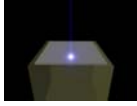


Industrial and Manufacturing Engineering



Presented by:
Dr. Valerie
Maier-Sperdelozzi,
Assistant Professor



www.ime.uri.edu

Industrial and Manufacturing Engineering

- Industrial Engineers figure out how to do things better, integrating computers, people, machines, and material.
- They engineer processes and systems to improve quality and productivity.
- Industrial Engineers make significant contributions to their employers by saving money, while making the workplace better for fellow workers.

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Industrial and Manufacturing Engineering



Profile: Lillian Gilbreth,
Pioneer Industrial Engineer

- Mother of modern management.
- Mother of 12 children.
- Lived in Rhode Island with Frank Gilbreth, until his death in 1924.
- Related movies: *Cheaper By the Dozen* and *Belles on Their Toes*.
- Gilbreth Hall (Industrial Engineering) at URI named in her honor.

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Industrial and Manufacturing Engineering

Lillian Gilbreth, continued

- Concerned with the human aspects of industrialization.
- She helped create job standardization, incentive wage-plans, and job simplification.
- Conceptualized and designed *Efficiency Kitchens*.
- She created new techniques to help disabled women accomplish common household tasks.
- She has been called "a genius in the art of living."

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Industrial and Manufacturing Engineering

- Industrial Engineering offers great flexibility in employment.
- Industrial Engineers can be found:
 - designing supermarket checkout lines,
 - streamlining an operating room,
 - distributing products worldwide,
 - manufacturing superior automobiles,
 - improving the quality of chemical and pharmaceutical processes,and much, much more!

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Industrial and Manufacturing Engineering

- Service and manufacturing industries hire a significant number of Industrial Engineers to improve operational efficiencies.
- Enterprises as diverse as Ford, GM, Coca-Cola, IBM, Levi Strauss, Boeing, the Post Office, Federal Express, hospitals, airlines, banks, railroads, communications companies and social services.
- More and more in areas like sales & marketing, finance, information systems, and personnel.

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Industrial and Manufacturing Engineering

- Employment prospects: high demand for Industrial Engineers in many different kinds of businesses
- Industrial Engineering is a profession that offers you great variety and tremendous earning power:
 - Typical starting salaries around \$50,000
 - Average salaries around \$80,000
 - Typical top salary around \$220,000

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Industrial and Manufacturing Engineering

First Two Years:

- Basic sciences (math, physics, and chemistry)
- English communications
- Social sciences
- The humanities
- Economics and accounting
- Introductory engineering

Last Two years:

- Quality assurance
- Simulation
- Manufacturing systems design
- Operations research
- Probability and statistics
- Manufacturing Processes

Plus electives in research areas that interest you, including biomedical engineering, design for manufacture, human factors, lean manufacturing...

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Industrial and Manufacturing Engineering

supply chain *Craftsmanship* Lights Out Manufacturing
 agile **Design for Manufacturing** manufacturing execution systems
 continuous improvement *Flexible*
 supply-chain
 RAPID PROTOTYPING **human factors** International Manufacturing
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 logistics agility *Continuous Improvement*
 Quality
 financial  human factors systems maintenance engineering
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Industrial and Manufacturing Engineering

Research Activities:

Design for Manufacture and Assembly (DFMA)

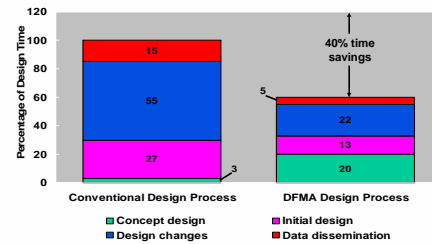
- An industry funded research program where faculty and students developed procedures for designing simpler and more competitive products.
- Identifies part consolidation opportunities.
- Exposes cost and quality problems early in the design process.
- Objectively assesses design simplification opportunities.
- Reduces time-to-market and overhead costs.

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Industrial and Manufacturing Engineering

Research Activities:

DFMA shortens the design process



Source: *Plastics Design Forum*, Oct. 93

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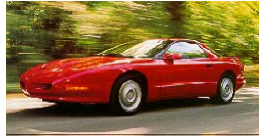
Industrial and Manufacturing Engineering

Research Activities:

DFMA at GM

Firebird/Camaro

(since 1990)



- Utilized DFMA in the redesign of a wheel brake assembly.
- New design is assembled at a single station with little reorientation

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Industrial and Manufacturing Engineering

Research Activities:

DFMA at

Respironics, Inc.

Bag Easy III

(since 1991)



- 84% reduction in assembly time.
- 65% reduction in number of unique parts.
- 81% reduction in assembly operations.
- Resulted in 6 patent applications.

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Industrial and Manufacturing Engineering

Research Activities:

DFMA at Hasbro

Corporation

Talk n' Play Fire Truck

(since 1991)



- 84% part count reduction in ladder assembly.
- 88% assembly time reduction.
- More reliable during abuse testing.

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Industrial and Manufacturing Engineering

Research Activities:

Boeing Longbow Apache Helicopter

(estimated \$1.3 billion savings over project)

Source: Alfredo Herrera
1998 International DFMA
forum, Newport, RI

Before:



After:



Anti-Flair Bracket Assembly

- | | |
|--|--|
| <ul style="list-style-type: none"> • 5 sheet metal parts • 19 rivets • 20 tools needed • 32 hours of manufacturing | <ul style="list-style-type: none"> • 1 high-speed machined part • 10% less weight • 45% less cost (virtually no tooling cost) • 2 hours of manufacturing |
|--|--|

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Industrial and Manufacturing Engineering

Research Activities:

Human Factors and Ergonomics

- Studying road markings and variable message signs to determine which are most visible under a variety of driving conditions.
- Tracking the eye movements of drivers while they dial a cell phone, talk on a hands-free phone, or perform other tasks.



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Industrial and Manufacturing Engineering

Research Activities:

Product Design for the Environment

- Developing more environmentally-friendly products that are easier to recycle.
- Environmental assessment of products.
- Design for disassembly.
- Design for recycling.
- Analysis of bulk recycling.
- Collection logistics for recycling.

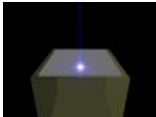
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Industrial and Manufacturing Engineering

Research Activities:

Advanced Manufacturing Processes

- Rapid Prototyping – building a CAD model layer by layer.
- Laser processing.
- System design, efficiency, and performance



- Manufacturing for pharmaceuticals and biomedical devices.
- Reconfigurable manufacturing systems.

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Industrial and Manufacturing Engineering

- The IME department offers:

- B.S. in Industrial Engineering (ABET),
- M.S. in Manufacturing Systems Engineering,
- Ph.D. in Industrial and Manufacturing Engineering

- Engineering is typically a 4 year program, but can be longer if you do co-op work or study abroad (well worth it, though!)
- IME department phone number 401-874-2455

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Industrial and Manufacturing Engineering

If you want to be part of a profession dedicated to quality and continuous improvement, consider Industrial Engineering as your career of choice...

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