Engineering as a Career

A Career Talk with an Engineer working in the Aerospace Industry

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February 2011

Let's Talk About Engineering

Definitions:

Engineering:

- The application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people
- The design and manufacture of complex products

Engineer:

- One who practices engineering is called an engineer.

Credit: http://www.merriam-webster.com/netdict/engineering

Engineering Has Many Fields

- Civil
- Biomedical
- Chemical
- Aerospace
- Mechanical
- Electrical
- Software
- Systems
- Lots more disciplines not mentioned today

■ = Widely used in Aerospace

Civil Engineering

- **Civil engineering is the engineering discipline that deals with the design, construction and maintenance of bridges, roads, canals, dams and buildings.**

Burj Dubai (August, 2009)

Biomedical Engineering

- **Biomedical engineering is the application of engineering principles and techniques to the medical field. It combines the design and problem solving skills of engineering with medical and biological sciences to improve healthcare diagnosis and treatment.**

Credit: http://www.wikipedia.com

Chemical Engineering

- **Chemical Engineering applies science and mathematics to the process of converting raw materials or chemicals into more useful or valuable forms.**

Credit: http://www.wikipedia.com

Aerospace Engineering

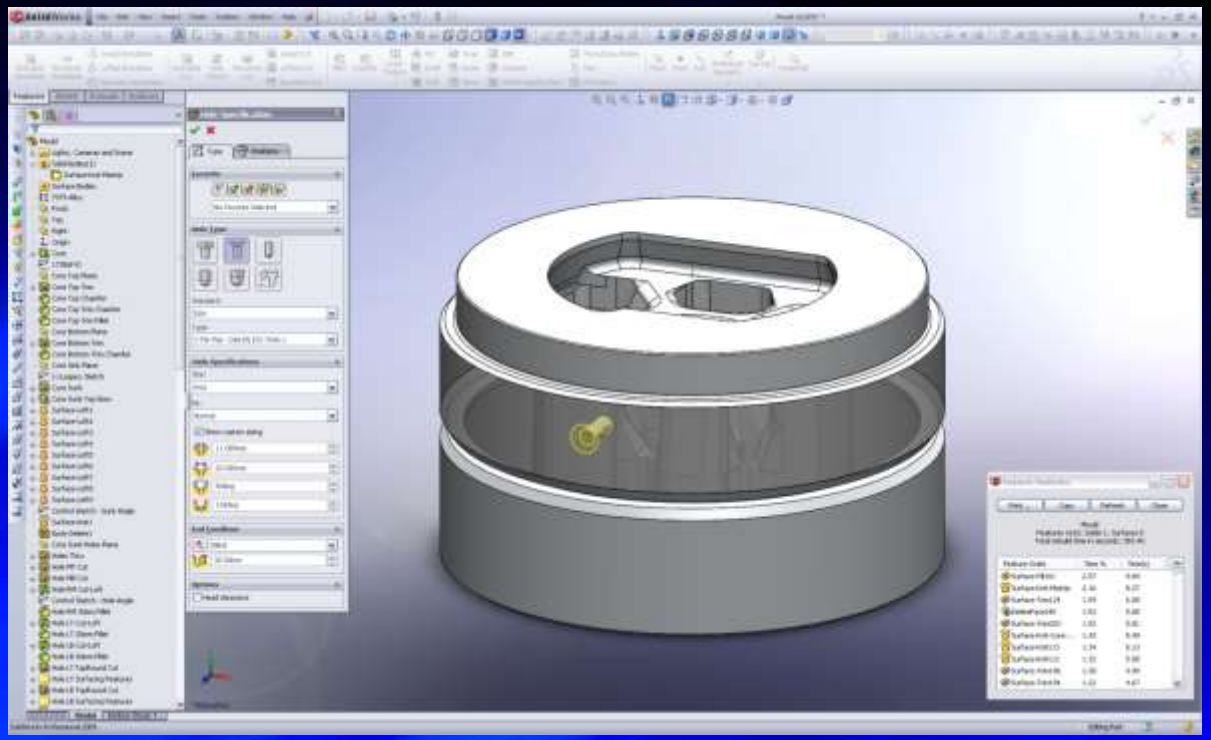
- **Aerospace engineering is the branch of engineering behind the design, construction and science of aircraft and spacecraft.**

