Project #3 Drawing and Tolerances

ME 366 Computer Aided Engineering & Manufacturing

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Overview

The task for this project was to use calipers to measure a given object, redesign in solidworks and use tolerancing to produce a fit that is appropriate for this assembly. In this project we learned the importance of accurate measurement and it's impact on tolerancing and fits. My part's measurements did not allow a loose running fit on the minor diameter due to the part being outside of the tolerance.

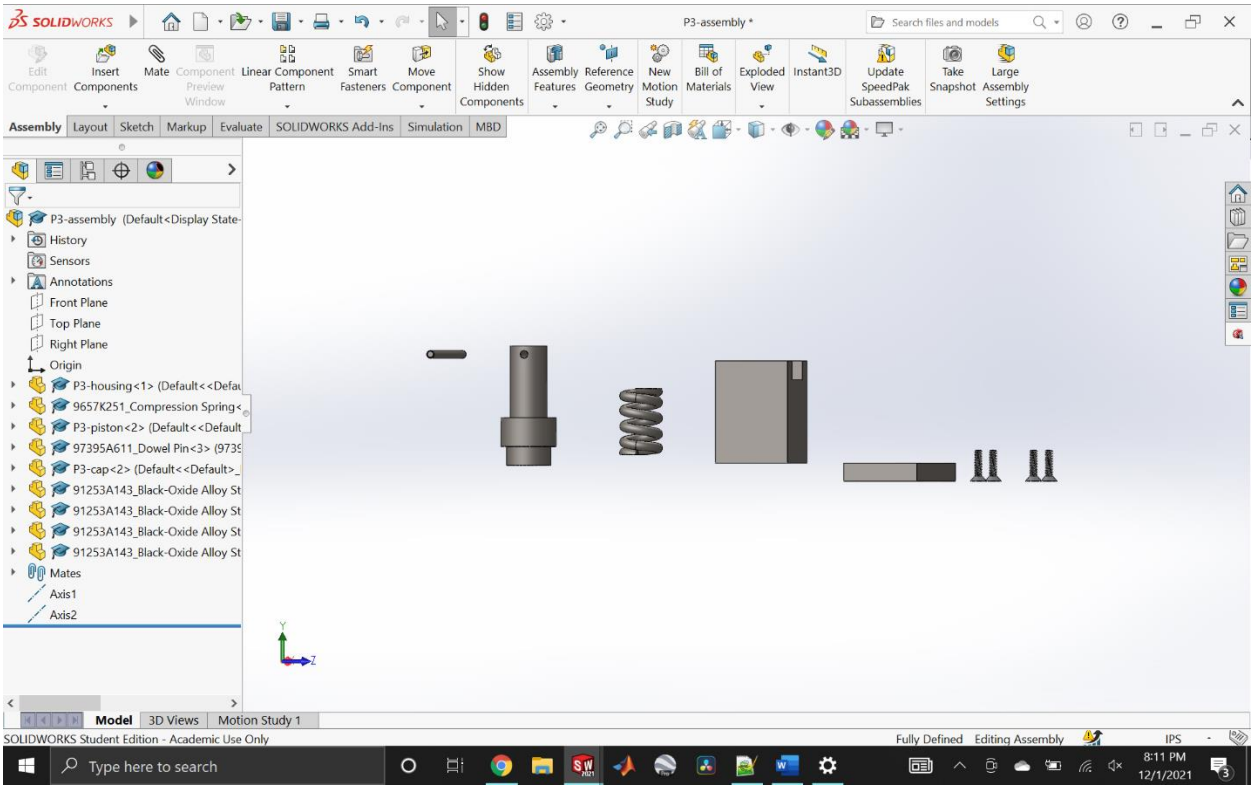
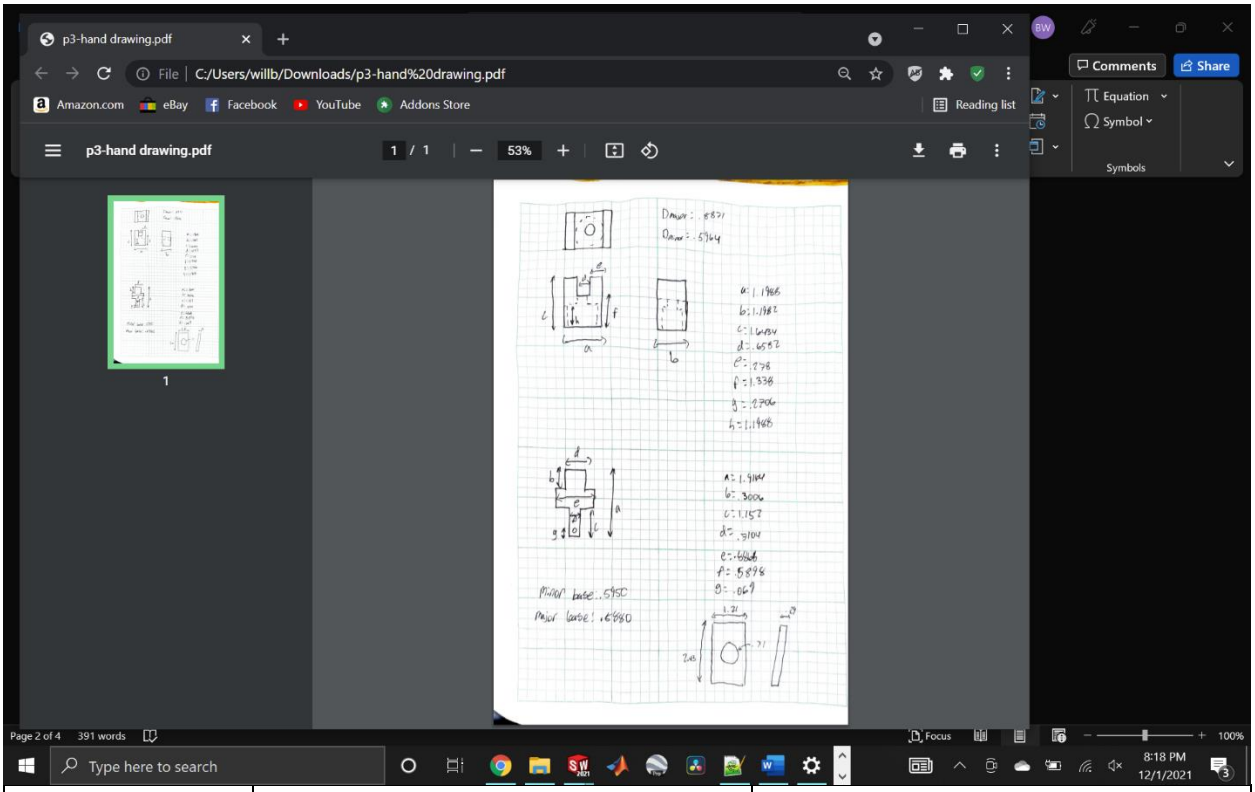


