ENGG1003-Graphics

Portfolio

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Introduction:

The hand sketches and drawings in Solidworks in this portfolio have been made during our ENGG1003/Graphics course in the Fall 2014 semester. Particular sketching techniques,projections,and faces of objects,as well as modelling in Solidworks were learned.This document includes selected hand sketches and designs in Solidworks to demonstrate my knowledge I gained from Graphics course.The first part of this document includes sketches drawn by hand.The second part includes modelling made in Solidworks.Each section includes two selected sketches or designs that have different features from one another.

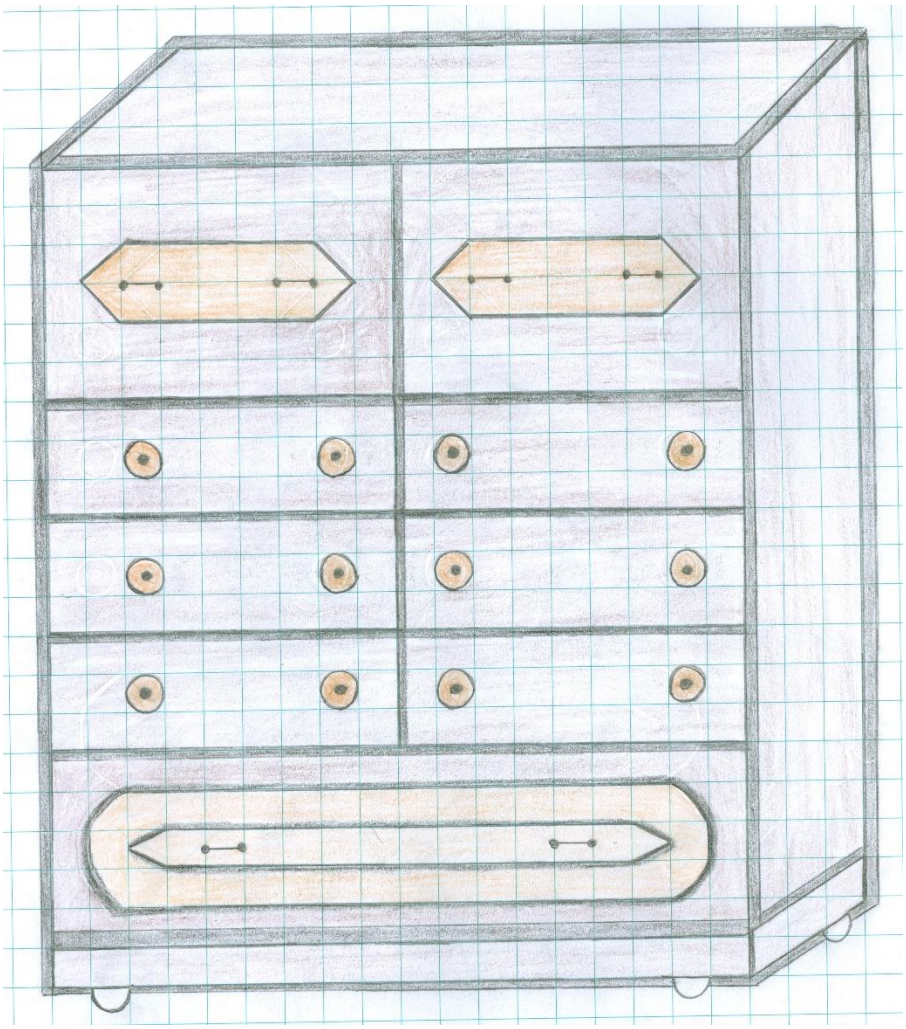
First part of the portfolio starts with two freehand sketches and continues with orthographic sketches/drawings and isometric sketches. Second part starts with accurate modelling in Solidworks and continues with modelling of complex parts and drawings created from selected parts modelled in Solidworks. In references, sources of sample models selected to create this portfolio are listed. In Appendix,views from different angles/faces of Solidworks models can be found.

Sketching:

Freehand Sketching:

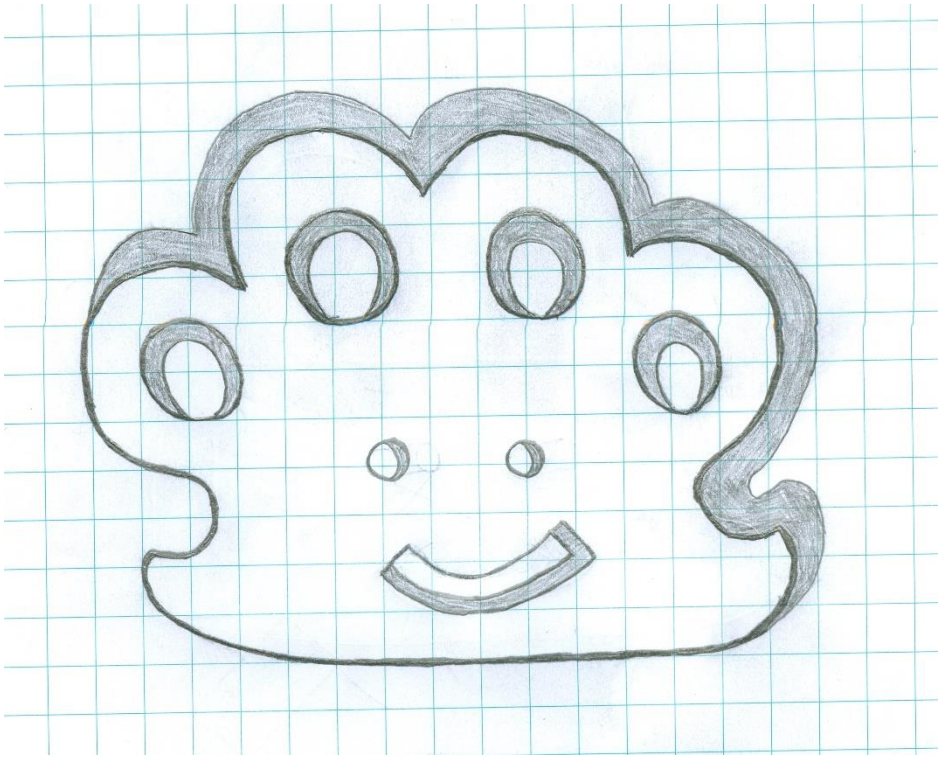
Wooden Dresser:

Straight lines, different views of an object in a single sketch,and shapes drawn by hand can be seen in this freehand sketch.This sketch might seem isometric;however,it is not,because the top of the dresser is not drawn from the same angle as the side of the dresser.Dark and light colors represent different materials used in production of the material.Edges in dark color and grooves inbetween drawers can be seen in details.Distance between circles and diamonds is exactly the same as well as circles have exactly 1 square (0.25 inch) radius.



