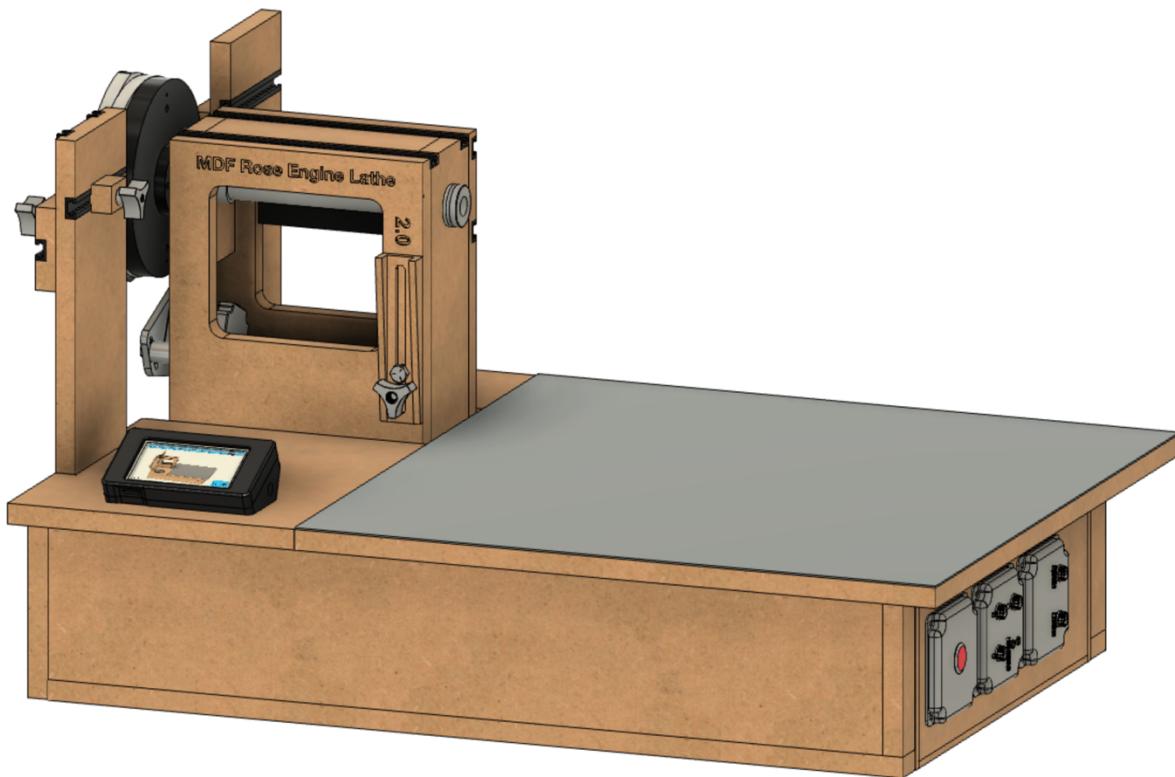


MDF Rose Engine Lathe 2.0 with Stepper Motor Drive



Instructions for Building Jigs, Fixtures, & Add-Ons

**Version 1.5
31 December 2022**

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

This document is intended to help one familiar with the MDF rose engine to easily build the identified jigs, fixtures, and add-ons. You can purchase these from us at www.ColvinTools.com, or build them yourself.

As you get started with building these jigs, fixtures, or add-ons to the MDF rose engine lathe, please consider making the machine exactly according to the outlined instructions. There are lots of ways you can modify this, and, quite frankly, the MDF rose engine encourages experimentation. But it is best to attempt those modifications after understanding how it works. Some ideas which sound grand may not appear so after understanding how the machine works (we speak from experience).

If you have any questions on the terminology in this document, check out the “Ornamental Turning Book of Knowledge” (www.OTBoK.info).

Throughout this document, I’ve tried to show the MDF in its native color of tan/brown. There are differences in the images I captured from the CAD drawing made, but those are not representative of the machine’s differences.

The added pieces are typically shown in different colors to ensure they stand out from the MDF rose engine lathe.

Unless otherwise noted, the MDF is $\frac{3}{4}$ " thick.

If you have any questions, please contact us at ColvinTools@Gmail.com.

Good luck and we hope you enjoy this machine as much as we.

Rich Colvin & Jack Zimmel

Permission is not granted to manufacture these for sale.

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

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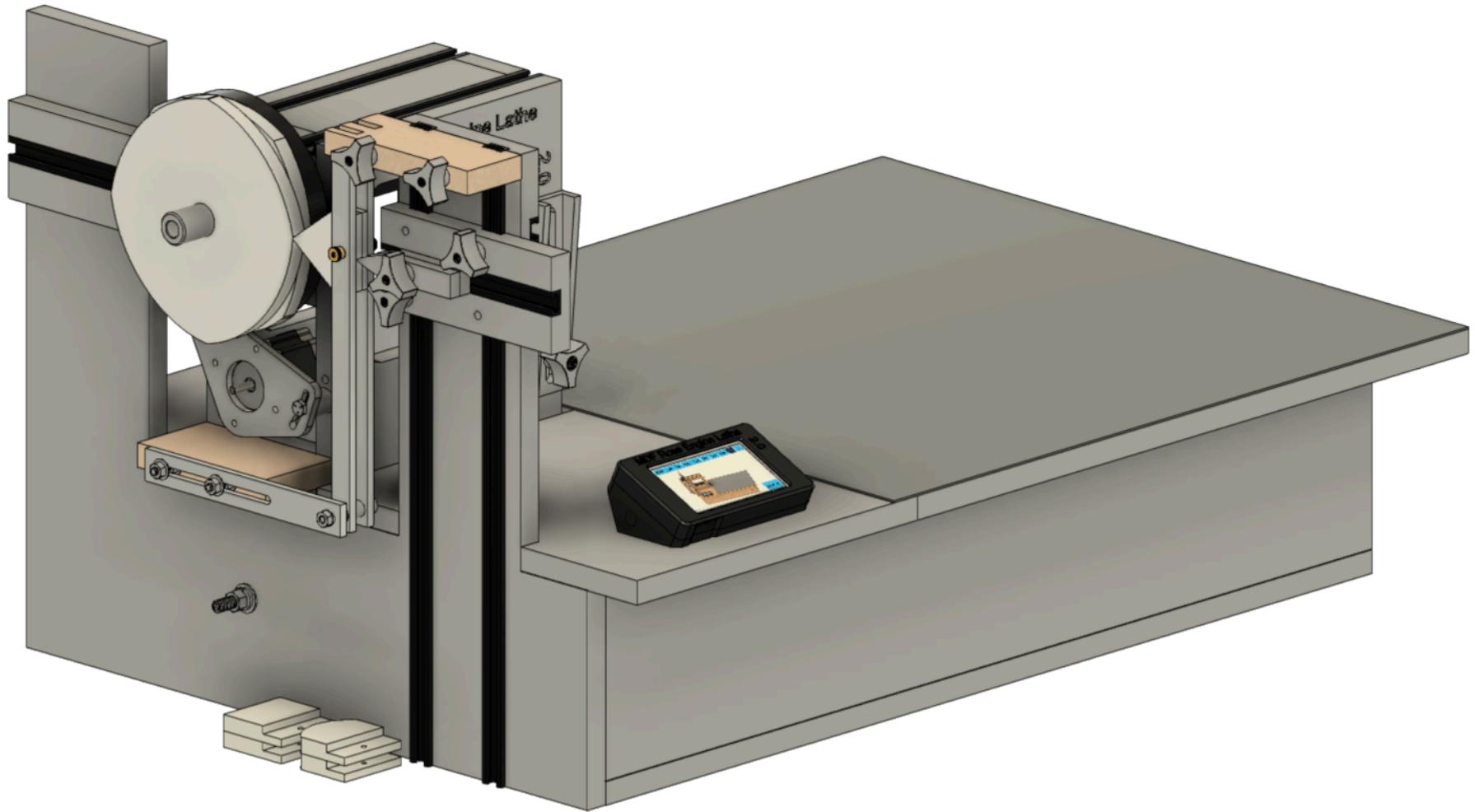
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Amplitude Adjuster

The amplitude adjuster for the MDF Rose Engine Lathe 2.0 is shown installed to the right.

Also shown are some extra rubbers. Note that the RS1 has been flipped 180° to open up more space.

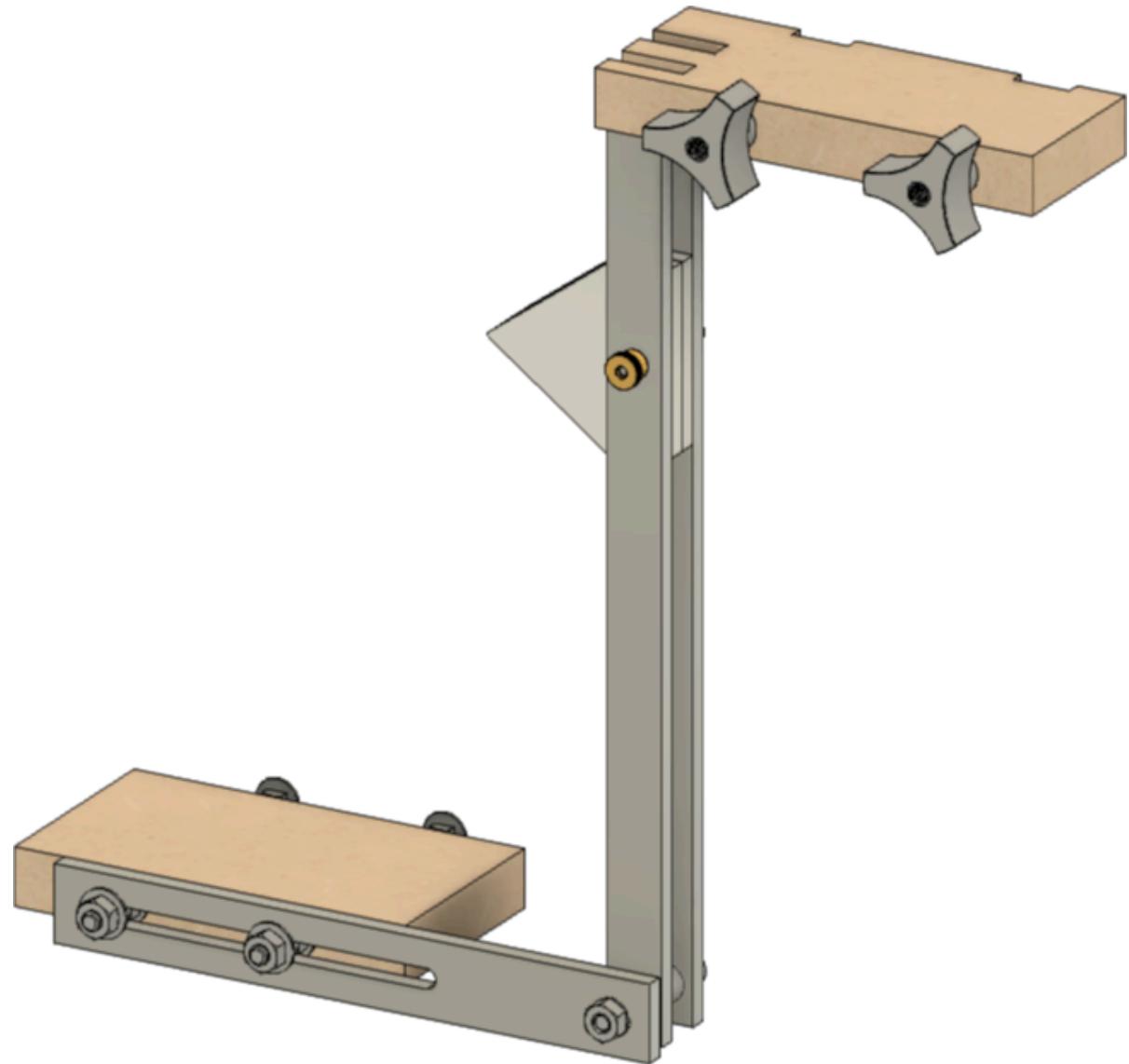
Details for building this follow the bill of materials.



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

This diagram shows the AA removed from the MDF Rose Engine Lathe 2.0.

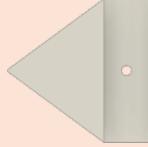
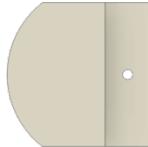


MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Bill of Materials

Parts required for building this are below.

