Have you Ever Thought About Being An Engineer?

Alf Carroll, Sr. Principal Systems Engineer*
Kim Francis, Director of Engineering**
Mark Whalen, Chief Engineer***

* Raytheon IDS, Portsmouth RI
** Acushnet Co, New Bedford MA
*** Lockheed Martin, Marion MA
Ever thought about being an Engineer?

- Curious how things work?
- Take things apart to see?
- Modify things to make them work better for you?
- Enjoy working with a team?
- Do you like math? (or at least understand it)
Ever thought about being an Engineer?

- Curious how things work?
- Take things apart to see?
- Modify things to make them work better for you?
- Enjoy working with a team?
- Do you like math?
- If you say yes to most of the above, you should consider becoming an Engineer
What do you want from a career?

- Challenging?
- Well-paid?
- Job Security?
- Flexible Schedule?
- Ability to change careers?
What do you want from a career?

- Well-paid?
- Job Security?
- Challenging & Fun?
- Flexible Schedule?
- Ability to change careers?
- Travel?
Why Engineering?

- Engineers are in Great Demand
- Many important problems that need to be solved
- **YOU** could be part of the solution!
- It can actually be fun, rewarding work, and provide good $$$.
Avg. Starting Salaries For College Grads

Engineers have the best starting pay out of college!

<table>
<thead>
<tr>
<th>Major</th>
<th>Average salary offer ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical engineering</td>
<td>59,218</td>
</tr>
<tr>
<td>Computer engineering</td>
<td>55,920</td>
</tr>
<tr>
<td>Electrical engineering</td>
<td>55,333</td>
</tr>
<tr>
<td>Mechanical engineering</td>
<td>54,057</td>
</tr>
<tr>
<td>Computer science</td>
<td>53,051</td>
</tr>
<tr>
<td>Information sciences &amp; systems</td>
<td>49,966</td>
</tr>
<tr>
<td>Civil engineering</td>
<td>48,998</td>
</tr>
<tr>
<td>Economics (business/managerial)</td>
<td>47,782</td>
</tr>
<tr>
<td>Management information systems</td>
<td>47,407</td>
</tr>
<tr>
<td>Finance</td>
<td>46,442</td>
</tr>
<tr>
<td>Accounting</td>
<td>46,292</td>
</tr>
<tr>
<td>Business administration/management</td>
<td>43,256</td>
</tr>
<tr>
<td>Marketing</td>
<td>39,269</td>
</tr>
<tr>
<td>Political science/government</td>
<td>35,261</td>
</tr>
<tr>
<td>History</td>
<td>35,092</td>
</tr>
<tr>
<td>Sociology</td>
<td>32,161</td>
</tr>
<tr>
<td>English</td>
<td>31,924</td>
</tr>
</tbody>
</table>
Challenges in Today’s World

- What do you think biggest ones are?
Challenges in Today’s World

- What do you think biggest ones are?
- Here’s just a few examples:
  - Global Warming
  - Future Sources of Energy
  - Countering Terrorism
  - World Hunger and Disease
  - Global Economy
  - Pollution
Challenges in Today’s World

- What do you think biggest ones are?
- Here’s just a few examples:
  - Global Warming
  - Future Sources of Energy
  - Countering Terrorism
  - World Hunger and Disease
  - Global Economy
  - Pollution

Future Engineers and Scientists are going to be a Key Part of the SOLUTION
Global Warming

KNOWN:
- The earth is getting warmer
- CO₂ is a greenhouse gas
Global Warming

KNOWN:
- The earth is getting warmer
- CO$_2$ is a greenhouse gas

QUESTIONS:
- How much of the warming is due to human activity?
- What are the consequences to the planet?
Global Warming

Scientists and Engineers team up to solve these questions:
Climate Monitoring & Modeling

Environmental Scientists
Global Warming
Meteorology

Figure 3.17: Observed surface and upper-air temperature anomalies (°C), (A) Lower stratospheric T4, (B) Tropospheric T2, (C) Lower tropospheric T2 MSU satellite analyses and UKMO HadAT1 and NOAA RAPID radiosonde observations, and (D) Surface records from NOAA, NASA/GISS, and UKMO/Cru (HadCRUT2v). All time series are monthly mean anomalies relative to the period 1979 to 1997 smoothed with a seven-month running mean filter. Major volcanic eruptions are indicated by vertical blue dashed lines. Adapted from Karl et al. (2006).
Global Warming
Weather Balloon

MECHANICAL ENGINEERING:
Low cost rugged, reliable

ELECTRICAL ENGINEERING:
Accurate sensors, radio transmitter, low power

SAFETY/ENVIRONMENTAL ENGINEERING:
Safe for people and surrounding environment

Technical Solutions Require Knowledge and Teamwork!
Global Warming
Oceanographic Instruments

Technical Solutions Require Knowledge and Teamwork!

