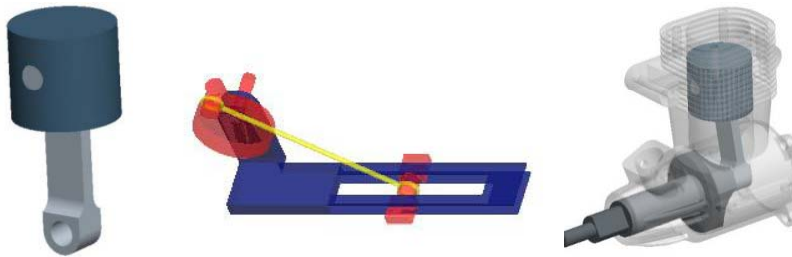


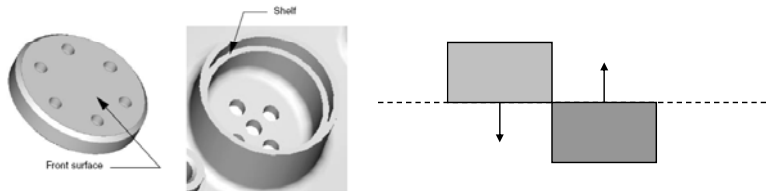
ASSEMBLY MODELING and MOTION ANIMATION Using Pro/ENGINEER



Six Common Assembly Constraints

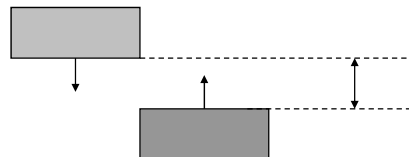
MATE (or MATE COINCIDENT)

Two planar surfaces or datums become coplanar and face in opposite directions.



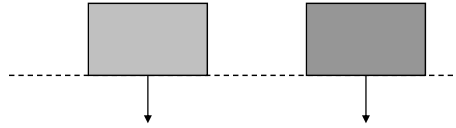
MATE OFFSET

Two planar surfaces or datums are made parallel, with a specified offset distance, and face in opposite directions. The offset dimension can be negative.



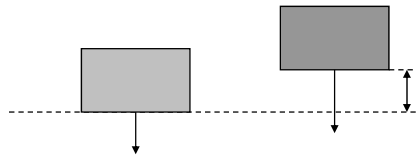
ALIGN (or ALIGN CONINCIDENT)

This can be applied to planar surfaces, datums, revolved surfaces and axes. Planar surfaces become **coplanar** and face in the **same direction**.



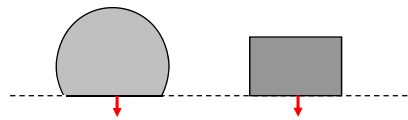
ALIGN OFFSET

This can be done only with planar surfaces: they become **parallel** with a specified **offset** and face the **same** direction.



ALIGN OREINT

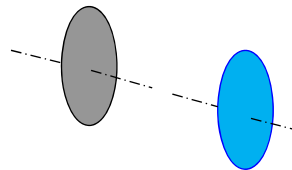
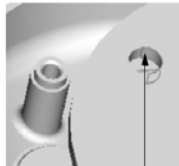
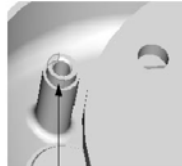
Two planar surfaces or datums are made **parallel and face the same direction** (similar to Align Offset except without the specified offset distance).



INSERT

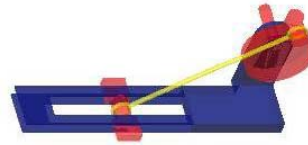
This constraint can only be used with **two surfaces of revolution** in order to make them **coaxial**.

Third reference set for the PC board



Other Functions in Assembly Generation

- Add Color
- Create a Cutout View
- Create an Exploded View
- Generate Assembly Drawing
 - Dimensions for Defining Overall Size
 - Assembly Dimensions
- Motion Animation ([Pro/ENGINEER Wildfire 4.0 Design Animation Concepts Guide from PTC](#))
- Run a Simple Mechanism ([Pro/Assembly](#), [Pro/Animation](#) and [Pro/Mechanism Design Tutorials](#))



← Key dimensions needed on an assembly drawing



MECH 410 and MECH520
Computer Aided Design

Course Homepage: <http://www.me.ubc.ca/~mech410/>
Dr. Zuomin Dong
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 E-mail: zdong@me.ubc.ca Research Interests: <http://www.me.ubc.ca/~pdong/>

(This website will be continuously updated and activated.)

