



EN1740 Computer Aided Visualization and Design

Spring 2012

Tu-Th 6:30-7:50 B&H 191

Brian C. P. Burke



Tonight:

- ...*when, where, why, who, what?*
- Syllabus
- Projects
- Assignment 1
- Intro to Pro/Engineer
 - How to get around
 - File management

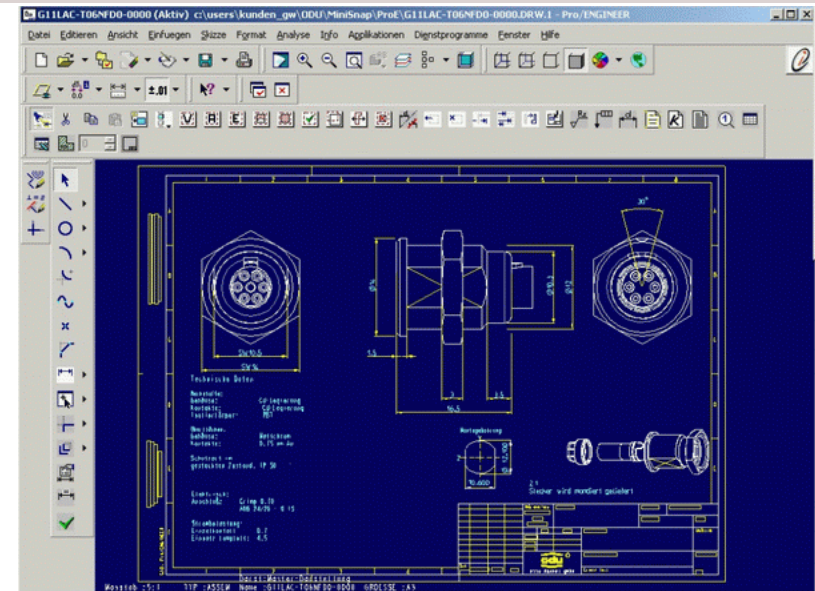
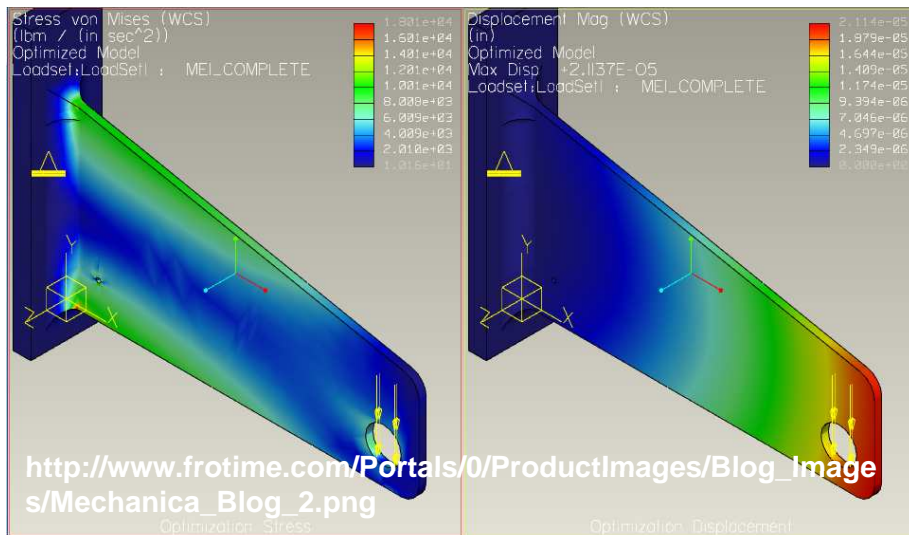


When and Where?

- Lecturers – B&H 191, Tu-Th 6:30-7:50pm
- Office Hours
 - Burke – B&H 191, Th 8:15-10:15pm
 - TA, Ryan Marinelli & Jessica Claflin – B&H 191,
 - Projects may require some time in Prince Lab
 - To be announced
 - We'll need to coordinate with Brian Corkum
- **Going to need a make-up time available**



Why CAD?



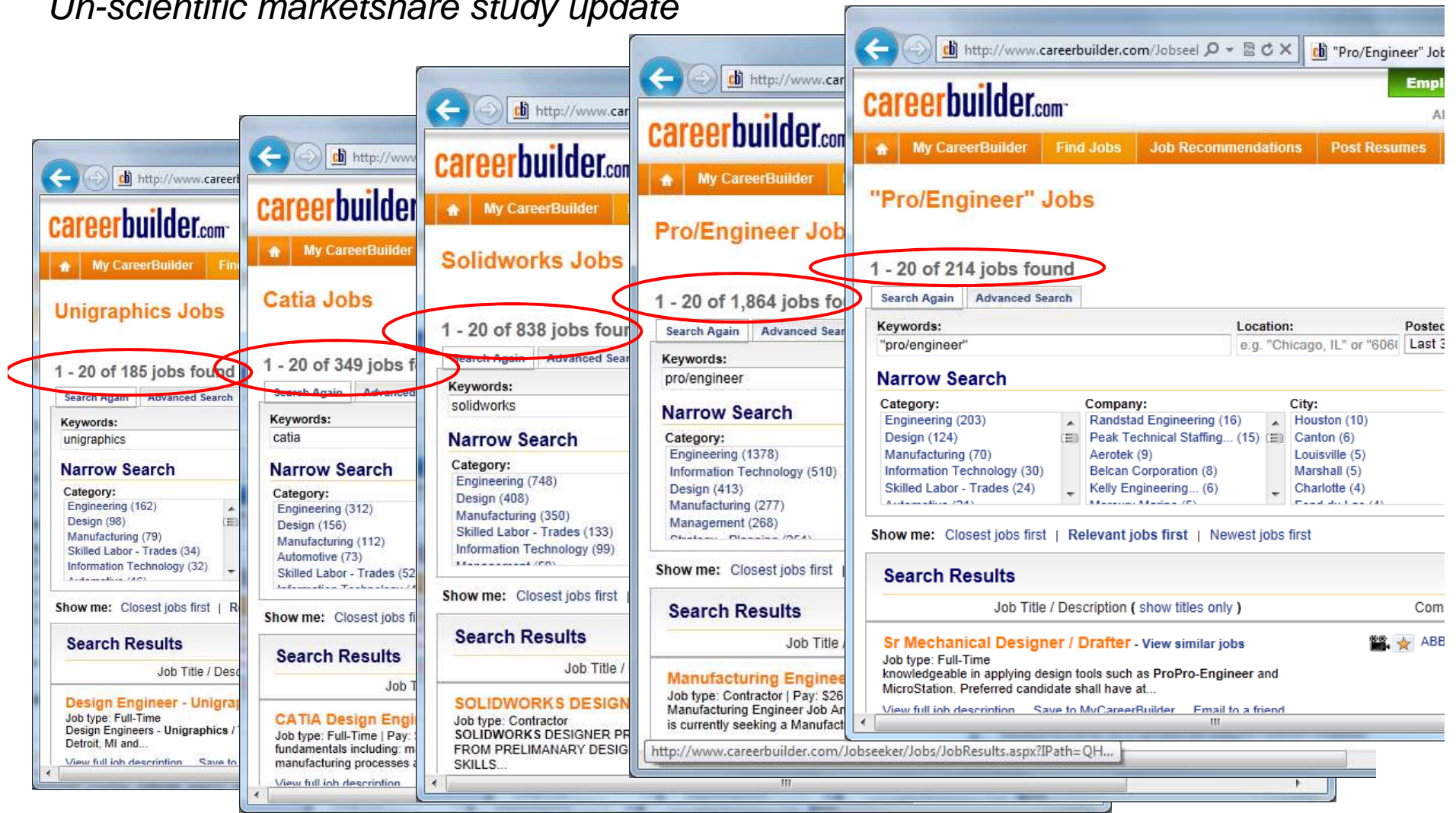
http://www.cogras.cz/images/projects_odu_drawing.png





Why Pro/Engineer (2012)?

