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HOTS for Independent Reading and Research
ASEE June 2008

Challenges: *Higher Order Thinking Skills online!*

- Online environment
- Working engineers
- Unfamiliarity with libraries
- Proving value of secondary research



Story: Interdisciplinary

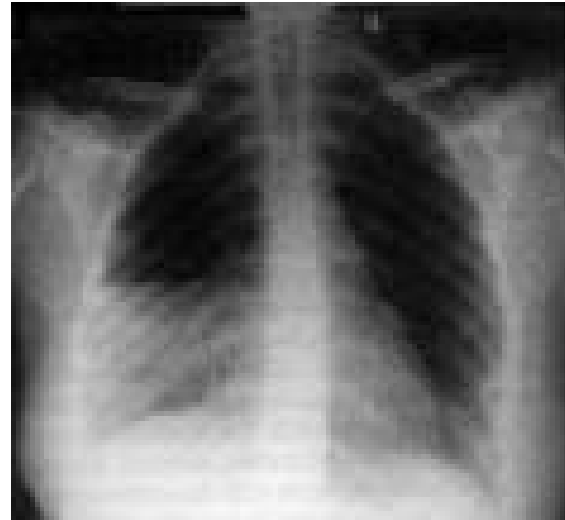
Mechanical engineer needs to learn about electric drives. Choice of motors.

What will fit?



Story: Job Change

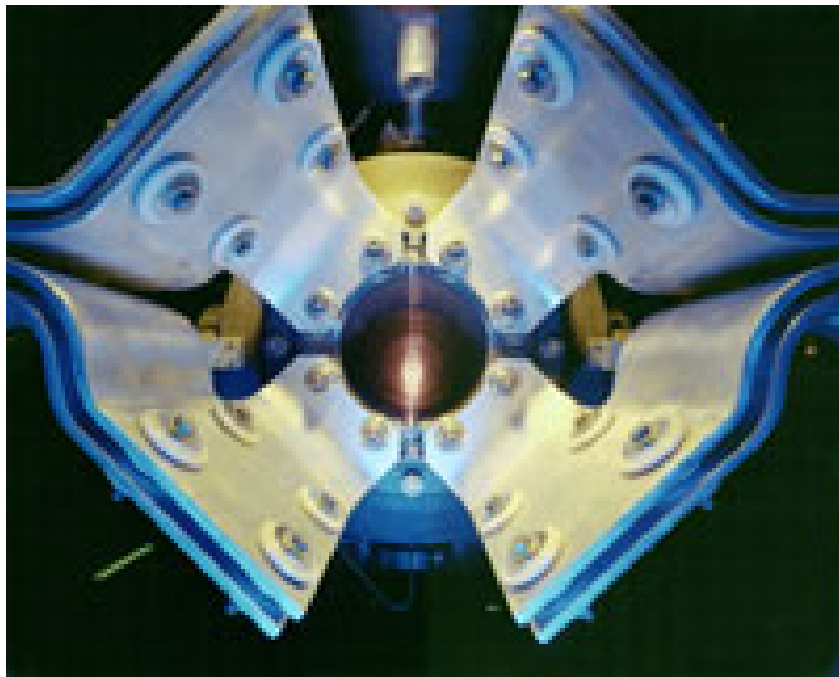
Engineer is moved to a new department. Needs to understand U.S. regulations concerning x-ray machines.



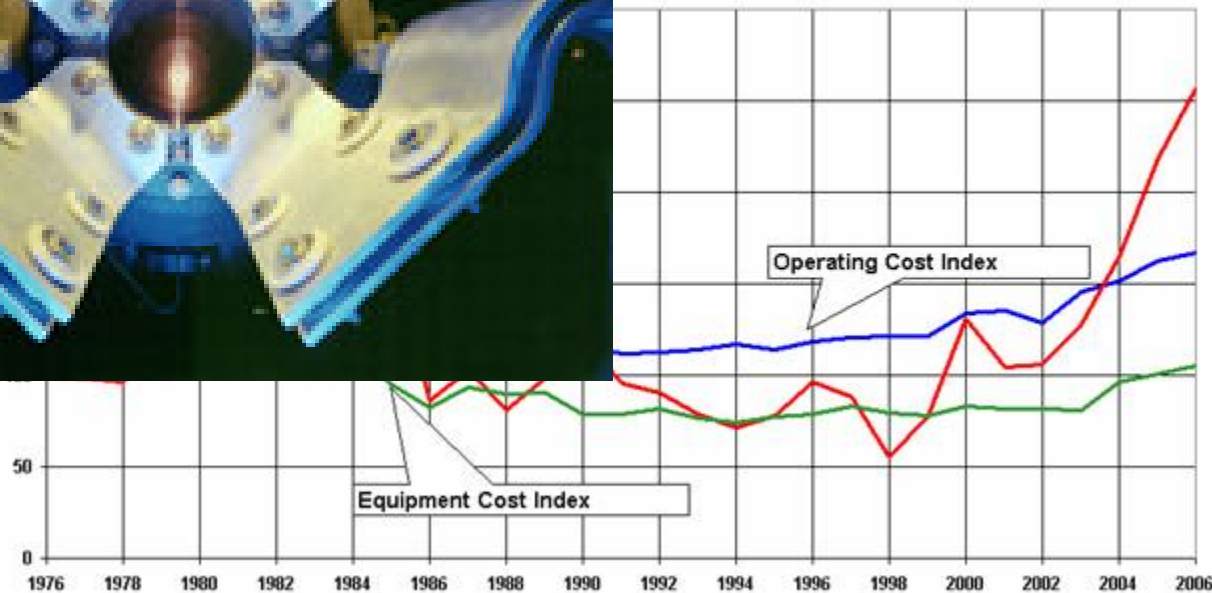
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Story: Cost Risk Analysis