Figure 1.

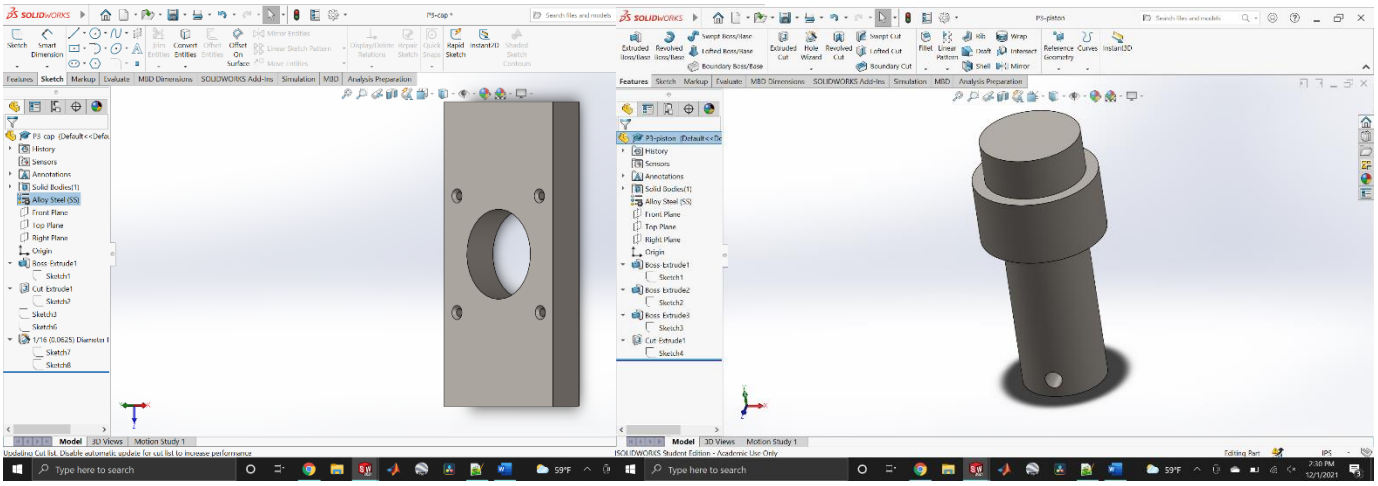
Part Measurements

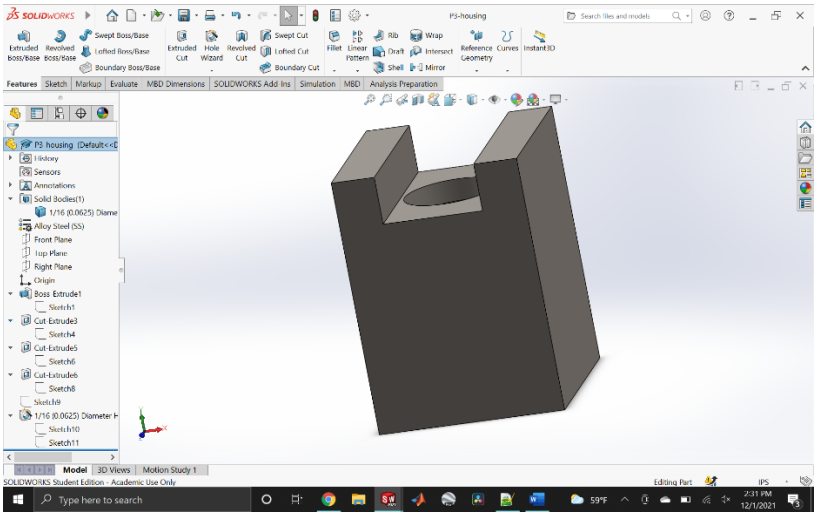


	Minor Diameter		Major Diameter	
	As Measured	Scaled Base	As Measured	Scaled Base
Pin	.4915	.5950	.7395	.8880
Housing	.5035	.5950	.7405	.8880

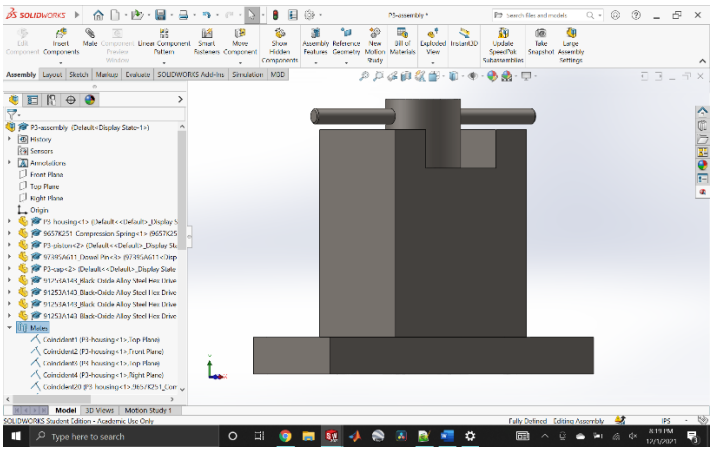
Table 1. Dimensions of Major and Minor Diameters

