

Competency Growth of Mechanical Engineers in GE Global Research

高素质机械工程师的培养与思考

Jianming zheng, PhD 郑建明博士

General Electric (GE) Global Research 通用电气全球研发中心



imagination at work

Contents

Technical competency: innovation process of new product development

- Highlight the core mechanical engineering technologies

Professional competency

- Business oriented
- Team player
- Communications skills
-



imagination at work

A global leader in technology driven company

Operations in over **100** countries

320,000+ employees worldwide

Manufacturing facilities in **32** countries



Six businesses, each with a number of business units aligned for growth.



Commercial Finance



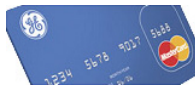
Infrastructure



Industrial



Healthcare



Consumer Finance



NBC Universal



Global Presence

Global Research Center

– Niskayuna, NY



John F. Welch Technology Centre

– Bangalore, India



China Technology Center

– Shanghai, China



Global Research – Europe

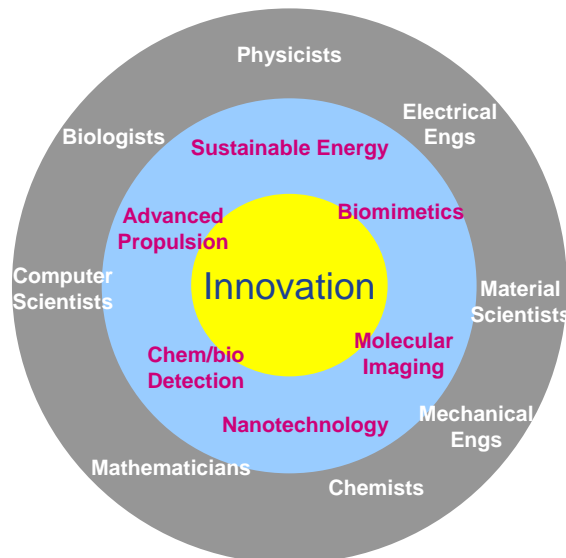
Munich, Germany



imagination at work

Technical Diversity...Drives Innovation

- 2,500 technologists worldwide
- All major disciplines
- \$384 million annual R&D spending
- 285 patents issued, 485 disclosures filed in 2004



imagination at work

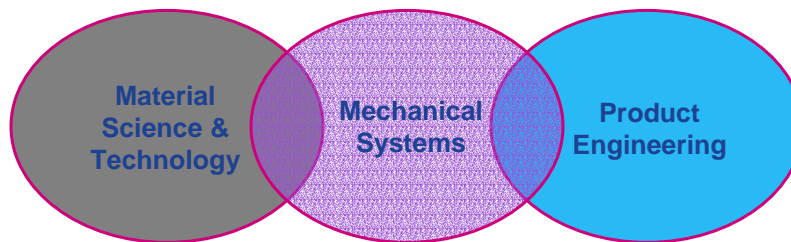
Mechanical Engineers' Missions

- Invent High-Performance Mechanical Systems to Enable Product Breakthroughs
- Transition New Materials Expertise into Revolutionary New Components and Applications from Lab-Scale to Robust Pilot-Scale Manufacturing
- Lead Technical-Driven Measurement Solutions that Deliver Productivity, Quality, and Safety to Our Customers

Design Manufacturing Inspection 



Product Development Evolution



- | | | |
|---|--|---|
| <ul style="list-style-type: none"> • Polymers • Ceramics & Metals • Semiconductor Materials • Biomaterials • Metal Materials | <ul style="list-style-type: none"> • Mat'Is Processing • Mat'Is Inspection & Modeling • Mechanics of Mat'Is • Engineered Mat'Is • Engineering Physics | <ul style="list-style-type: none"> • Systems Design • Prototype Development • Performance Modeling • Experimental Testing • Transition |
|---|--|---|

IDEA DISCOVERY FEASIBILITY Pre-NPI 



NPI: New Product Introduction

Advanced Design Technologies

- Solid Mechanics
- Fluid Mechanics
- High Energy System
- Composites & Hybrid Systems
- CAD/Motion Control
- 3D Geometry & Clearances
- Multi-scale Mechanics
- Probabilistic Design
- Surface & Contact Mechanics
- Nano Mechanics

- Master Model Technologies
- Advanced Preliminary Design
- Fan & Compressor
- Rotating Parts Technologies
- Probabilistic Design
- Clearance Technologies
- ACE/Composites



Manufacturing Process Technologies

Laser Processing



- Net-shape
- Welding
- Joining
- Surface texture

Micro Machining



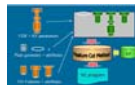
- Micro/Nano Scale
- Master Drum
- EDM

Robot Machining



- Motion control
- Sensor and feedback

Digital Manufacturing



- CAD/CAM
- Knowledge engineering
- Tolerance
- Team center

Adaptive Machining



- Process monitoring & diagnoses
- Process control and optimization
- Close loop

Cutting Tool Technology



- Cutting physics
- Geometry and chip formation
- Surface finish prediction



Outstanding Mechanical Engineers Should

- **Strong mindsets of business oriented and understanding of the business economics and how this affect engineering decisions**
- **Work with discrepant expertise and look for systematic solutions for complex problems**
- **Build network and work as a team player with good communication skills**
- **Develop reputation of delivering results above & beyond**
- **Understand business culture and have unyielding integrity**



Competency Model

Employee commitment is earned only after basic needs are met

The insights for outstanding Engineers are desired

For who am I working?

