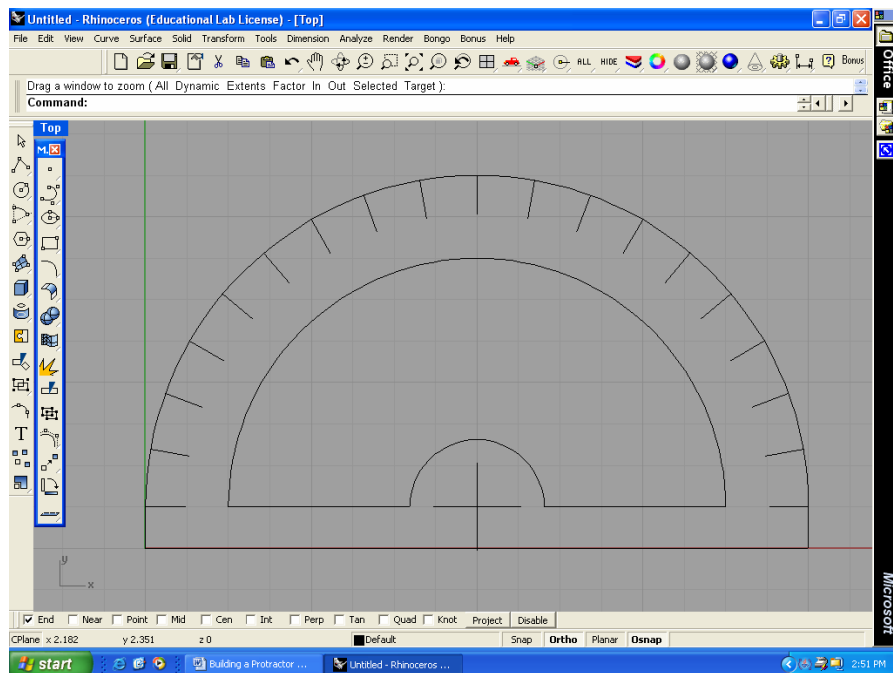


Design brief submitted by Pete Sorenson (PSorenson@lwsd.org), Technology Teacher, Lake Washington High School, Kirkland, WA.

Create a Protractor using a Laser Engraver

Design Restrictions

1. Must fit on a 4 inch by 3 inch piece of .125 inch transparent Acrylic.
2. Must include a 3-1/2 inch ruler with .0625 divisions.
3. All lettering must be on the side of the protractor that touches the material being measured.
4. Must measure in 1 degree increments.
5. Must include an alignment feature as well as a "center target".
6. Include your name and the school year as lettering on the protractor.



Estimated time: 2 class periods

Materials: 4 inch by 3 inch by .125 inch transparent Acrylic.

Questions to answer:

1. Should the protractor read CW or CCW or both?
2. Why is the lettering on the back side of the protractor?
3. What method is used to enable quick and accurate measurement?

Teacher Notes for Building a Protractor

Skills for CAD

Arc	Osnap
Array	Quad
Mirror	Center
Layer	End
Solid/Text	
Rotate	
Offset Line	
Move/Copy	
Relative/absolute positioning	
Trim/Split	

Math Issues

Degrees	Radius/Diameter	Inches
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Answers to the questions

- 1) It can read either direction or both. *CAD would read CCW if using it to describe a relative move.*
- 2) To compensate for *parallax*
- 3) Varied length of lines compared to values in degrees.

Terms

- 1) **Center target:** Cross hairs for the *vertex* of the angle being measured.
- 2) **Alignment feature:** A means to ensure the protractor is aligned with the base line of the angle.

Materials

Clear Acrylic is satisfactory. Either "green edge" or fluorescent green are easier to use.

