Orthographic Projection
ENGR 1182
Graphics 03
Today’s Objectives

- Creating Orthographic Projections
  - Basics
  - Hidden Lines
- GP03 Activity
- GP03 Application
Orthographic Projections

- Orthographic projections are another way to represent 3D objects in 2D space.
- By using multiple orthographic drawings, we eliminate any misinterpretations that isometric views allow.
- Hidden lines show features that are not visible from that view.
- Multiple views of an object determine where to include hidden lines in orthographic drawings.
Orthographic Projection Basics
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Drawing Orthographic Views
(facilitates clear specification of object dimensions)

- One way to visualize objects in orthographic is to imagine the object inside a glass box.
- Imagine that the object is projected onto each surface of the glass box.
- The box is then unfolded to form the multiview drawing.
Requiring Multiple Views

- A single projection cannot fully describe the object.
  - This single view can be interpreted in at least 6 different ways!

- To completely describe the object, we use multiple views.

- In general, the front, top, and right side views are used to represent an object.
Visualizing in Orthographic

- Use your snap cubes to build the following object.
- Look at it from the front, right, and top sides.

Note: These are the 3 views associated with the object you just built.
Complete Multiview Drawings

- The front, top, and right side views are required to fully describe an object.
- The views are aligned so that corresponding points are lined up between views.
- Each view only shows 2 dimensions:
  - Top: width and depth
  - Front: height and width
  - Right: height and depth

SW Views - SOLIDWORKS Part and Drawing available
Activity (GP03)

NOTE: To be graded, views must be properly aligned

CREATE ORTHOGRAPHIC PROJECTIONS OF THE FRONT, TOP, AND RIGHT SIDE VIEWS OF EACH OBJECT FROM ITS Coded PLAN
Hidden Lines in Orthographic Projection

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Hidden Lines

- Hidden lines are shown as dashed lines, and depict edges that are not visible from the current viewpoint.

- Using the coded plan shown, sketch the isometric view of the object from the z-corner.

- Which edges would appear as hidden lines in an orthographic drawing?
Hidden Lines

- These are the orthographic views that correspond to the object you just built

* A SolidWorks implementation of this object is available on the EEIC website – Hidden Lines 1
Hidden Lines

- Hidden lines are dashed lines used to represent internal features that are obscured by the object.

These hidden lines represent the obscured corner of the notch.

These hidden lines show the extents of the hole.

* A SolidWorks implementation of this object is available on the EEIC website – Hidden Lines 2
Line Precedence

- **Visible lines** take precedence over all other lines

- **Hidden lines** take secondary precedence

- If visible and hidden lines overlap, only the visible line is shown
AN ILLUSTRATION OF LINES, MARKS AND LINE PRECEDENCE

Visible Lines cover Hidden Lines cover Center Lines

Hidden Line covers Center Line - note gap for Center Line

Visible Lines cover Hidden Lines

Center Line extends just beyond curved surface

Visible Lines
Line Precedence Example

- Note that the two potential hidden lines in this sketch fall directly behind visible lines in the right side view.
- The visible lines take precedence and the hidden lines are not shown.
Activity (GP03)

| Example: |
|---|---|
| ![Example 1](image1) | ![Example 2](image2) |
| ![Example 3](image3) | ![Example 4](image4) |
| ![Example 5](image5) | ![Example 6](image6) |

CREATE ORTHOGRAPHIC PROJECTIONS OF THE GIVEN ISOMETRIC OBJECT. INCLUDE ANY HIDDEN LINES.
Important Takeaways

- Orthographic drawings are another way to represent 3D objects in 2D space
- Top, front, and right views are required to fully describe an object
- Hidden lines show features that cannot be seen from the current viewpoint
- Hidden lines have secondary precedence to visible lines
What’s Next

- Due Next Class: GP03 Application
- Inclined and Curved Surfaces in Orthographic Projection
  - Adding inclined planes and curved features to orthographic projection
  - Increasing clarity by adding center marks and centerlines
- Take Graphics 4 Quiz on readings