

“How CAD Forces Changes to Engineering Graphics Education”

Dr. Richard Jerz
St. Ambrose University
Davenport, Iowa

Presentation Outline

- Review our program & philosophy
- Describe how we teach EG
- Discuss experiences & future plans

How should Engineering Graphics be taught?

- Engineering curriculum?
- How many semesters?
- Content?
- Manual drafting?
- Computer-aided design (CAD)?

St. Ambrose University

- Industrial Engineering Program (ABET accredited)
- Liberal Arts emphasis
- 132 hour curriculum

What is Design?

- Concept Design
- Modeling
- Testing
- Communications (customer, manufacturing, & others)

IE110 - History

- One semester engineering graphics
- Up to 1998
 - Traditional approach
 - No CAD
- Student focus group results
 - Need CAD Experience

CAD Technologies

- Solids-modeling
- Parametric modelers
- Drawing creation
- Analysis

1998 Engineering Graphics Changes

- Changed instructors
- Drafting tables removed
- Maintained EG theory
- Added CAD component
- Adopted solids-modeling philosophy

Books and Supplies

- Engineering Graphics, Giesecke, F.E, Mitchel, A., et.al., 6th ed. 1998.
- Designing Parts With Solid Works, Wysack, R., 1998.
- Solidworks98 training manuals, Volume I and Volume II (Detailing and Assembly)
- Syllabus: <http://web.sau.edu/rjerz/Ambrose/IE110/ie110.htm>.

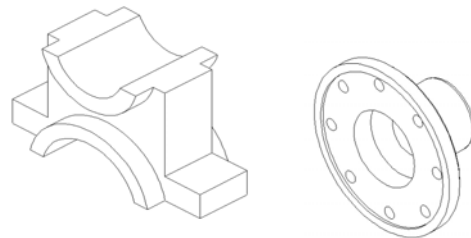
Implementation

- Theory of engineering graphics
 - Lectures
- Hands-on CAD
 - Labs

Results

- CAD experience
- EG theory
- A little drawing creation
- A little assembly creation

Results (continued)



Current Observations

- Good CAD content
- EG book is obsolete
- Need to improve focus on drawing creation

Why is the EG Book Obsolete?

- Outdated material
- Not applicable with CAD
- Too much effort
- Too much time
- Costs too much

Educational Components to Eliminate

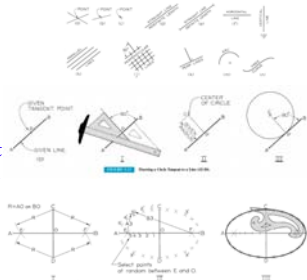
Instrument Drawing

- Pencils
- Vertical & horizontal Lines
- Circles
- Ellipses
- Angles
- Scales
- Templates



Geometric Constructions

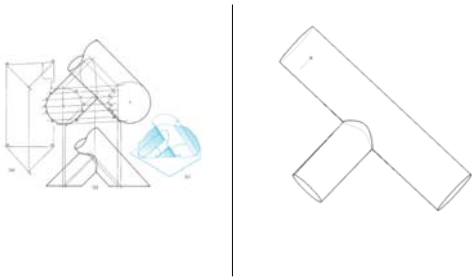
- Parallel and perpendicular lines
- Finding the center of a circle
- Drawing tangent circles, arcs, and lines



Parallelism and Perpendicularity



Intersections



R. Jerz, St. Ambrose University

19

7/29/2003

Descriptive Geometry

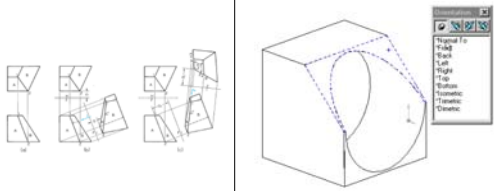
- Science of graphical representation of spatial relationships of points, lines, and planes
- Geometry
- True length, size, angle
- Revolutions

R. Jerz, St. Ambrose University

20

7/29/2003

CAD - Replaces Descriptive Geometry

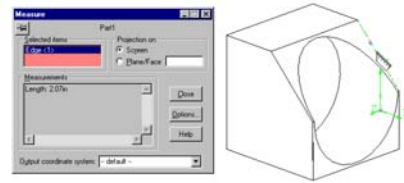


R. Jerz, St. Ambrose University

21

7/29/2003

CAD - Replaces Descriptive Geometry

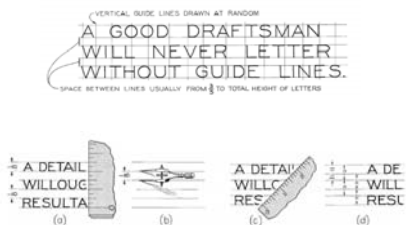


R. Jerz, St. Ambrose University

22

7/29/2003

Lettering

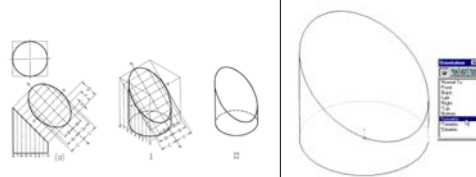


R. Jerz, St. Ambrose University

23

7/29/2003

Creating Axonometric Drawings



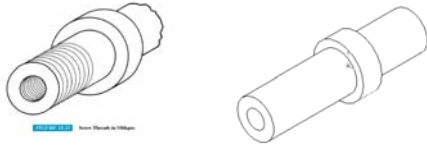
R. Jerz, St. Ambrose University

24

7/29/2003

Oblique Projection

- A faked projection (simulated isometric)
- Eliminates need to draw ellipses

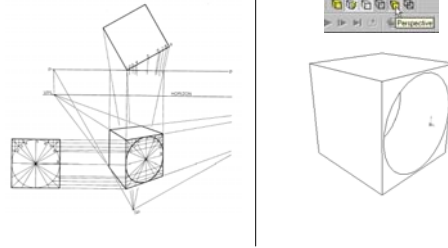


R. Jerz, St. Ambrose University

25

7/29/2003

Perspectives

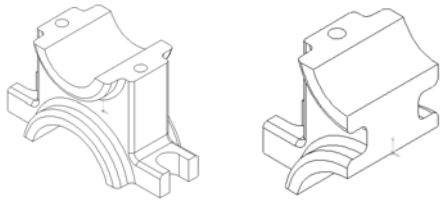


R. Jerz, St. Ambrose University

26

7/29/2003

Section Views



R. Jerz, St. Ambrose University

27

7/29/2003

Overall Results

- Students like the course
- Students gain CAD experience
- Students get exposure to engineering graphics concepts
- An important engineering tool has been added to student's toolkit
- Student's are using CAD skills in succeeding courses

R. Jerz, St. Ambrose University

28

7/29/2003

Future Ideas

- Increase link with manufacturing processes:
Drawing creation focus
- Dimensioning & Tolerancing
 - ANSI Standard Y14.5M-1994
- Design intent
- Auxiliary views
- Assembly drawings
 - Bill of materials
 - Tolerance analysis
- Analysis (FEA, kinematics & dynamic)

R. Jerz, St. Ambrose University

29

7/29/2003