Item #	Item	Qty	Source	Source Part Number	Comments
MDF Parts					
AA1	MDF Spacer Block	1			
AA2	MDF AA Alignment Block	1			
Machined Parts					
AA3	Aluminum bar, $\frac{1}{4}$ " x 1"	1			A piece $7 \frac{3}{4}$ " to 8" long is needed. Used for the horizontal bar.
AA4	Aluminum bar, $\frac{1}{4}$ " x $\frac{3}{4}$ "	2			Two pieces, $12 \frac{1}{2}$ " to 13" long (each) are needed. Used for the vertical bars.
R1	Rubber, Pointed	2			
R2	Rubber, 2" Radius	2			
R3	Rubber, Flat	2			
Other Parts					

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

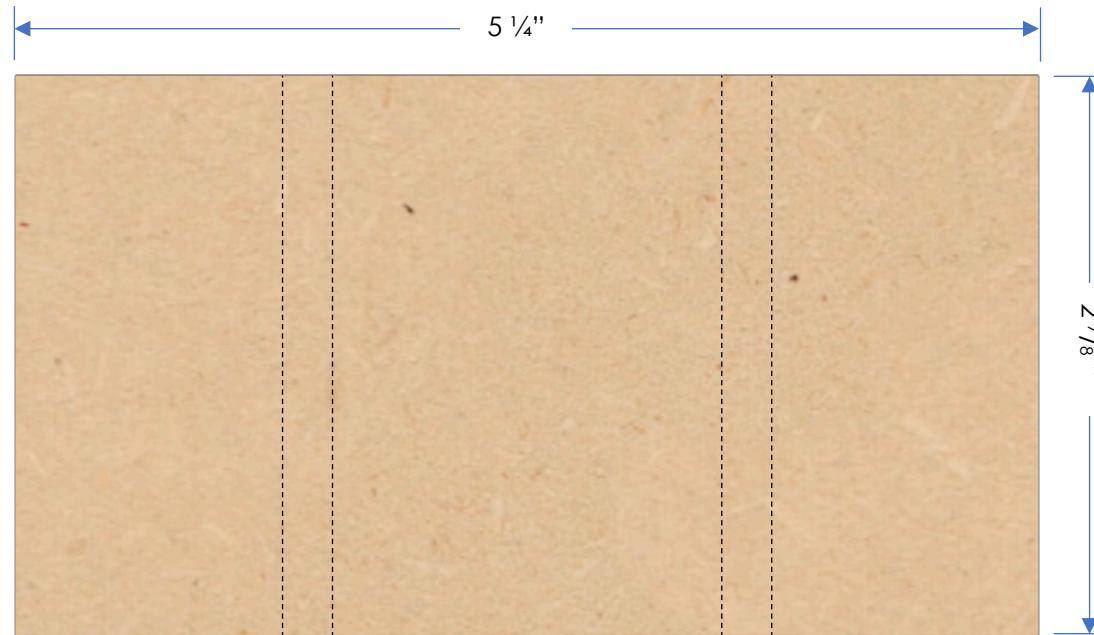
Item #	Item	Qty	Source	Source	Comments
				Part Number	
101	Carriage Bolts, $\frac{1}{4}$ "-20, 4" long	2	McMaster-Carr	93548A560	
102	Washer, $\frac{1}{4}$ "	8	McMaster-Carr	90107A029	
103	Lock Washer, $\frac{1}{4}$ "	1	McMaster-Carr	92146A029	
104	Nut, $\frac{1}{4}$ "-20	5	McMaster-Carr	95505A601	
105	Bolt, $\frac{1}{4}$ "-20	1	McMaster-Carr	90272A196	Used as the axle for the vertical bars (AA4). Cut down per drawing on pg. 11. Need 1 $\frac{1}{2}$ " of unthreaded area.
					
106	Spacer, $\frac{1}{4}$ " ID, $\frac{1}{2}$ " Long	1	McMaster-Carr	92510A765	
107	Collar, $\frac{1}{4}$ " ID	1	McMaster-Carr	6432K12	
108	T-Track Bolt, $\frac{1}{4}$ "-20, 2 $\frac{1}{2}$ " to 3" Long	2	McMaster-Carr		
109	T-Track Nut, $\frac{1}{4}$ "-20	2	McMaster-Carr		
110	Bolt, #8-32, 5/8" Long	2	McMaster-Carr	90272A196	
111	Knurled Nut, #8-32	2	McMaster-Carr	92741A120	

MDF Rose Engine Lathe 2.0

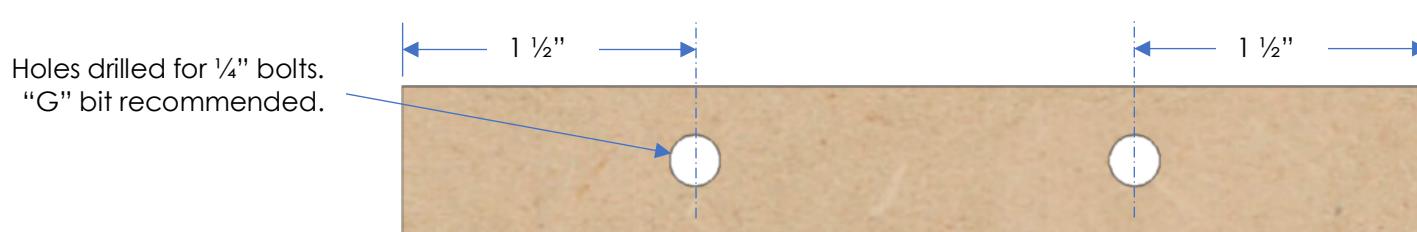
Jigs, Fixtures, and Add-Ons

AA1 – MDF Spacer Block

This spacer block is used to attach the AA to the headstock at the correct distance. You will need to drill two holes in H4L on the headstock to match the thru holes.



Top View



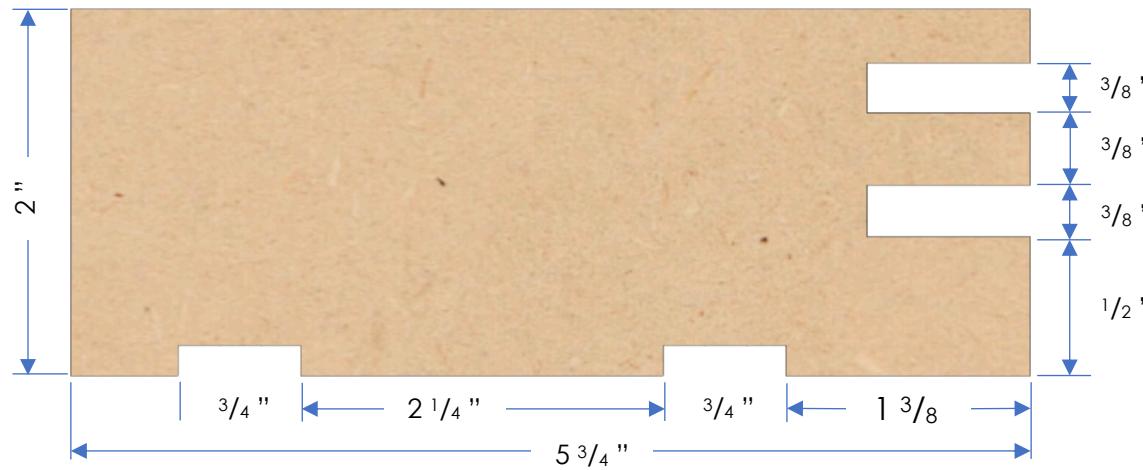
Side View

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

AA2 – MDF AA Alignment Block

This is used to help keep the vertical bars aligned to the rosettes.



Top View

Holes drilled for $\frac{1}{4}$ " bolts.
"G" bit recommended.
Center in slot for T-Track.



Side View

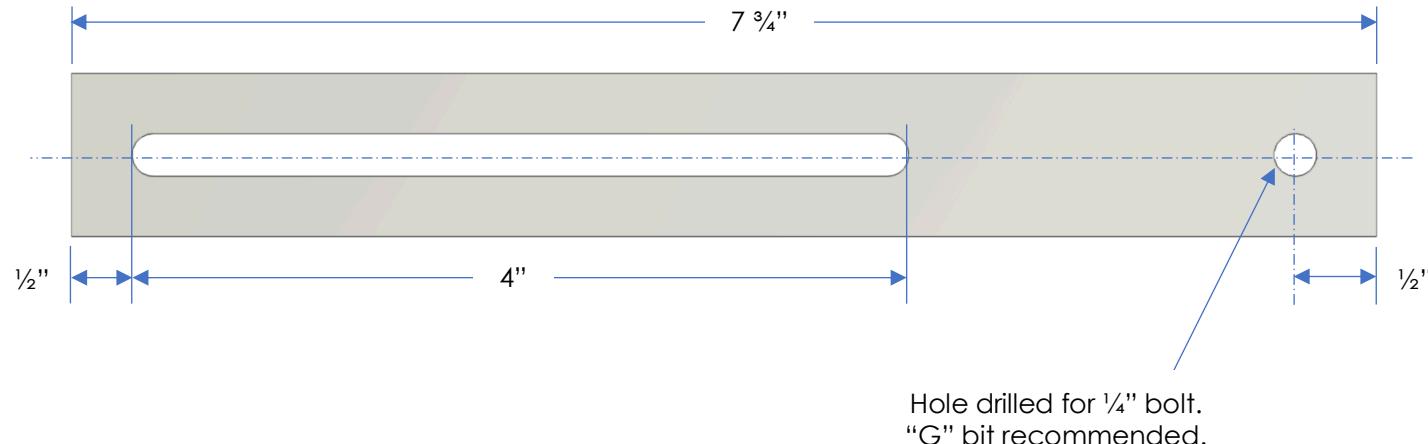
NOTE: There is also a 3D printable version in the 3D Printed Parts manual in the MDF Rose Engine Lathe 2.0 Library (<https://mdfre2.ColvinTools.com>).

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

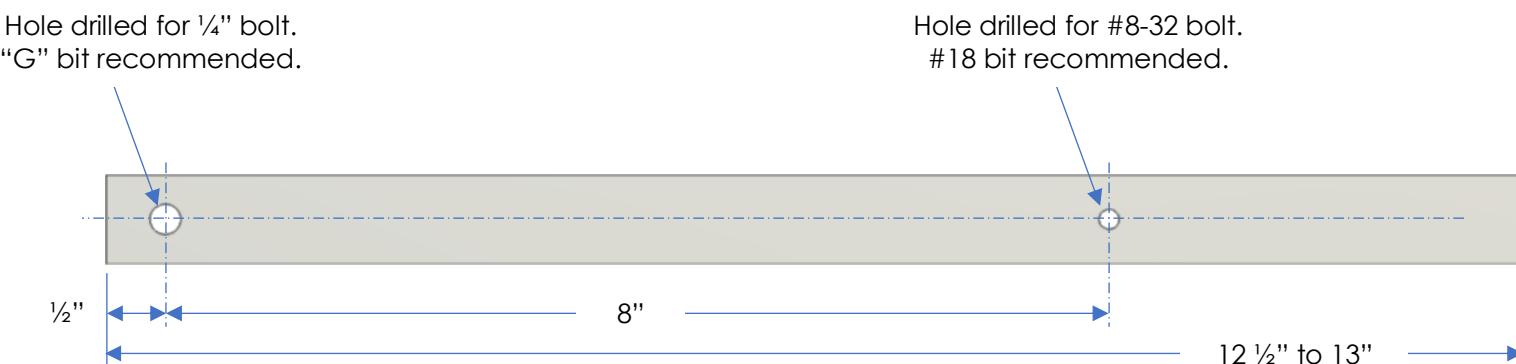
AA3 – Horizontal Bar

The horizontal bar is made from 1" x $\frac{1}{4}$ " aluminum bar.



AA4 – Vertical Bar

The vertical bars are made from $\frac{3}{4}$ " x $\frac{1}{4}$ " aluminum bar. There are two of these.



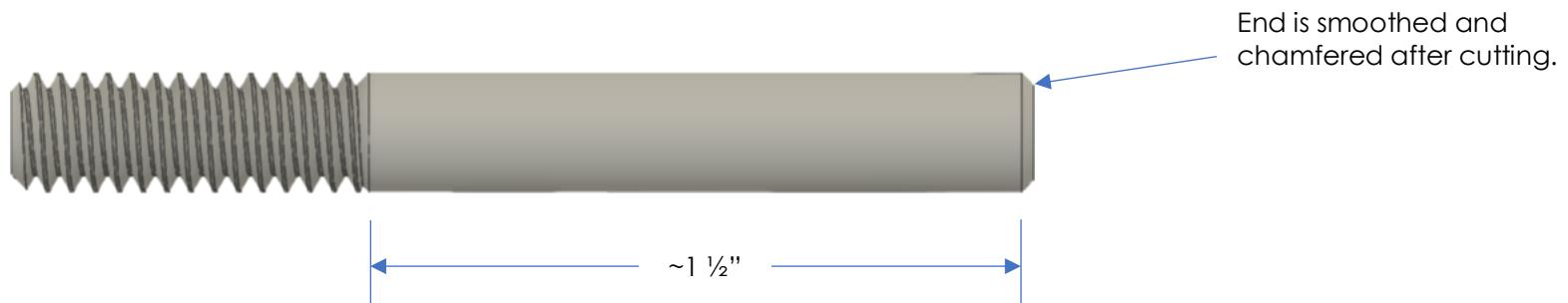
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

105 – AA Lever Arm Axle

This is made from a partially threaded bolt. It can be cut with a hack saw, but be sure to smooth off the end, and chamfer it.