Manager is required by Dept of Energy to write a Cost Risk Analysis for construction of new laboratory.



Equipment Costs, and Operating Costs



Source: Energy Information Administration, Office of Oil and Gas



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Story: International

Student needs to work closely with German companies



German Language School TREFF PUNKT

Story: Management issues

Employee Training, Knowledge Management, Employee Retention



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About 15 years of cooperation....



Technical Communication Program



**Kurt F Wendt
Engineering
Library**

College of Engineering



MEPP: Masters of Engineering in Professional practice

Year 1 - Summer	Year 1 – Fall	Year 1 – Spring	Year 2 – Summer	Year 2 – Fall	Year 2 – Spring
Network Skills 1 credit	Engineering Economic Analysis and Management 3 credits	Engineering Problem Solving with Computers 3 credits	Independent Reading and Research in Applied Engineering 1 credit	Engineering Applications of Statistics 3 credits	Quality Engineering and Quality Management 3 credits
<i>First Summer Residency on the UW-Madison Campus</i>	Technical Project Management 3 credits	Communicating Technical Information 3 credits	<i>Second Summer Residency on the UW-Madison Campus</i>	International Engineering Strategies and Operations 3 credits	Engineering and Business Data Communication and the Virtual Office 3 credits



Engineering programs must demonstrate that their students attain:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.



Using Bloom's Taxonomy to assess IRRAE work...

	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
01 IRRAE Project Proposal	Include facts about a problem to be solved	Discuss and describe the problem	Demonstrate or illustrate the expected use of the proposed solution.	Categorize and review possible implications of the proposed solution.	Plan a unified approach to solution (timeline, budget, personnel).	Assess likely level of success; predict value of proposed solution.
02 IRRAE Literature Review	Use research to discover the facts of the state-of-the-art.	Discuss related research, show relationships, and review the relative completeness of the information.	Apply the research to the problem; indicate what is useful and what is not.	Interpret and arrange your discussion to effectively deal with the topic.	Combine different ideas and research information to provide a clear and coherent summary	Draw conclusions as to what parts of the problems have or have not been solved. Recommend next steps.

Expectations and assessment – first two assignments



Using Bloom's Taxonomy to assess IRRAE work...

	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
03 IRRAE Project Document (Draft) 04 IRRAE Project Document (Final)	Establish an effective factual basis for project (good research completed). Include facts about a problem to be solved	Discuss and relate the research, explain connections between elements of research and the problem. Discuss and describe the problem	Apply facts and research to the identified problem; show effective problem solving for the project. Demonstrate or illustrate the expected use of the proposed solution.	Identify and relate components of the problems and elements of the research; establish relevance. Categorize and review possible implications of the proposed solution.	Assemble, organize, and present elements of the problem and details of research to demonstrate a coherent and complete solution.	Assess significance of your work, likely impact, recommend next steps, note any prospective problems or future issues

Expectations and assessment – final assignments



Story: When information literacy skills are revved up

Motorcycle engineer needs to study motorcycle windshields in wind tunnels.



www.motorcyclecruiser.com



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Advice to other librarians

- Win them over with a mini literature search
 - Show them this is an effective way to get things done.
 - Not used to reading how someone else solved a problem
- Document Delivery
 - Unfamiliar with a free service. Too good to be true.
- Support them
 - Any problem you have – come to me.
 - Convince them that you like to get lots of questions.
- Repeat yourself. Re-explain
 - Some people don't hear you until they are in the middle of a problem.



Why it's worth the extra effort...

- Distance students ask questions that help improve services for everyone.
- Working engineers are solving real and difficult problems.
 - Tests the library resources and librarians' skills.
- Proven success of program
 - Students develop information literacy skills
 - Students want to use library resources after graduation.



Evaluation

- Overall – continued increase in perceived “value”
- Specific comment from summer 2007 (survey results):

...improved research skills considerably	agree 50%	strongly agree 50%
...improved communication skills	agree 50%	strongly agree 39%
...what I learned will be useful...now: ...in the future:	agree 50% agree 56%	strongly agree 39% strongly agree 39%
...library databases were valuable	agree 44%	strongly agree 56%

- Here's what we heard



Motorcycle Engineer

