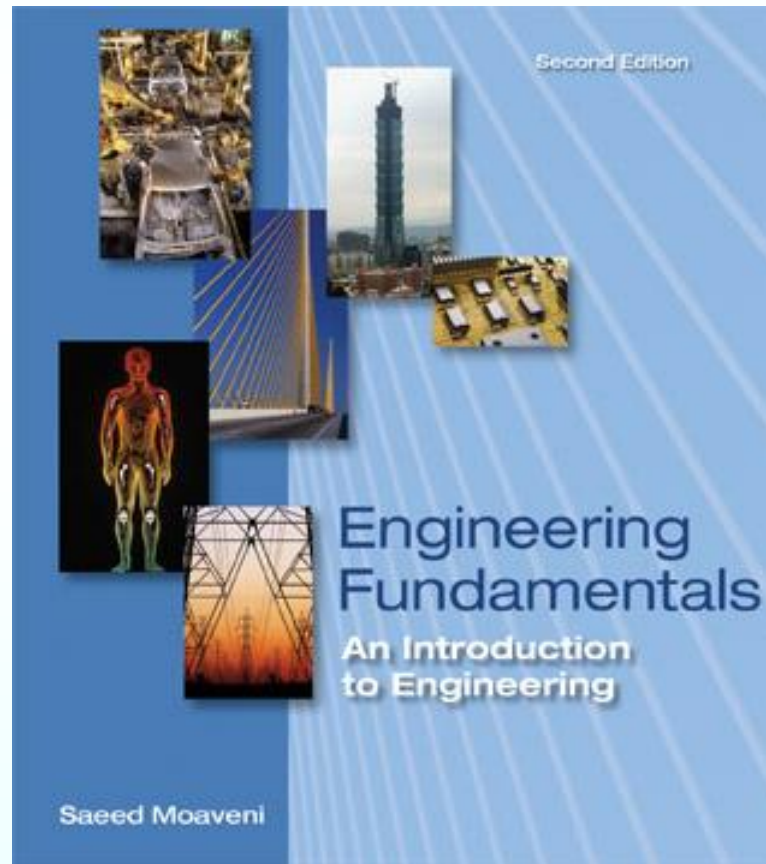


CHAPTER 1

Introduction to the Engineering Profession



Engineering work is all around you

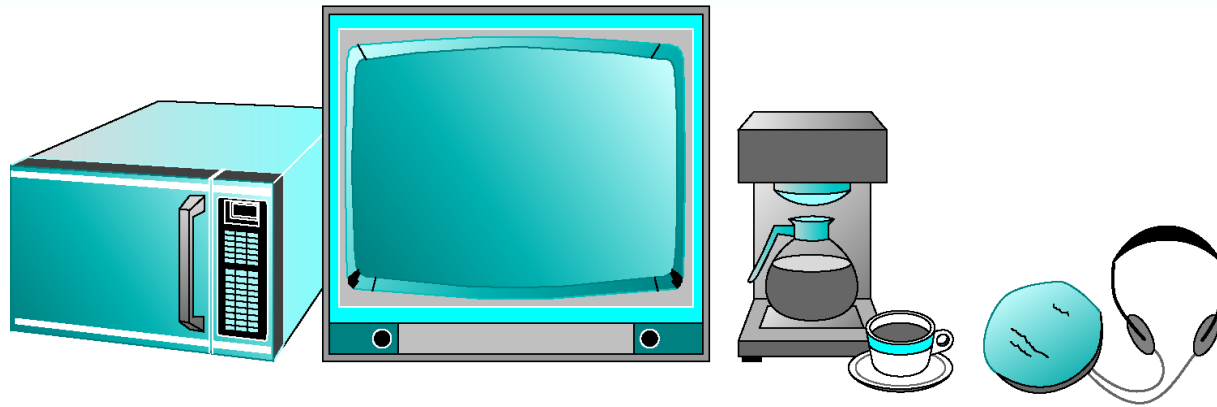


Figure 1.1

Examples of products and services designed by engineers.