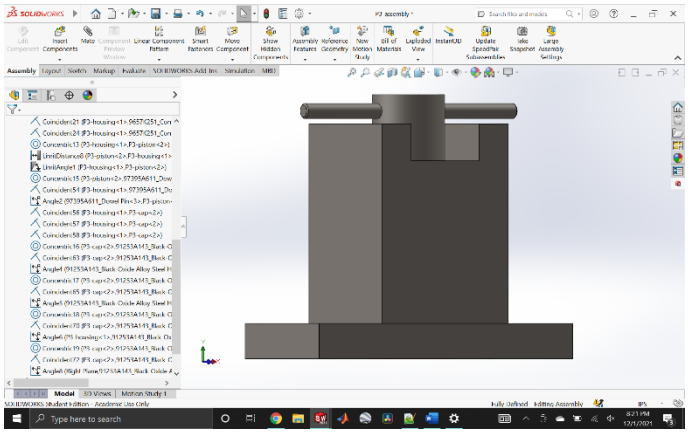
Part Files

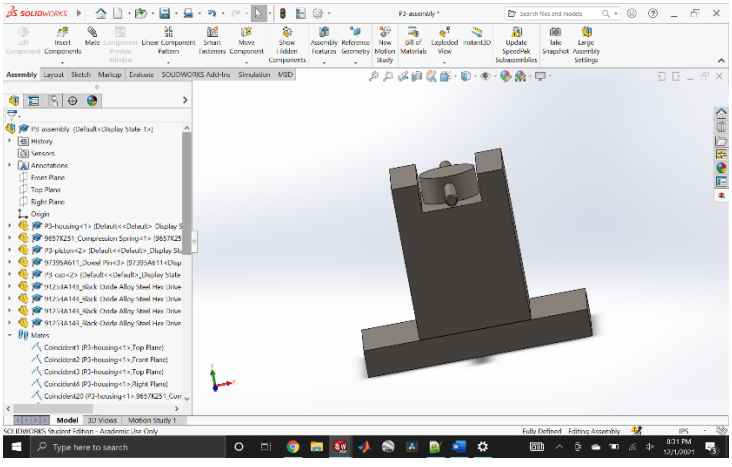


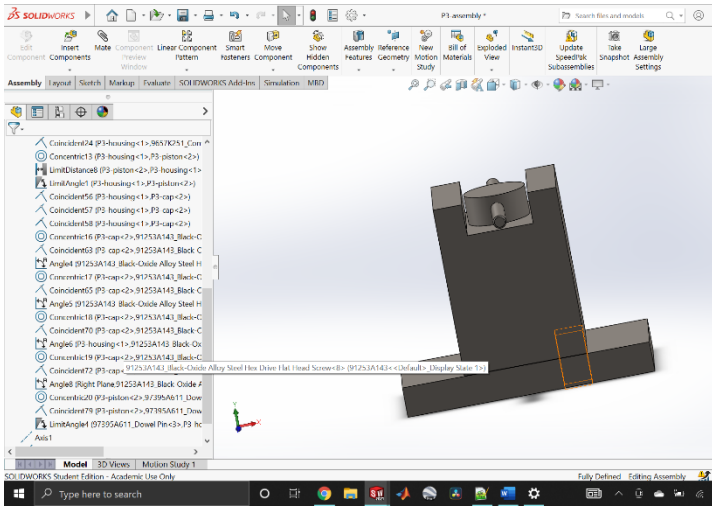


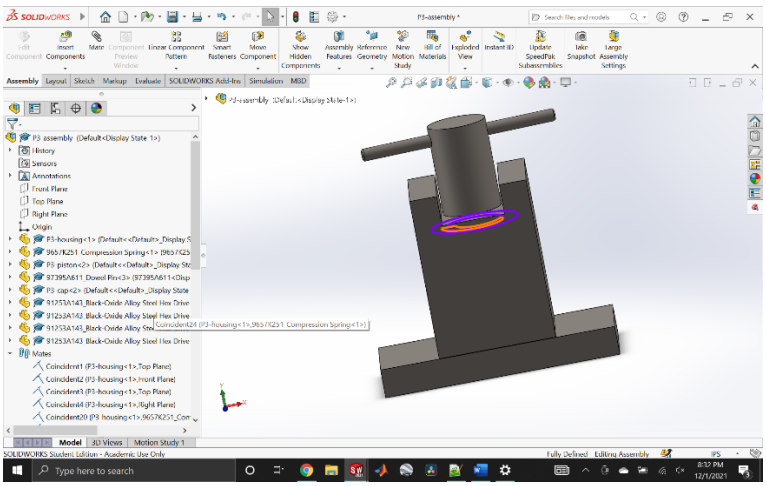
Assembly File

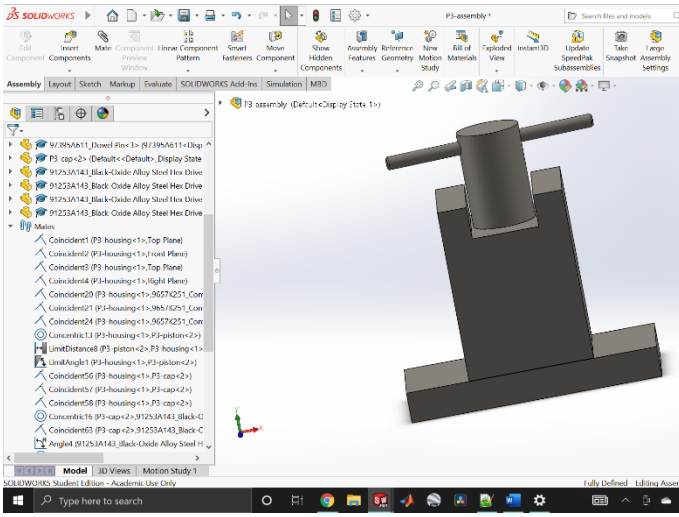