Brass Knuckles

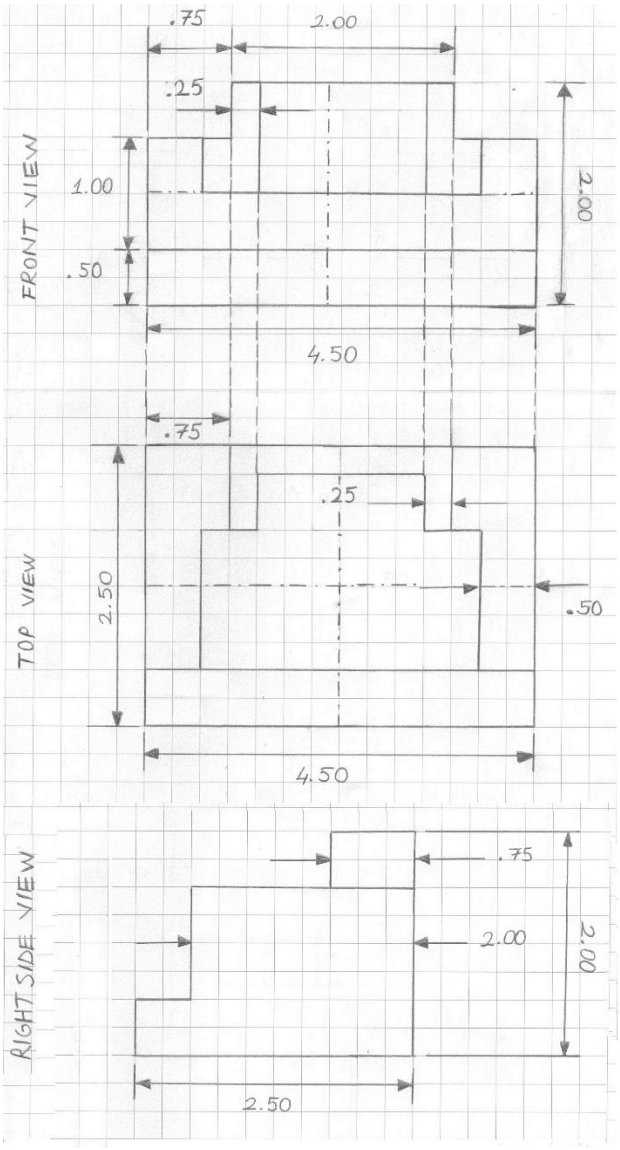
In this freehand sketch,shading,hand drawn shapes,such as arcs and circles,is shown.From the right side of the object,its depth can be seen.The shadings aren`t drawn with exactly same angles in order to show different perspectives used in the same sketch.Depths in circles are relatively similar and the angle of arcs are drawn to give a natural brass knuckle image.The shading used in the object is also proportional at its top and right side.The sketch`s scale is 1:1,which means its size is same as a real brass knuckle.



Orthographic Sketching:

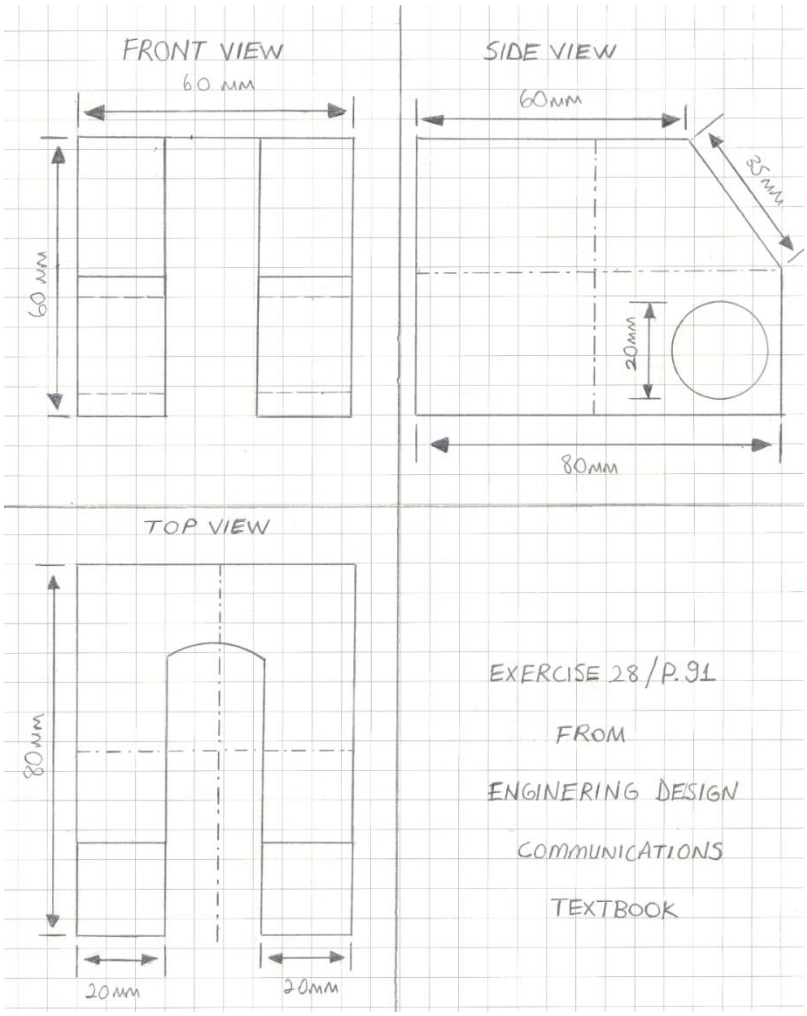
Iron Cover[1]:

This sketch has a different concept than freehand sketches above.There is no freehand drawing or shading.In the sketch dimensioning is profound because isometric drawing can be created using ortographic sketches if there is dimensions.Also naming views is also important because ortographic drawings can be complicated when dimensioning and centerlines involve.It also makes modelling an ortographic sketch easier.Projection lines make a drawing more clear when views of a part compared.Centrelines in ortographic drawings shows the centre of the object since making instant calculations may not be possible.