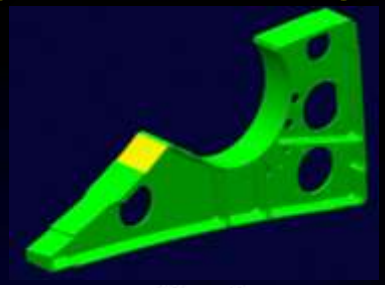
Credit: http://www.ksc.nasa.gov

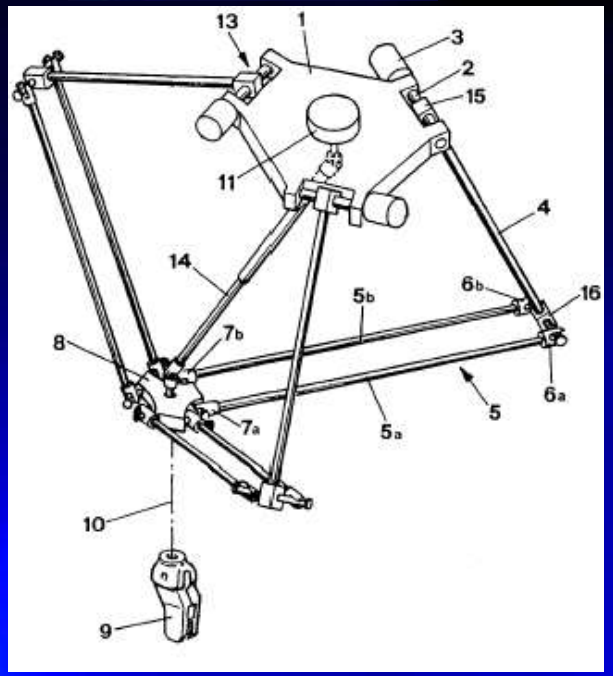
Credit: http://www.lockheedmartin.com

Mechanical Engineering

- **Mechanical engineering utilizes mechanics, kinematics, thermodynamics, fluid mechanics, heat transfer, materials science, and energy to design and analyze machinery and mechanical parts.**