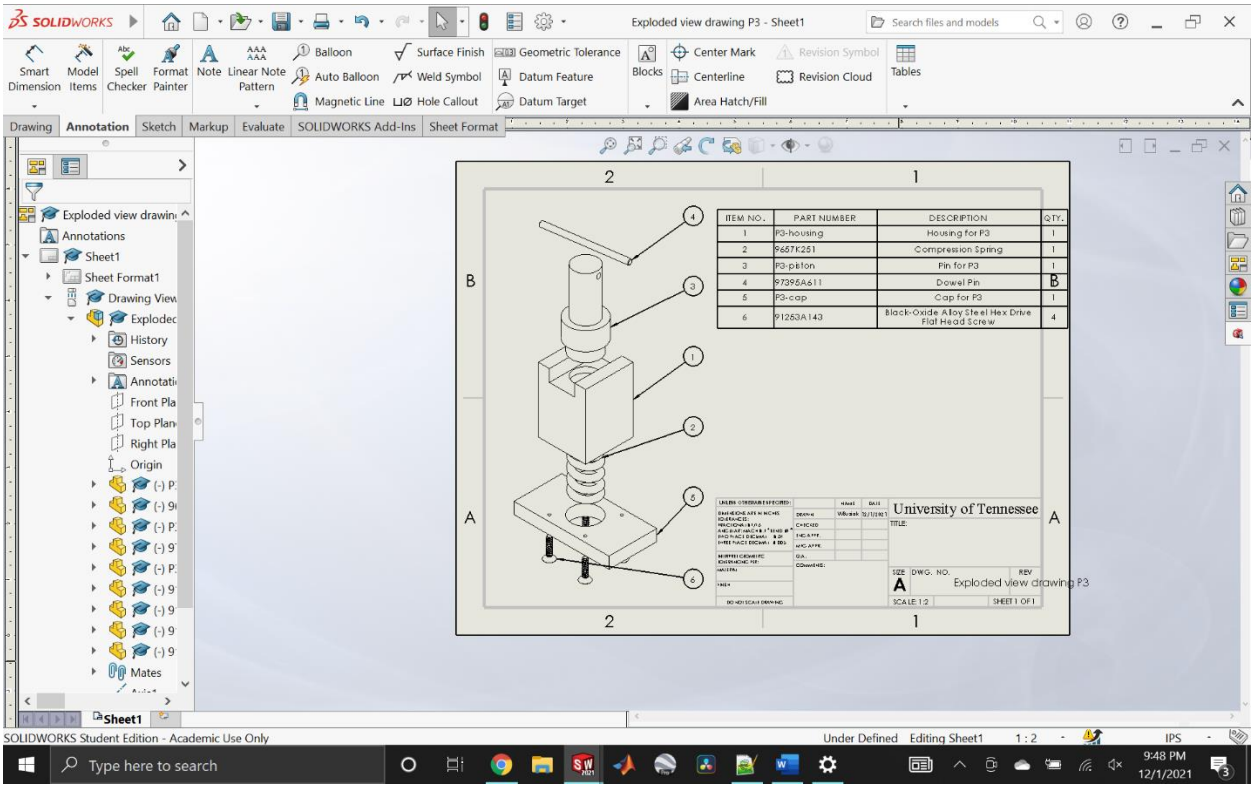






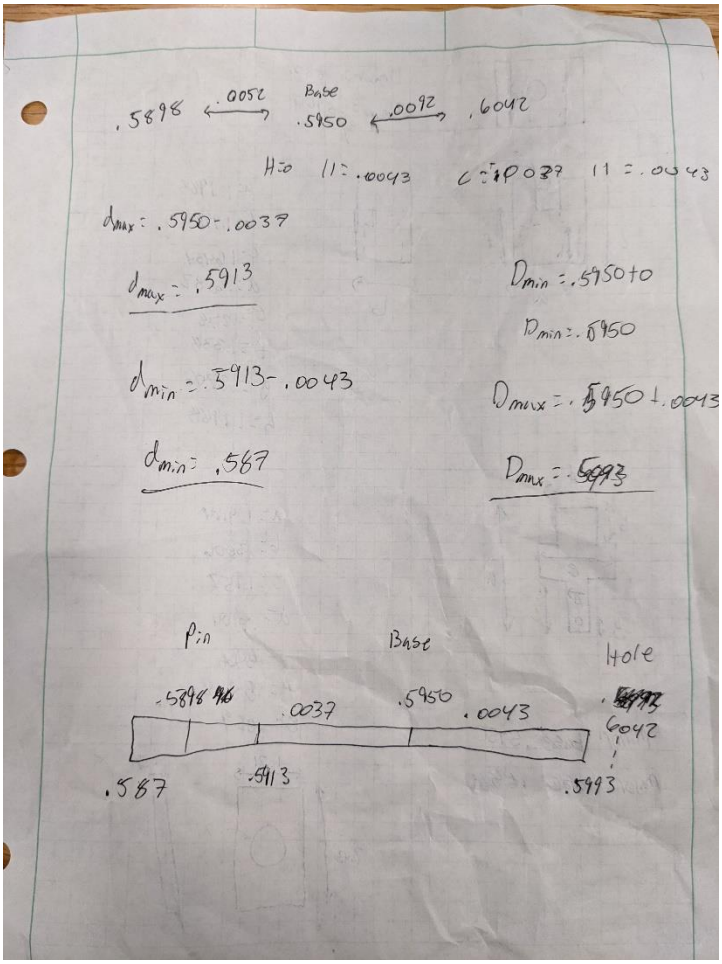






Fit Selection and Tolerances

Loose running fit does not work on minor diameter, could be result of caliper error


.5898 .0052 Base .5950 .0092 .6042
H: 11 = .0043 C: 11 = .0037 11 = .0043
$d_{max} = .5950 - .0037$
$d_{max} = .5913$
$d_{min} = .5913 - .0043$
$d_{min} = .587$
$D_{min} = .5950 + 0$
$D_{min} = .5950$
$D_{max} = .5950 + .0043$
$D_{max} = .5993$
Pin
Base
Hole
.5898
.0037
.5950
.0043
.6042
.587
.5913
.5993