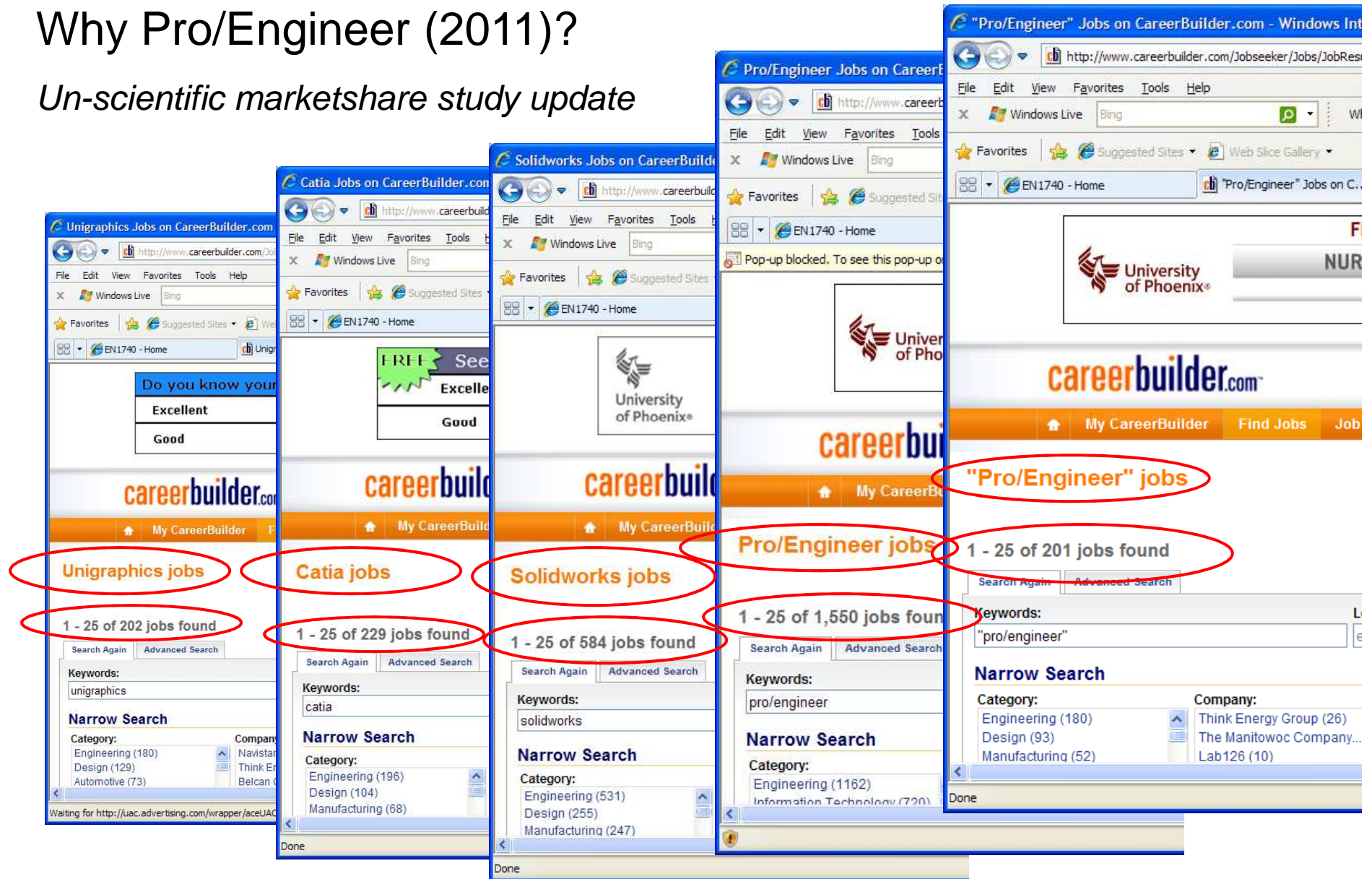
Un-scientific marketshare study update





Why Pro/Engineer (2011)?

Un-scientific marketshare study update





Why Pro/Engineer (2010)?

Un-scientific marketshare study

The image displays four overlapping screenshots of the CareerBuilder website, each showing job search results for a different CAD software. Red circles highlight the search keywords, the number of jobs found, and the first job listing in each window.

- Unigraphics Jobs on CareerBuilder.com:** Keyword: unigraphics, 85 jobs. First job: Drafter with Unigraphics - View similar jobs.
- Catia Jobs on CareerBuilder.com:** Keyword: catia, 119 jobs. First job: DESIGNER CATIA CATIA DESIGNER - View similar jobs.
- Solidworks Jobs on CareerBuilder.com:** Keyword: solidworks, 327 jobs. First job: Designer Solidworks Autodesk - View similar jobs.
- Pro/Engineer Jobs on CareerBuilder.com:** Keyword: pro/engineer, 797 jobs. First job: Pro/Engineer Designer/Detailer - View similar jobs.



Why Pro/Engineer?

Scientific (slightly) marketshare study update

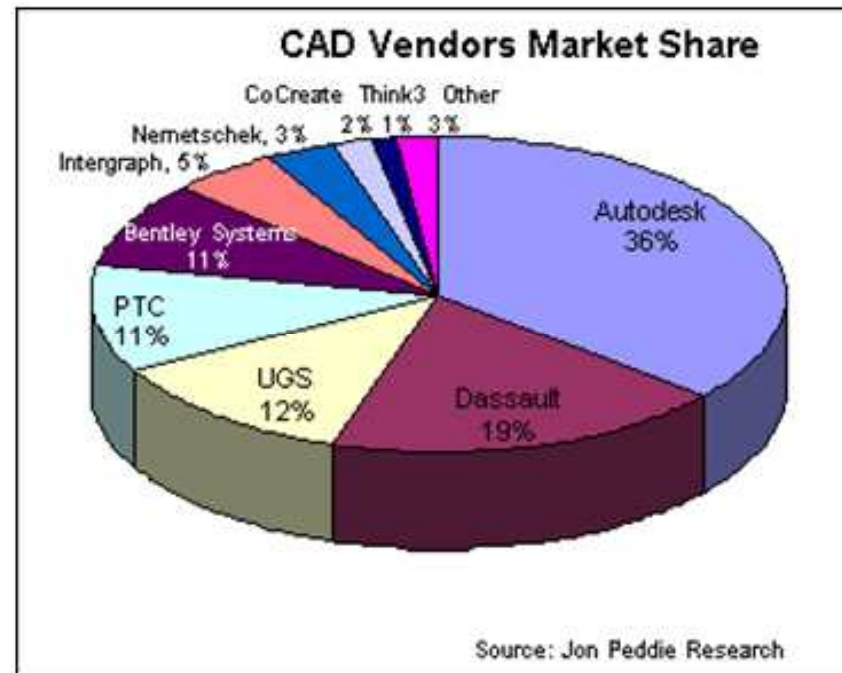


Figure 1: Worldwide market shares for CAD software.

Kathleen Maher, Jon Peddie Research, 2008

<http://www.ictspaghetti.com/CAD/vol3issue1/jpr.php>



Who?

- Primarily engineering students who have taken EN0310
 - Flexible on prerequisite
 - Responsibility of student to fill in missing background
- Course should match interest of students
 - Who is here will greatly influence what we study



What?

Your interests? Background? Experience?

What is currently planned:

Formulation

- Top-Down vs. Bottom-up design
- Solid Modeling - Parametric feature creation, Layout, datums and coordinate systems, Data sharing and published geometry, Advanced geometry creation
- Assemblies – Skeletons, Parent-child, Tolerance analysis, Best practices

Visualization

- Rendering
- Animation

Simulation

- Motion Analysis
- Structural FEA
- Optimization

Communication

- Multi-view engineering drawings
- Orthographic projection
- Geometric Dimensioning and Tolerancing
- ASME Y14.5 2009



Syllabus

Objective

An overview of software tools available for the formulation, visualization, simulation and communication of engineering designs. Students will study the use of computer applications to develop an engineered product from initial concept through to completed production design. Includes hands-on experience in the use of CAD/CAE software packages. Emphasis is placed on applications to solids and structural problems. Design projects will be carried out to supplement the material presented in course lectures.

Grading

Homework - 40%

Approximately bi-weekly assignments

Individual Project (*due on or around 3/17*) - 30%

Create component and assembly 3D models as well as corresponding engineering drawings.

Group Project (*due on or around 5/11*) - 30%

Use selected individual projects as a starting point to enhance design by using tools presented in class.

Textbook

GD&T Application and Interpretation by Bruce A. Wilson, Goodheart-Willcox
(ISBN 978-1-60525-249-0)

Available from a large number of on-line retailers

Notes

- Assignments will be distributed in class
- Electronic files will be submitted to *en1740.brown@gmail.com*
- Supporting materials will be available on the class website
- Assignments will be due one week after distribution
- Assignments may be submitted late only if an extension is granted before the due date
- The tenets of Brown's Academic Code will be followed



Course Philosophy and Objectives

- Software independent
- Skills developed here setup and then complete fundamental engineering
- Everyone should be proficient to jump in as entry-level design engineer



Textbook - *Optional*

Goodheart-Willcox—GD&T: Application and Interpretation, 5th Edition - Windows Internet Explorer

http://www.g-w.com/SelectedBook.aspx?CatID=08&BookID=353

File Edit View Favorites Tools Help

Convert Select

Goodheart-Willcox—GD&T: Application and Interpretation...