The one specified has sufficient unthreaded space.

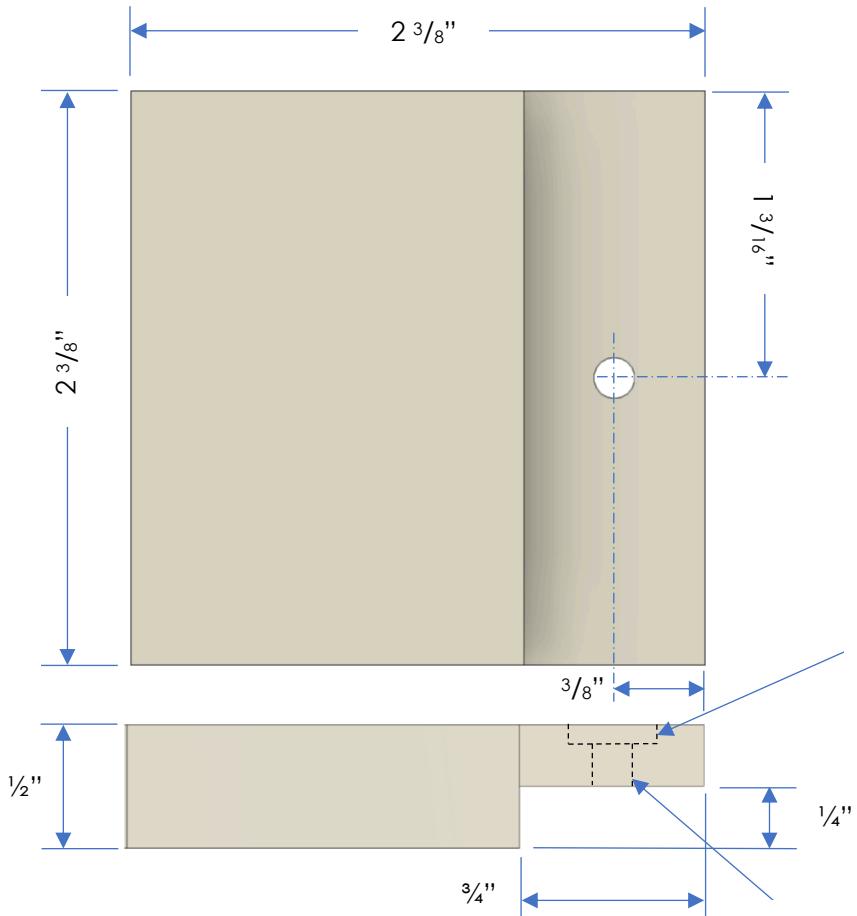


MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

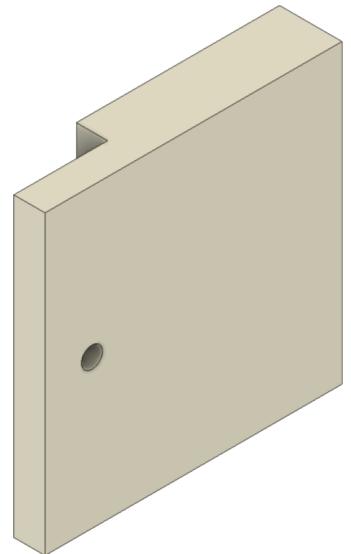
R1 – AA Rubber

Two are needed at any one time. More can be made. The basic shape to start with is like shown to the right, with measurements below.

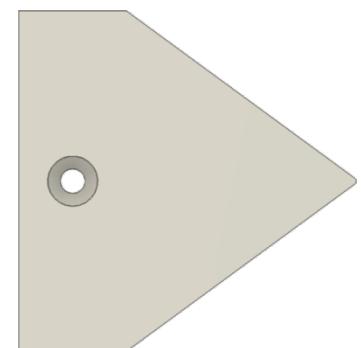


Partial hole drilled for head of #8-32 bolt. Needs to be $> 0.350''$.
 $\frac{3}{8}''$ Forstner bit recommended.
 Drill this first. The point marks where to drill the through hole.
 Depth of the partial hole is $0.100''$ to $1/8''$.

Through hole drilled for #8-32 bolt.
 $\#18$ bit recommended.



Flat Rubber



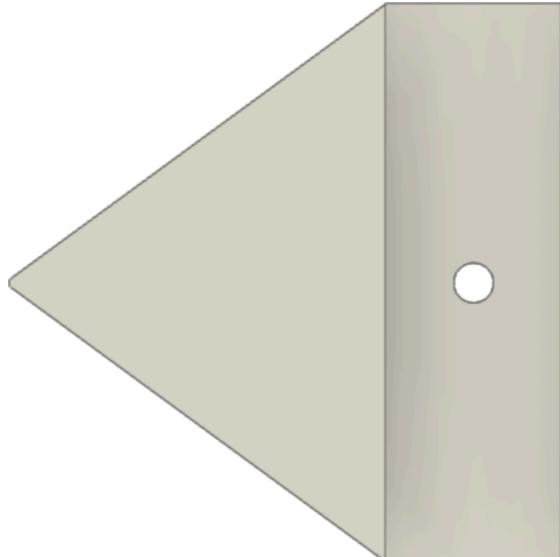
Pointed Rubber

MDF Rose Engine Lathe 2.0

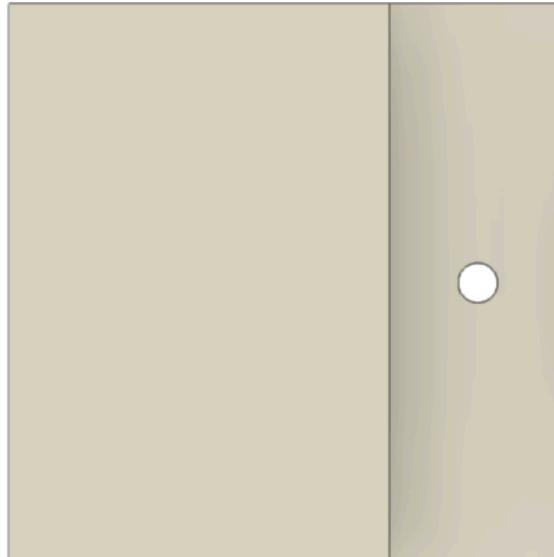
Jigs, Fixtures, and Add-Ons

Various Rubber Shapes

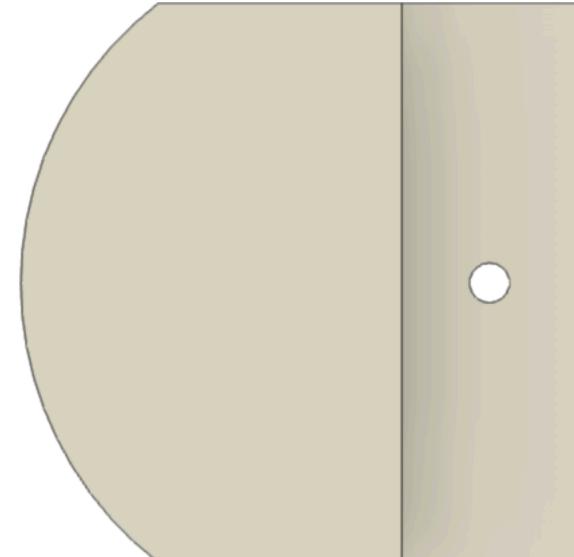
Some examples of rubber shapes are below. Others can be made to accomplish the desired results.



Pointed



Flat



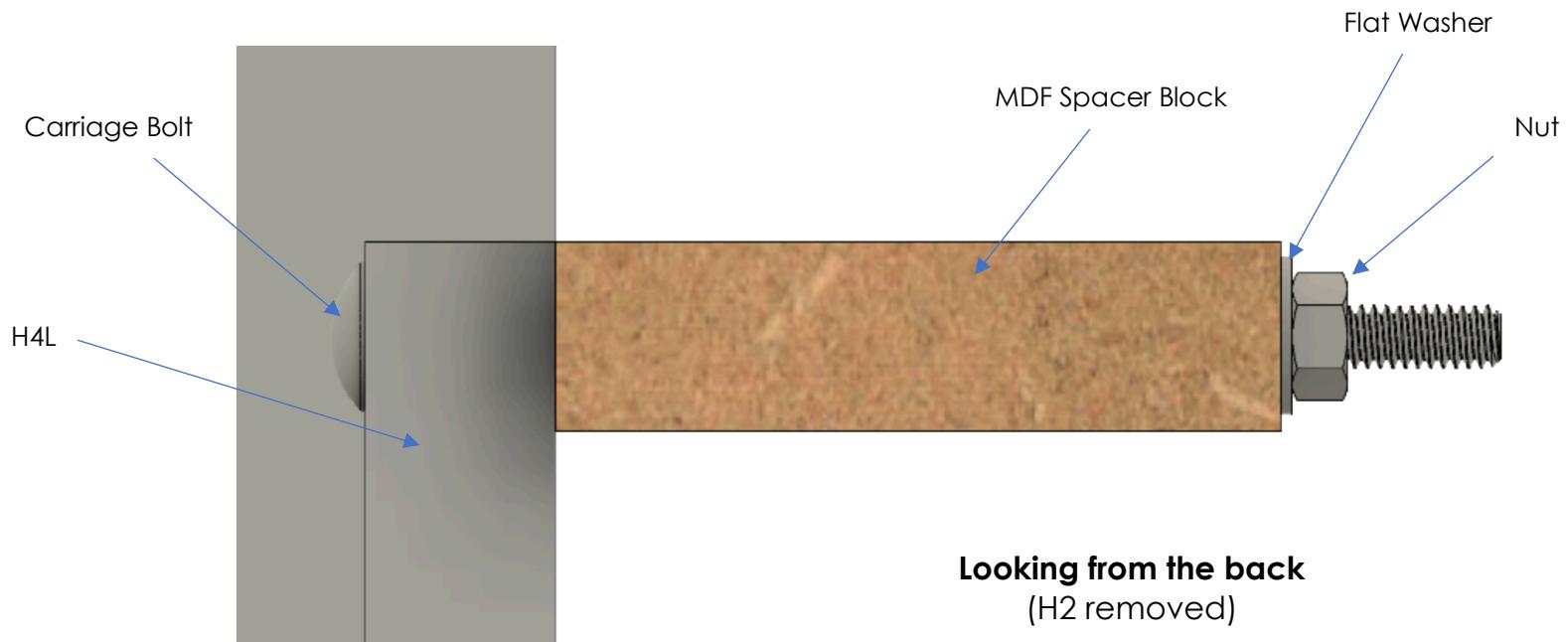
**Rounded
(2" Radius)**

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Assembly

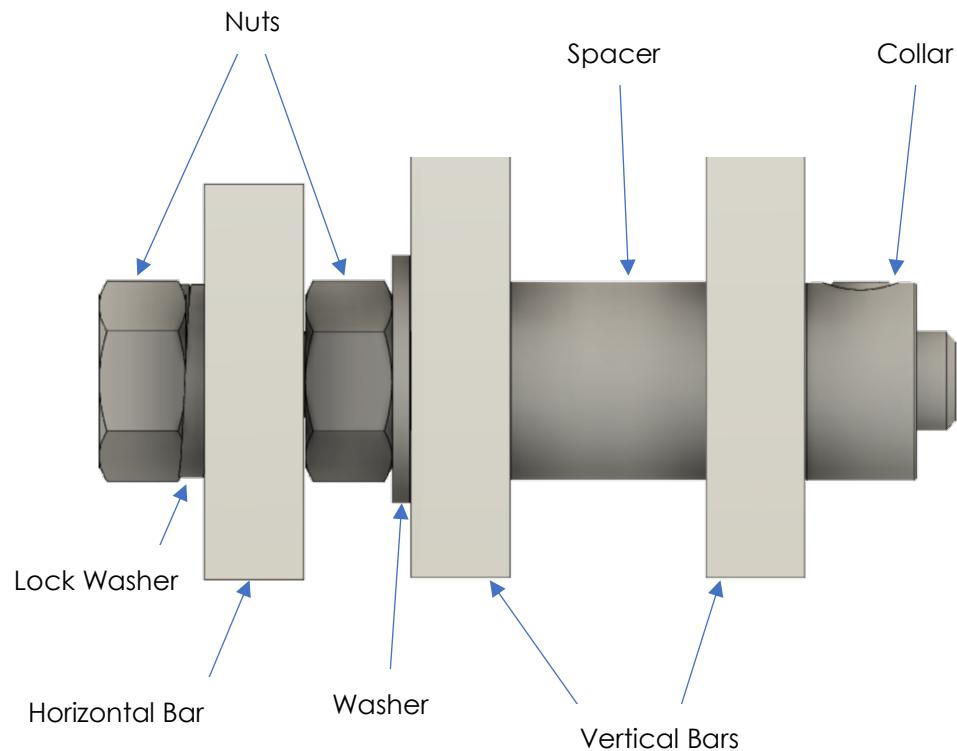
1. Drill the two holes needed in the headstock.
2. Attach the MDF Spacer Block (AA1) to the headstock using two carriage bolts with nuts and flat washers (#101, #102, & #104). The spacer block should be flush with the top of H4L.