.8874 ←.0006→ .8880 ←.0006→ .8886

H6 g6

H: 0 IT7 = .0012 g = -.0004 IT6 = .007

$d_{max} = .8880 - .0004 = .8876$

$d_{min} = .8876 - .007$

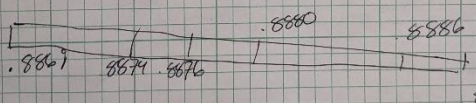
$= .8869$

$D_{min} = .8880 + 0$

$= .8880$

$D_{max} = .8880 + .0012$

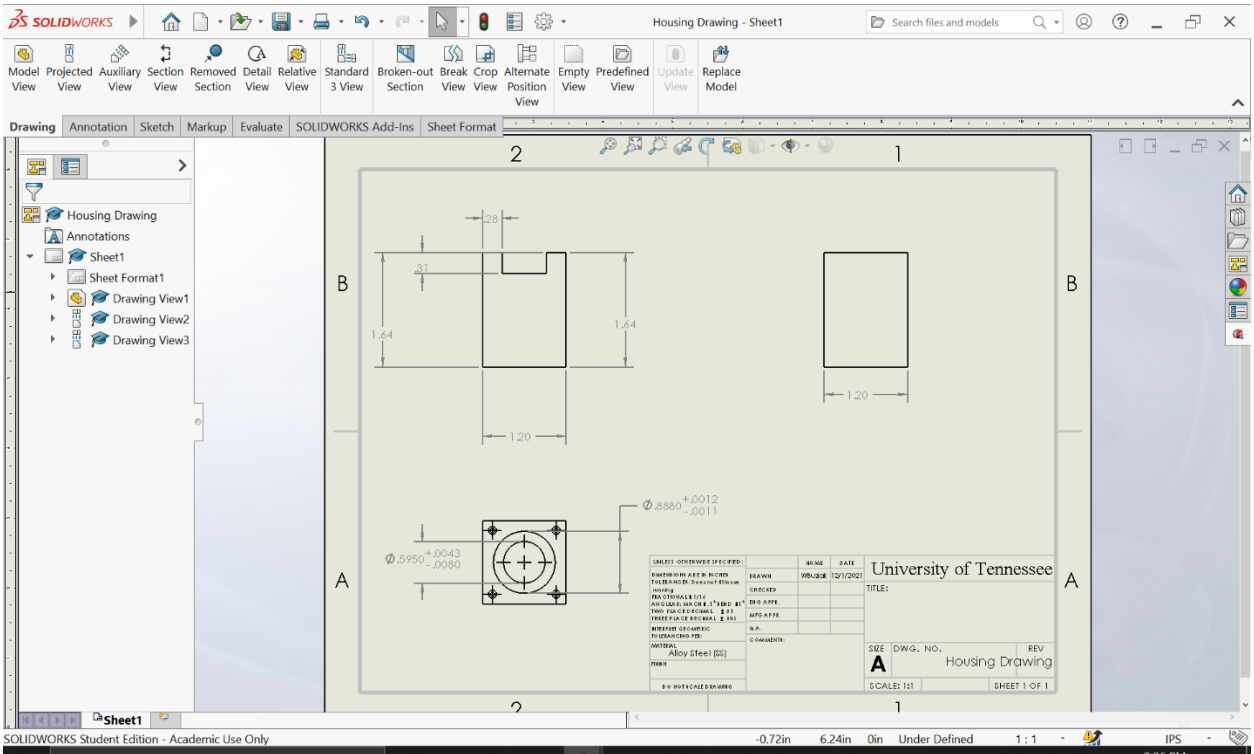
$D_{max} = .8892$

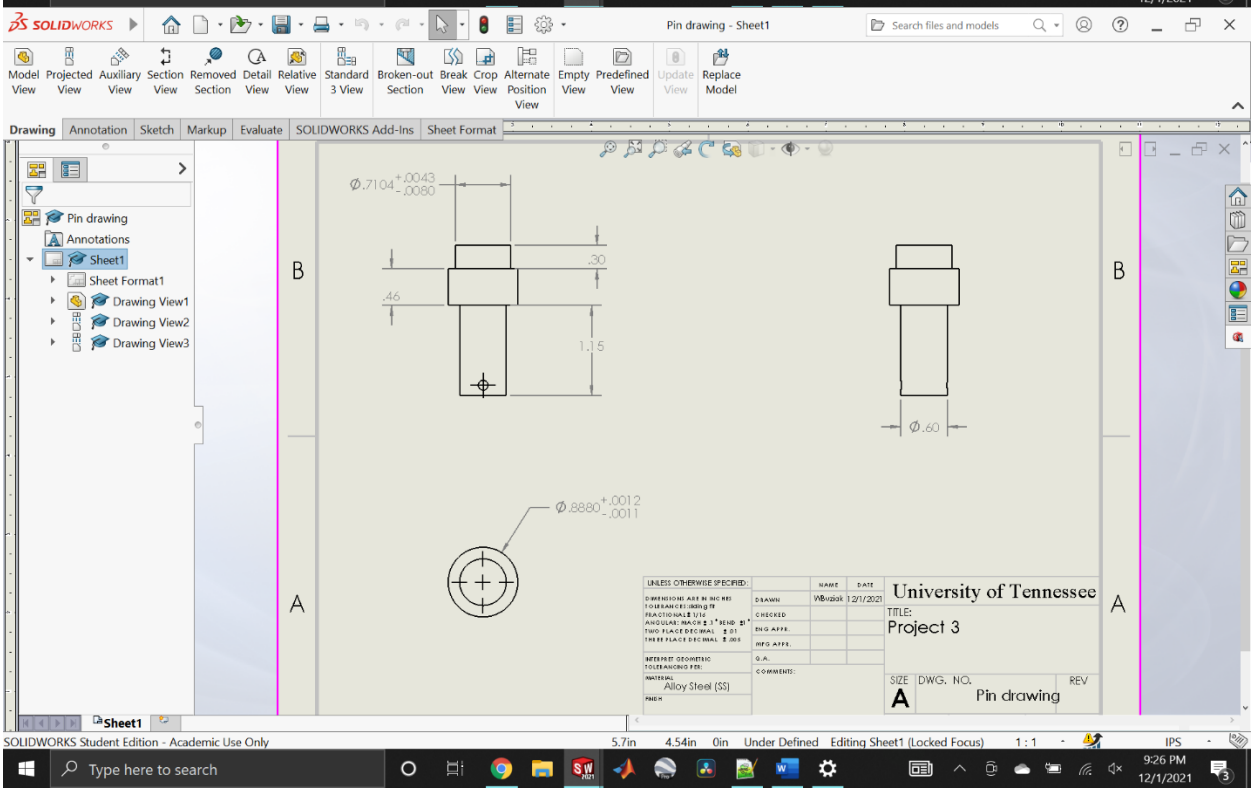


	Minor Diameter			**Major Diameter**		
	Loose running			sliding		
	H11/C11			H7/G6		
	Base	**Upper Limit**	**Lower Limit**	**Base**	**Upper Limit**	**Lower Limit**
Pin	.5950	.5913	.587	.8880	.8876	.8869
Housing	.5950	.6042	.5950	.8880	.8892	.8880
Clearance	.008			.004		
Allowance	.008			.0023		

Table 2. Calculated Tolerances for Major and Minor Diameters

Drawings


Housing Drawing - Sheet1
Housing Drawing
Annotations
Sheet1
Sheet Format1
Drawing View1
Drawing View2
Drawing View3
University of Tennessee
Housing Drawing
Alloy Steel (SS)
SOLIDWORKS Student Edition - Academic Use Only


Pin drawing - Sheet1
Pin drawing
Annotations
Sheet1
Sheet Format1
Drawing View1
Drawing View2
Drawing View3
University of Tennessee
Project 3
Pin drawing
Alloy Steel (SS)
SOLIDWORKS Student Edition - Academic Use Only

Conclusion

My group had issues finding a tolerance for the minor diameter. I experienced the hole being outside of the allowance for even the loosest fit, however the major diameter was much closer to the base allowing a sliding fit. My hypothesis is that there was either human or caliper error which resulted in a miscalculated measurement. I believe that if there were a more unbiased measurement (mainly, separate measurements that are then checked and agreed upon instead of one measurement that is agreed upon) would reduce this error and perhaps allow at least a loose running fit.