

Design and Fabrication 1202

Unit 1 - Introduction to Design

- **Topic 1-1: History of Design (1 hour)**
- Topic 1-2: The Design Process (4 hours)
- Topic 1-3: Social/Environmental Considerations (2 hours)
- Topic 1-4: Design in Fabrication (2 hours)
- Topic 1-5: Careers in Design (1 hour)
- This unit introduces students to the engineering design process and provides the basis for the remaining units.
- Students will review the history of the design process and examine how it has evolved. You will also examine various fabrication techniques and discover how design and fabrication are interrelated.

Topic 1 – The History of Design

The history of engineering can be roughly divided into four overlapping phases, each marked by a revolution:

1. **Pre-scientific revolution:** The prehistory of modern engineering features ancient master builders such as Leonardo da Vinci. These forerunners of engineers, practical artists and craftsmen, proceeded mainly by trial and error.
2. **Industrial revolution:** From the 18th through early 19th century, civil and mechanical engineers changed from artists to scientific professionals. The first phase of modern engineering emerged in the Scientific Revolution. Galileo's *Two New Sciences*, which seeks systematic explanations and adopts a scientific approach to practical problems, is a landmark regarded by many engineering historians as the beginning of structural analysis, the mathematical representation and design of building structures. This phase of engineering lasted through the First Industrial Revolution, when machines, increasingly powered by steam engines, started to replace muscles in most production.
3. **Second industrial revolution:** In the century before WW II, science-based engineering branches developed electricity, telecommunications, cars, airplanes, and mass production. The second industrial revolution, symbolized by the advent of electricity and mass production, was driven by many branches of engineering.
4. **Information revolution:** As engineering science matured after the war, microelectronics, computers, and telecommunications jointly produced information technology.

Research and development boomed in all fields of science and technology after World War II, partly because of the Cold War and the Sputnik effect. The explosion of engineering research, which used to lag behind natural science, was especially impressive, as can be seen from the relative expansion of graduate education.

Engineering was also stimulated by new technologies, notably aerospace, microelectronics, computers, and novel means of telecommunications from the Internet to cell phones.

The Design Process

The Design Process has evolved from an informal approach to a formal approach to one with defined steps and procedures.

Italian architect, [Filippo Brunelleschi](#) (1377-1446), is attributed with creating the first formal approach to the Design Process!

Around the year 1400, he won a prestigious opportunity to design and build the dome of the "new" cathedral for the city of Florence.

Brunelleschi was worried, however, that his contemporaries would try to steal his ideas, so to keep it secret he did something new.

Brunelleschi kept a journal in which he sketched and described individual ideas. He distributed them to the various manufacturers.

He then evaluated the concepts, blending some together and discarding others altogether. Finally he completed the dome.

Brunelleschi had unwittingly invented a design process.

The design process has expanded into a **multidiscipline** approach that relies on people with varied disciplines and backgrounds.

There are many historically noteworthy inventions and designs throughout history.