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

3. Attach the Axle (#105, cut as shown on pg. 11) to the Horizontal Bar (AA3) using two nuts (#104) and a lock washer (#103).
4. Add a flat washer (#102), one vertical arm (AA4), the spacer (#106), the 2nd vertical arm (AA4), and the collar (#107).



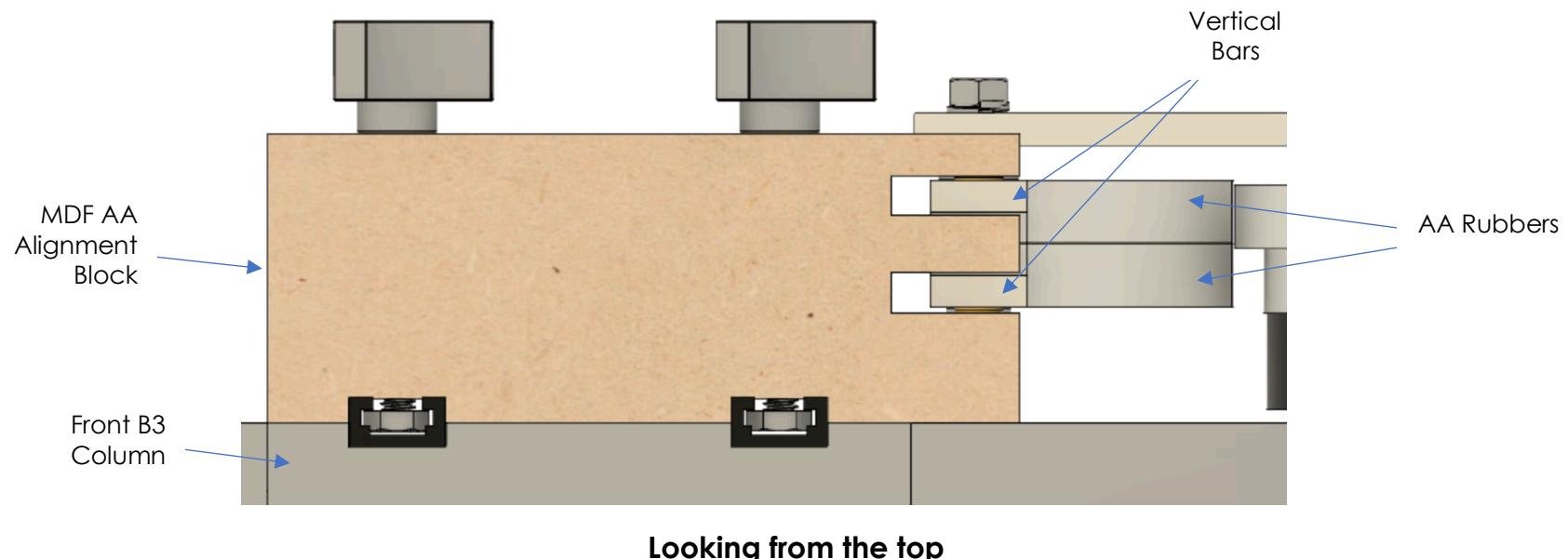
Looking from the front

MDF Rose Engine Lathe 2.0

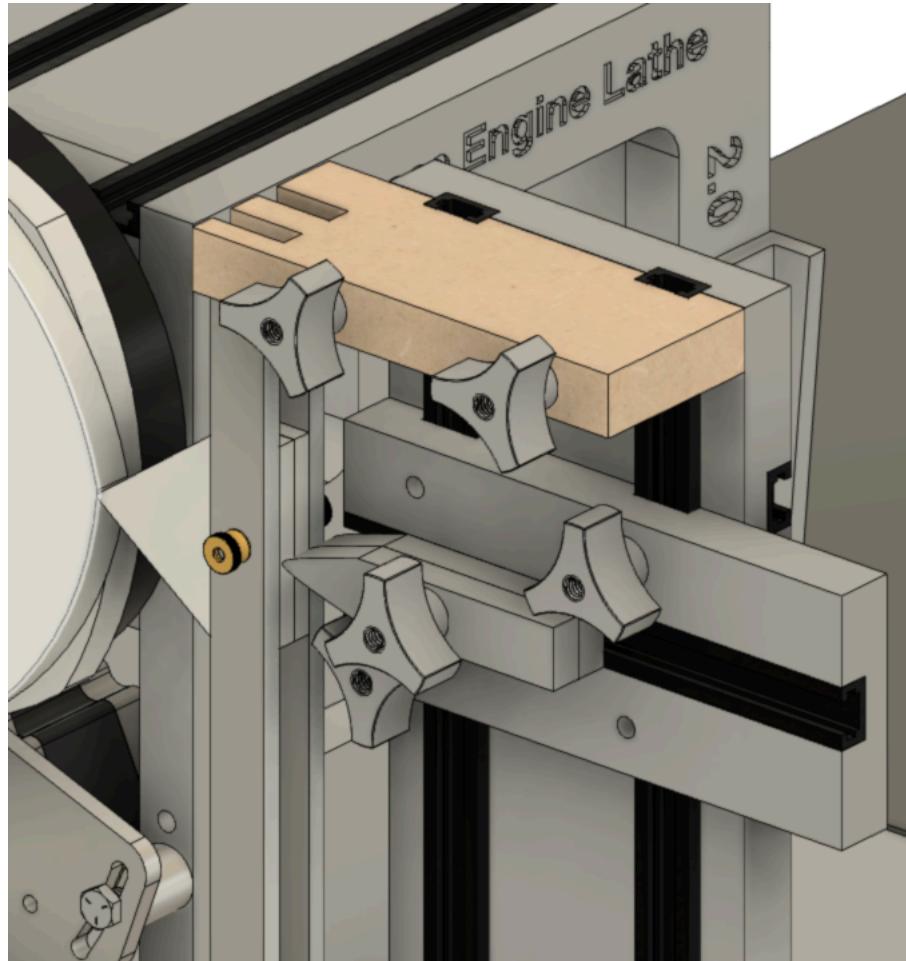
Jigs, Fixtures, and Add-Ons

Using the AA

1. Attach a rubber to each Vertical bar using an #8-32 bolt (#110) and a knurled nut (#111).
2. Attach the Horizontal bar to the MDF Spacer Block using two nuts and flat washers (#102 & #104). Ensure the vertical bars so that they are aligned with the front column (B3) on the MDF Rose Engine Lathe 2.0.
3. Add the MDF AA Alignment block (AA2) and hold it in place using two T-Track bolts (#108) and nuts (#109).



MDF Rose Engine Lathe 2.0 Jigs, Fixtures, and Add-Ons



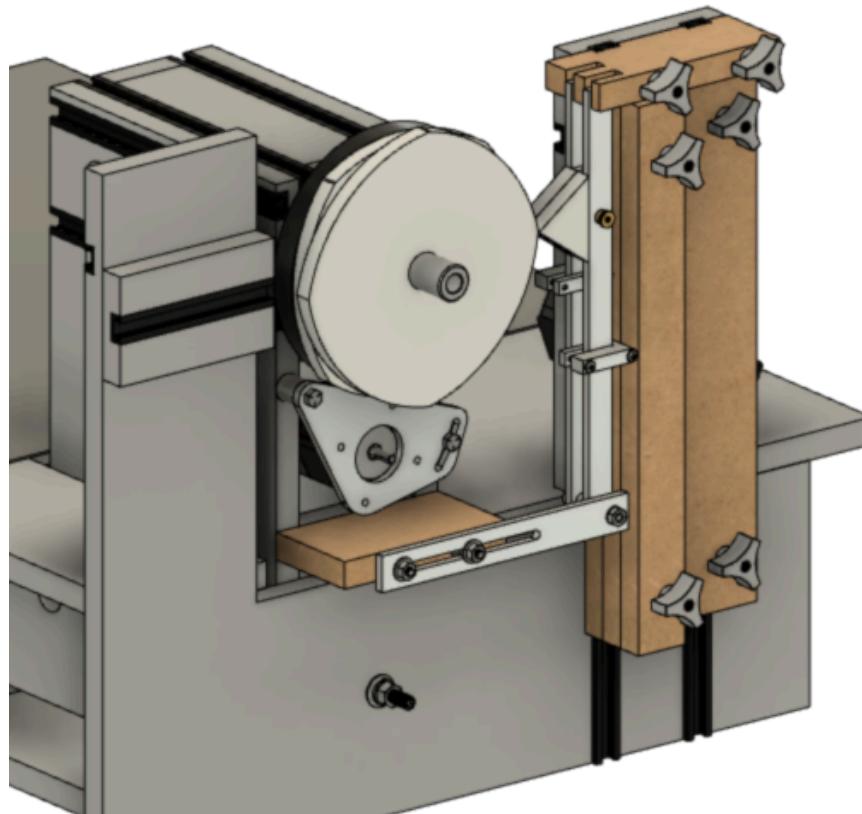
MDF Alignment Block installed at the top of the front B3 column.

- If reducing amplification, install it at the top of B3.
- If increasing amplification, install it below the RS1 rubber support, but as high as possible so as not to interfere with the AA rubbers.

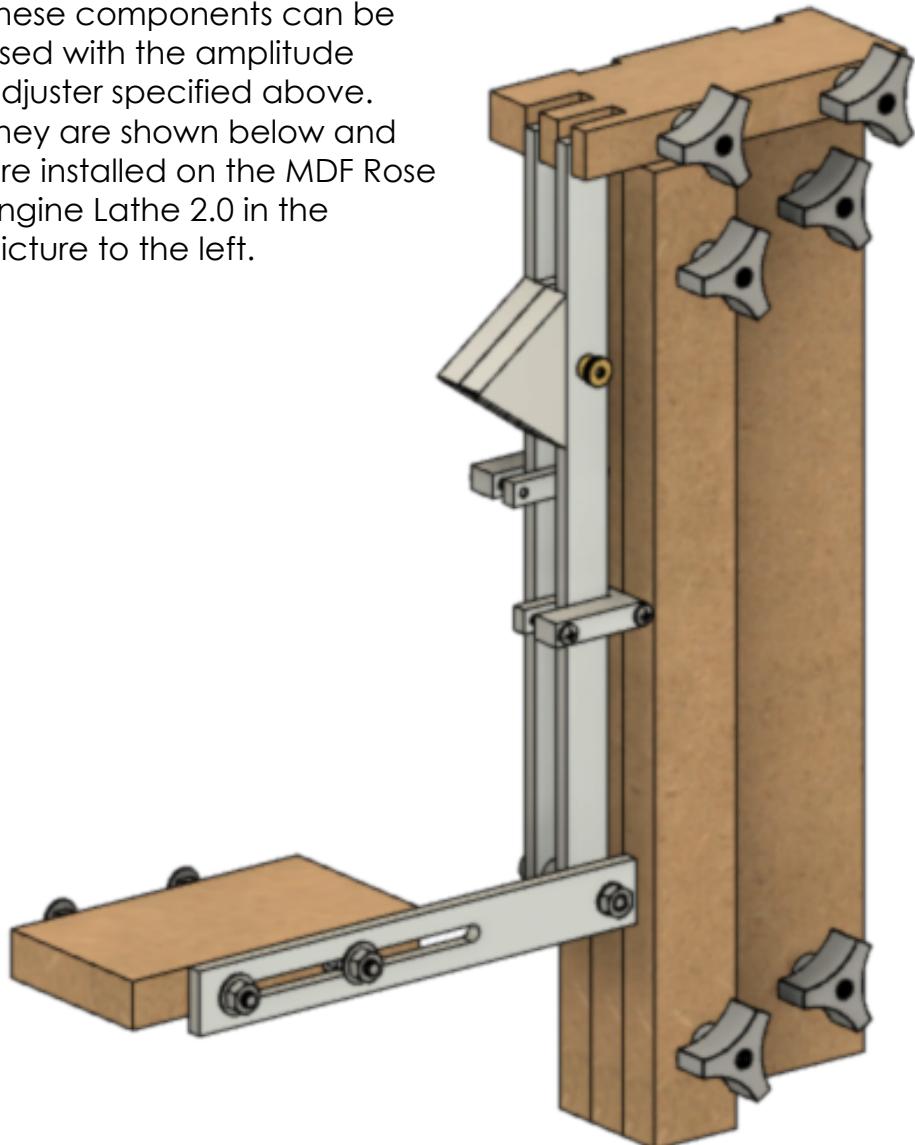
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Amplitude Adjuster Components for Independent Amplitude Adjustment



These components can be used with the amplitude adjuster specified above. They are shown below and are installed on the MDF Rose Engine Lathe 2.0 in the picture to the left.

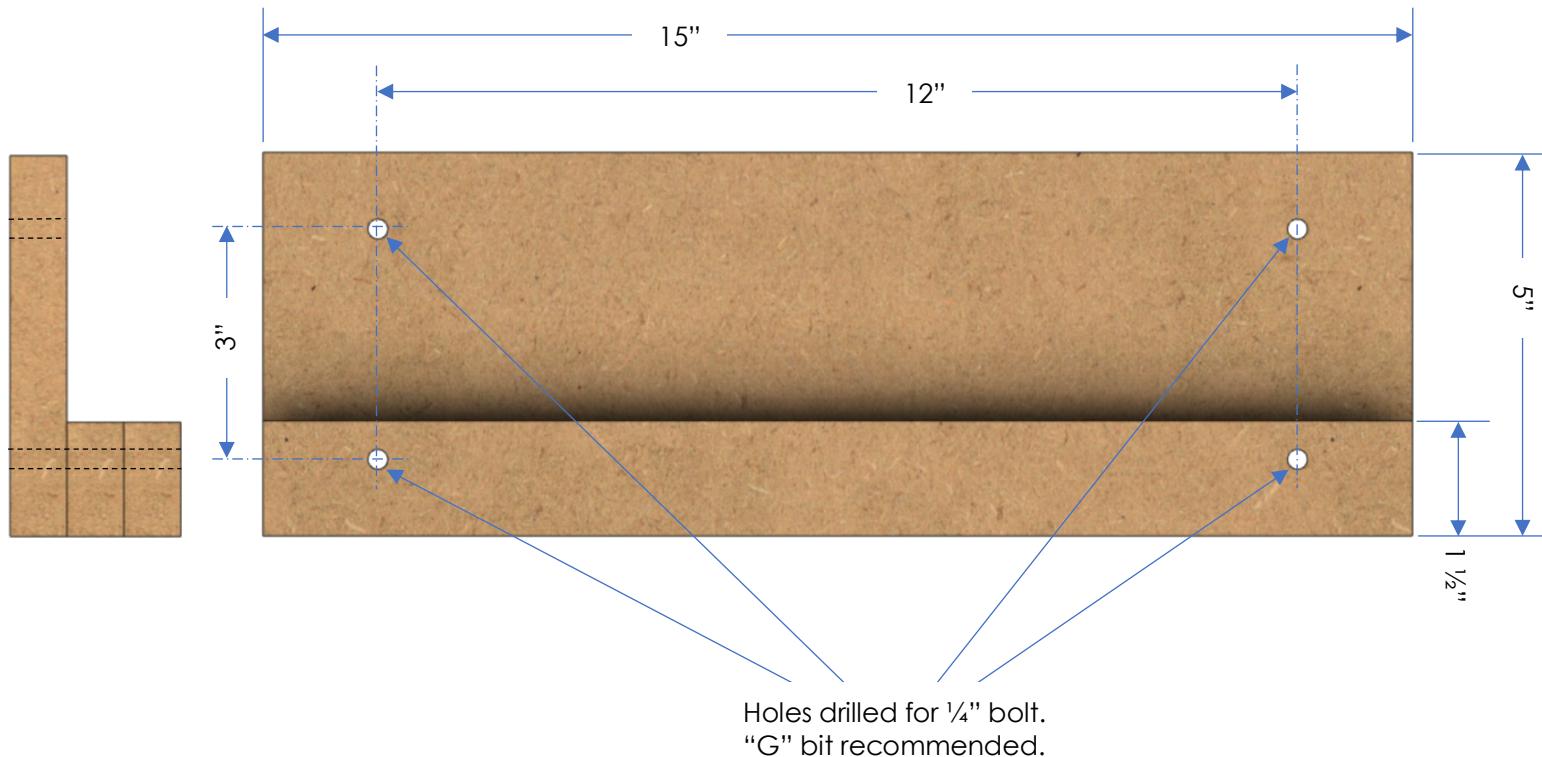


MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Backstop

This is made from 3 pieces of $\frac{3}{4}$ " MDF.

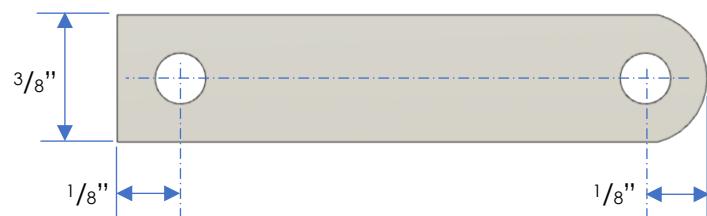
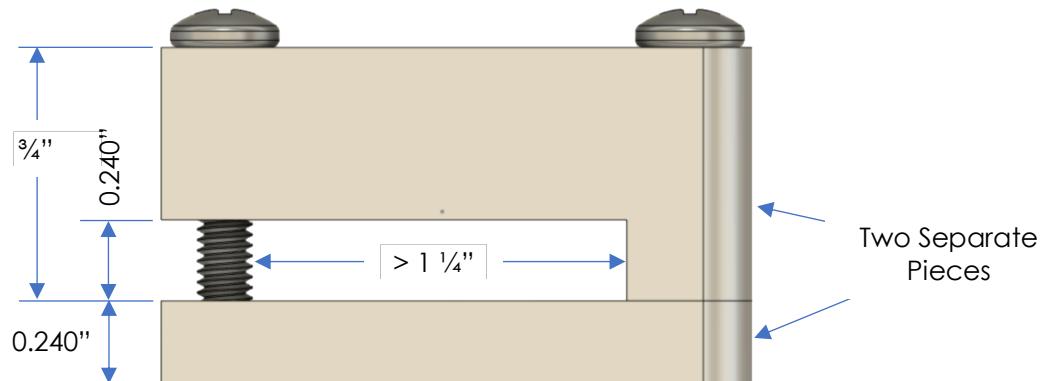


MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Clamp

The clamp consists of two pieces of aluminum and two screws. Two clamps are needed.



screw.



The two screws are #8-32.

The thru holes on the L-shaped piece (the top one in the picture at the top right) are drilled #16 (0.177"). The screws simply feed thru these.

The thru holes on the flat piece (the bottom one in the picture at the top right) are drilled #28 or #29. These are tapped for a #8-32

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Rosette Phaser / Multiplier

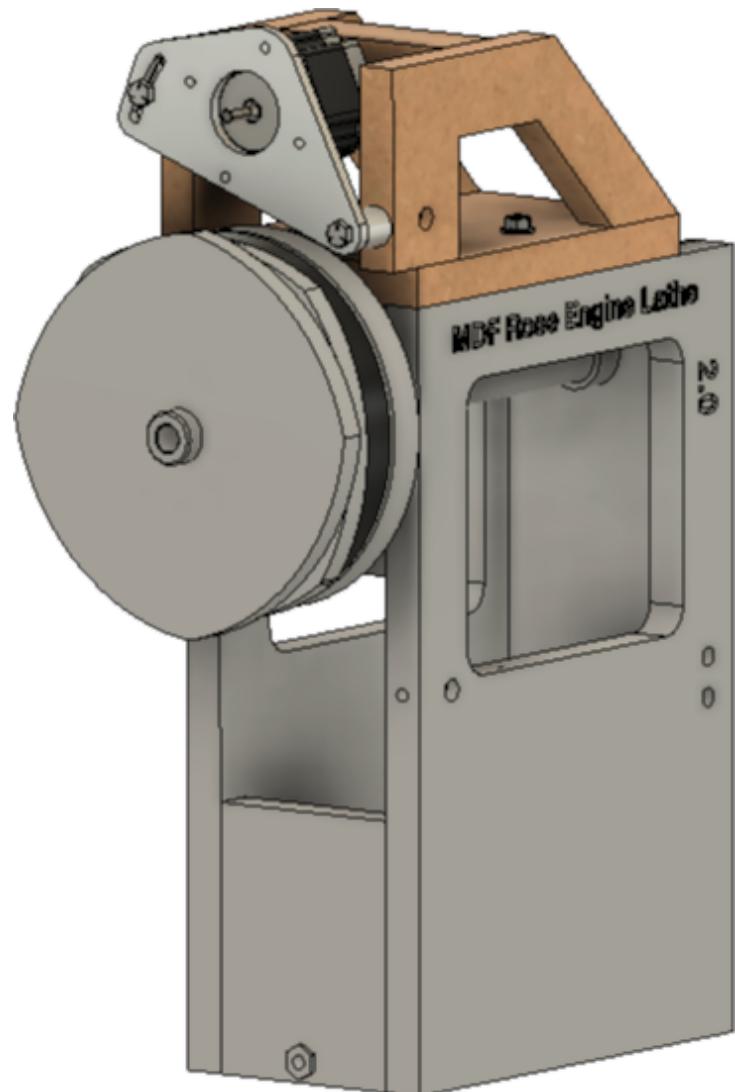
This device is used to allow a second stepper motor to drive the rosette, separately from the stepper motor driving the spindle.

It is facilitated by the Multiple Stepper Motor Control System, version 3.0. The upper stepper motor is driven as the M3 axis.

This device uses a second copy of the same components as the spindle stepper motor drive:

- Motor bracket
- Motor bracket pacers (2)
- Motor bracket screws, washers, and nuts (2 sets)
- Stepper Motor Drive gear
- Spindle Drive gear
- Drive belt

Also needed is a Needle Roller Bearing (McMaster-Carr p/n 5909K36) to separate the two drive gears.

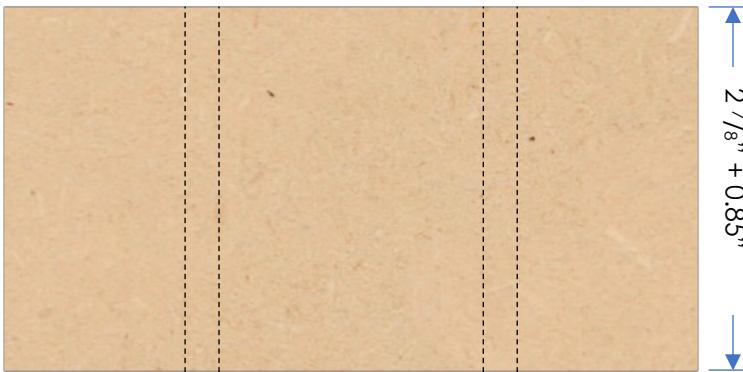


MDF Rose Engine Lathe 2.0

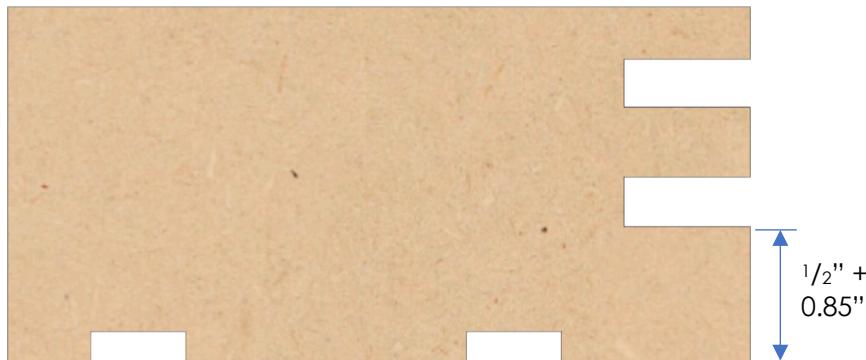
Jigs, Fixtures, and Add-Ons

When using it with the **Amplitude Adjuster for Independent Amplitude Adjustment** outlined on 18, the arms will need to be spaced out an additional 0.85":

- MDF Spacer Block will need to be 0.85" wider, and



- MDF AA Alignment Block will need to be 0.85" further away from the vertical T-Tracks to which it attaches.