Engineers deal with an increasing world population

- Just note that at the turn of the 19th century, the world population was 1 billion, it became 6 billion at the turn of the 20th century. Just in term of essentials, we need engineering (agricultural) to make enough food for everyone!
- What about drinking water, heat, shelter,...TV and cable?

What do engineers do?

- Engineers apply
 - physical/ chemical laws/principles
 - + mathematics
- In order to design products or services that we use daily

Some examples of engineering work

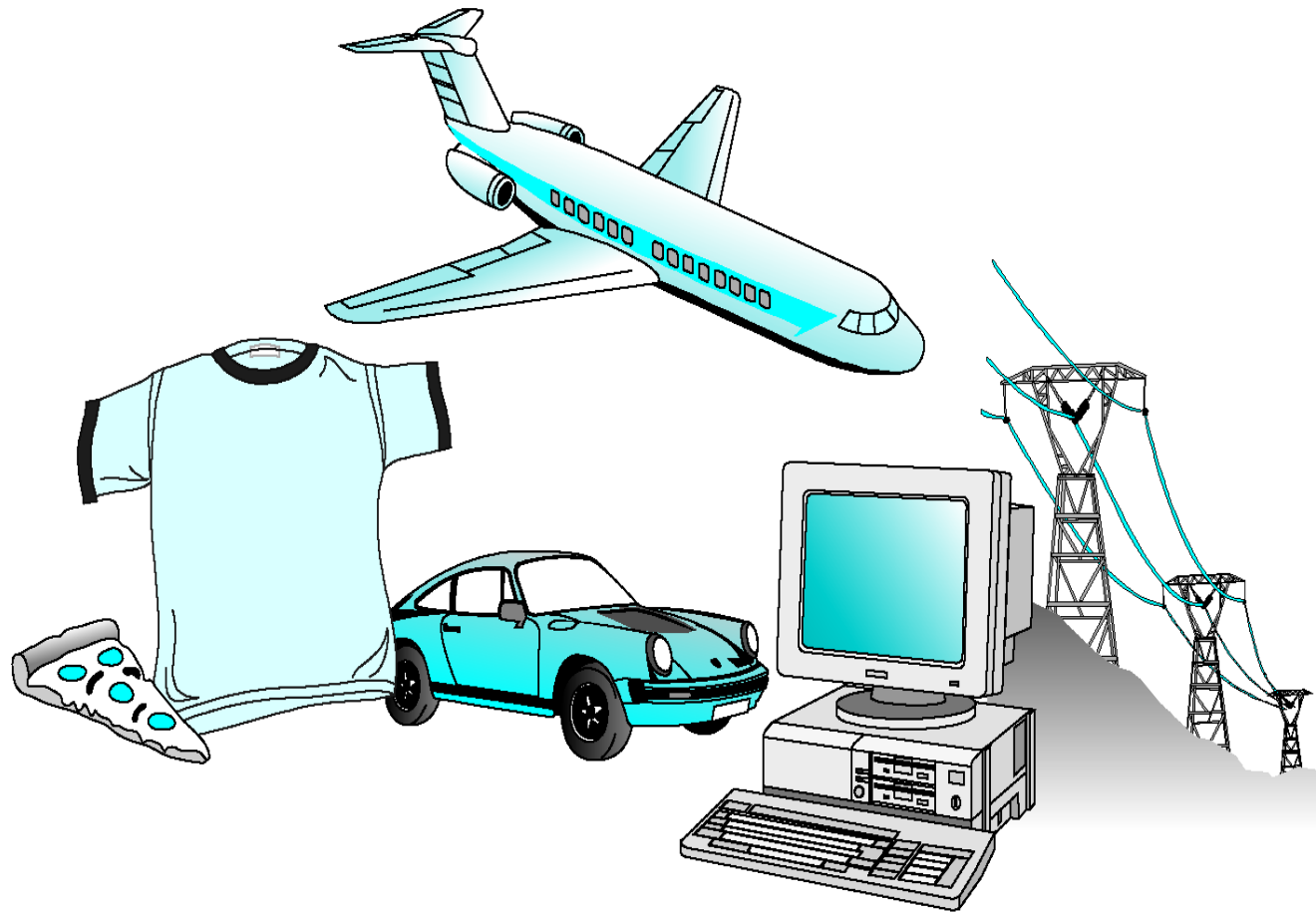


Figure 1.3

As an engineer you will apply physical and chemical laws and principles and mathematics to design various products and services.