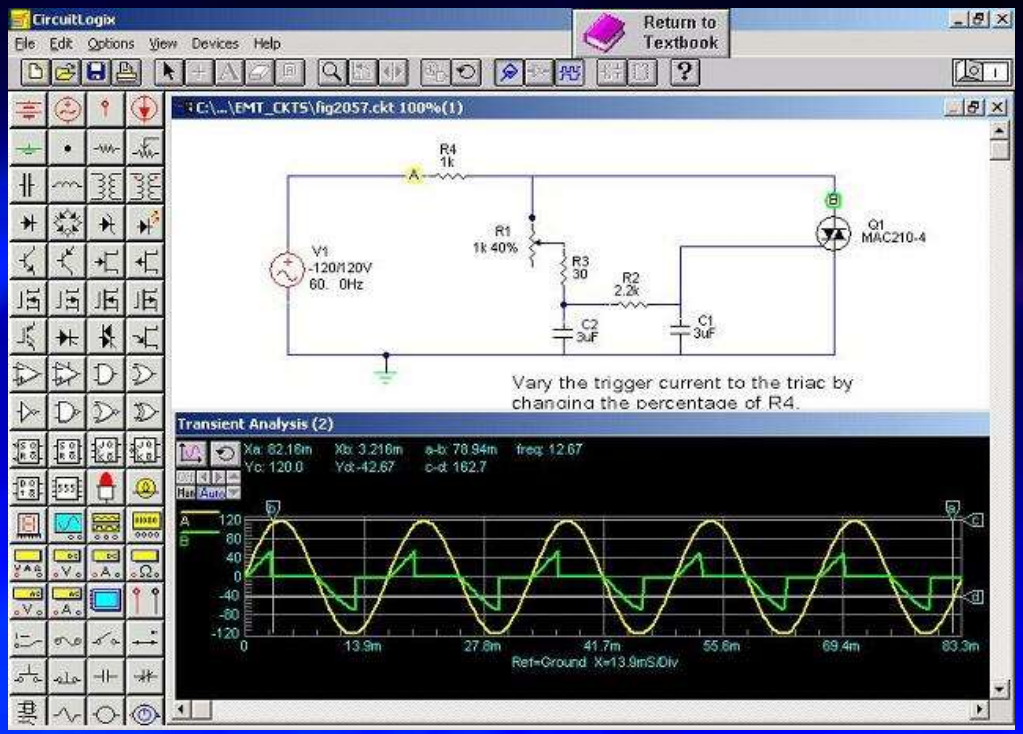




Credit: http://www.wikipedia.com

Electrical Engineering

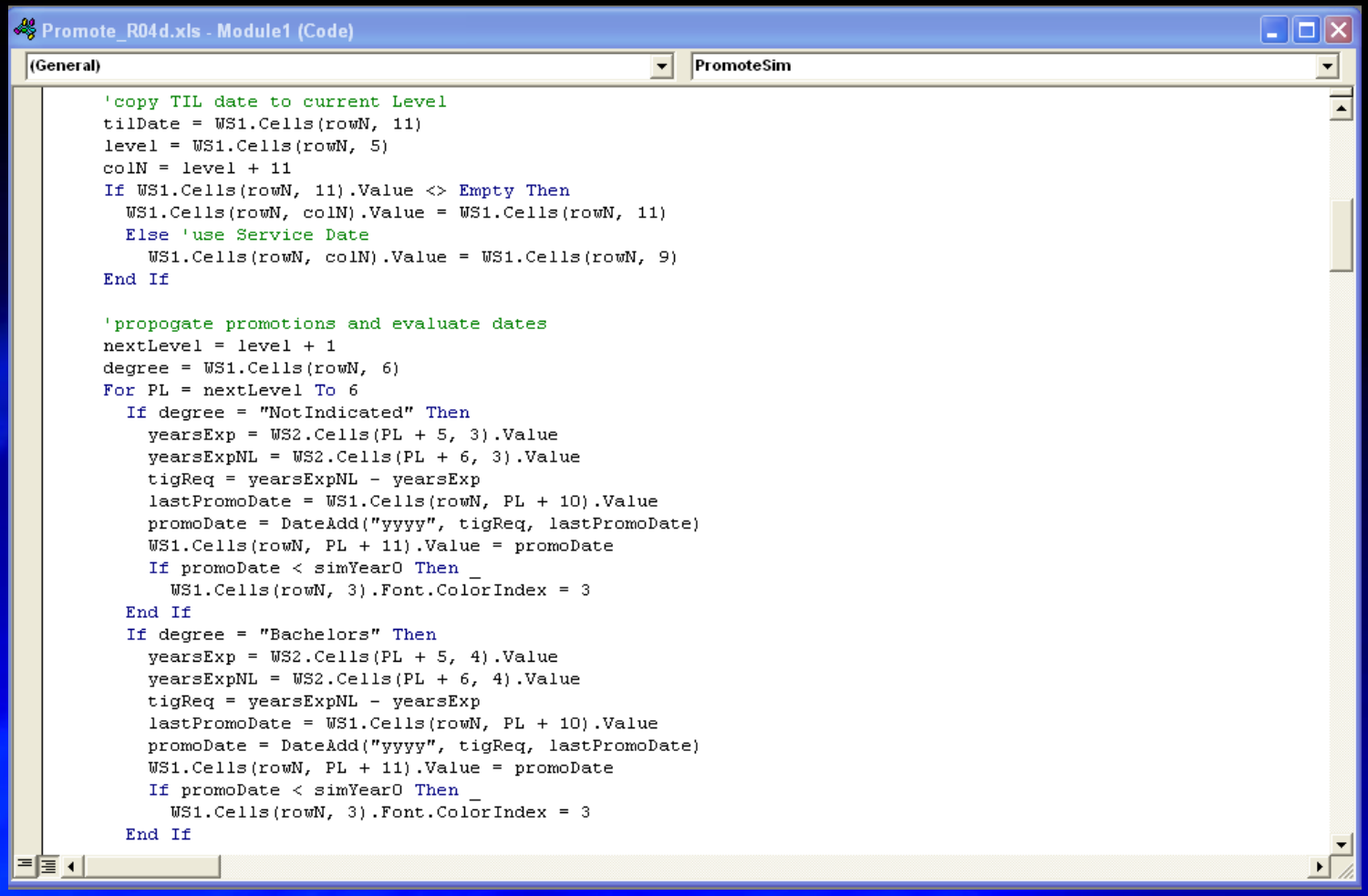
- Deals with the application of electricity, electronics and electromagnetism.
- Covers a range of subtopics including power, electronics, control systems, signal processing and telecommunications.