Steel Block[2]:

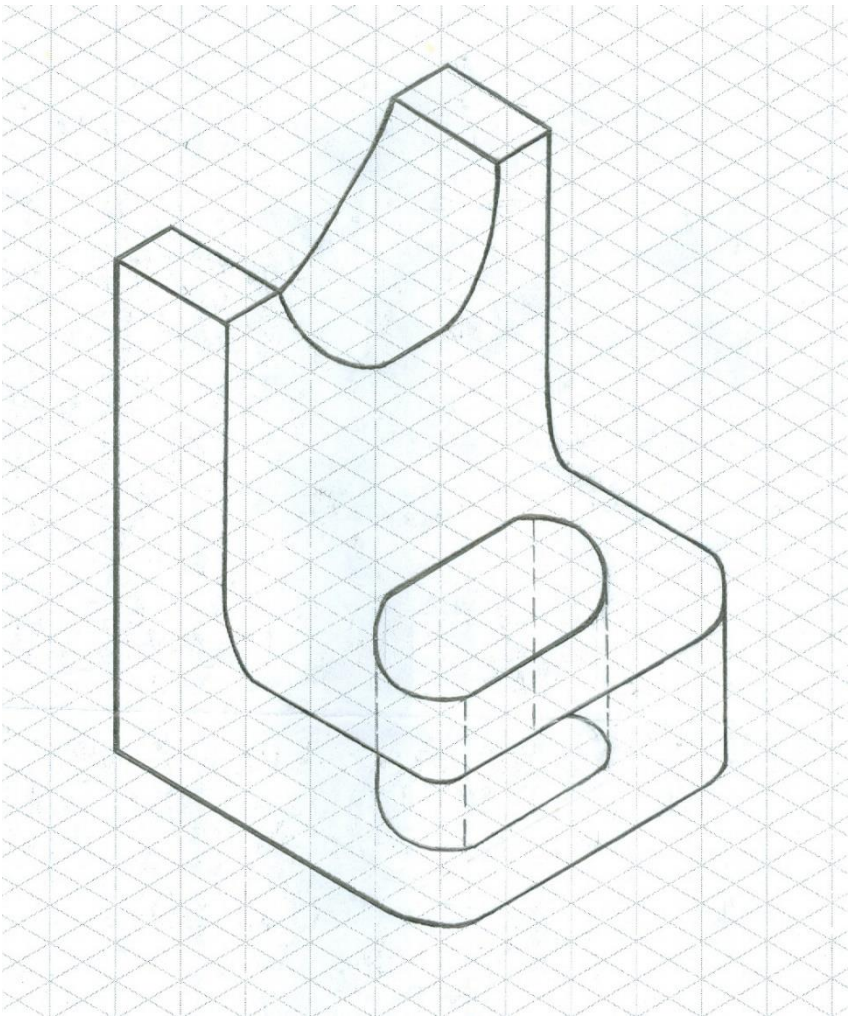
Dimensioning in imperial units might be confusing for some of us since International system of units (SI units) are widely used all over the world.Therefore,in this orthographic drawing,dimensioning was made in milimeters.There is a 20mm hole in the side of the object all through the other side.In the front view this is shown with hidden lines.Visible lines make the frame of the object more visible since there might be projection lines and hidden lines in the same drawing.Centrelines make drawings more readible and informative.



Isometric Sketching:

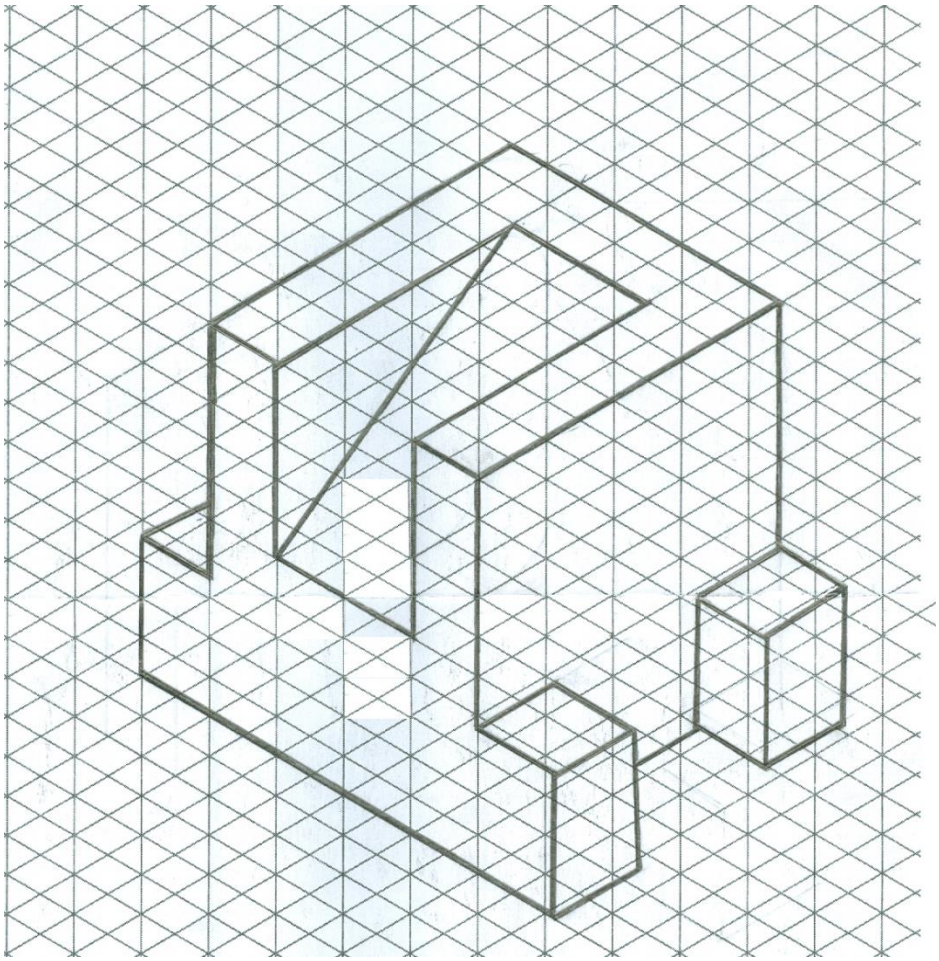
Brass Cover[3]:

In this isometric sketch,two things might draw attention most.The ellipse in the normal surface of the object and the curved cut at the higher top of the object.Two paralleograms are also increases this objects complexity since they both are at the end of the curved cut.The ellipse in the middle of the lower normal surface goes through the object,which is also shown with hidden lines.There is a curved inclination at the far end of the lower normal surface.Arcs at the edges of the object make the drawing smoother. The hardest part of this sketch was drawing the hidden ellipse at the bottom of the part because it cannot be instantly imagined in mind.



Iron block[4]:

Isometric sketches can be difficult to make like this one below because at the sides of the object there are rectangular prisms.These prisms must be elevated according to the objects and its height.At first glimpse,normal surfaces might seem inclined or even oblique.The inclined groove in the middle of the object (when looked from front) adds a profound feature to the object.Visible lines in this sketch are dominant whereas hidden lines cannot be seen.