College

G-W Home > Technical / Trades / Technology > CAD / Drafting > GD&T: Application and Interpretation, 5th Edition

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GD&T: Application and Interpretation, 5th Edition

By: Bruce A. Wilson

ISBN: 978-1-60525-249-0
Format: Softcover
Copyright: © 2010
Subject: CAD / Drafting
Grade Level: 11-14
Retail Price: \$58.64
School Price: \$43.98

[Preview Request](#)

Order Products	Description	Table of Contents	Look Inside	Correlations	
Title	Pages	ISBN	Retail Price	School Price	Quantity
Text	275	978-1-60525-249-0	\$58.64	\$43.98	<input type="text"/>
Study Guide	134	978-1-60525-250-6	\$18.00	\$13.50	<input type="text"/>
* Instructor's Manual	48	978-1-60525-251-3	\$30.00	\$22.50	*
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*Items marked with an asterisk cannot be ordered online. Please call 800.323.0440 to order.

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Projects

Phase I (Individual)

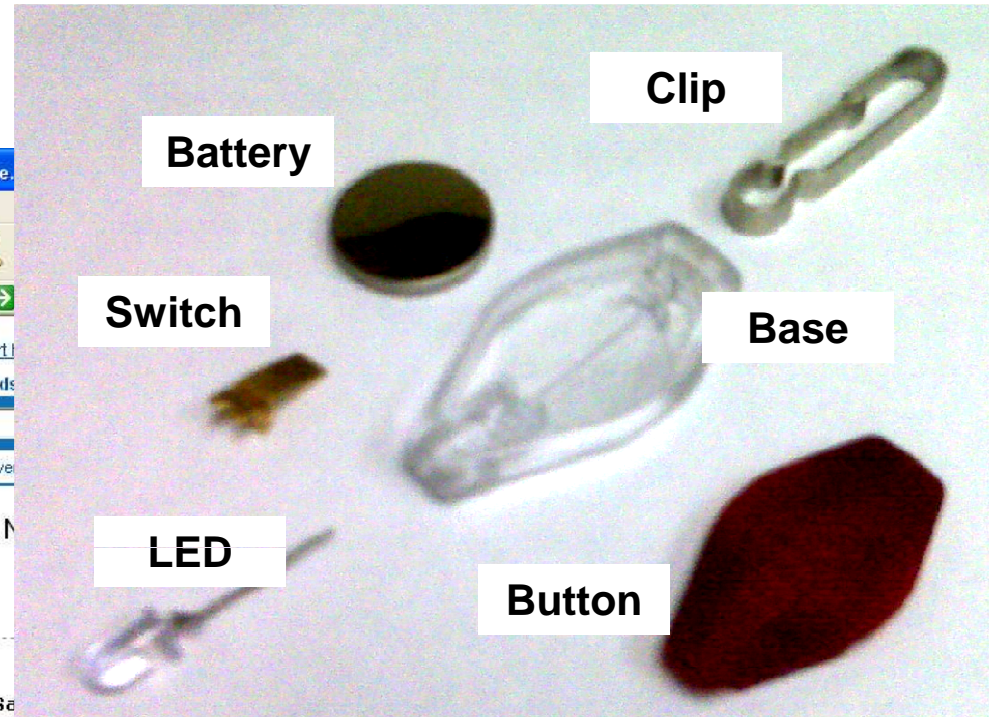
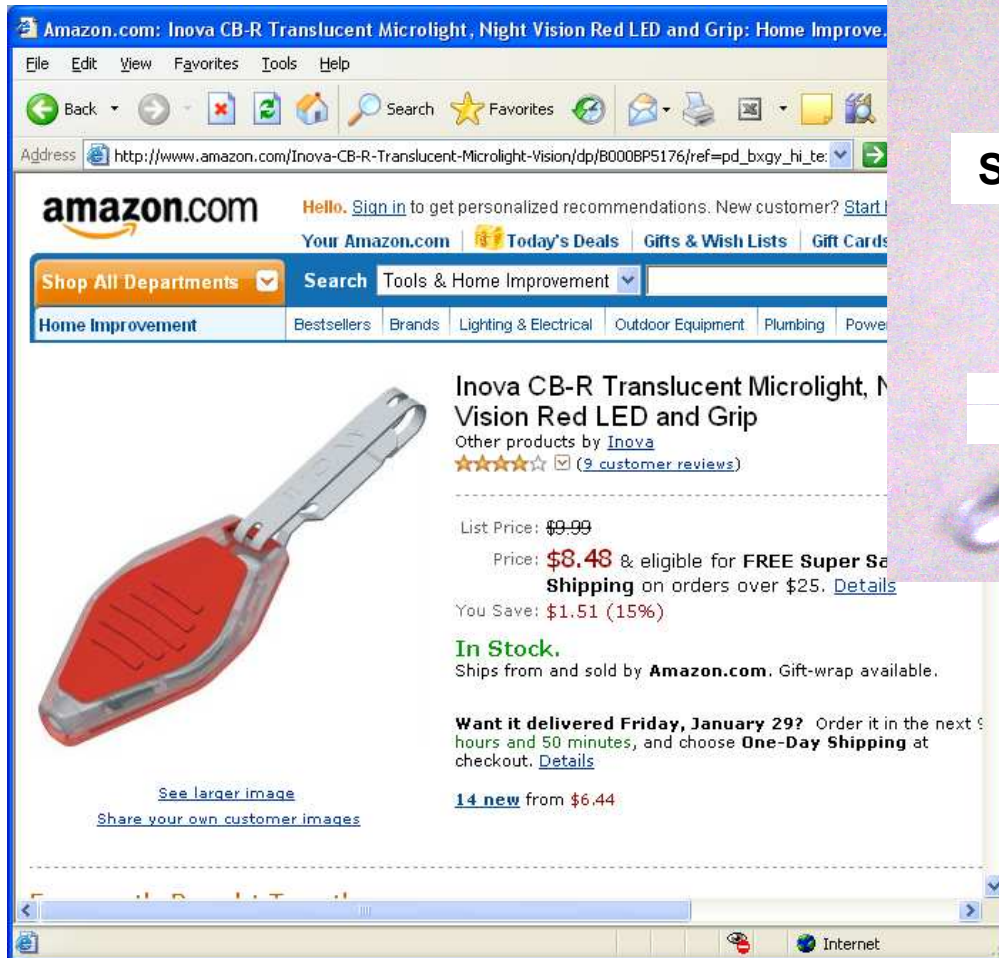
- Model an existing project
 - Parts
 - Assembly
 - Component drawings
 - Assembly drawing

Phase II (Group)

- Visualize
 - Render
 - Animation
- Improve design using tools presented
 - Strength
 - Weight
 - Cost
 - Durability