Credit: http://www.wikipedia.com

Software Engineering

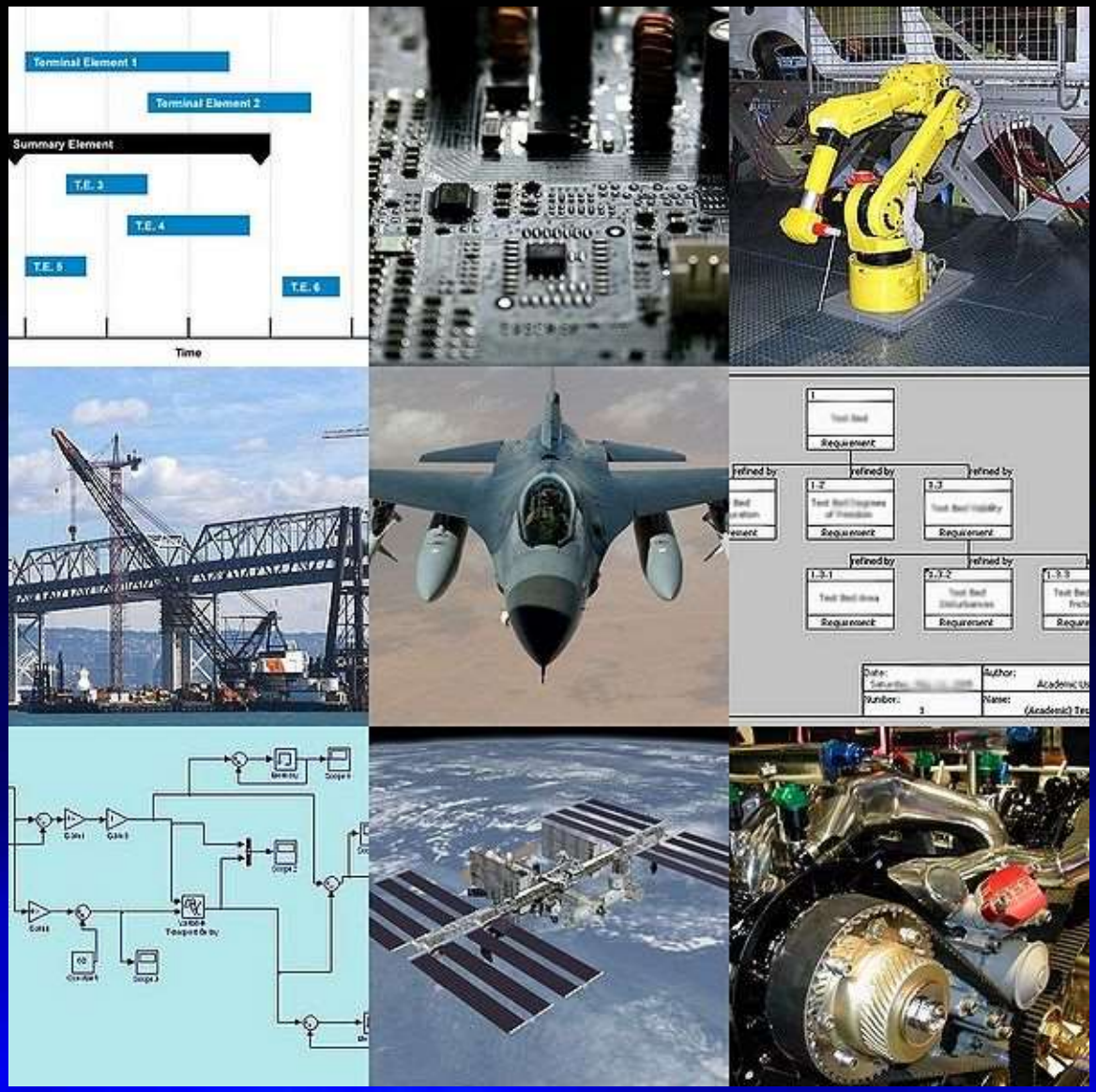
- **Software Engineering is the application that develops, tests, operates, and maintains software.**



Credit: http://www.wikipedia.com

Systems Engineering

The interdisciplinary field of engineering that focuses the integration of electrical, mechanical, and software systems.