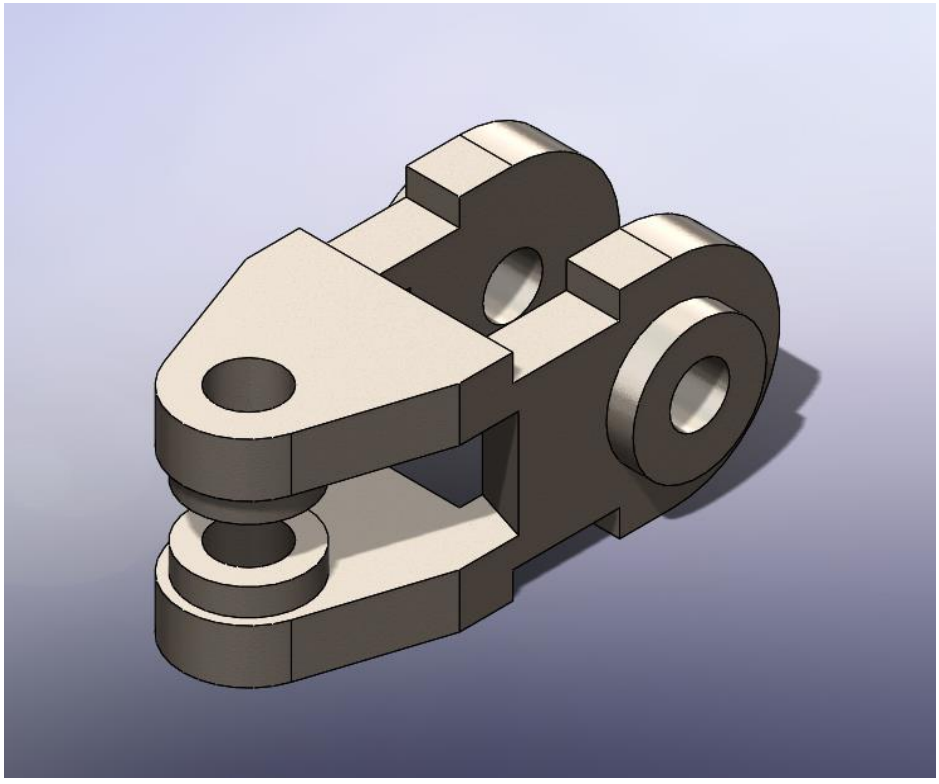


Solidworks:

Accurate Modelling:

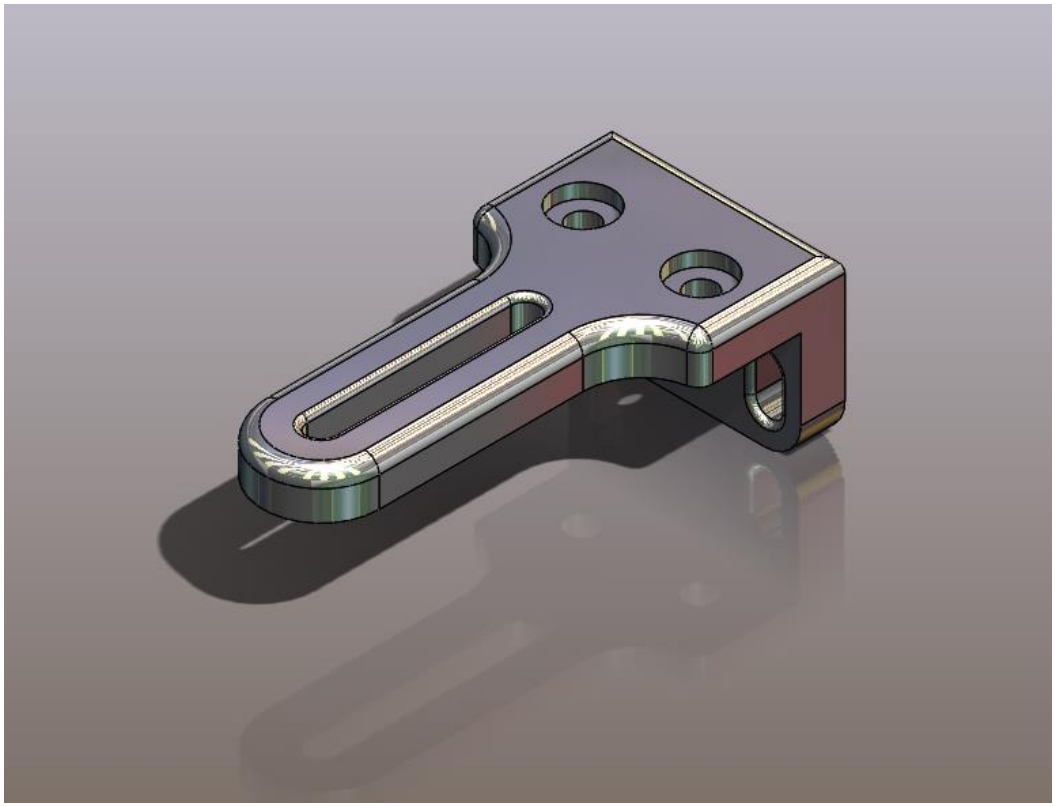
Engine Part #354[5]:

Modelling multidimensional parts in Solidworks can be difficult when if there was not smart dimensioning feature.It makes modelling faster.In the design below,smart dimensioning was mostly used because precision is one of the most important aspects of modelling.Inclined surfaces and curvy groove in the middle part , and four holes in the object make it complex.Rounds at the vertices of the object make the design look smoother as straight edges sometimes are not as favorable.(More views of this part can be found in Appendix/Section A)



Metal Fix[6]:

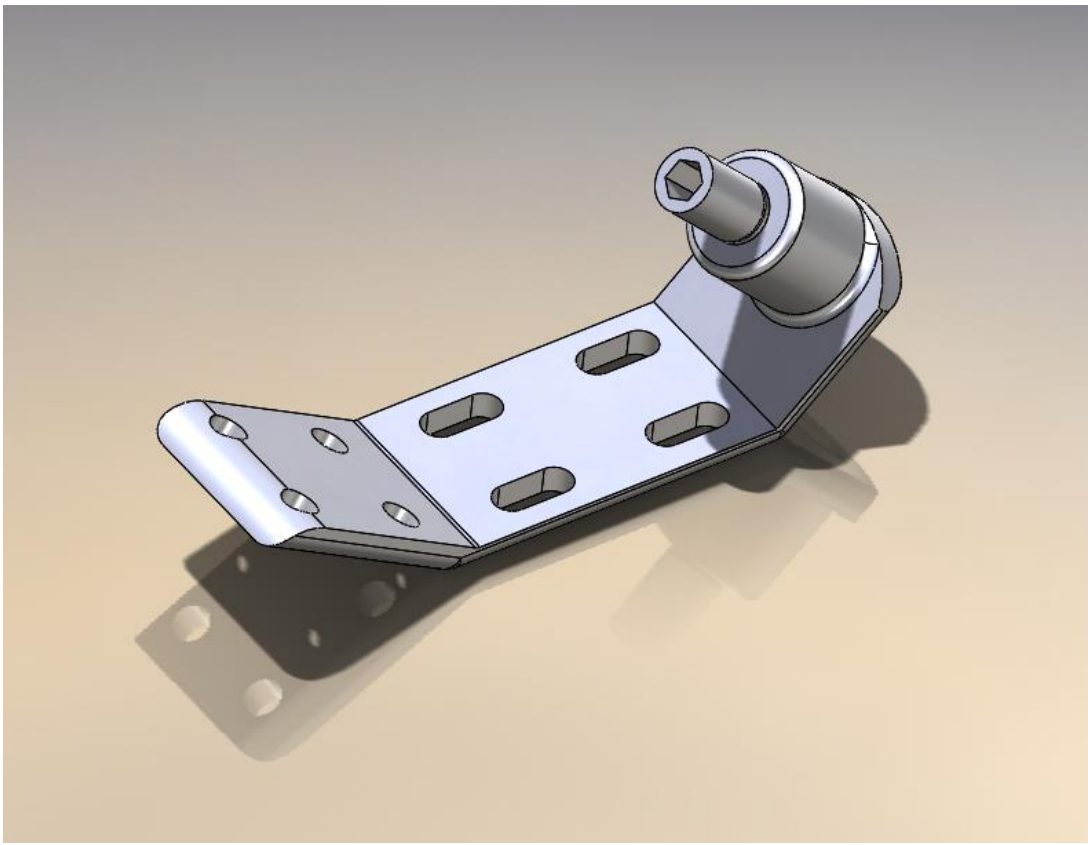
In this design, fillets, smart dimensioning and curves in the part draw attention. Fillets give the model more aesthetic look.Smart dimensioning has a profound role in this design because the rounds have to have the same radius and angle.The distance between holes on the top (normal) surface of the object , and the distance to the arcs are proportionally equal.(More views of this part can be found in Appendix/Section B)



Modelling of Complex Parts:

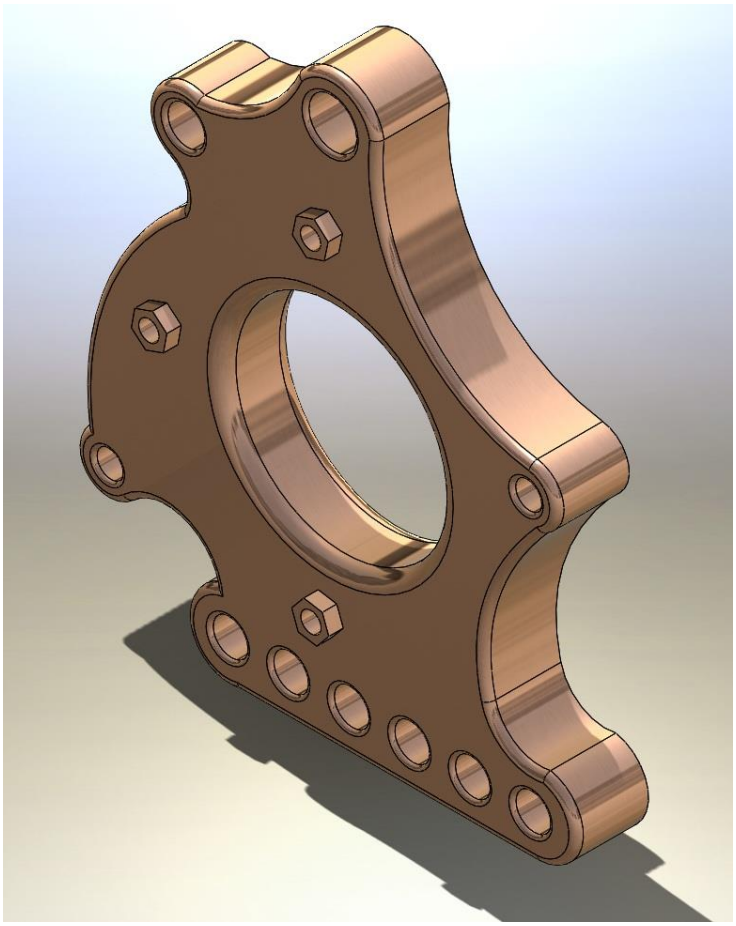
Bolt breaker:

What makes this design complex is holes in the inclined surfaces,curves,fillets and mirroring in the frame of the object.Four holes in the inclined surface have the same distance from each other as they have the same radius.Top two holes in the inclined must be appropriately close to the edge of the surface , not too far,not too close.Inclined curved surface on the right hand side (when looked from front) of the object does not have the same angle as the inclined surface on the left hand side,but proportional (15^{o},30^{o} respectively).Fillets around the circles and the body of the object make it more durable to hits and scratches as straight cut edges aren`t always good. (For different views see Appendix/Section C)



Engine Cover #25[7]:

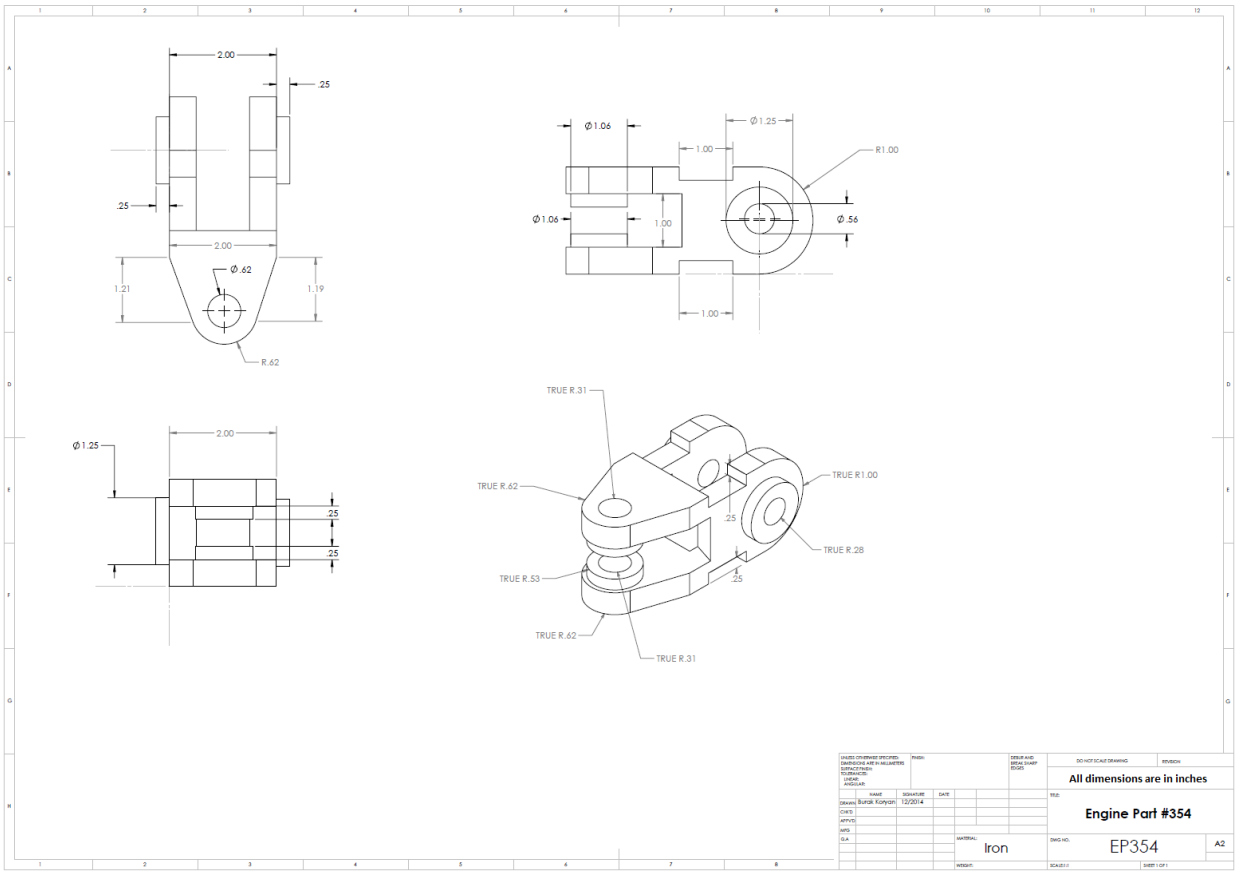
Parts that have curves with different angles and radius are hard to design since they all should be aligned from a centrepoint.Also holes have to have the same centre as the curves,which makes calculation of radius more challenging.In this design below,all holes have the same centre with curves and angled curves`reference point is the centre of the 3” hole that is in the middle of the part.The radius of fillets has been calculated carefully since if a fillet is too large,it goes over the holes.Bolt openings are made higher than the part`s normal surface intentionally.Shelling in the back of the part (see Appendix/Section D) is designed according to model`s thickness because the front face of the model should not be thinner than it should be.(For different views of this part,see Appendix/Section D)



Creating Drawings from Parts:

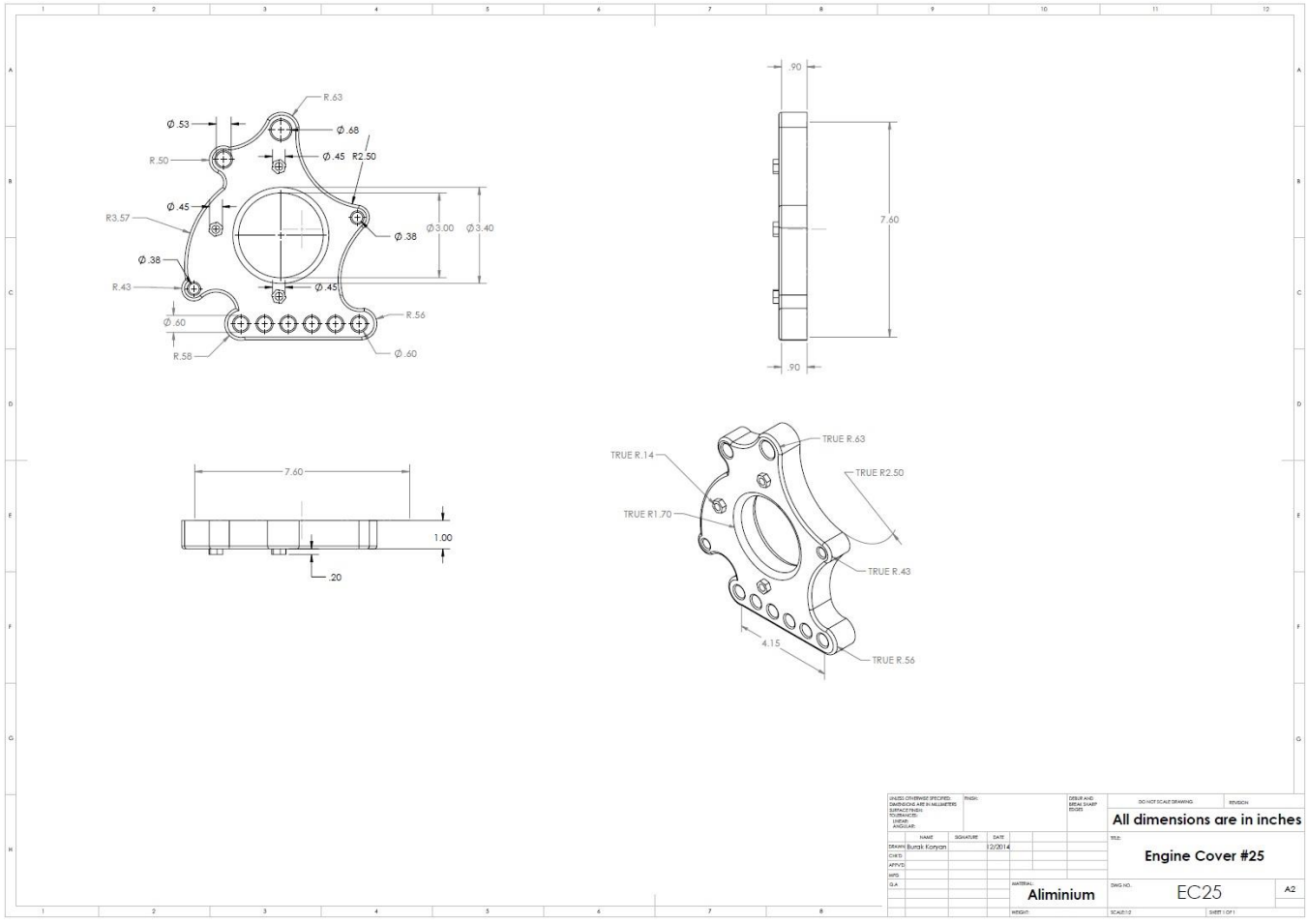
Engine Part #354 Drawing[9]:

When it comes to making a part physically can be impossible if there is no drawings of it.Drawings must include dimensions of the part,the date the drawing was created,what material the part suppose to be made from,the designers`s name,a model number,and descriptions.In the drawing below,dimensioning(in inches) can be seen clearly for every part of the model from views other than the front.Moreover,in the bottom-right corner,the designer`s name,the date the drawing was created,what the model should be made from,and further descriptions can be seen.