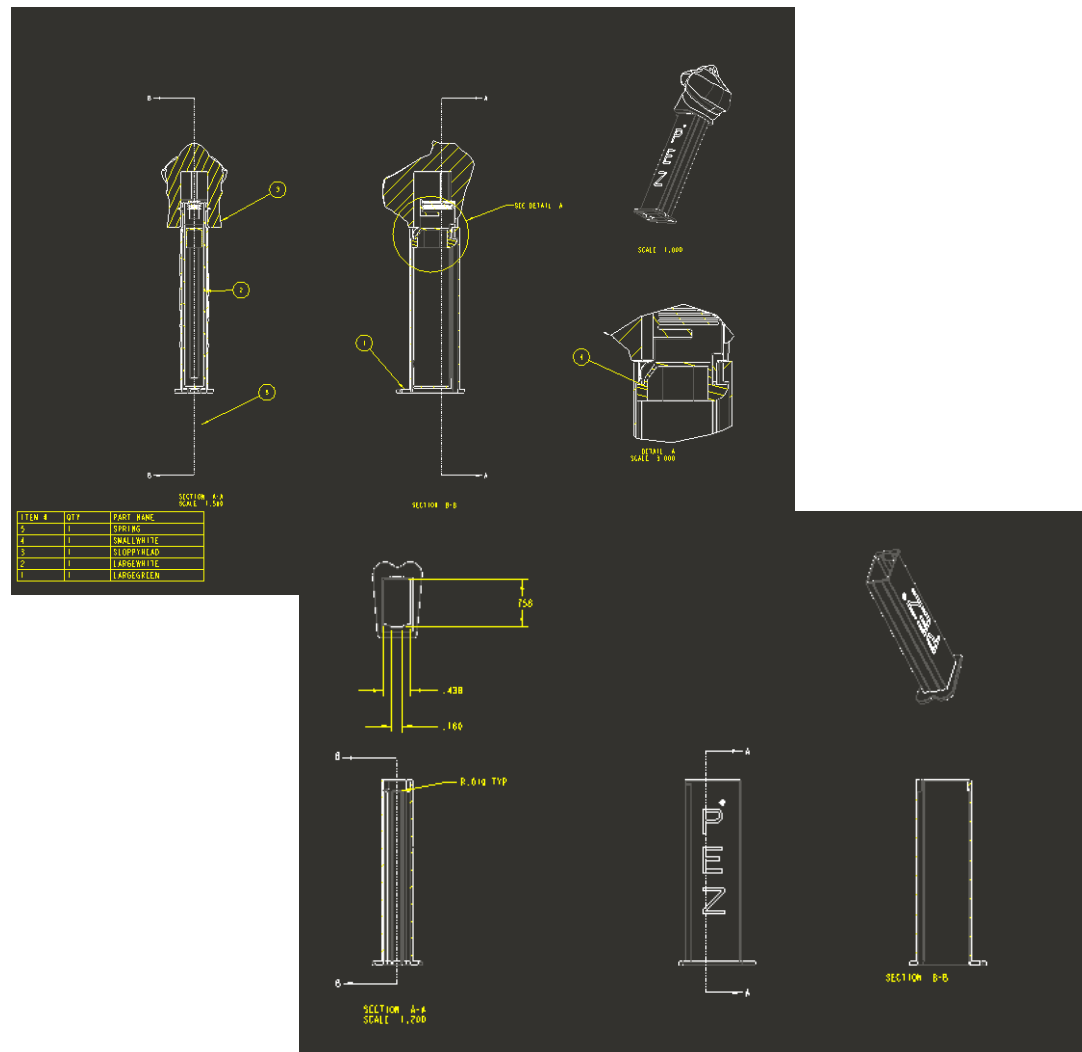


Individual Project Example

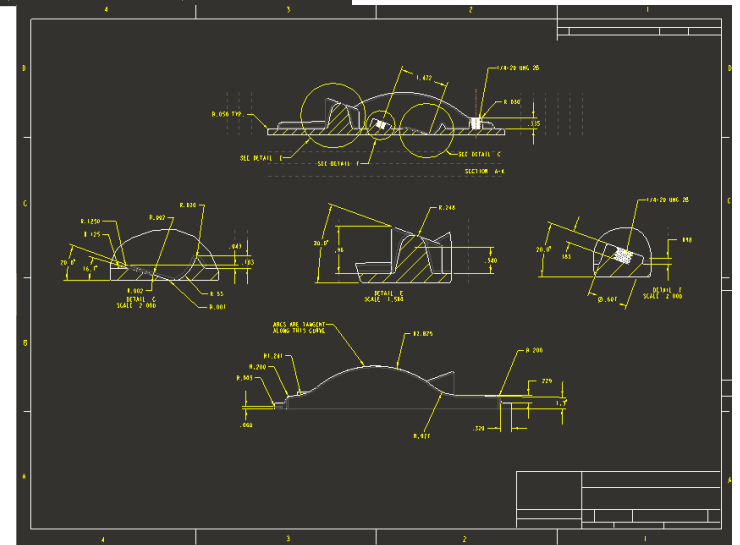
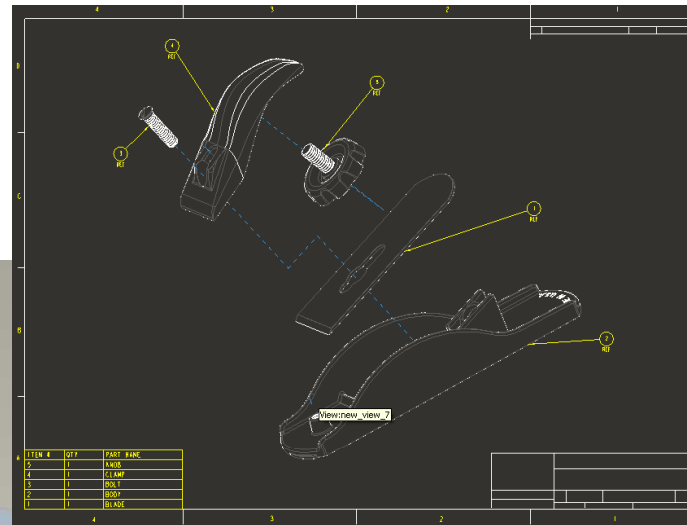
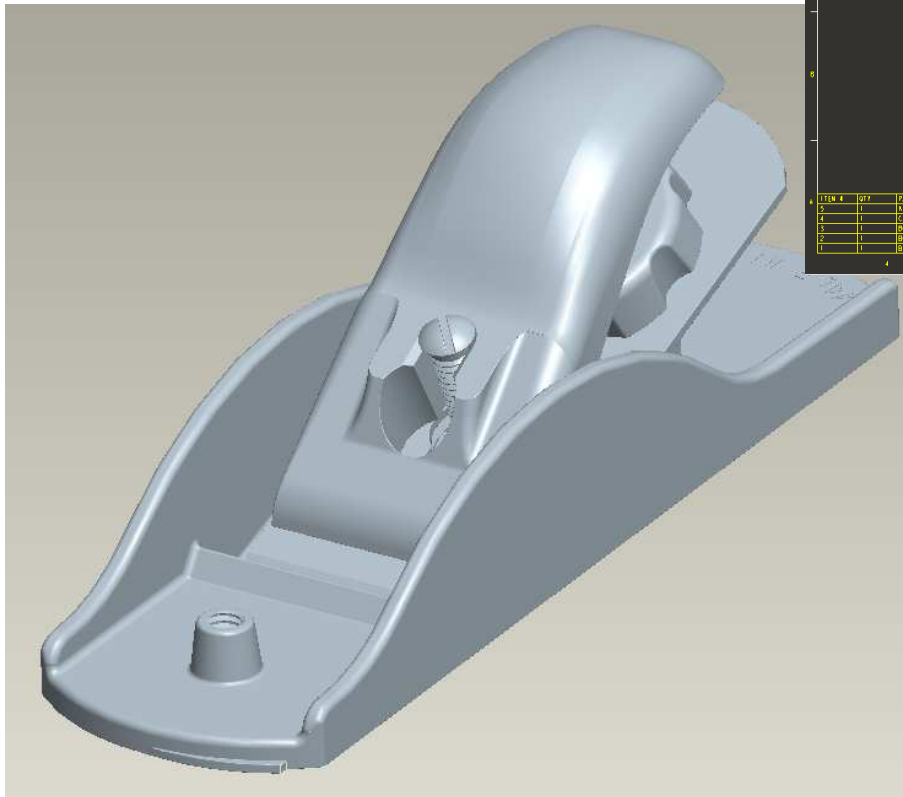