Credit: http://www.wikipedia.com

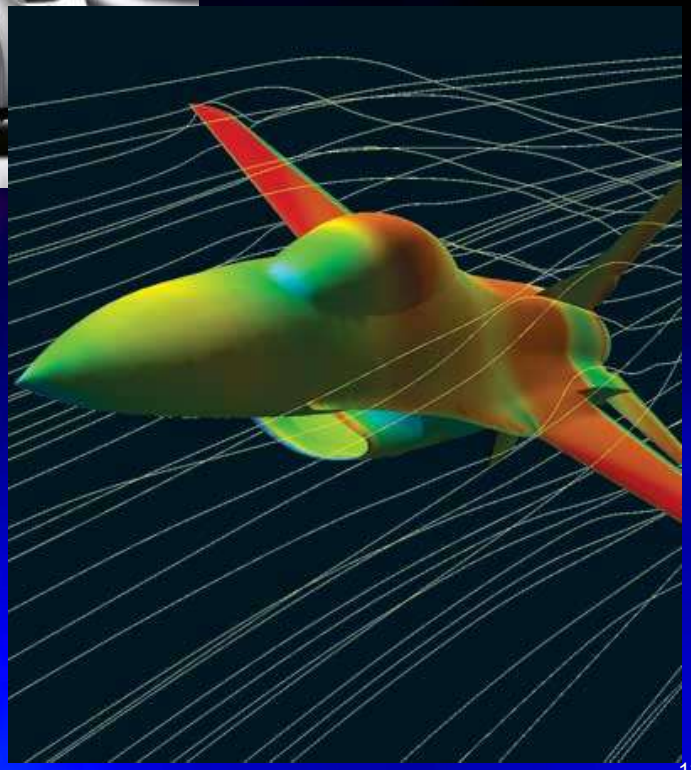
Engineering Has Many Disciplines/Specialties

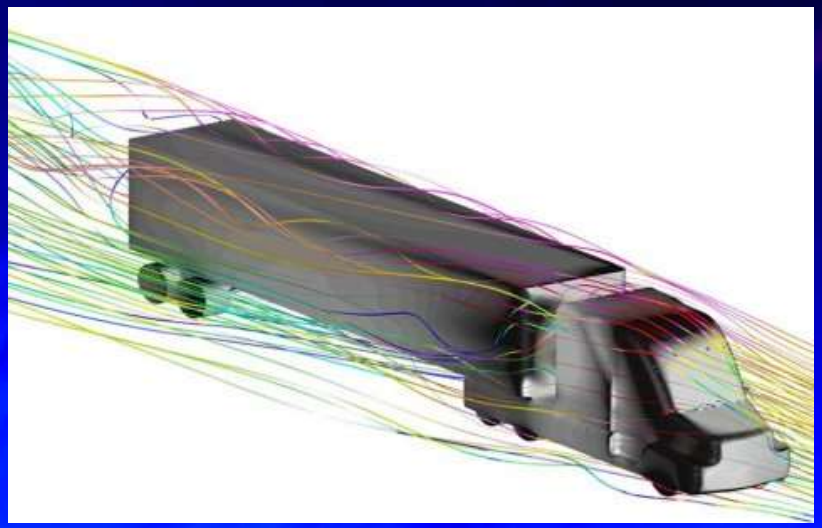
- Aerodynamics
- Fluids
- Thermal
- Stress/Loads/Dynamics
- Solar Arrays
- Batteries
- Lots more disciplines not mentioned today