Engine Cover #25 Drawing[10]:

In drawings created in Solidworks,precision in dimensioning is very important since a small mistake in numbers might cause huge problems.In the drawing below,two decimal places used in dimensioning the part to increase precision.Angles of curves aren`t shown in the drawing because when curves are put in the correct coordinations,automatically a curve can be created when its radius is entered.Names of drawings  should be related to the part`s name to help designer find it quicker in a list of drawings,as we see in the annotations,EC#25 is easy to recognize in a list of drawings.When a drawing is created and signed/stamped,it means it is ready for production,so no information about it should be missing,such as the material it will be made from.



References:

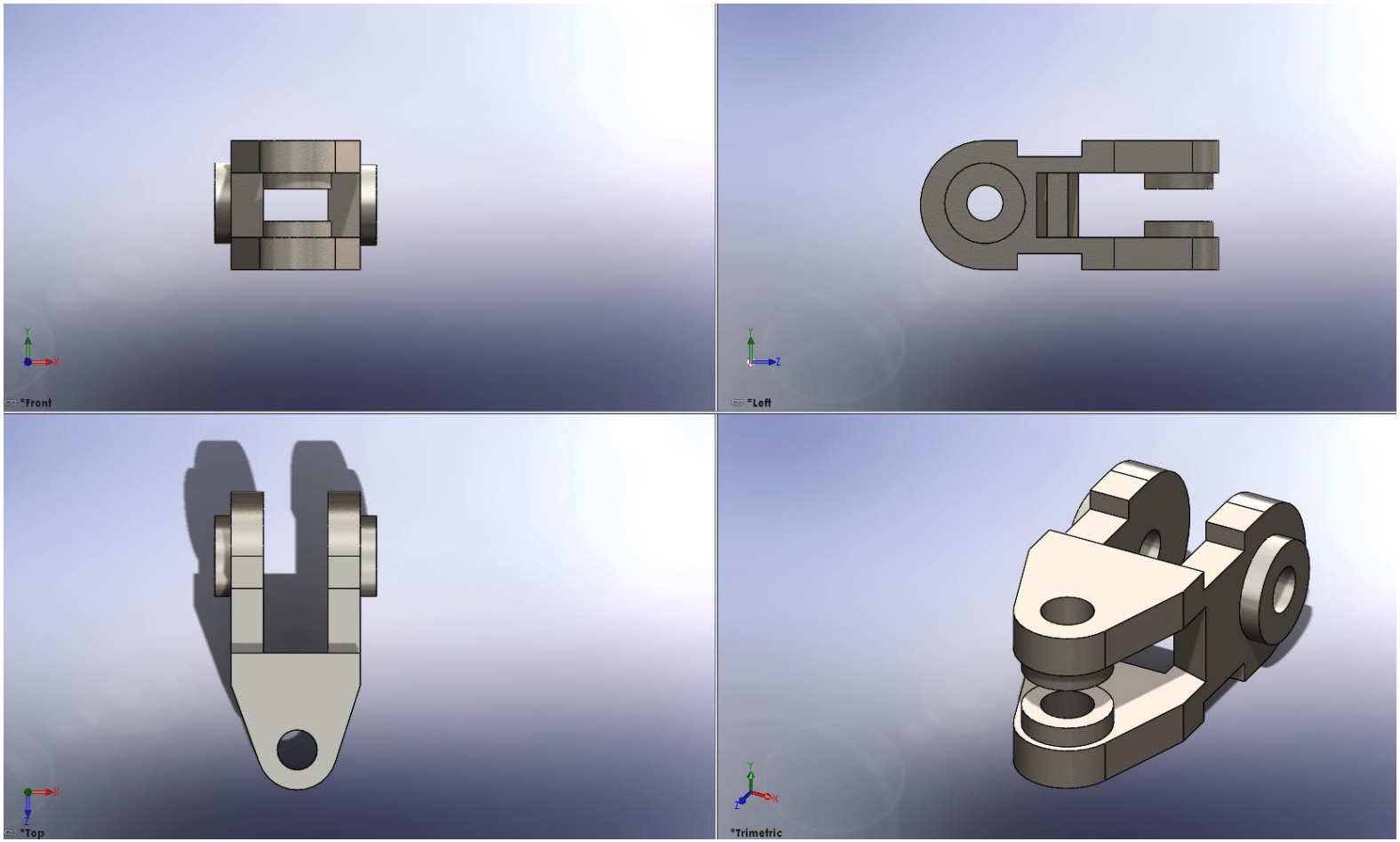
(Superscripts beside the names of models/sketches indicate from which book they are taken from)

[1][5][6][7] Lieu, Dennis, and Sheryl Sorby. "Modern Design Practice and Tools."*Visualization,Modelling,and Graphics for Engineering Design*. 1st ed. New York: Cengage Learning, 2008. Print

