In 1822, Charles Babbage an English Mathematics Professor, invented the Difference Machine. Babbage was troubled by the many errors found in calculations which led to the loss of ships.

The Difference Engine was powered by steam. This machine could solve complicated calculations by moving various levers and gears. After working with the Difference Engine for 10 years, Babbage invented another device called the Analytical Engine. He later applied to the British government for funding to do more research on computers. Charles Babbage is noted as the father of computers.
2-1 Computer Systems and Components
CAD Systems

Classes

Networked Computers: Conventional and LAN
2.3 Computer-Aided Drafting
FEM/CFD Analyses
- Observe deformation, max von Mises stress, and convergence of strain energy
2.12 Solid Modeling in CAD System

**FIGURE 2.38** Extruded Solid.

**FIGURE 2.39** Revolved Solid.
Boolean Operations

Venn diagrams depicting Boolean operators

- $A \cup B$ (A union B)
- $A - B$ (A subtract B)
- $A \cap B$ (A intersect B)

Results of Boolean operators on solids

- $A \cup B$ (A union B)
- $A - B$ (A subtract B)
- $A \cap B$ (A intersect B)

**Figure 2.40** Boolean Operators.
Assembly
Rapid Prototyping

The rapid prototyping is a new technology that is based on layering technology. Any 3D objects can be constructed by a sequence of layers stacked up. There are several different types of machines to build the prototypes these days.
The following site shows the list of rapid prototyping systems.
http://www.cc.utah.edu/~asn8200/rapid.html#COM

**StereoLithography** is a technology that uses a 3D CAD design to produce solid epoxy prototype models. The StereoLithography apparatus (SLA) is connected to a computer. Specialized software directs a laser beam over a specialized epoxy resin in an exact pattern driven by the 3D CAD model. The laser beam hardens a thin layer of the resin. Over time, the laser "builds" a solid plastic prototype layer by layer. The result is a highly accurate solid model of the 3D CAD design.

**Fused Deposition Modeling™:**
Stratasys developed and patented Fused Deposition Modeling (FDM™) that enables Stratasys rapid prototyping systems to build accurate, complex parts using a variety of high-performance engineering materials like ABS, polycarbonate and polyphenylsulfone. Powered by Insight™ software, STL CAD files for a selected part are automatically sliced and oriented to fit within a given system's build envelope. Insight generates precise extrusion paths for the specified build materials along with any additional support structures.
CAD Systems are made up of computer hardware and specialized software.

The use of CAD has revolutionized engineering graphics.

Usually you should select the software that will perform the functions you require and then select hardware appropriate to run that software effectively.