Past Individual Project Example



Past Individual Project Example



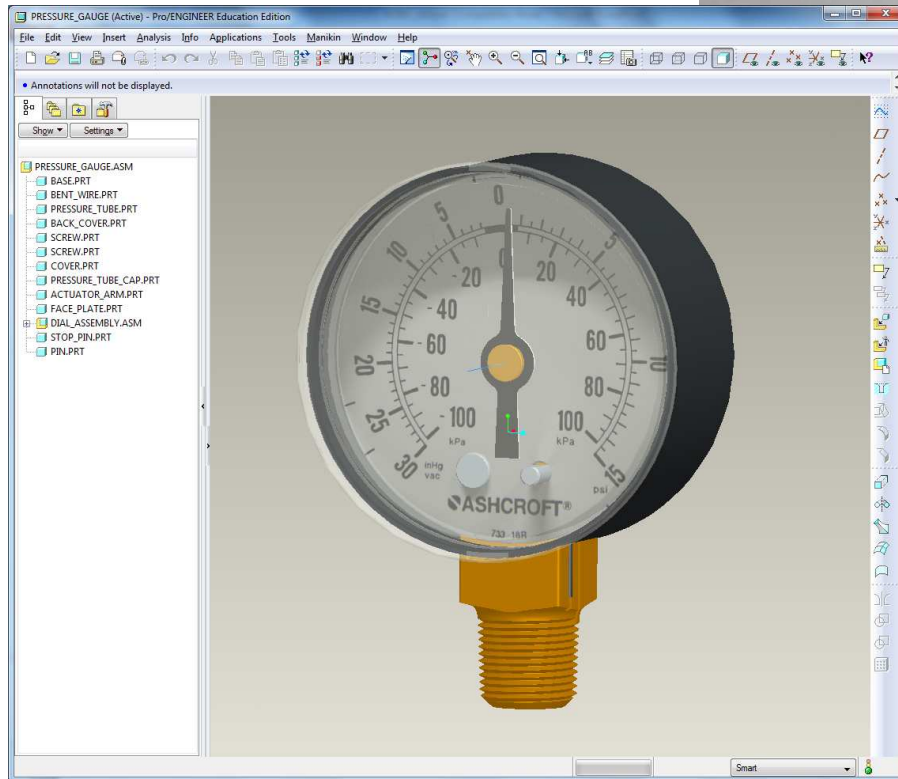


Past Individual Project Example



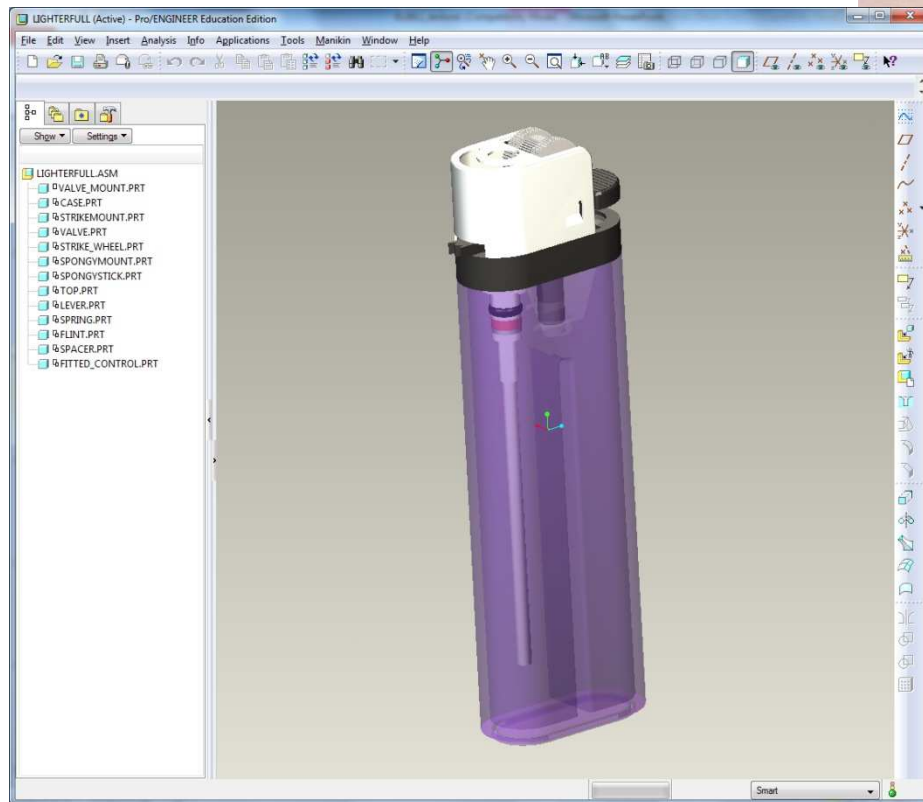


Past Individual Project Example





Past Individual Project Example





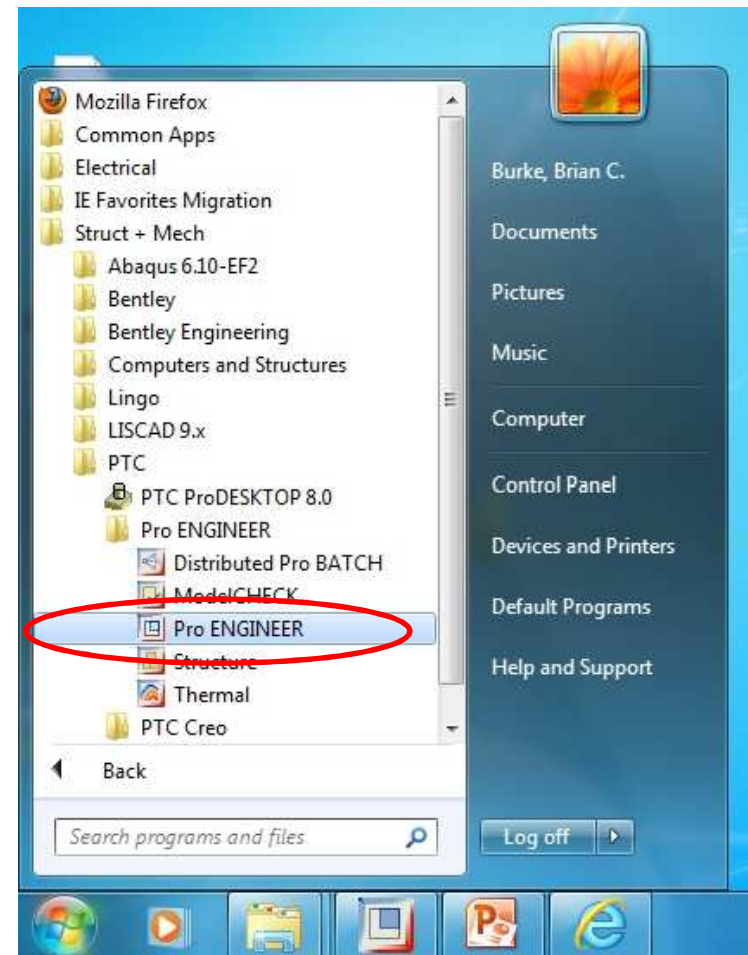
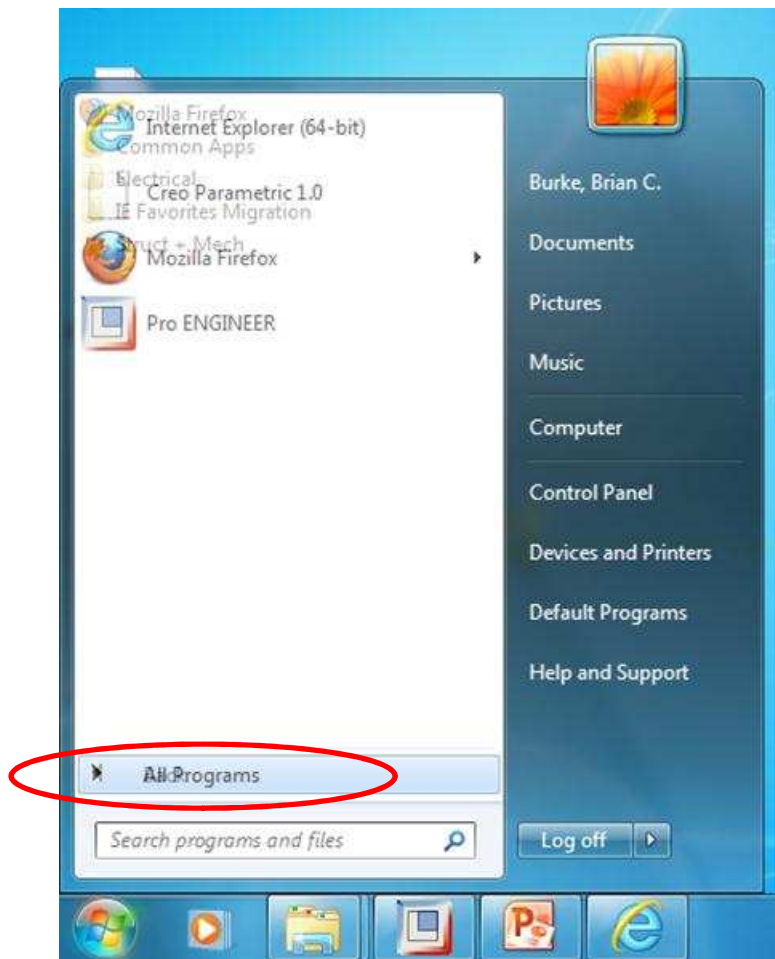
HW Assignment 1

- Find a product or sub-assembly for the project that meets the following criteria:
 - 5-8 components
 - At least two different materials (metals, polymers, etc.)
 - *NO PENS OR PENCILS*
 - *NO HIGHLY SCULPTED GEOMETRIES (Detergent bottles, spray bottles, etc.)*
 - One product per person
 - First come, first serve as determined by email receipt
- Take it apart and ***KEEP THE PIECES***
- Send exploded picture to en1740.brown@gmail.com ***NO LATER THAN 1/31/12.***
- Bring device to class on Thursday 2/2/12 to review.