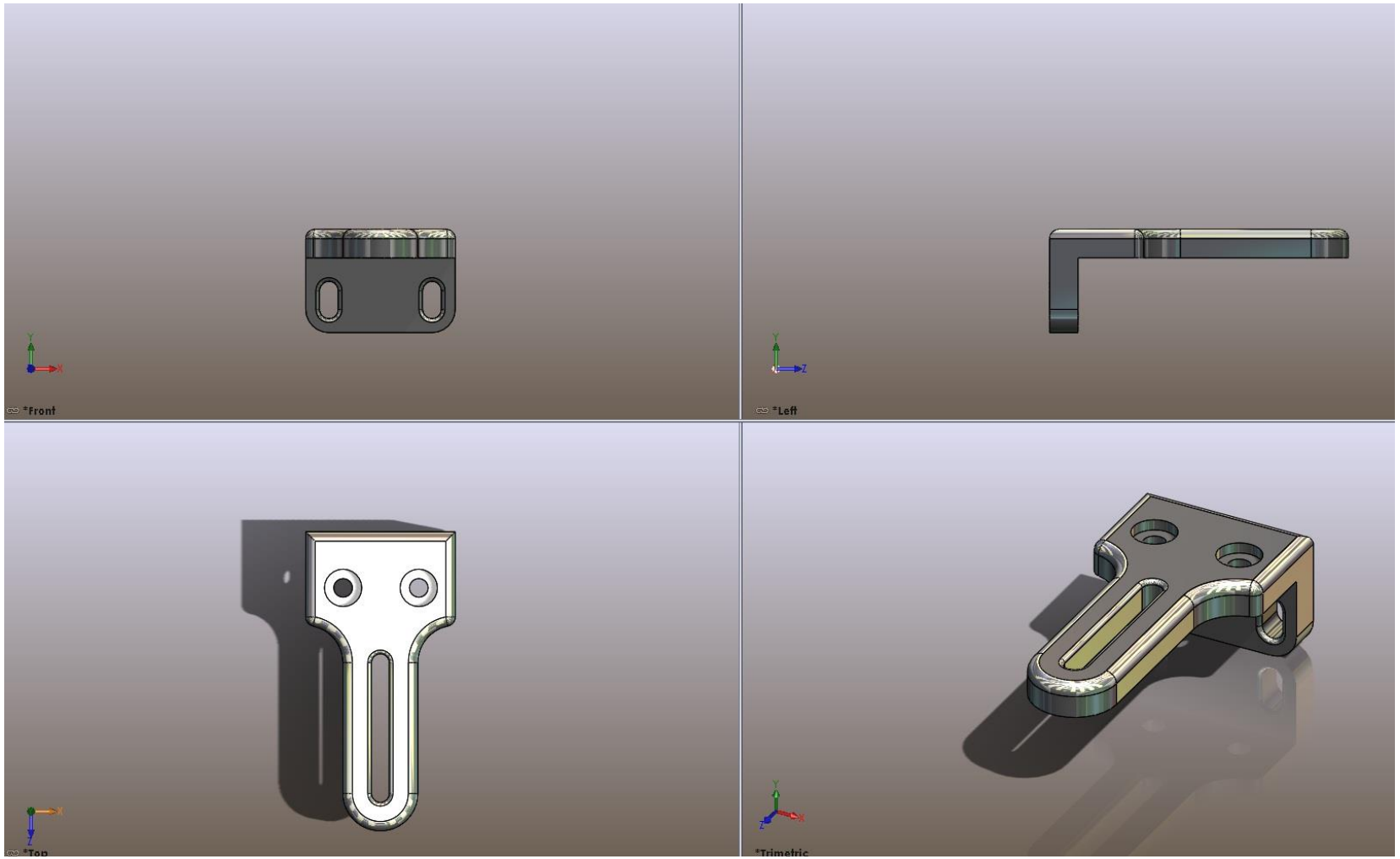
[2][3][4] Lockhart, Shawna, and Cindy Johnson. *Engineering Design Communications: Conveying Design through Graphics*. 2nd ed. Peachpit, 2012. 91. Print.

Appendix:

Section A:

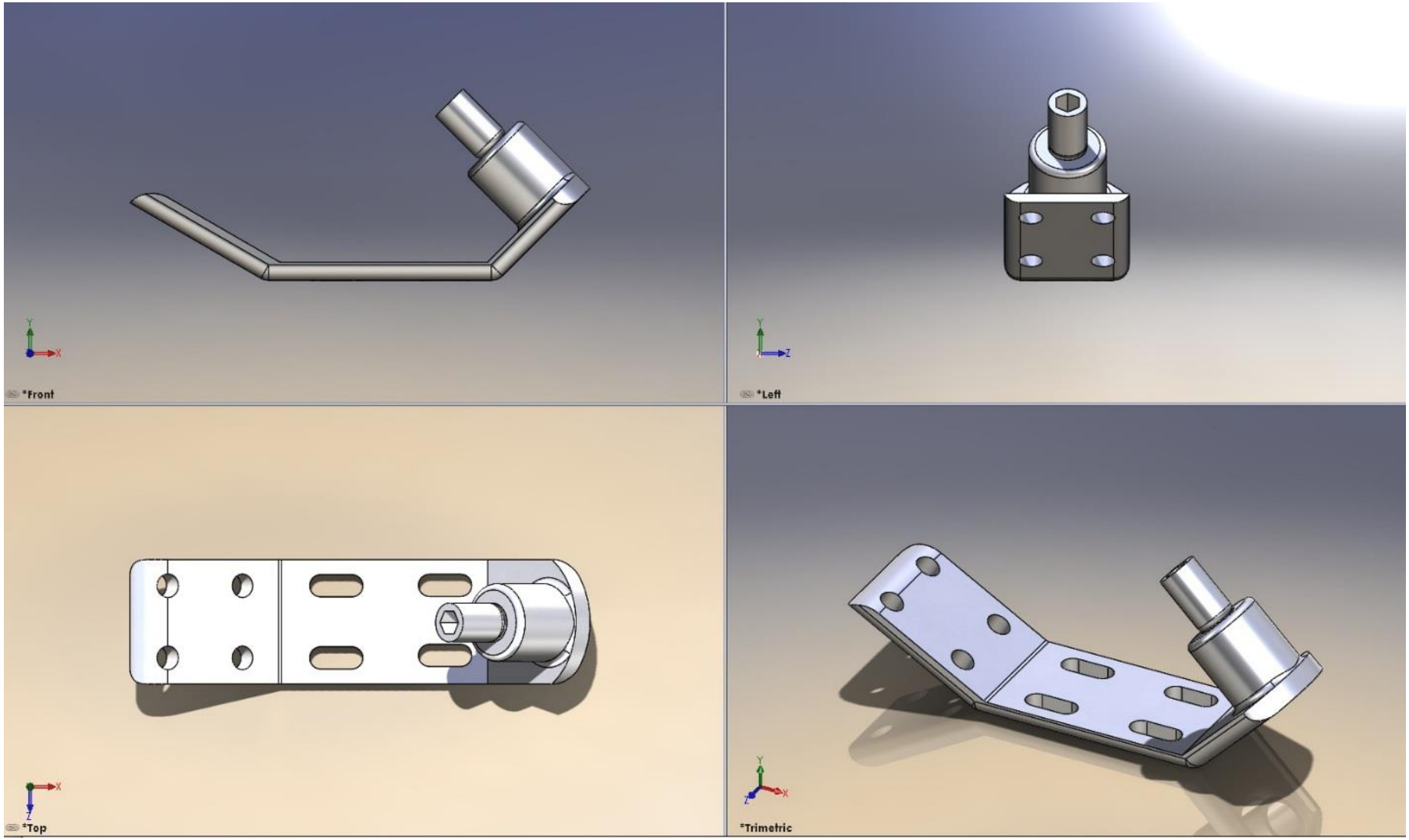


Section B:



Section C:

Views of Bolt Breaker:



Section D:

Views of Enginer Cover #25: