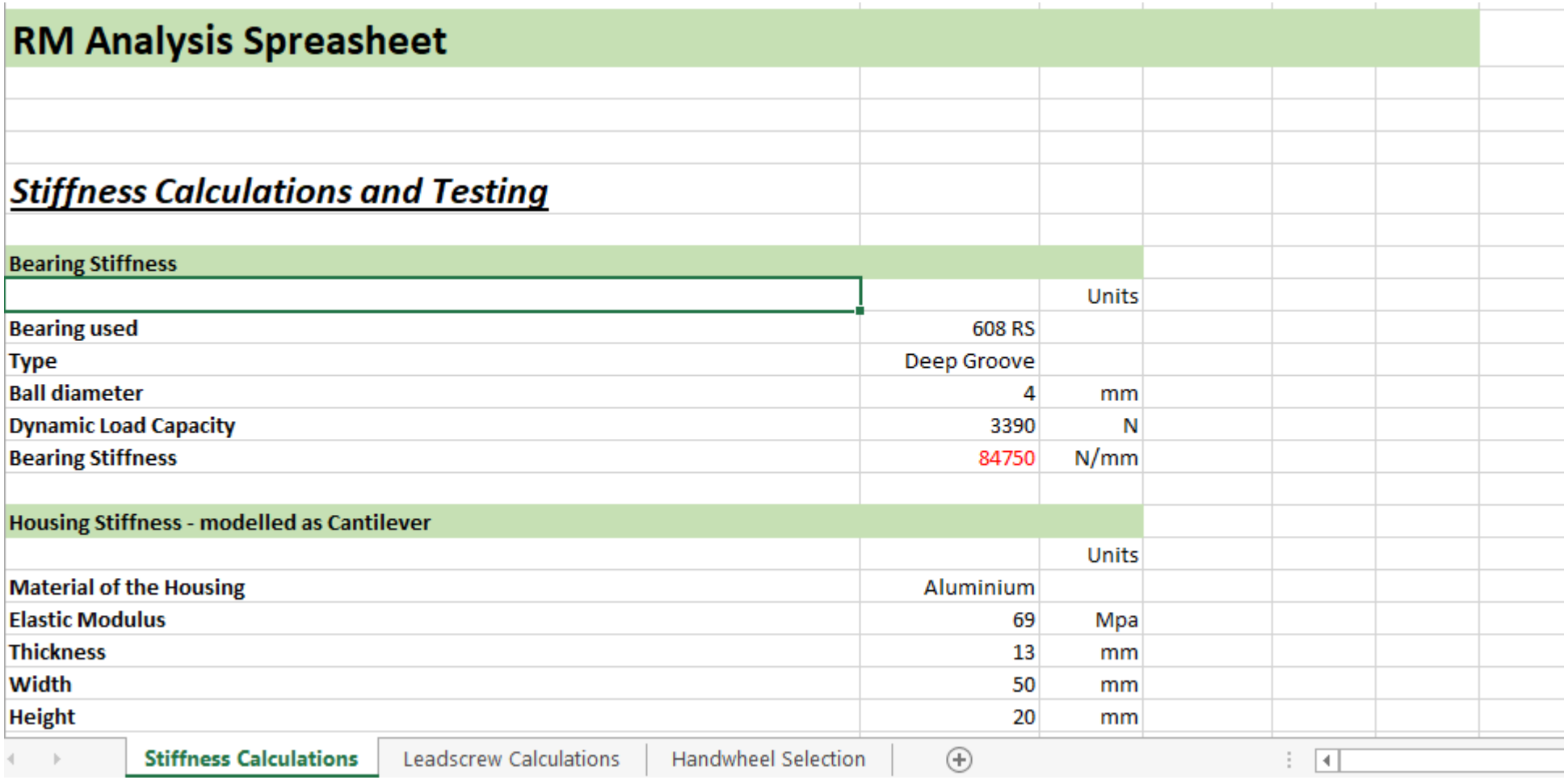
Week 10

Work Completed this Week

- Final CAD of the Rotary Motion System
- Drawings and BOM
- Analysis of the RM – Check the Analysis Spreadsheet
- Seek and Geek 10
- Error Budget Analysis (Still in progress)

Link to RM Analysis Sheet



RM Analysis Spreasheet

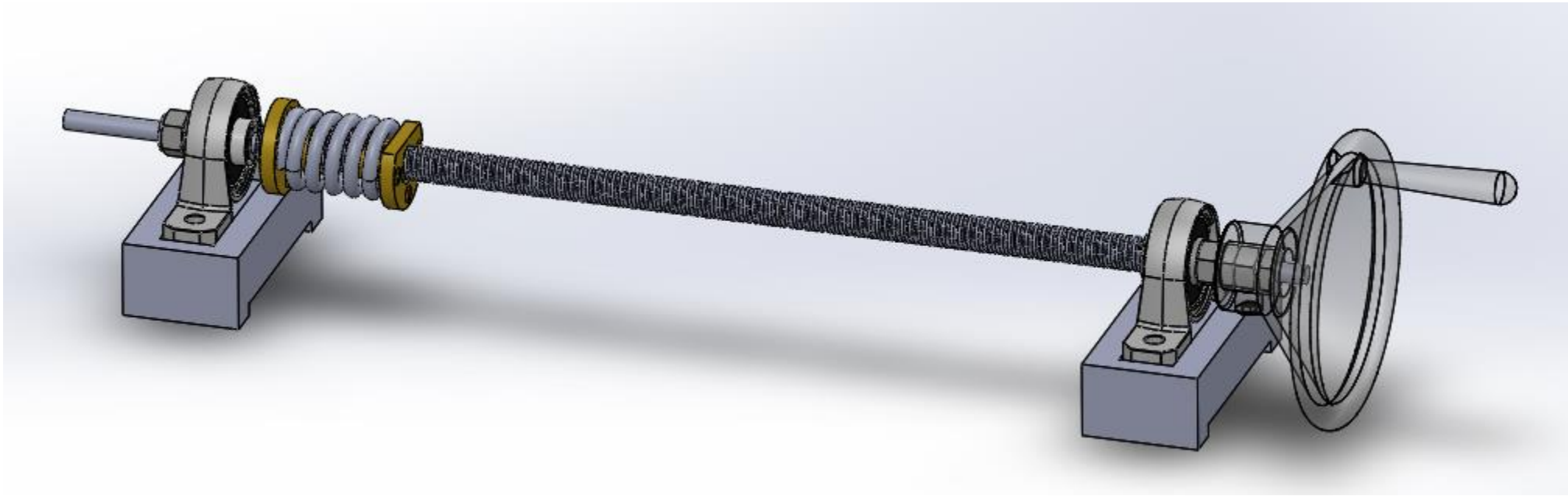
Stiffness Calculations and Testing

Bearing Stiffness		
		Units
Bearing used	608 RS	
Type	Deep Groove	
Ball diameter	4	mm
Dynamic Load Capacity	3390	N
Bearing Stiffness	84750	N/mm

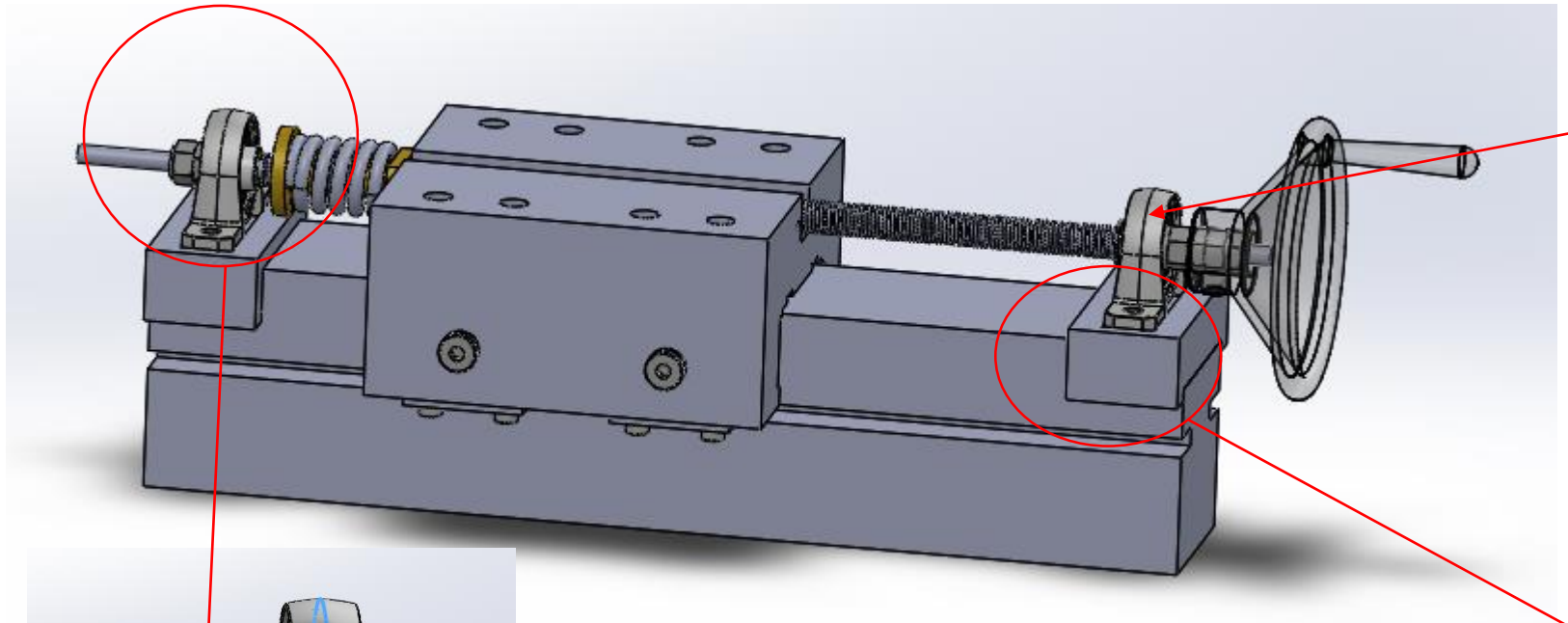
Housing Stiffness - modelled as Cantilever		
		Units
Material of the Housing	Aluminium	
Elastic Modulus	69	Mpa
Thickness	13	mm
Width	50	mm
Height	20	mm

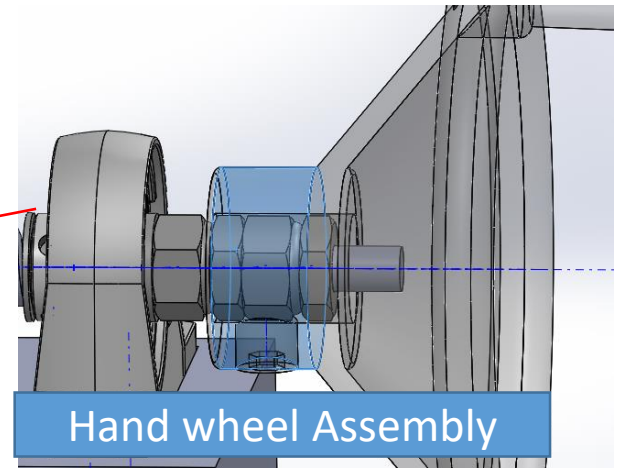
Stiffness Calculations | Leadscrew Calculations | Handwheel Selection

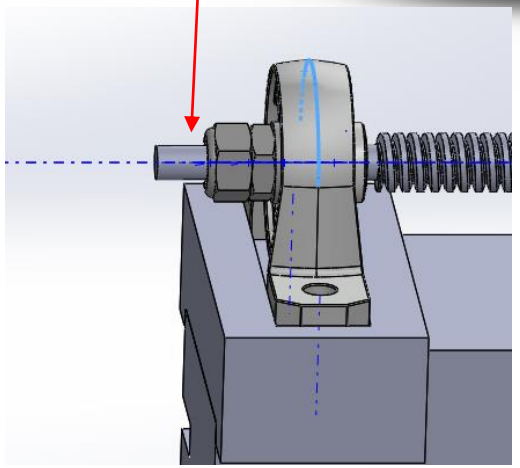
Final CAD for the Rotary Motion Module

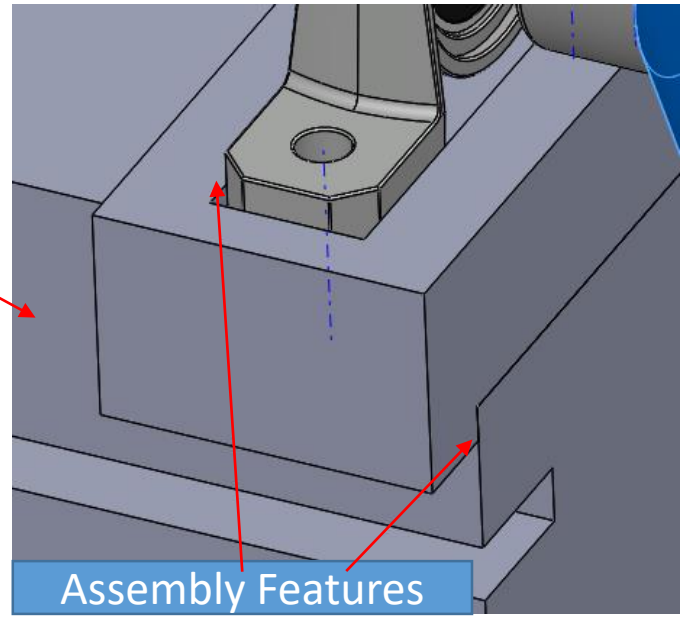


Final Assembly of LM+RM



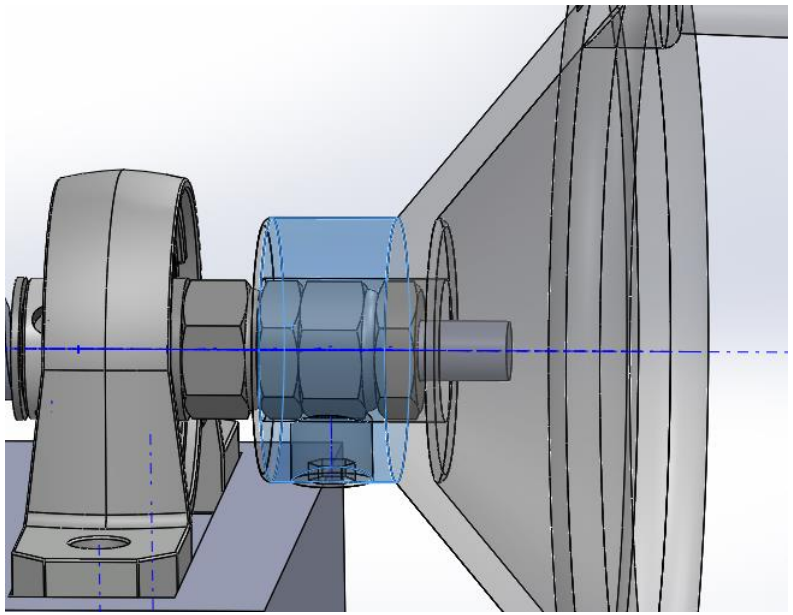




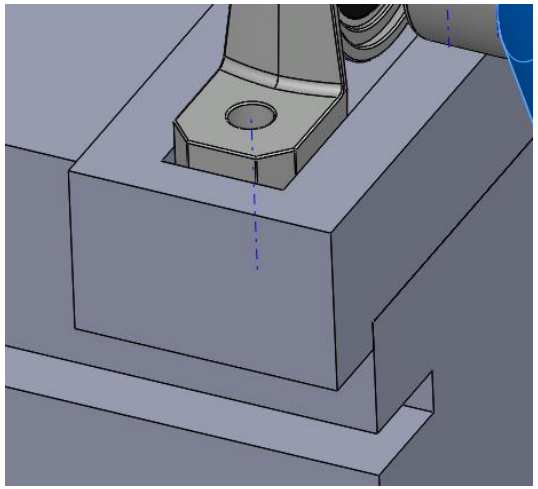


Rotary Motion Module –Design Details

Handwheel Assembly – 2 nuts tightened against a locknut to prevent the movement of the locknut from both sides. Loctite will be used to prevent rotation of the nuts on the handwheel side. A set screw will be used to transmit the torque.

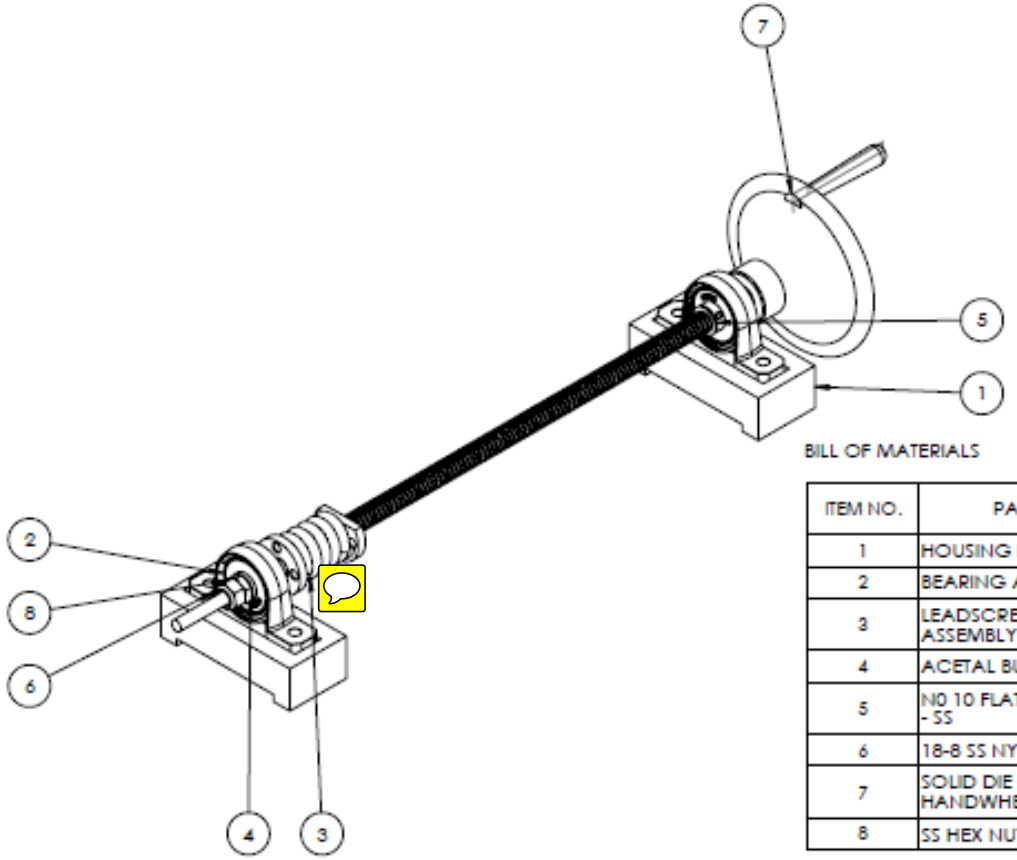


Bearing Housing Assembly – Two deep groove ball bearings are used to either side. A separate part with assembly features will be joined to the rail using wood glue. The bearing housing will be located using assembly features also to ensure accurate positioning of the housing with respect to the rail.



Preloading the Bearings – An axial preload is applied to the inner race of the bearings using locknut. The axial stiffness of one deep grove ball bearing was 84,750 N/mm. The force borne by leadscrew is 30.8 N. This translates to a deflection of just 0.36 um which will be well within the budget. Therefore, one deep groove bearing on either side provided sufficient axial stiffness in this case.

BOM for RM Module



BILL OF MATERIALS

ITEM NO.	PART	DRAWING NO. /VENDOR PART NUMBER	QTY.
1	HOUSING HOLDER	RM-HH-01	2
2	BEARING ASSEMBLY	KP08	2
3	LEADSCREW ASSEMBLY	LS-ASSEMBLY-01	1
4	ACETAL BUSHING	2705T12	2
5	NO 10 FLAT WASHER - SS	90107A011	1
6	18-8 SS NYLOCK	91831A4	3
7	SOLID DIE CAST HANDWHEEL	6403K42	1
8	SS HEX NUT	91841A195	3

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS		FINISH				DEBURR AND BREAK SHARP EDGES	
		NAME	SIGNATURE	DATE			
DRAWN		ACENAT H	ACH	13-6-2018			
CHK'D							
APP'VD							
MFG							
Q.A.							
					MATERIAL:		
					WEIGHT:		

DO NOT SCALE DRAWING — REVISION 0

2.77 PRECISION PRODUCT DESIGN

TITLE: RM ASSEMBLY

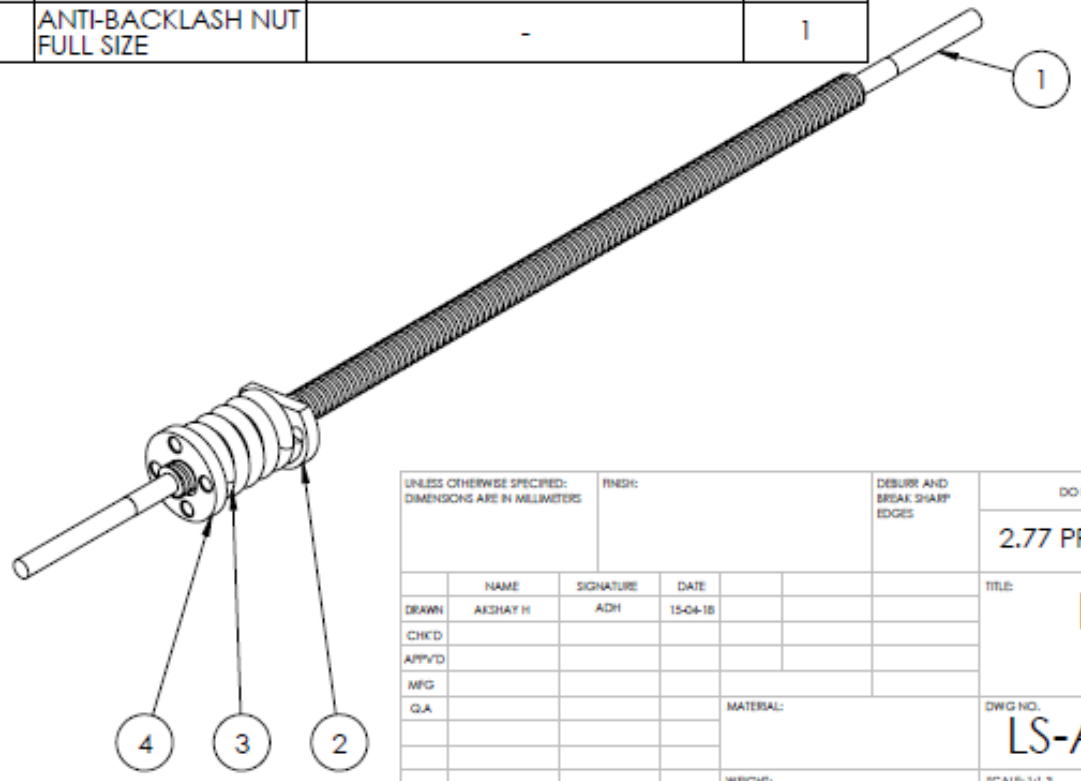
DWG NO. RM-ASSEMBLY-01 — A3

SCALE: 1/4 — SHEET 1 OF 1

BOM for Lead Screw Assembly

BILL OF MATERIALS

ITEM NO.	PART	DRAWING NO/VENDOR PART NUMBER	QTY.
1	LEADSCREW	RM-LS-01	1
2	ANTI-BACKLASH NUT CUT SIZE	-	1
3	COMPRESSION SPRING	9657K318	1
4	ANTI-BACKLASH NUT FULL SIZE	-	1



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS
FINISH:
DEBURR AND BREAK SHARP EDGES
DO NOT SCALE DRAWING
REVISION 0

2.77 PRECISION PRODUCT DESIGN

	NAME	SIGNATURE	DATE
DRAWN	AKSHAY H	ADH	15-04-18
CHK'D			
APPV'D			
MFG			
Q.A			

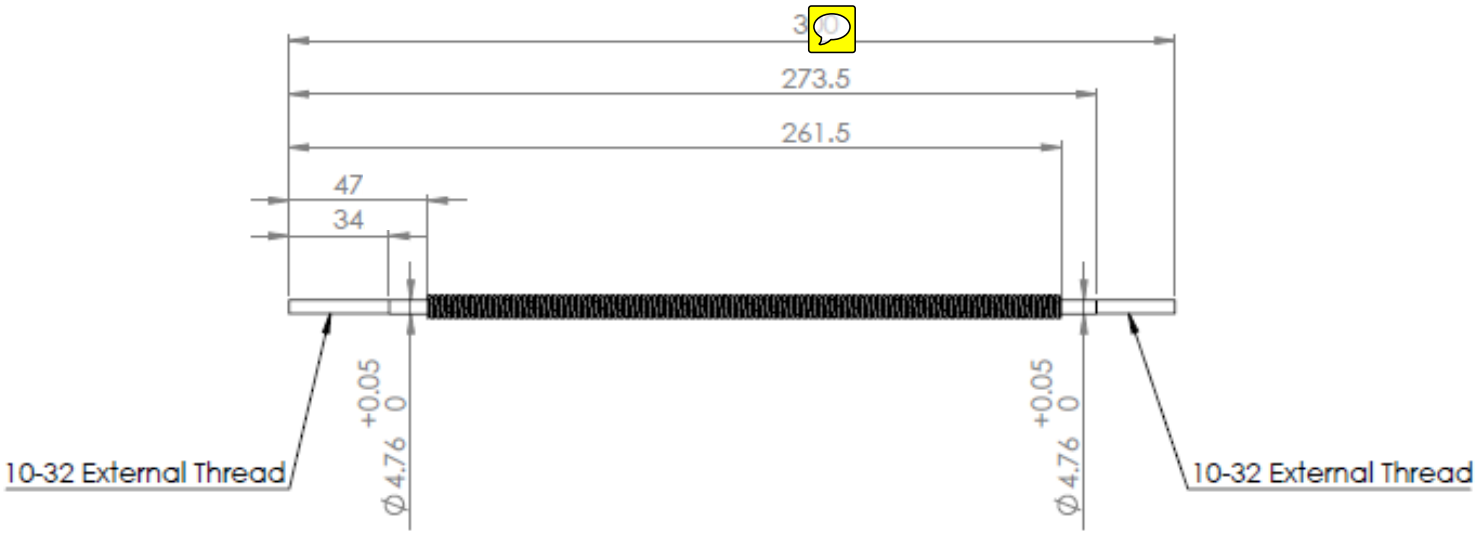
MATERIAL:
WEIGHT:

TITLE:
LEADSCREW ASSEMBLY

DWG NO.
LS-ASSEMBLY-01
A4

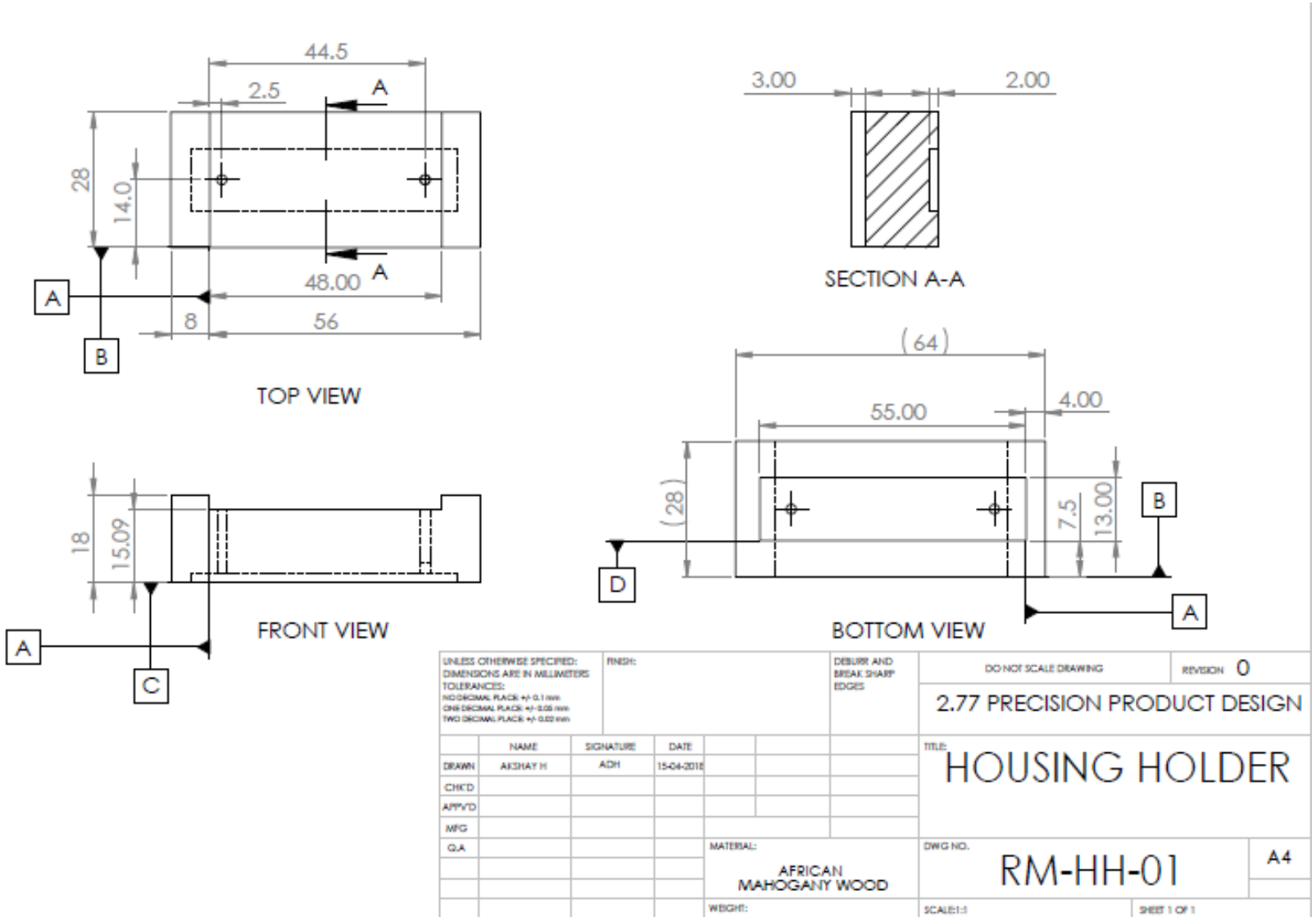
SCALE: 1:1.3
SHEET 1 OF 1

Manufacturing Drawing for Leadscrew

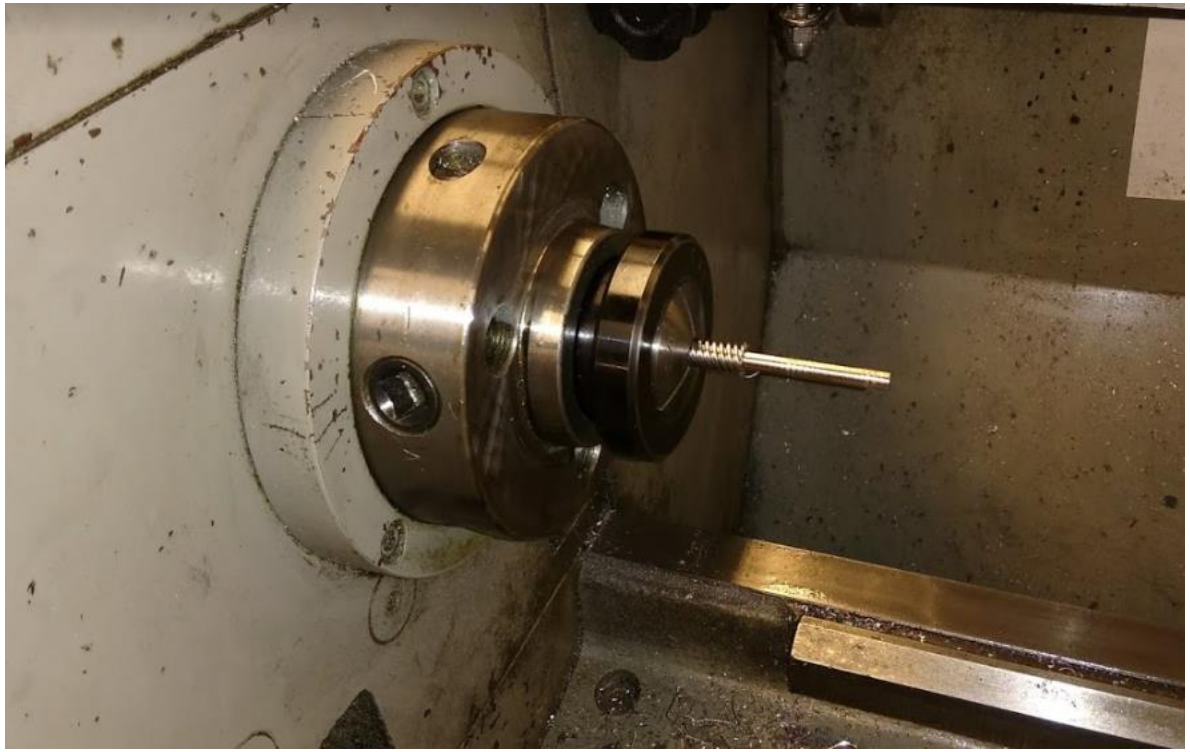


UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS TOLERANCES: ONE DECIMAL PLACE: +/- 0.05 mm TWO DECIMAL PLACE: +/- 0.02 mm	FINISH:				DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING REVISION 0
						2.77 PRECISION PRODUCT DESIGN