Electrical Engineering
- Waterproof Wire
- Hydrodynamic Shape
- High Pressure Housing
- Low Cost
- Digital Signal Processing
- Accurate Sensors
- Low Power

Mechanical Engineering

Computer Engineering
- Programming
- User Interface

Global Warming
Oceanographic Instruments
Hands-on examples
Manufacturing Engineering

- What does it take to make a product?
  - An idea, concept, invention
  - A design, then drawings to specify materials, sizes, product performance characteristics
  - A process to get raw materials, make parts and put them together
  - Assembly equipment and testing procedures to ensure safe, efficient operation
  - A warehousing plan to distribute it
  - A marketing plan to sell it
Example: painting a golf ball

How would you do it??
Example: painting a golf ball

- Must have even, smooth application
- Must allow product to dry
- Cannot let excess paint go into the atmosphere
- Must process enough product to be economical
EXAMPLE: USS Cole was attacked in 2000, by Terrorists (17 Sailors died)

VERY Challenging Technology, esp. “Determining Hostile Intent”

Need to defend against terrorists without hurting innocent people!!!

How would you do it ??
One solution that does “Warning & Hailing” is LRAD “Long Range Acoustic Device”

LRAD is designed so sailors can hail, notify (many languages), warn & “Determine Intent”

Before taking severe protective action

Danger! Warning Safe
Great Engineering Helps Protect People and Improve Safety!

**MECHANICAL ENGINEERING:** Compact, rugged, corrosion resistant

**ELECTRICAL ENGINEERING:** High power level

**COMPUTER ENGINEERING:** Language translator

**SAFETY/ENVIRONMENTAL ENGINEERING:** Safe for sailors and surrounding environment

**ACOUSTICAL ENGINEERING:** Sound level very high in front, low in back

Engineering An LRAD
YOU Can Help Solve Some of the World's Challenges!

- YOUR daily choices, plus:
- Engineers and Scientists Will Have Important Roles in the Solution
- Is anyone here already planning on it?
- Anyone thinking about it?
- Not sure yet, but curious?
SO.... Think about this...

- Consider pursuing Engineering or Science in College
  - Take lots of Math and Science
  - Talk to your Guidance Counselor, NHS Advisor, Math, Science Teachers
  - Check out nearby colleges: Northeastern, UMASS, WPI, UNH, URI, MIT
Working with Schools

- Talk first to folks who speak our language
  - Science/Math teachers (MS and HS)
  - District Science/Math Coordinators
  - State Science/Math Coordinators & Associations

- Try to complement teachers’ efforts
  - Class visits on engineering applications of basic science/math ideas
  - Mentor students & support student projects/competitions
  - Support/Expand Tech Ed across curriculum
Survey - Engineering Careers Presentation  
ORR – 3/11/10

Please circle the appropriate response to each of the following:

1. The presenters effectively dealt with the topic “Considering a Career in Engineering.”
   | Strongly Agree | 1 (20) | 2 (18) | 3 (5) | 4 (1) | Strongly Disagree | 5 (2) |

2. I am interested in a career in Engineering or the Sciences.
   | Strongly Agree | 1 (6) | 2 (12) | 3 (15) | 4 (8) | Strongly Disagree | 5 (4) |

3. Today’s presentation was interesting and informative.
   | Strongly Agree | 1 (16) | 2 (17) | 3 (11) | 4 (0) | Strongly Disagree | 5 (2) |

4. Today’s presentation was dull and uninteresting.
   | Strongly Agree | 1 (0) | 2 (1) | 3 (7) | 4 (24) | Strongly Disagree | 5 (14) |

5. The presentation was nicely organized.
   | Strongly Agree | 1 (14) | 2 (27) | 3 (4) | 4 (0) | Strongly Disagree | 5 (1) |

6. Visual aids were well designed and nicely organized.
   | Strongly Agree | 1 (20) | 2 (19) | 3 (5) | 4 (2) | Strongly Disagree | 5 (0) |

7. The speaker(s) appropriately involved the audience.
   | Strongly Agree | 1 (22) | 2 (18) | 3 (3) | 4 (2) | Strongly Disagree | 5 (1) |

8. Participants questions were answered satisfactorily.
   | Strongly Agree | 1 (22) | 2 (16) | 3 (6) | 4 (1) | Strongly Disagree | 5 (2) |

9. The presentation met my expectations.
   | Strongly Agree | 1 (16) | 2 (22) | 3 (6) | 4 (1) | Strongly Disagree | 5 (1) |

Continue on the back
Which of the following types of engineering would you like to know more about? (Please circle one or more of the following)

- Aerospace/aeronautical (7)
- Computer (11)
- Agricultural (3)
- Electrical/electronics and Communications (12)
- Architectural (8)
- Environmental (14)
- Environmental health (9)
- Bioengineering & biomedical (7)
- Industrial/manufacturing (4)
- Chemical (5)
- Materials (1)
- Civil (8)
- Mechanical (20)
- Mining and mineral (2)
- Nuclear (8)
- Petroleum (0)

Optional:
What did you like best?
- Alternate energy materials (6)
- Handed around materials; visuals (4)
- Relation to their personal lives/stories (3)
- I started thinking about becoming an engineer. Liked the statistics favoring engineers.
- Open atmosphere for questions. Guys really knew their stuff.
- Whole presentation was good, so I liked it all.