Getting started with Pro/E

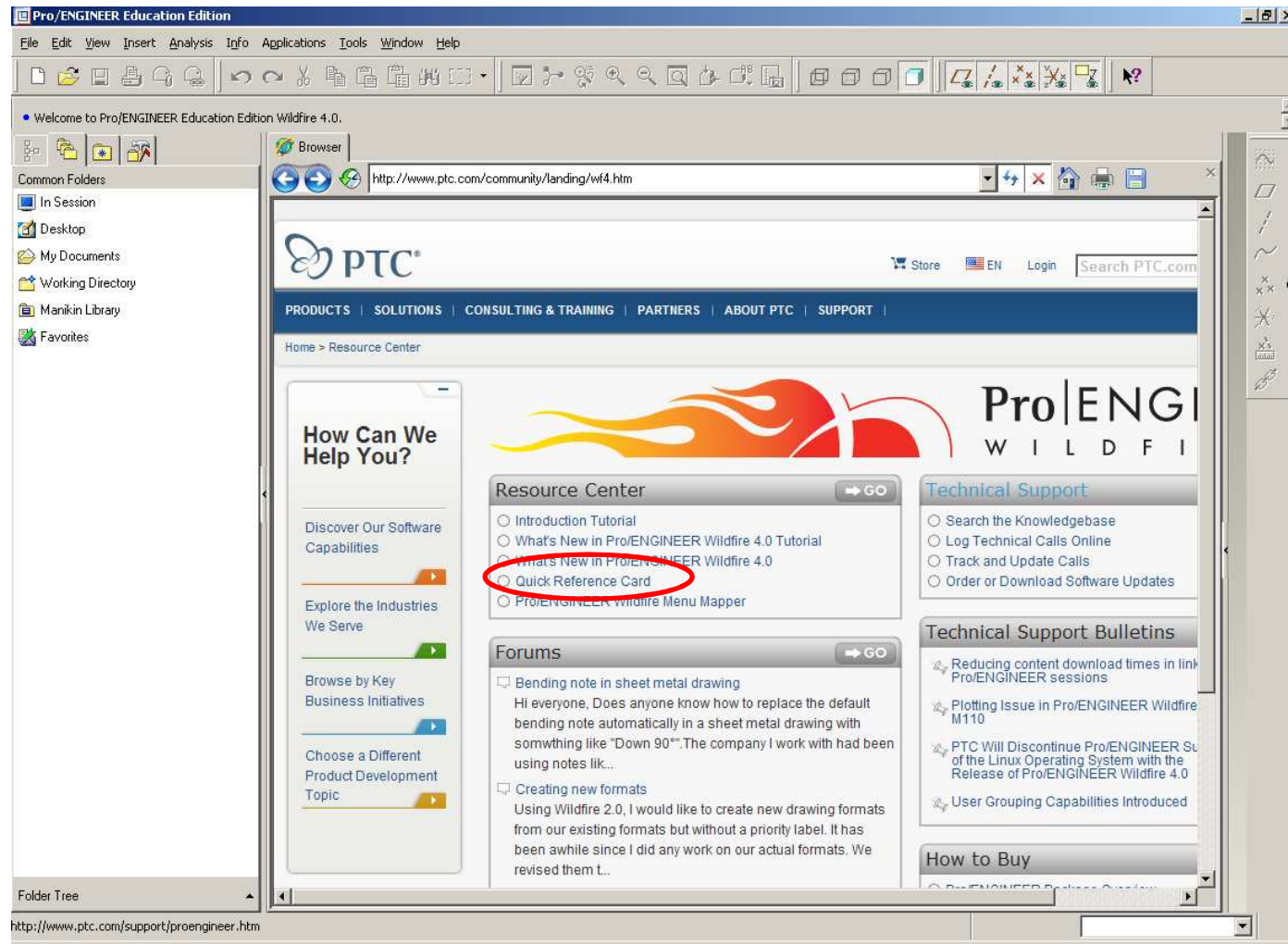
From All Programs...