COURSE CONTENT

Lab, Project and Time Schedule

Laboratory Information and Report Formats

Lecture Notes

- Course Outline and Background Information (condensed slides)
- Introduction to CAD, CAE, CAM and Technology Review, I (condensed slides)
- Computer Hardware for CAD (condensed slides)
- Technical References on 3D Scanning and Computer Model Generation
- An Introduction to the Pro/ENGINEER Design Modeling System (Linked to Pro/E Tutorials and Lecture Notes)
 - An Overview of Pro/ENGINEER (condensed slides)
 - About Pro/ENGINEER Tutorials (condensed slides)
 - Assembly Modeling and Motion Animation I (condensed slides)
- Graphical Coordinate Systems and Basic Geometric Transformations (condensed slides)
- Rotation about an Arbitrary Axis (condensed slides)
- Geometric Projections (condensed slides) (notes in Word)
- Computer Modeling Techniques (condensed slides; notes in Word)
- Advanced Applications of Pro/ENGINEER
 - An Overview of Pro/ENGINEER and Applications of Pro/E Structures (condensed slides)
 - A Review of Finite Element Analysis Method (condensed slides)
 - Design of Sculptured Part Using Pro/ENGINEER (condensed slides)
 - CNC Tool Path Generation and Simulation Using Pro/ENGINEER (condensed slides) (5-axis machining video)
- An Introduction to Design Optimization (condensed slides)
- Example Problems for Quiz I
- Representation of Curves (condensed slides)
- Representation of Surfaces (condensed slides)
 - Generation of Free-form Surface in Pro/ENGINEER (condensed slides)
- Interactive Computer Graphical Programming (condensed slides)
- Data Organization in CAD I (condensed slides)
- An Overview of SolidWorks, COSMOSWorks, COSMOSXpress and COSMOSMotion (condensed slides)
- Example Problems for Quiz II
- Research on Virtual Prototyping, Design Optimization, RP and Fuel Cell Vehicle Systems

Pro/ENGINEER Tutorials and Related Documents

Unigraphics NX Tutorials and Related Documents (available soon)

Pro/Engineer Related Documents and On-Line Tutorials

I. Pro/ENGINEER Wildfire 4.0 Tutorials

1. [Getting Started with Pro/ENGINEER Wildfire 4.0 from PTC](#) (PDF Version)
□□□□□□□□□□ Pro/E Concepts, User interface, Part Modeling, Assembly Modeling and Drawing Generation.
 2. [Pro/ENGINEER Wildfire 4.0 Introduction Tutorial link to PTC Webpage](#)
 3. [Pro/ENGINEER Wildfire 4.0 Quick Reference Card from PTC](#) (PDF Version)
 4. [Pro/ENGINEER Wildfire 4.0 Design Animation Concepts Guide from PTC](#) (PDF Version)
 5. [Pro/Assembly, Pro/Animation and Pro/Mechanism Design Tutorials](#)
Pro/E Part and Assembly Model Files: [part1](#); [part2](#); [part3](#); [Tutorial2a_assembly](#); [Tutorial2b_assembly](#);
Pro/E Animation of the Assembly: [Tutorial_2b](#); [Tutorial_2c](#)
 6. ProMECHANICA [Structural and Thermal Analysis \(example part\)](#) (WF 2.0, unchanged)
 7. ProMECHANICA [Sensitivity Analysis and Design Optimization \(example part\)](#) (WF 2.0, unchanged)
 8. [Pro/ENGINEER Wildfire 4.0 Manufacturing □ Volume Milling Tutorial](#) (PDF Version)
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II. Pro/E Reference Books and Student Edition:

- o [SDC Publications Pre/ENGINEER Book Series](#)
 - o [Pro/ENGINEER Student Edition \(software and tutorials\)](#)
Tutorial book and software of Pro/E student edition can be purchased on-line from *JourneyEd Publishing* at a modest cost.
 - o [Parametric Technology On-Line Information](#)
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IV. Pro/ENGINEER On-Line Tutorials for Previous Releases