This is to accommodate the second drive gear, and the needle roller bearing, and aligning the rubbers with the new position for the rosettes.

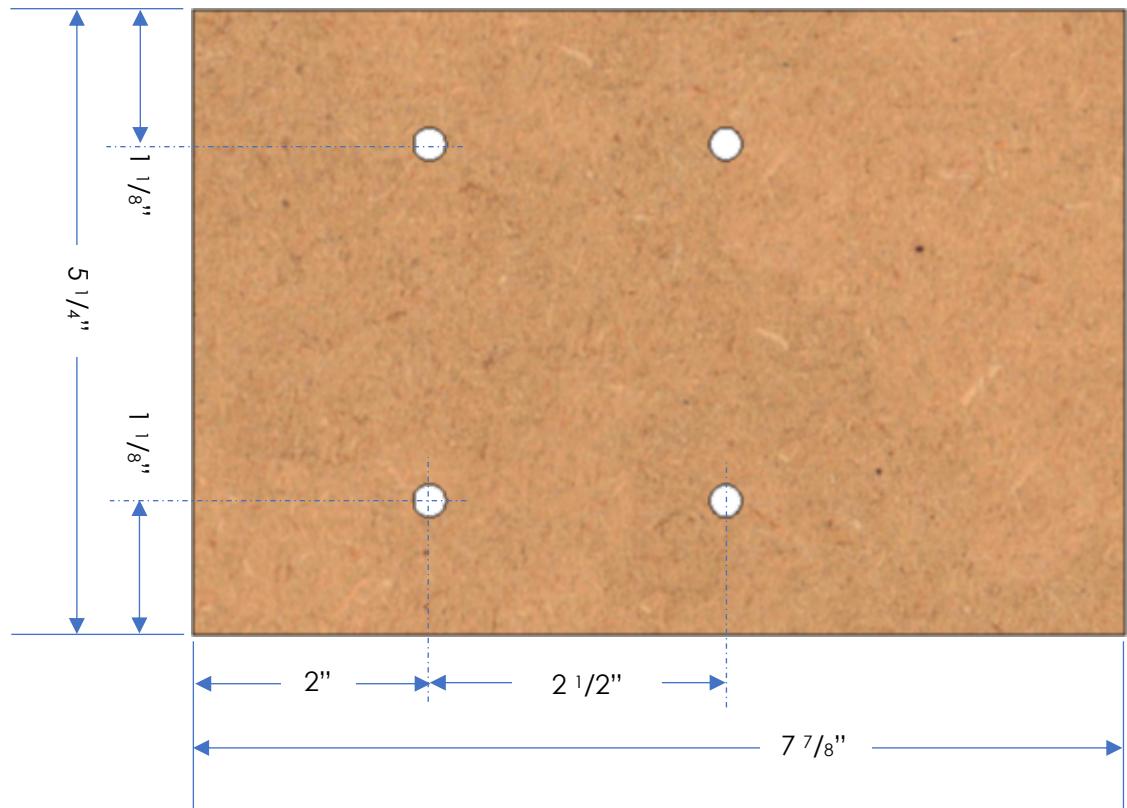
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Bottom Piece

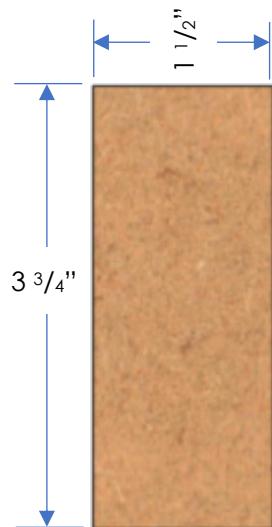
This is made from $\frac{3}{4}$ " MDF. One is needed.

The 4 holes are $\frac{1}{4}$ " in diameter. These accommodate the screws which hold this device to the top of the headstock (via the T-Tracks).



Top Piece

This is made from $\frac{3}{4}$ " MDF. One is needed.



MDF Rose Engine Lathe 2.0

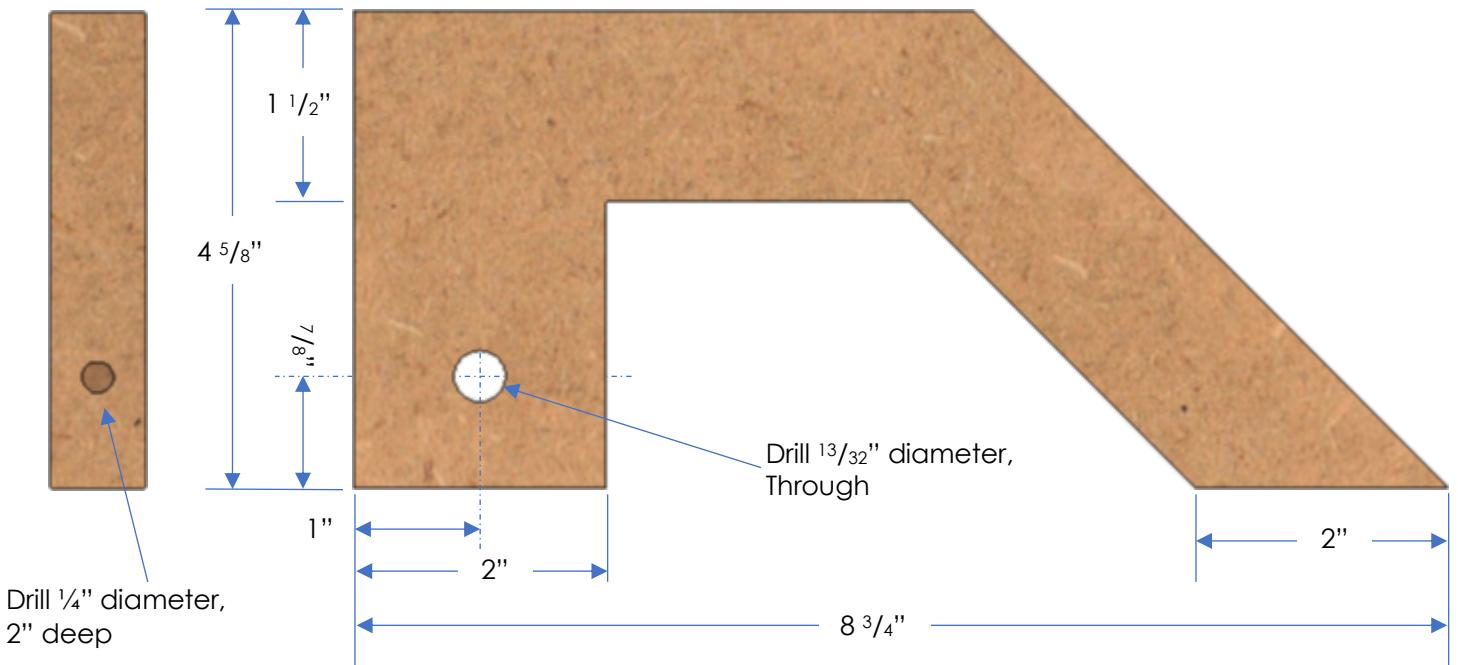
Jigs, Fixtures, and Add-Ons

Side Pieces

This is made from $\frac{3}{4}$ " MDF. Two are needed.

On the front piece, drill holes as shown.

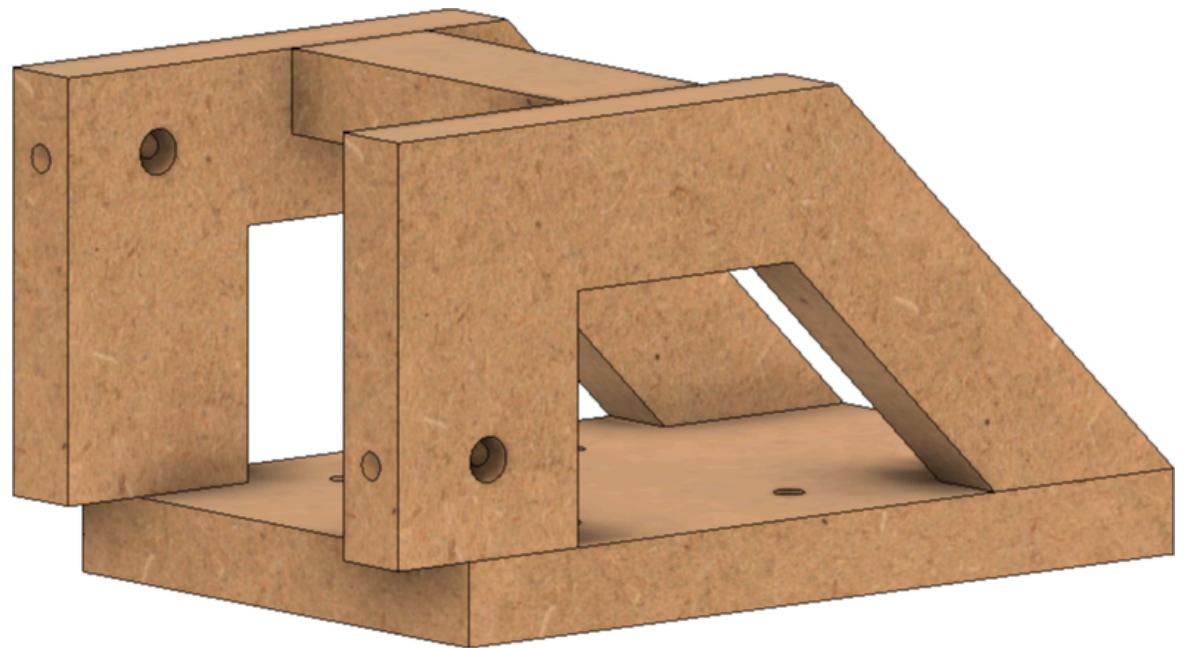
Do not drill into the back one yet piece yet; drill those after aligning the stepper motor bracket.



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Once assembled, the MDF pieces will look like this.



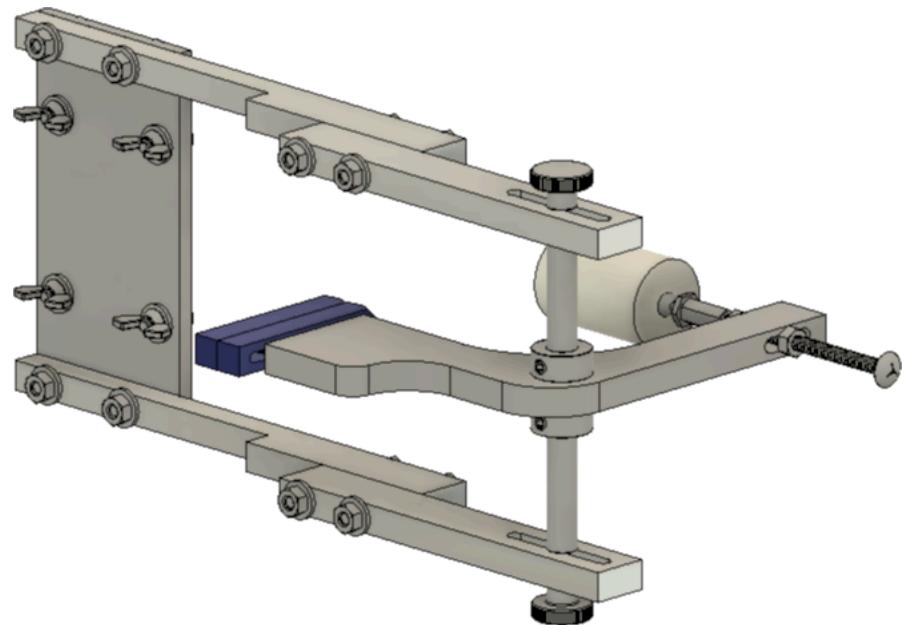
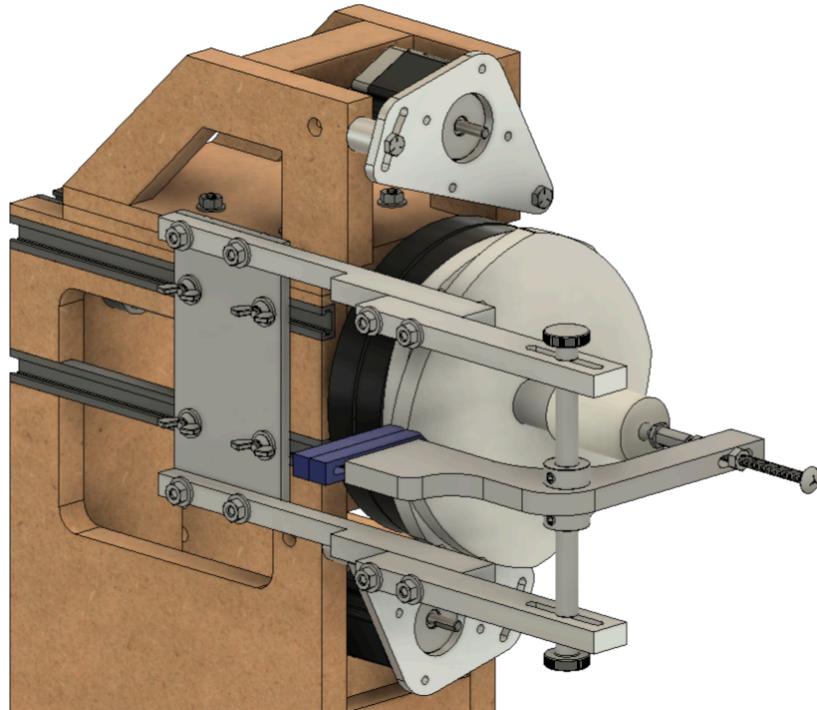
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Pumping Mechanism

The pumping mechanism for the MDF Rose Engine Lathe 2.0 is shown in the picture to the right, and as attached to the headstock in the picture below.