...go to Struct + Mech,
PTC, Pro ENGINEER

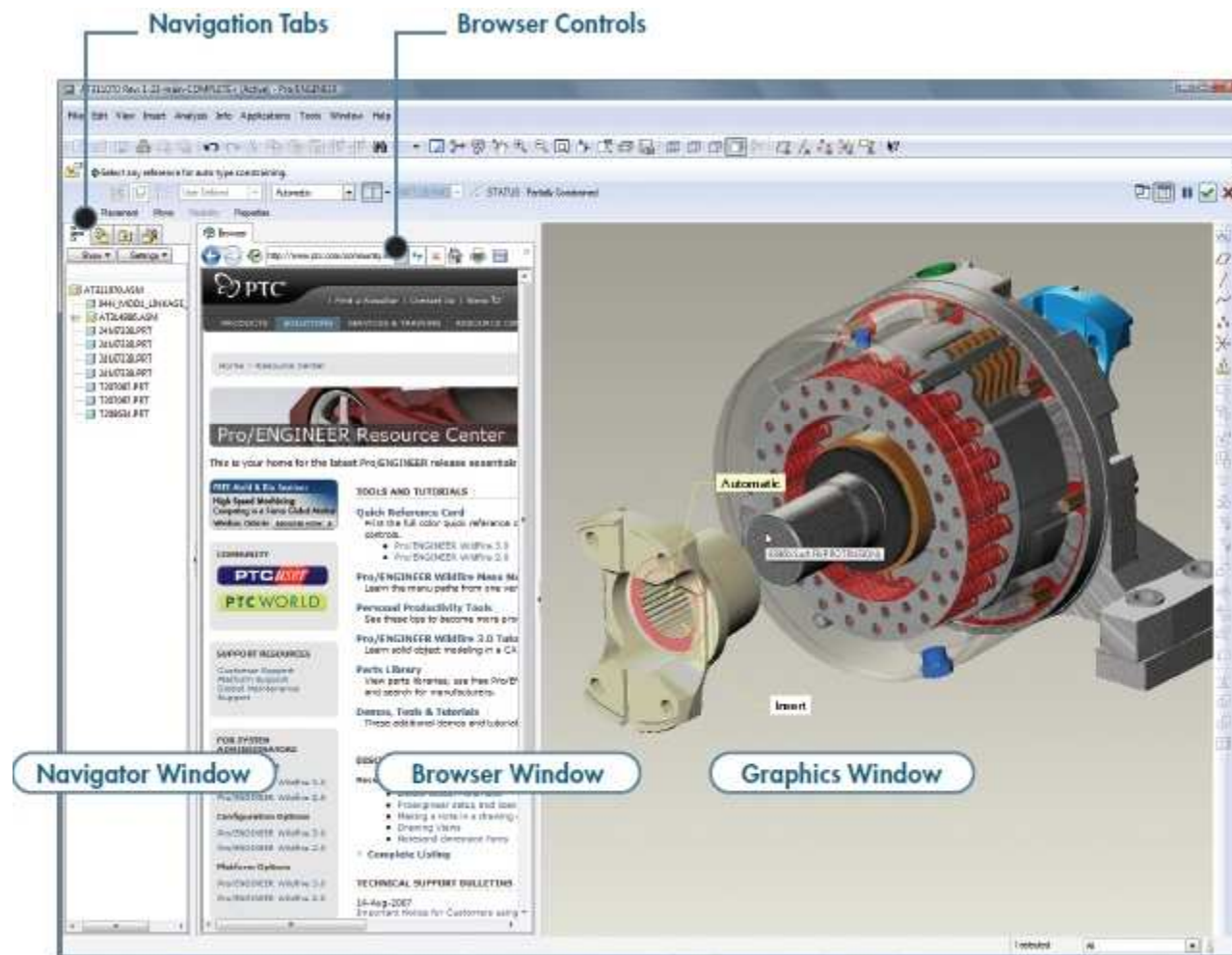


Getting started with Pro/E – Quick Reference Guide





Getting started with Pro/E – Main screen

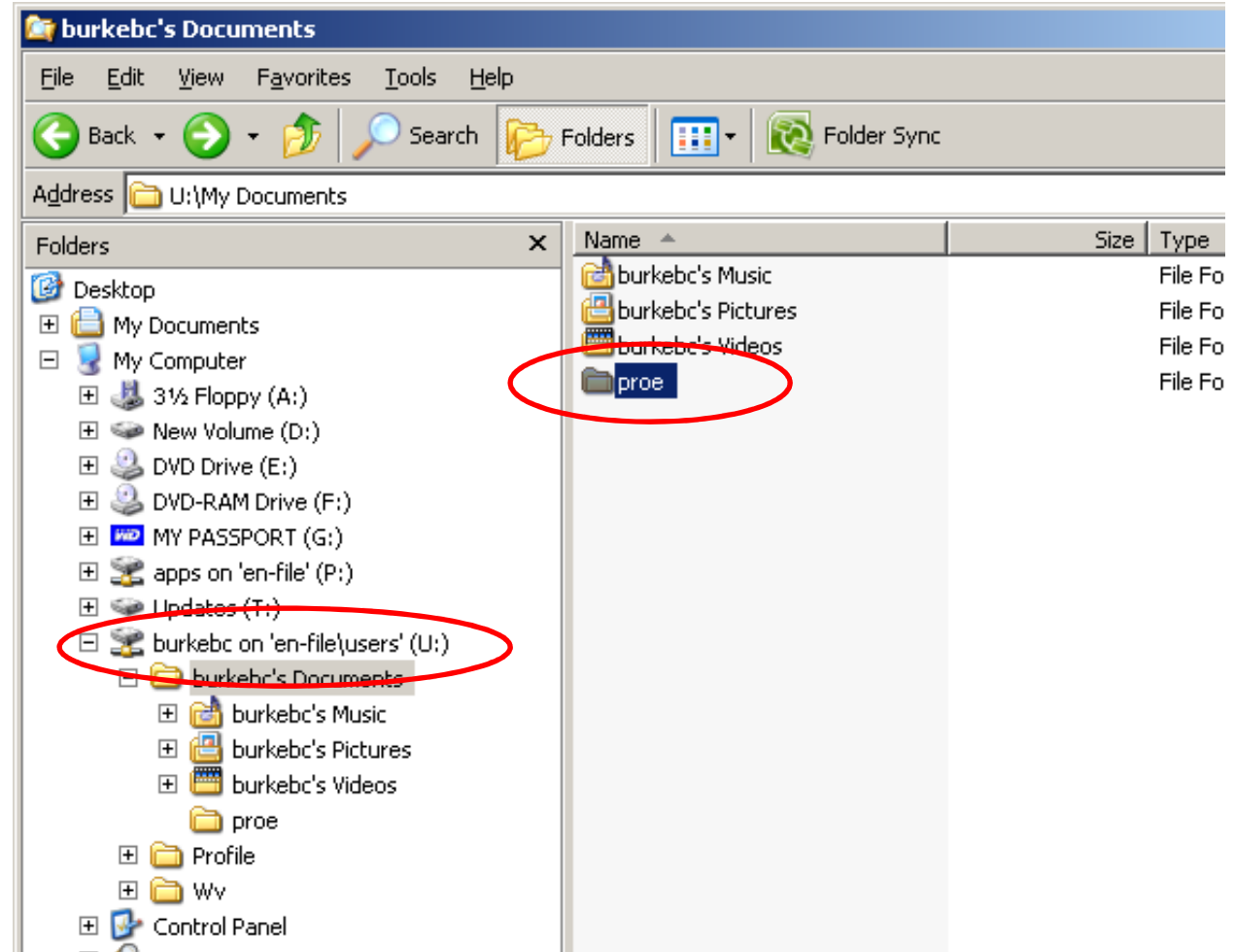




Getting started with Pro/E – Opening a part file

Setup Pro/E directory

- Go to U: drive
- Create a new folder “proe”





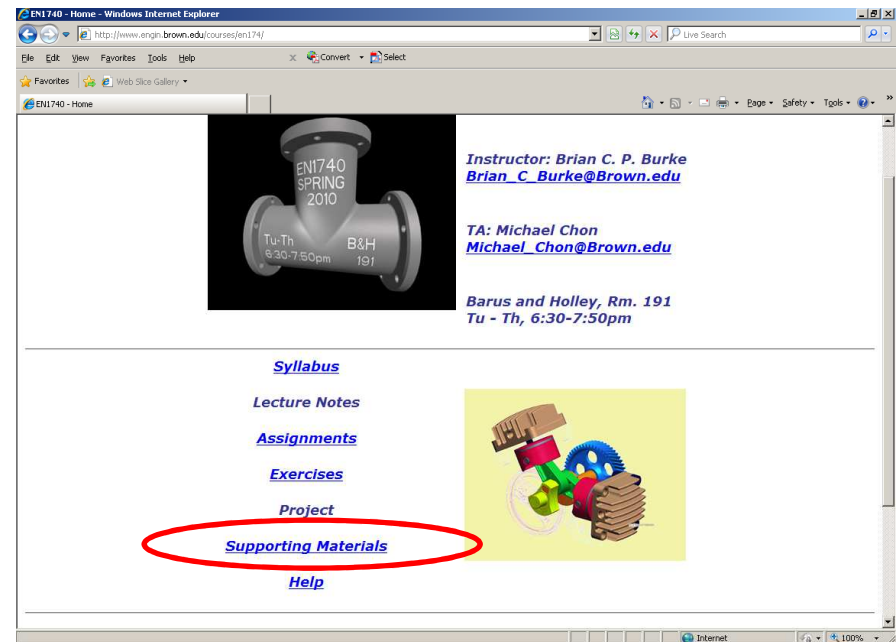
Getting started with Pro/E – Opening a part file

Download sample part

- Go to the course website:

<http://www.brown.edu/Departments/Engineering/Courses/En174/>

- Go to “Supporting Materials” page
- Right click, “Save Target As”
- Save to “proe” folder
- Extract in this folder
- *Make sure part is in this directory*





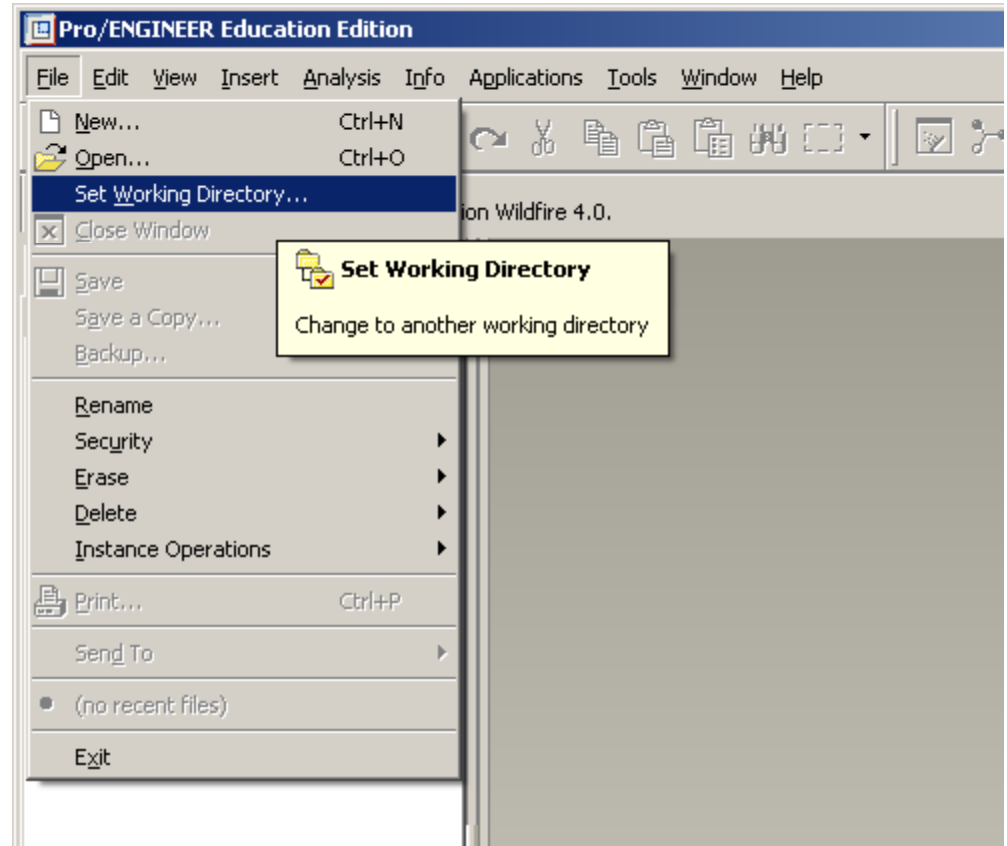
Getting started with Pro/E – Opening a part file