■ = Widely used in Aerospace

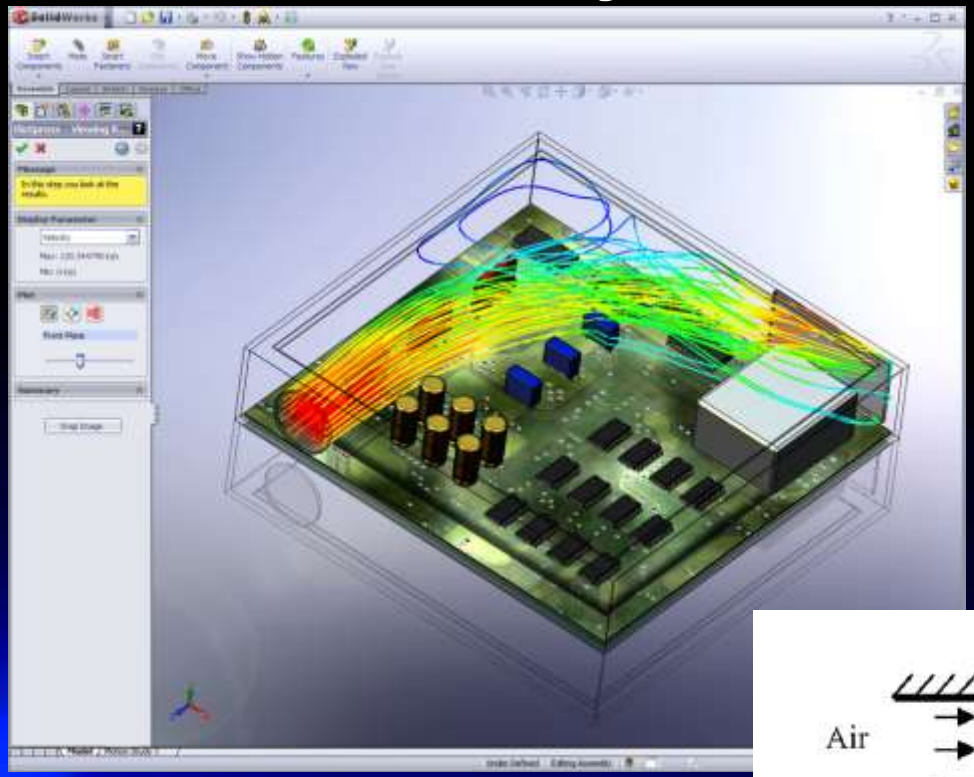
Aerodynamics

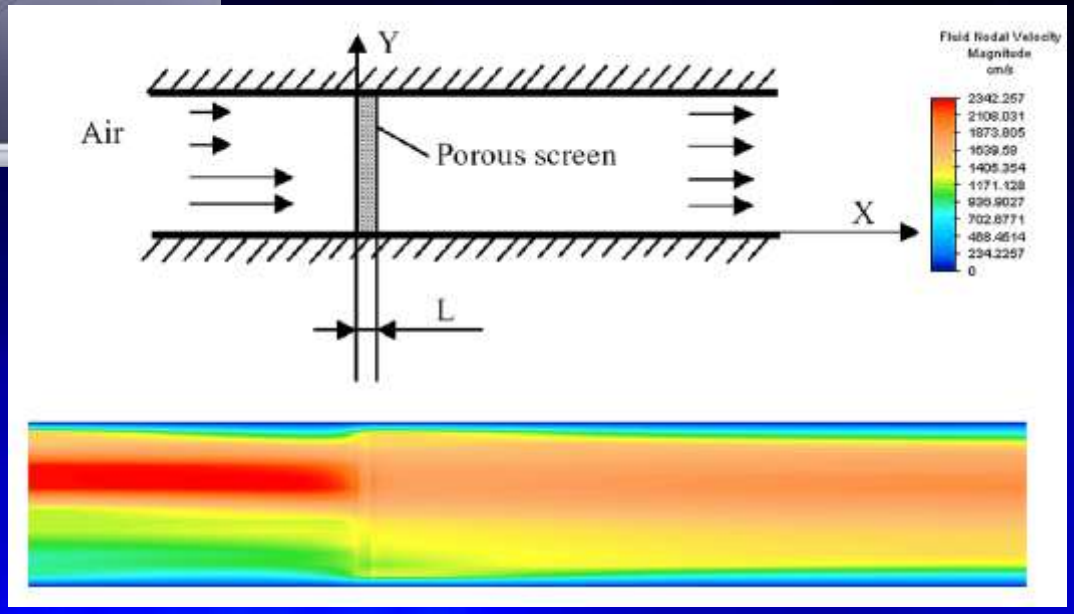
Optimize design to minimize drag





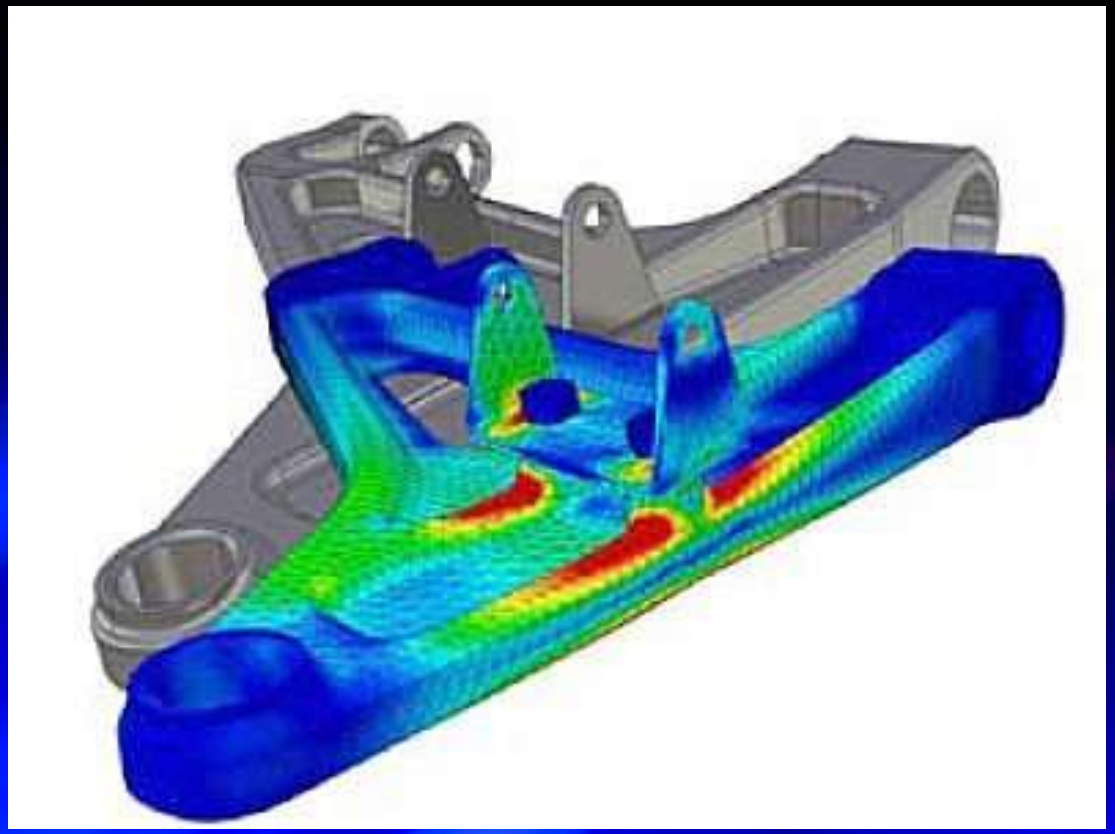
Fluid / Flow Analysis





Thermal Engineering

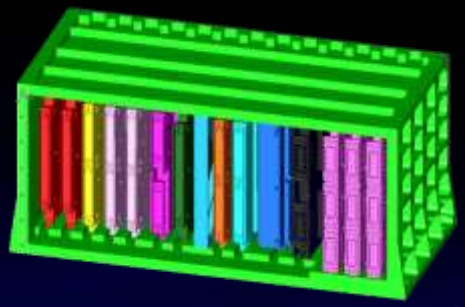
- responsible for the architecture, analysis, design, modeling, verification, technical evaluation and selection of hardware related to the thermal systems.