- 1 Learn to business oriented:
cost & Profit
Realize the market place:
Global mindset & competition



Competency Model

Employee commitment is earned only after basic needs are met

The insights for outstanding Engineers are desired



Aero, heat transfer, bearings, materials, physics, systems, purchase, manufacturing process and legal to solve the problems.

Competency Model

Employee commitment is earned only after basic needs are met

The insights for outstanding Engineers are desired



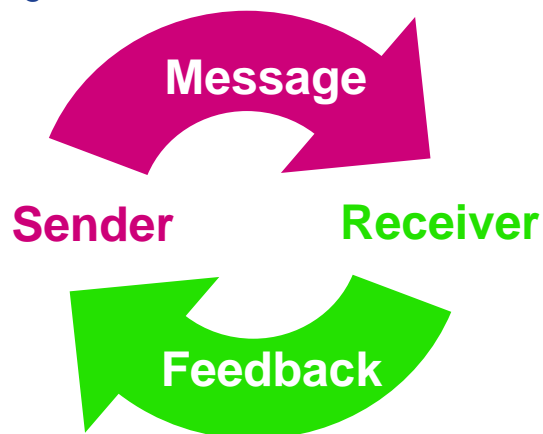
Communication Toolkits



What is Communication?

Communication has two core processes:
"Sending" and "Listening"

Communication is a process that turns information into understanding



Checking for Understanding

How to check/listen for understanding

- Ask direct open ended questions
- Request an action plan or list of priorities
- Solicit feedback on the initiative/project/request



What is Feedback

- Feedback is used to make a person or a group aware of a behavior you see and how that behavior is affecting customers, the business, the team or you
- Feedback is a key step in moving through the coaching process



Feedback

Feedback will form the basis for your discussions



Communication

To be a good team player, the engineer must effectively understand his commitments, job responsibility and role in the team.

Always look for feedback from the team and is willing to take change based on other's input.

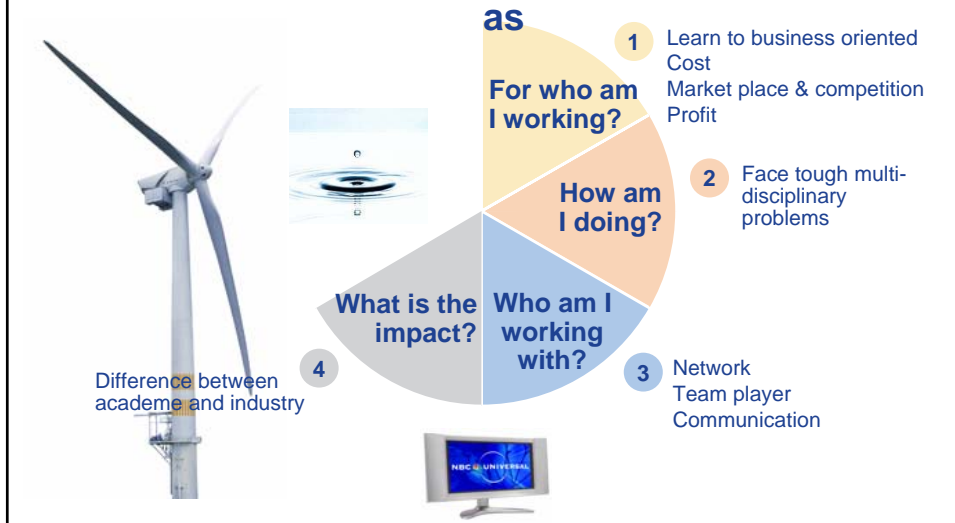
When presenting his idea or solution to the team, he must very well organize his thinking and use diversity approaches to present for various audiences to your peers, managers and customers.



Competency Model

Employee commitment is earned only after basic needs are met

The insights for outstanding Engineers are desired



Competency Model

Employee commitment is earned only after basic needs are met

The insights for outstanding Engineers are desired



Competency Model

Employee commitment is earned only after basic needs are met

The insights for outstanding Engineers are desired



“Non Negotiables – Compliance & Integrity – Must Adhere to GE Values”

- Conduct Your Every Act With Integrity
- Take Interest And Learn About Compliance From All Aspects
- Must Demonstrate In Natural Way GE Values In Your DNA
- Zero Tolerance...Toughest Actions Must Be Taken For Violations...No One Person Is Bigger Than Company



Training Courses in GE

New Employee /Integration

- GE Values
- Orientation to World of GE/Integrity
- GE Management Fundamentals

Professional Skills

- CAP/WO
- 6 Sigma
- Finance
- Presentation
- Coaching

Commercial Competency

- Marketing
- Sales

E-Learning

- English
- myLearning@GE

Leadership

- Crotonville
- Local Courses

Customer Education

- China CEO
- China CFO
- Customer Courses

The place for employees, leaders, customers and business partners to learn, share & explore



Thanks!