	NAME	SIGNATURE	DATE			TITLE: LEADSCREW
DRAWN	AKSHAY H	ADH	15-4-2018			
CHK'D						
APPV'D						
MFG						
Q.A				MATERIAL: STAINLESS STEEL		DWG NO. RM-LS-01 A4
				WEIGHT:		SCALE 1:2 SHEET 1 OF 1

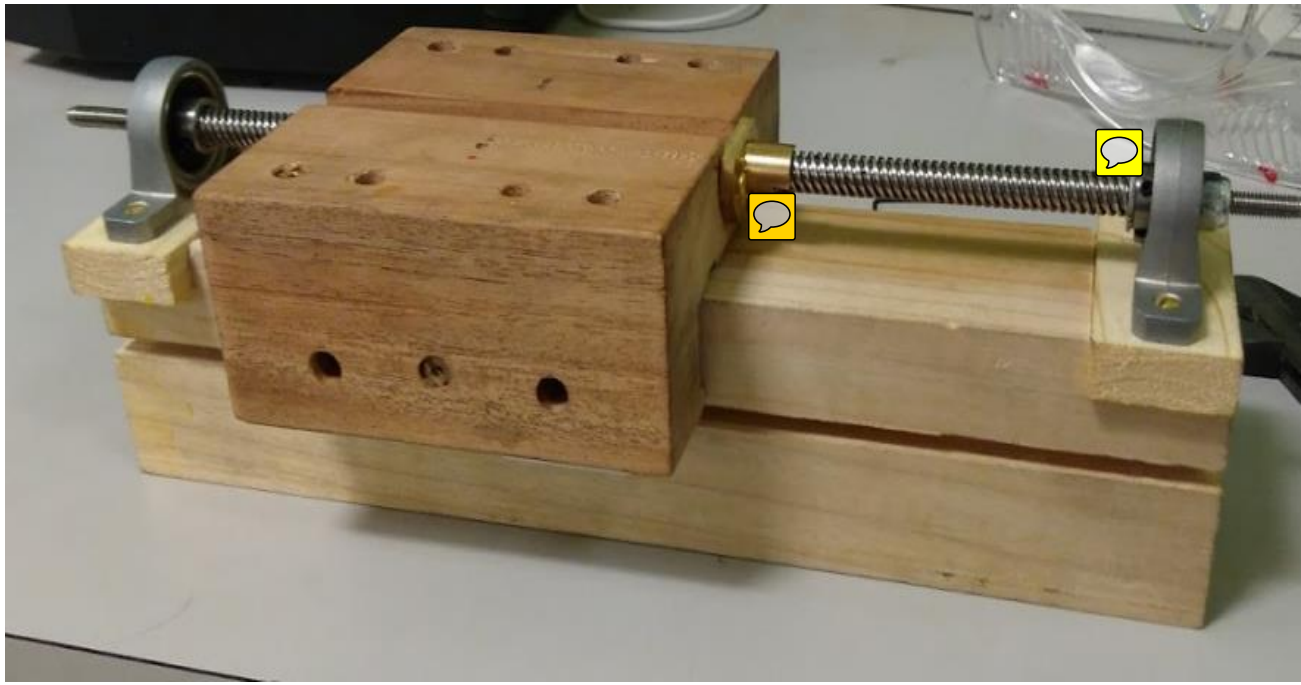
Manufacturing Drawing for Housing Holder



Manufacturing Progress



Leadscrew Machined



Assembled the Leadscrew on the Sketch Model

Plan for next week

- Complete Error Budget Analysis
- Manufacture Housing Holder
- Assembly and Test