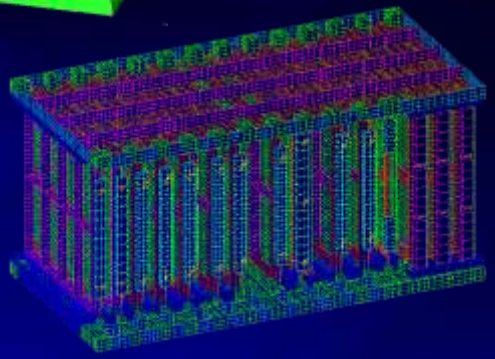
Thermal Model for a Mechanical Part

Stress, Loads & Dynamics Analysis and Test

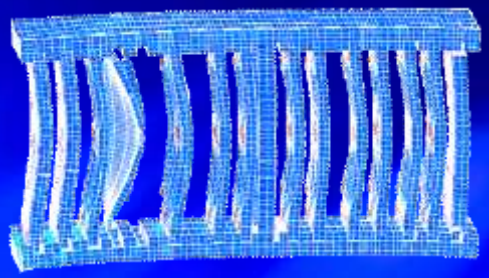
Electronics Package Analysis



Design Model



Finite Element Model



Results – Response Under Loading Conditions

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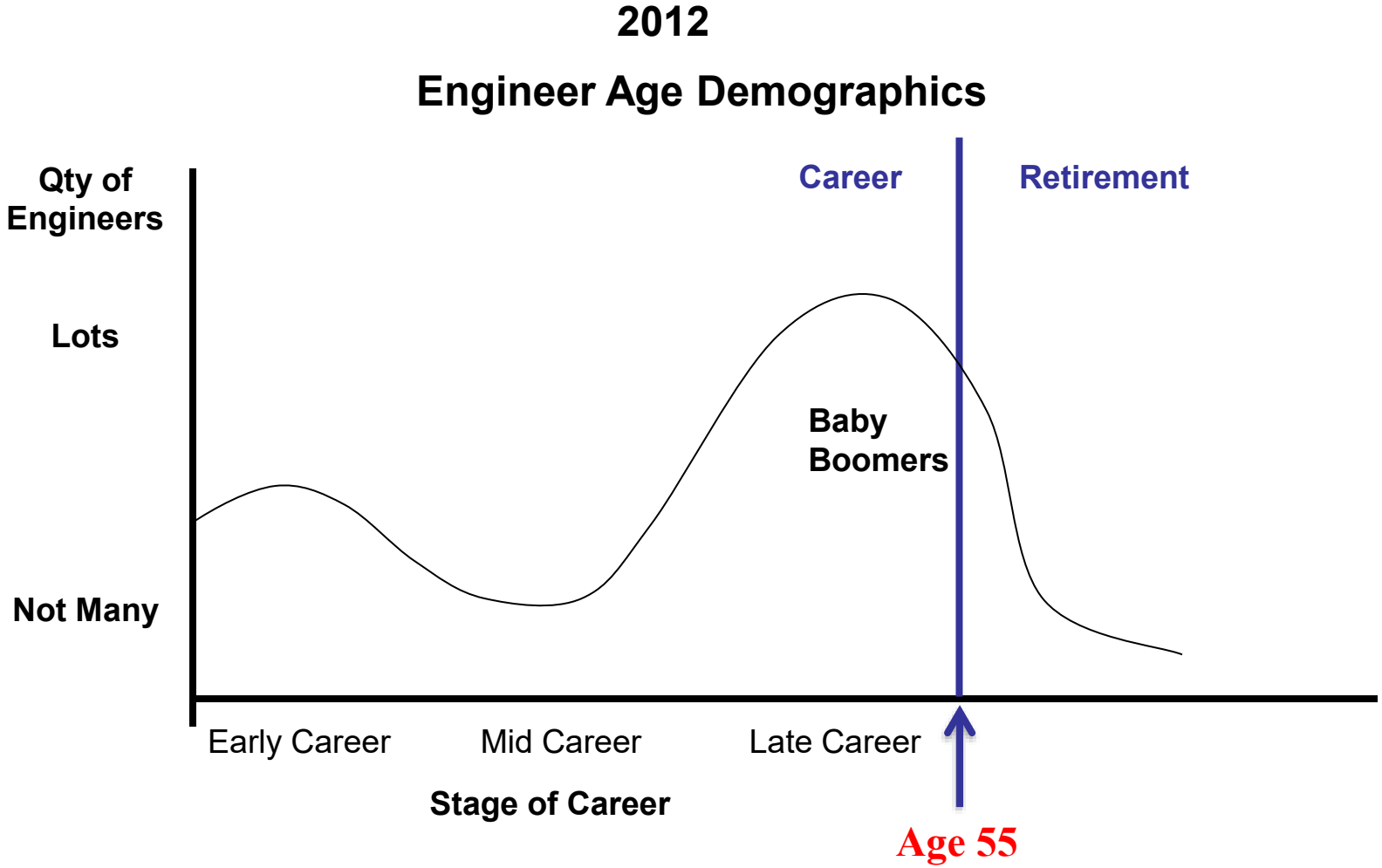
Engineering Statistics

- Engineering Jobs in United States
  - 1.5 Million
- Engineering Jobs Growth Rate
  - 10% annual growth
  - Approximately 150,000 / year
- Current Engineering Graduation Rate
  - 137,000 new engineers per year

Credit: http://www.careermarketplace.com

Engineering Career Projections
2012 – 1.5 Million Engineers



Courtesy James Paradise

Engineering Salaries

- Starting Salaries (by Degree)

Bachelor's	Master's	Ph.D.

Credit: 2005 survey taken by the National Association of Colleges and Employers adjust +16%

- With 35 Years Experience (by Degree)

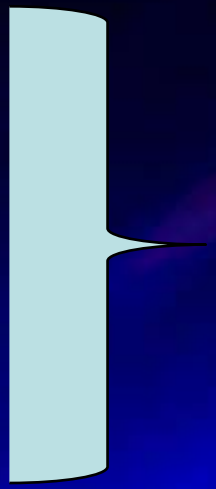
Role	Bachelor's	Master's	Ph.D.
Non-Supervisory			
Supervisory			

Credit: resources.metapress.com and Maureen Byko

Skills Used in Engineering

- **Hard Skills**
  - Math
  - Science
  - Problem Solving

- **Soft Skills**
  - Communication Skills
  - Teamwork
  - Leadership Qualities
  - Creativity



Faster Progression

Credit: http://www.careermarketplace.com

How Do You Prepare to become an Engineer?

- Math
- Physics
- Chemistry
- Electronics
- Biology
- Writing / English
- Debate and Speech
- Working on Teams
- Microsoft Office – Word, Excel, PowerPoint
- Computer Presentation Skills
- Photography
- And More…

Courtesy Adam Pender

Questions?