Common traits of a good engineer

- Problem solver →
 - A firm grasp of fundamental principles
 - Analytical, detail oriented, creative
 - Communication skills
 - Have people skills
 - Lifelong learner
- Team work – team management
 - Interact with people of various specializations

Common traits of a good engineer – cont.

- Regardless of his area of specialization, a good engineer has a core knowledge that can be applied to many areas
- able to use computers to model and analyze various problems
- Can write all types of reports correctly
- Actively participate in seminars, workshops, meetings...
- Good team – work skills, as a manager or a member

TABLE 1.1 Distribution of Engineering Employment (2000)

Area of Specialization	Employment	Percent
Electrical and electronics	292,000	19.8
Civil	228,000	15.4
Mechanical	215,000	14.5
Industrial, including health and safety	194,000	13.1
Aerospace	78,000	5.3
Computer hardware	74,000	5.0
Environmental	47,000	3.2
Chemical	33,000	2.2
Materials	24,000	1.6
Nuclear	16,000	1.1
Petroleum	14,000	0.9
Biomedical	7,600	0.5
Mining and geological, including mining safety	5,200	0.4
Marine engineers and naval architects	4,900	0.3
Agricultural	2,900	0.2
All other engineers	243,000	16.4

- Civil engineering:
 - Structural
 - Environmental
 - Transportation
 - Water resources
 - Geotechnical
- Electrical and electronic engineering (and CCE)
 - Power generation
 - Power transmission and distribution
 - Controls
 - Electronic equipment, including computer hardware
 - Computer network hardware
 - Communication devices: cellular phones, television, audio, video,...

- Mechanical Engineering
 - Thermal/fluid
 - structural/solid
 - it covers manufacturing of machines, robots, tools, heating, ventilation, ...
- Aerospace Engineering
 - Manufacturing of military and commercial aircraft, helicopter, spacecraft and missiles
- Biomedical Engineering
 - A combination of biology, chemistry, medicine and engineering to solve a wide range of medical and health related problems

- Chemical Engineering
 - Engineering the production of chemicals used in various industries: pharmaceutical, electronic, photographic, paint, petroleum,...
- Environmental Engineering
 - Apply principles of chemistry, biology and engineering to solve issues related to water and air pollution control
- Manufacturing Engineering
 - Develop, coordinate and supervise the process of manufacturing of all types of products, making products efficiently at a minimum cost
- Petroleum Engineering
 - Discovery and production of oil and natural gas

- Nuclear Engineering
 - Design, develop, monitor and operate nuclear power equipment that derive their power from nuclear energy.
- Mining Engineering
 - In collaboration with geologists and metallurgists, they extract coal, metals and minerals from underground
- Materials Engineering
 - Research, develop and test new materials for various applications

Where can you read more on engineering disciplines?

- American society for engineering education
 - www.asee.org
 - American Society of Civil Engineers
 - www.asce.org
 - American Society of Mechanical Engineers
 - www.asme.org
 - Institute of Electrical and Electronics Engineers
 - www.ieee.org
- And many others...

What is ABET?

- ABET = American Board for Engineering and Technology
- It accredits colleges and universities (in US) to give a bachelors degree in engineering, considering that a graduating student must be able to:
 - Apply knowledge of mathematics science and engineering
 - Design and conduct experiments, analyses and interpret data
 - Design a system, component or process to meet desired needs
 - Function on multidisciplinary teams
 - Identify, formulate, and solve engineering problems

What is ABET? – cont.

It accredits colleges and universities (in US) to give a bachelors degree in engineering, considering that a graduating student must be able to:

- Have an understanding of professional and ethical responsibility
- Communicate effectively
- Recognize his need for lifelong learning
- Have a knowledge of contemporary issues
- Use technical skills and modern engineering tools necessary for the practice
- Understand the impact of his engineering solutions in a global and societal context