It was designed to attach to the back of the headstock, using the T-Tracks there. This is to facilitate also using the Rosette Phaser/Multiplier at the same time.



Additionally, testing has shown that this configuration also allows for rocking whilst pumping, creating a whole host of opportunities for the artist using this machine.

MDF Rose Engine Lathe 2.0

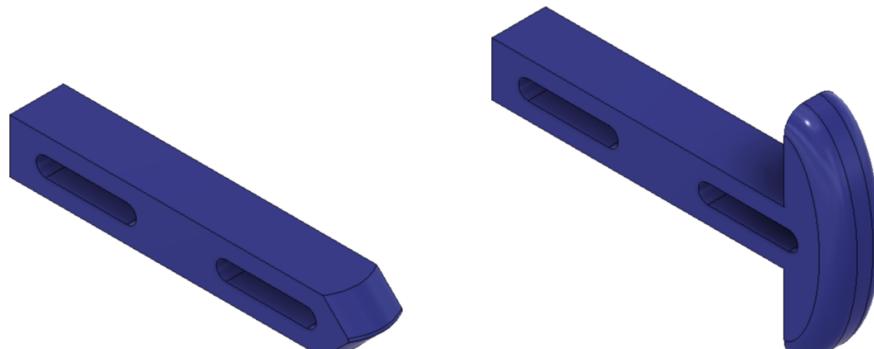
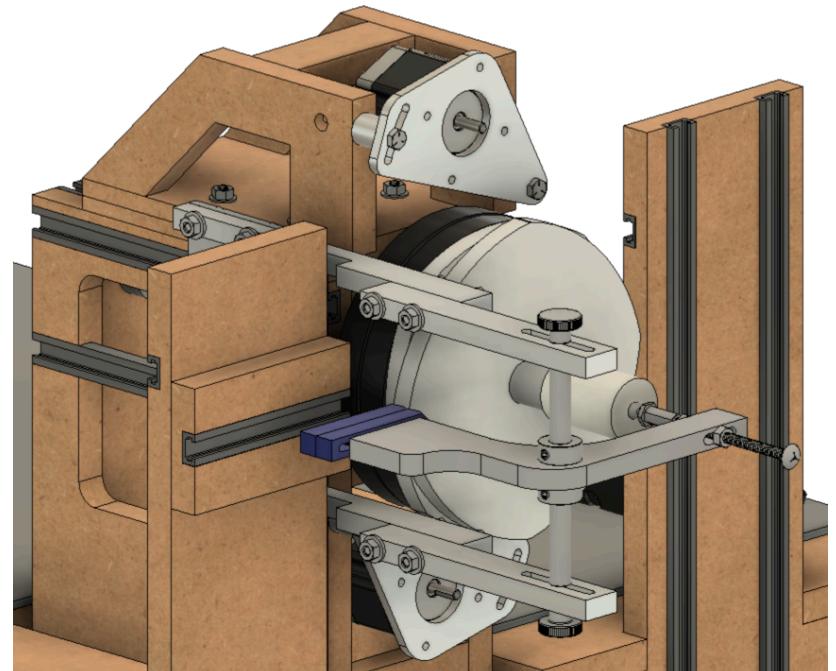
Jigs, Fixtures, and Add-Ons

The picture to the right shows it attached with the other parts of the MDF Rose Engine Lathe 2.0 also in the picture. This is to show how it clears the rear rubber column.

Details for building and assembling this follow the bill of materials.

For the rubbers to use on this attachment, they are 3D printed (they are shown in blue in this picture). The directions for those are in the MDF Rose Engine Lathe 2.0 Library (<https://mdfre2.colvintools.com>). The book is the black one on the 2nd shelf. It is titled, "3D Printed Parts".

These rubbers have a curved rubbing edge so that they do not gouge into the rosette(s). Two examples are below:



Point Rubber

Round Rubber

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Bill of Materials

Parts required for building this are below.

Item #	Item	Qty	Source Part Number		Comments
			Source	Number	
Spindle Parts					
101	Clamping, 2-Piece Shaft Collar, 1" diam.	1	McMaster-Carr	6436K18	
102	Spring, Compression 3" Long, 1.029" ID	1	McMaster-Carr	9657K444	
103	Bearing, Needle Roller for 1" shaft diam.	1	McMaster-Carr	5909K36	
104	Washer for Needle Bearing for 1" shaft diam.	1	McMaster-Carr	5909K49	
105	Thrust Bearing for 1" shaft diam.	2	McMaster-Carr	5906K523	Bronze, oil-embedded. For 1" Shaft dia, 1/8" Thick
Purchased Parts					
201	Hex Head Bolt, 1/4"-20, 3/4" Long	4	McMaster-Carr	91268A502	
202	Hex Head Bolt, 1/4"-20, 2 1/4" Long	4	McMaster-Carr	92865A551	
203	Nut, 1/4"-20	8	McMaster-Carr	95505A601	
204	Washer, 1/4"	18	McMaster-Carr	90850A100	
205	Wing Nut, 1/4"-20	4	McMaster-Carr	90866A029	
206	Set Screw Shaft Collar 1/2" ID	2	McMaster-Carr	6432K16	
207	Ball Stud	1	McMaster-Carr	9512K51	
208	Coupling Nut, 1/4"-20	1	McMaster-Carr	90264A435	

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Item #	Item	Qty	Source	Source	Comments
				Part Number	
209	Carriage Bolt, 1/4"-20 4" Long	1	McMaster-Carr	90185A415	
210	Threaded Rod, #8-32, 2-1/2" Long	2	McMaster-Carr	95412A882	
211	Nut, #8-32	4	McMaster-Carr	90480A009	
212	Washer, #8	4	McMaster-Carr	92141A009	
213	Thumb Screw, 1/4"-20 1" Thread Length	2	McMaster-Carr	91882A429	
214	Flat Head Screw, 1/4"-20 1" long	4	McMaster-Carr	91253A542	
	Aluminum Plate and Rods				
301	Aluminum plate, 1/4" Thick 6 1/4" x 3 1/4"	1			Base
302	Aluminum plate, 1/2" Thick 5 1/4" x 7 1/2"	1			Lever Arm
303	Aluminum rod, rectangular 1" x 1/2", 40" Long	1			Arms
304	Aluminum rod, round 1/2" dia. x 5 1/4" Long	1			Pivot for Lever Arm
305	HDPE rod, round 1 1/2" dia. X 2 1/4" Long	1			Spindle coupler Similar material could be used
	Rubbers				
	Rubbers	2	MDF Rose Engine 2.0 Library		

MDF Rose Engine Lathe 2.0

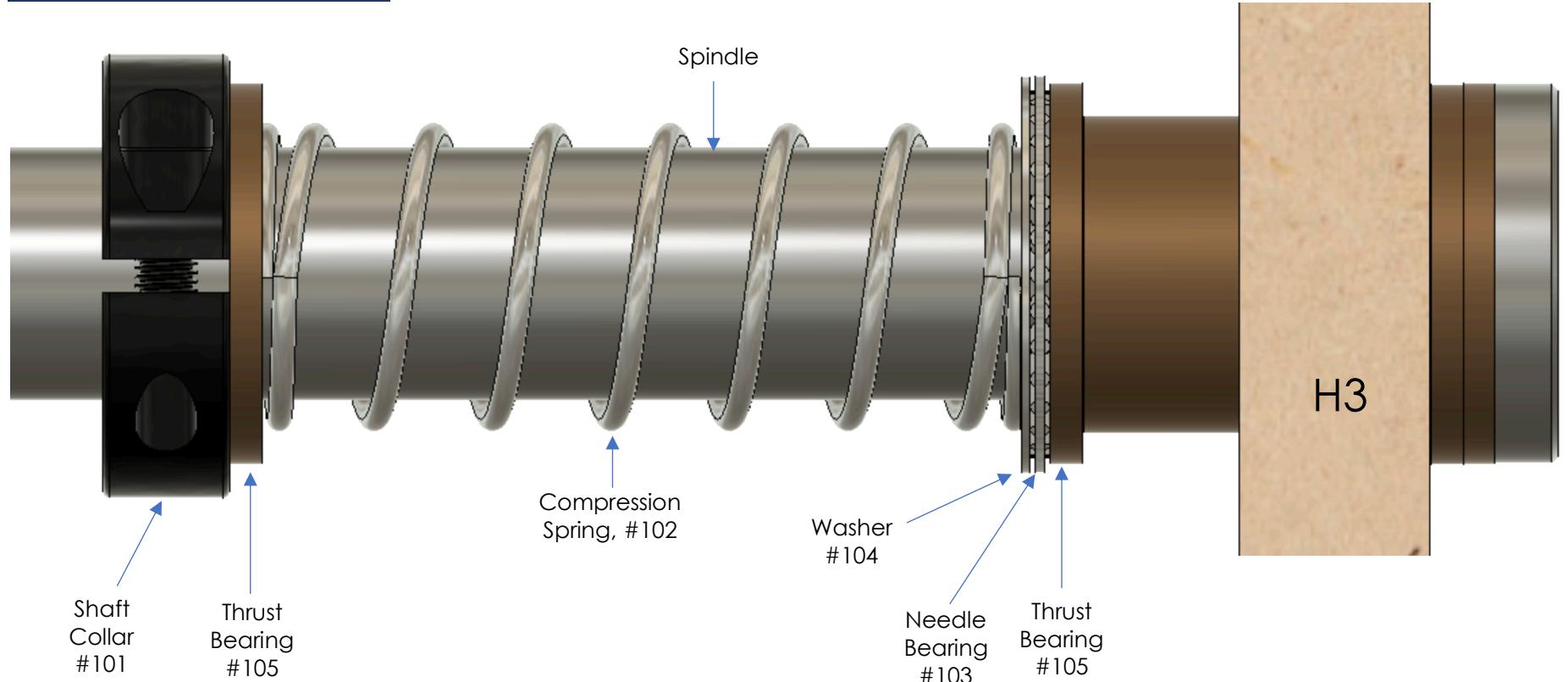
Jigs, Fixtures, and Add-Ons

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Spindle Parts

Assembly of the Spindle Parts



View from the Near Side of the Headstock
(H1 & H2 removed)