Set Working Directory

- File > Set Working Directory > Choose U:\My Documents\proe

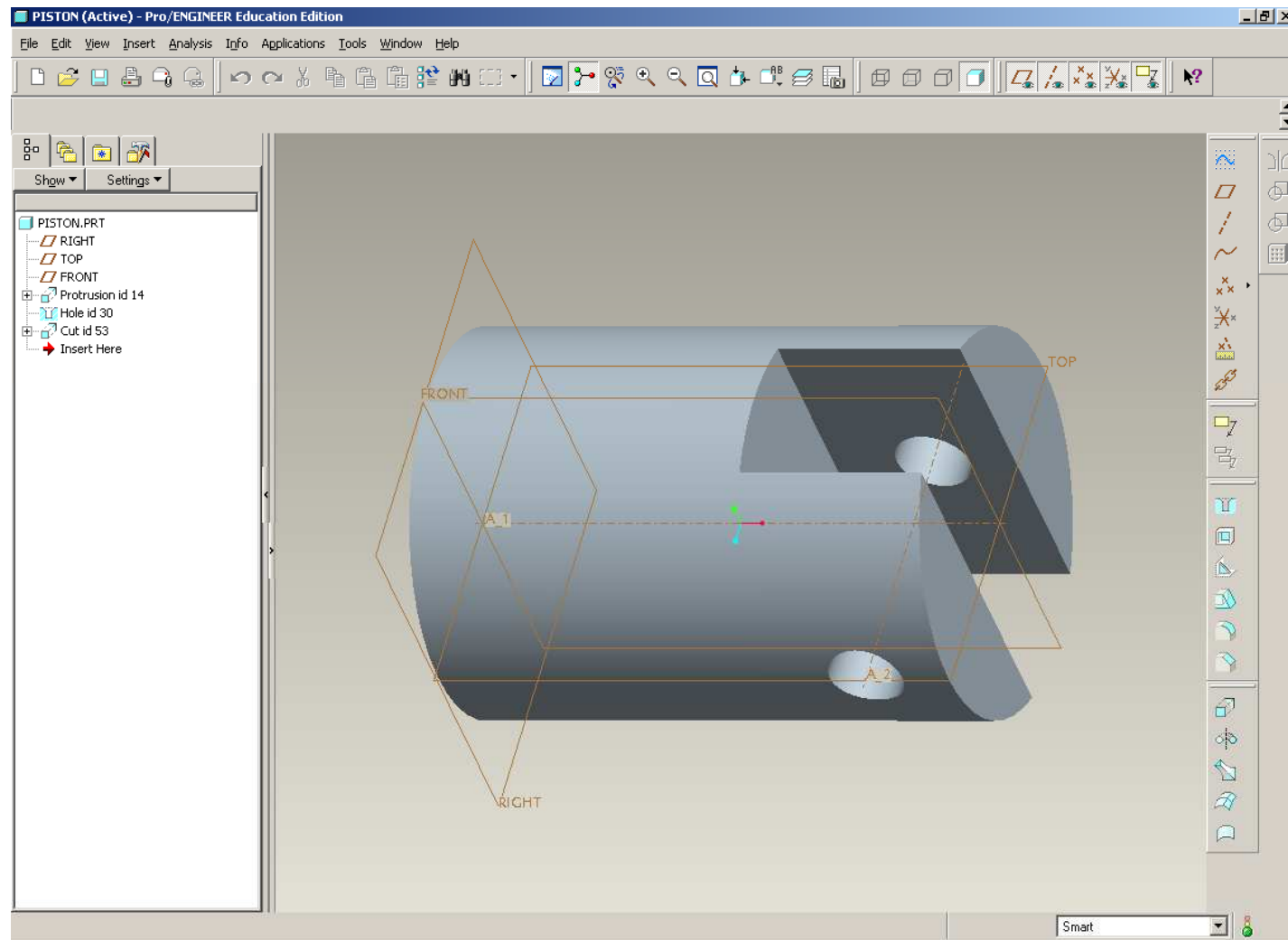
Open *piston.prt* in Pro/E

- File > Open > piston.prt > Ok





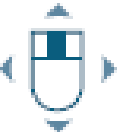



Getting started with Pro/E – Should be here

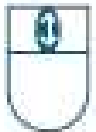






Getting started with Pro/E – Pan, Zoom, Spin

DYNAMIC VIEWING

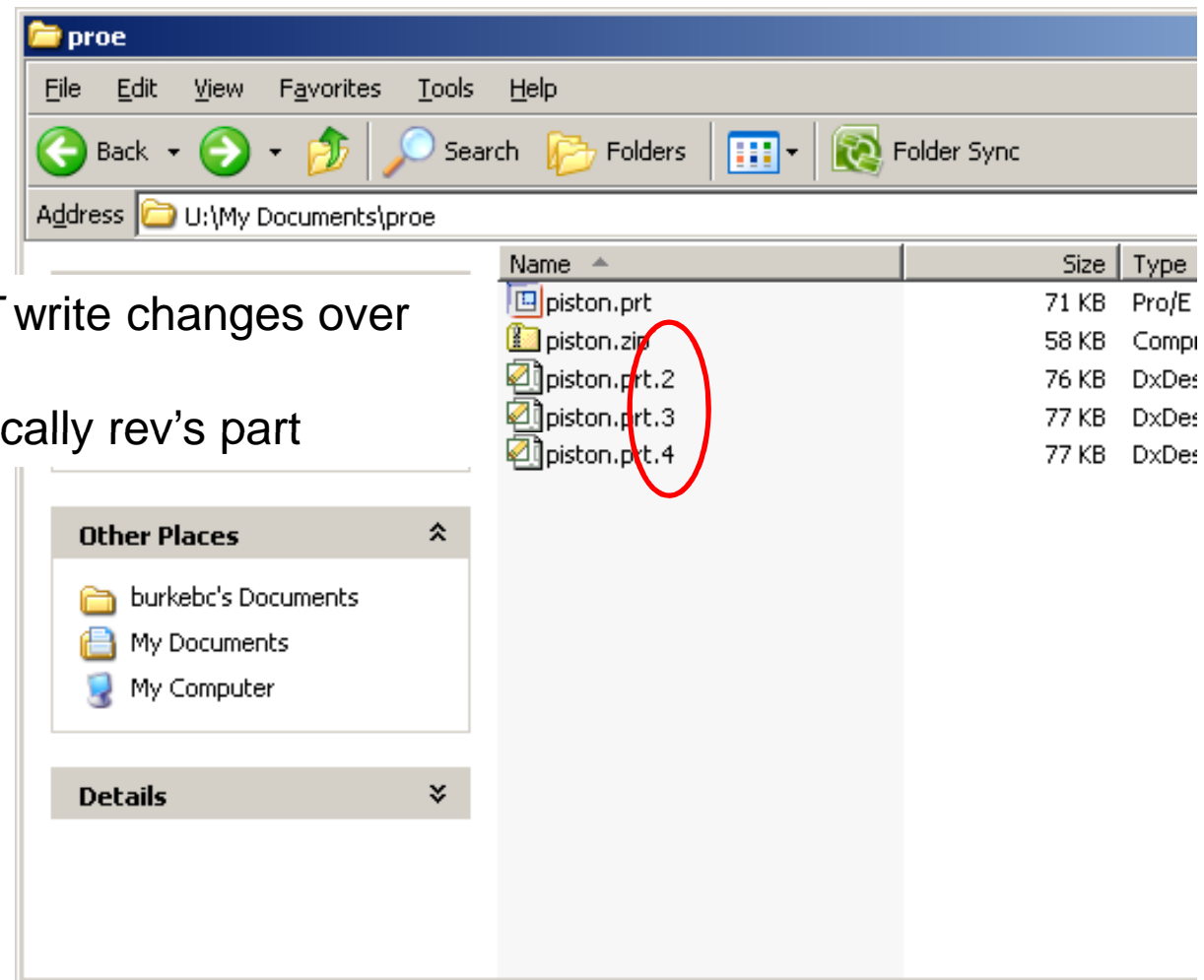
3D Mode	
Hold down the key and button. Drag the mouse.	
SPIN	» 
PAN	» SHIFT + 
ZOOM	» CTRL + 
TURN	» CTRL + 

2D and 3D Modes	
Hold down the key and roll the mouse wheel.	
ZOOM	
FINE ZOOM	SHIFT + 
COARSE ZOOM	CTRL + 



Getting started with Pro/E – How Pro/E saves files

- Pro/E does *NOT* write changes over the last version
- Rather, automatically rev's part





Getting started with Pro/E – File managment

