Applied Science
A Different Perspective

Carl D. Roberts
A Different Perspective

“ I believe I can do anything if I just try. “

Granville T. Woods
A Different Perspective

Engineering is the application of scientific and mathematical principles to practical ends
Or
Mechanical Cleverness
Or
Innovation
A Different Perspective

You can view **Invention / Innovation** as a:

- Necessity (the mother of invention)
- Challenge
- Passion

What is your perspective or point of view?
A Different Perspective

• Influences in my formative years
  • Stories of African American heroes
    – My mother read stories of African American heroes to me and taught me to read from these paperback books.
  • Father’s approach
    – My father rarely bought anything other than tools. He built everything using the tools.
A Different Perspective

• The **Ford-olet** (built by my father for his younger brother from a junk Chevy & Ford)
A Different Perspective

• Learning from history (Stories my mother read to me)

• George Washington Carver
  • Only 3 patents
  • Born a slave, freed as a child
  • 325 uses for peanuts
  • 118 uses for sweet potatoes
  • Optional crops to cotton
  • “God gave them to me, how can I sell them to someone else?”
A Different Perspective

• Learning from history (Stories my mother read to me)

• Madam C.J. Walker (1867 – 1919)
  • Invented a hair care product (Madam Walker’s Wonderful Hair Grower)
  • Grew her business to 3000 employees

• Marjorie Joyner (1896 – 1994)
  • U.S.Pat. # 1,693,515 Nov. 27, 1928
  • Product “permed” hair for long periods of time
  • Became Director of Walker’s beauty schools
A Different Perspective

• Learning from history
• U.S. patent law of 1793 – 1836 holds that slaves and freedmen can hold patents
• In 1858 the patent office holds that slaves may not hold patents (Oscar Stuart vs Ned)
• In 1870 the U.S. government passed patent law that all American men including African Americans can hold patents
A Different Perspective

• Learning from history

• Thomas Jennings (1791 – 1856)
  • U.S. Pat. # 3306X Mar. 3, 1821
  • First patent received by an African American
  • A dry cleaning process called “dry scouring”
  • All the money from the patent went to purchase his family
A Different Perspective

- Lewis Latimer (1848 – 1928)
- Granville T. Woods (1856 – 1910)
  “Black Edison”
- Elijah McCoy (1844 – 1929)
  “Real McCoy”
- George Murray (1853 – 1926)
- Meredith Gourdine (1929 – 1998)
- Jack Johnson (1878 – 1946)
A Different Perspective

• Young Carl at Eaton’s Research Center
  (sharing U.S. technology with the British)
A Different Perspective

• Carl’s history and seven key learnings
  • Your career should be a learning experience
  • Some learnings are reoccurring
  • Build on the key learnings and elevate your performance

• Remember: “There’s nothing wrong with ignorance, but a preference for it is stupidity “
A Different Perspective

1.) Find what appeals to you.

• You’ll have many options
• People like engineers because they are problem solvers
• The scientific method works in a many areas
• This will help as you don’t want to be that person that wakes up every morning for 40 years not wanting to go to work.
• Remember: “ He who has a job he loves never works a day in his life. “
A Different Perspective

2.) Make certain your skills are current. Never stop learning.

• Fill your toolbox
  – A company will hire and / or keep you based on their need for what’s in your toolbox

• Take opportunities
  – It might not specifically be in your job description
A Different Perspective

3.) Find a trustworthy, competent, compatible mentor.

• Believe it or not, you really don’t know everything
• Learning the hard way can be painful ( and costly )
• Finding your mentor ( that knowlegible person who will help you find your way in the company ) is a personal thing
A Different Perspective

4.) Stretch your job description.

• Leave it in an elevated state as compared to when you entered the position
• Introduce the appropriate new accountabilities, processes, technologies, products and growth areas
• And remember; “There’s nothing wrong with ignorance, but a preference for it is stupidity”
Notes For The Next 5 Slides

• Technology staircase – a tool that can be used to focus an organization on innovation that will support it’s long term goals.

• Component development.

• Opportunities present and future.

• Computational Fluid Dynamics – a tool that assists design and development.
Thermal Systems – Product Portfolio

- Mechanical Thermostat
- Coolant Pump
- Radiator
- Transmission
- Turbo
- Coolant Pump
- Fan Drive
- Mechanical
- Fan Drives – Electronic, Viscous, On/Off
- Fans, Exit Guide Vanes, Engine Mounted
- Shrouds,
- Auxiliary Pumps
- Coolant Pumps – Controlled and Mechanical
- Controlled Coolant Valves

20
Thermal Technology Trends

- Already here......
  - Intelligent Viscous Clutches
  - Integrated Exhaust Manifold
  - Split Cooling
  - Integrated Cooling Module
  - Coolant Temperature Control
  - Coolant Heat Flask Energy Storage
  - Exhaust Gas Heat Recovery System
  - Fluid Flow Control - Zero/Low Flow
  - Component Parasitic reduction
  - Water Pump Electrification
  - Electric A/C Compressor
  - Electric Thermostat
  - Grill Shutters
  - HEV/EV Thermal Management
  - Intelligent coolant flow control
  - Electrically Heated Thermostat
  - Switchable Coolant Pump
  - Integrated Intercooler in Intake Manifold
Thermal Technology Trends

• What’s next........?

- Thermo-Electric WHR
- Organic Rankine Cycle WHR
- Heat to Cool Systems
- Engine/Transmission Encapsulation
- Electrical Fluid Heating
- Turbo Generator WHR
- Phase Change Material Energy Storage
- Split Cycle
- Dual Mode Technologies
- Stirling Engines
- Turbo-Compounding
- Adsorption System
- Heat Pumps
- 48V Systems
- Thermo-Acoustic WHR
- System control and optimization
- Split Sump Technology
- Split Cycle
- Thermal Barrier Coatings

Picture Source: BMW
Proven Performance: Advanced Ring Fan Installation

**XD11 Ring Fan U-Shroud ("Standard Installation")**

**XD11 Ring Fan U-Shroud with Engine-Mounted SGV**
A Different Perspective

5.) Know company politics, but do not participate in them openly.

6.) Don’t Jump around, make strategic moves

• Right after graduation it is tempting to chase the money because you have bills to pay
• A good mentor will help you recognize good strategic moves
• John Nigro, 1983 WMU grad and VP Chrysler NAFTA Engineering stressed this point with WMU students during his visit in October
7.) As a leader, surround yourself with strong people.

- It’s important to your continued success
- It’s important to your company’s continued success
A Different Perspective

Be an engineer. Be an innovator. Accept the challenge and be passionate