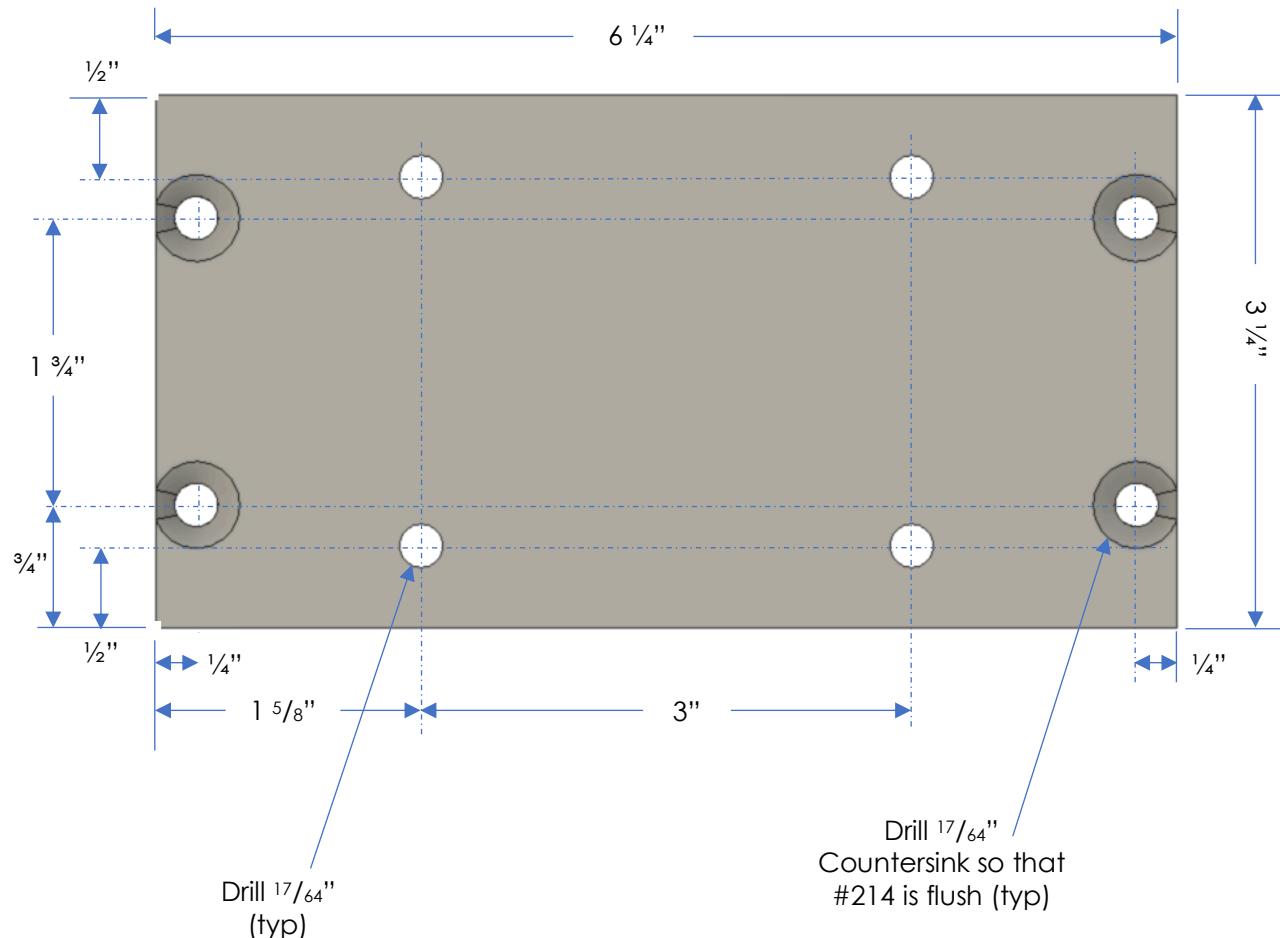
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Frame Parts

Base Plate

The base plate is made from $\frac{1}{4}$ " aluminum (#301). 1 is required.



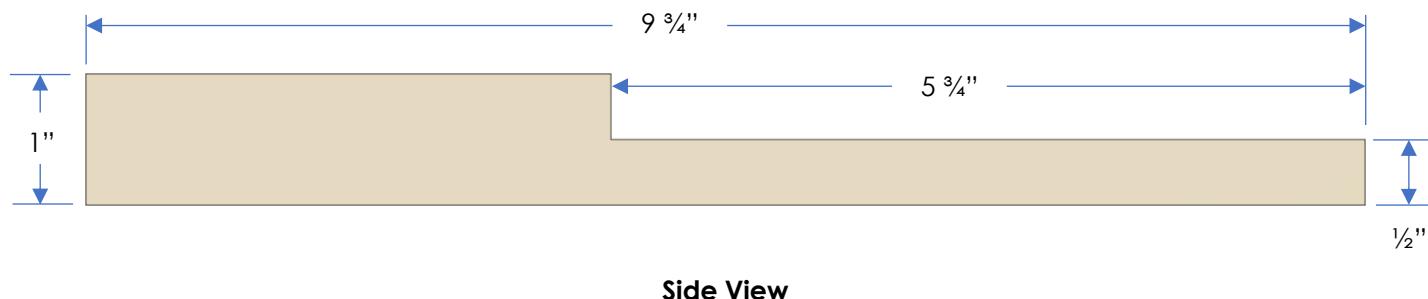
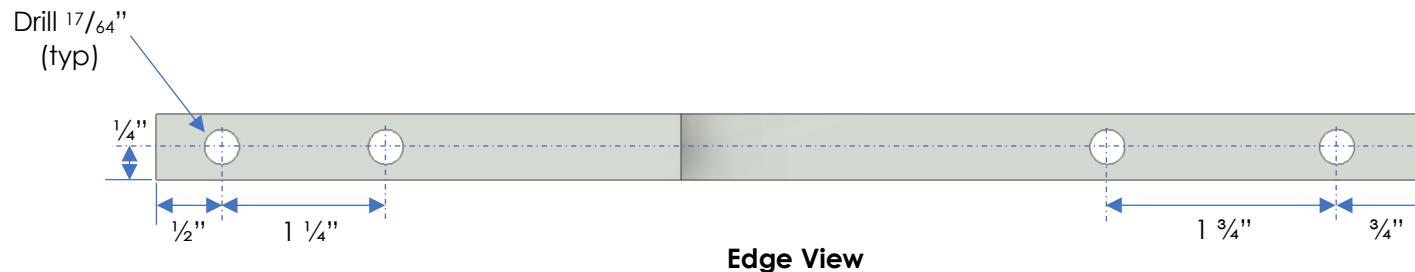
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Horizontal Arm #1

The horizontal arms are made from 1" x 1/2" aluminum rod (#303). 2 are required.

Please ignore the color differences – some odd fluke happened when copying from Fusion 360.



Side View

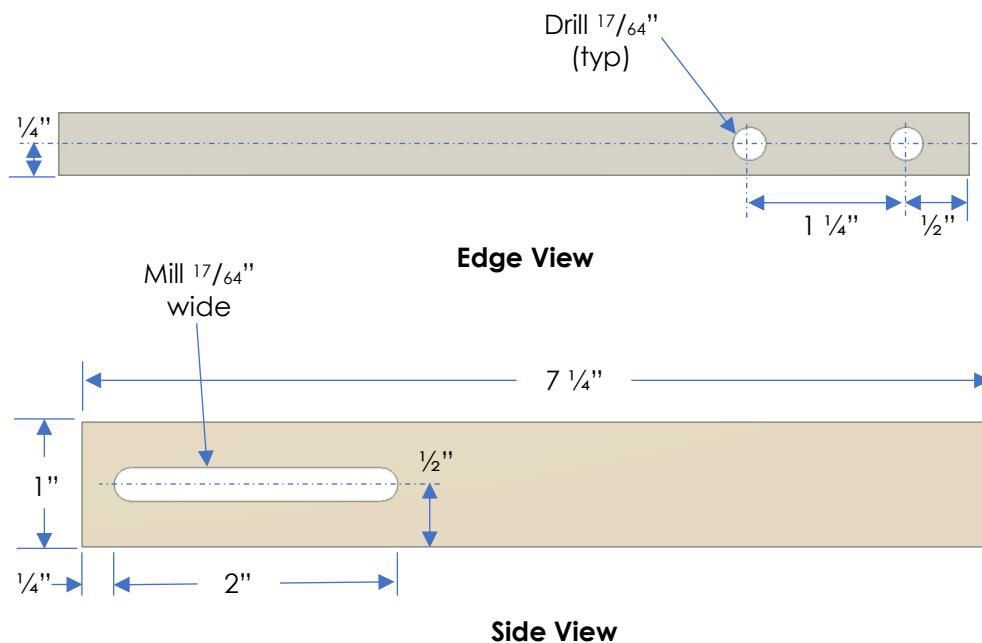
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Horizontal Arm #2

The horizontal arms are made from 1" x 1/2" aluminum rod (#303). 2 are required.

Please ignore the color differences – some odd fluke happened when copying from Fusion 360.



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Pivot Arm

The pivot arms is made from $\frac{1}{2}$ " diameter aluminum round rod (#304). 1 is required.

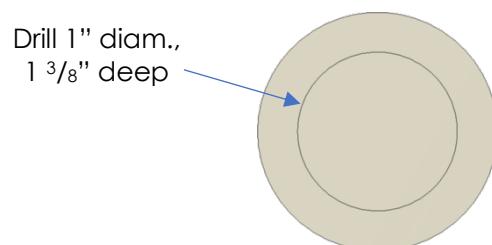
The piece is $5\frac{1}{4}$ " long. Drill and tap both ends for a $\frac{1}{4}$ "-20 bolt. Be sure to allow for at least $\frac{3}{4}$ " of threads.



Spindle Coupler

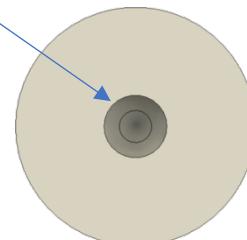
The spindle coupler is made from $1\frac{1}{2}$ " diameter HDPE (or similar) round rod (#305). 1 is required.

The piece is $2\frac{1}{4}$ " long.



Inboard Side

Ball Mill 10mm diam.,
5mm deep
(Makes a hemisphere)



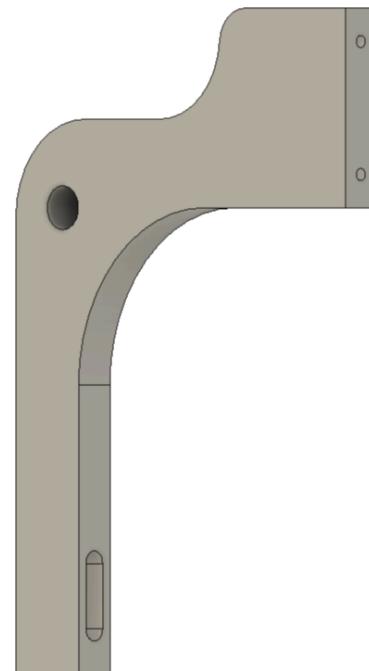
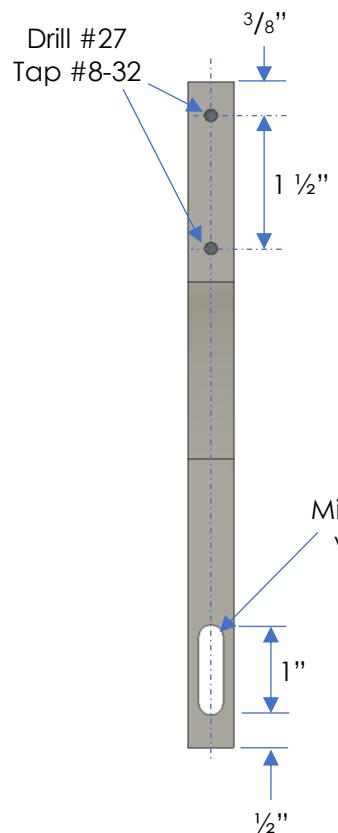
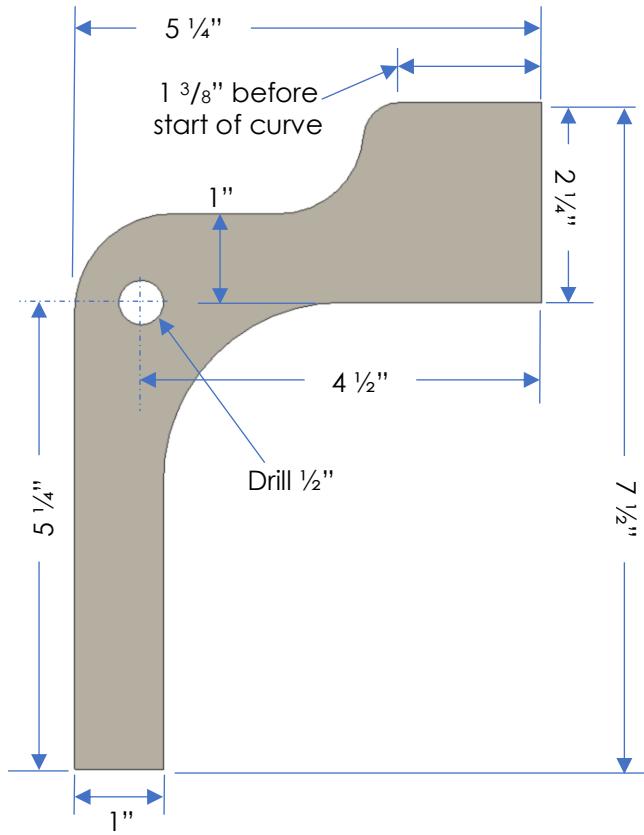
Outboard Side

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Lever Arm

The lever arm is made from $\frac{1}{2}$ " aluminum plate (#302). 1 is required. The radii of the curves are not critical. However, do be sure the pivot hole is drilled before making the curve cuts.



Side View

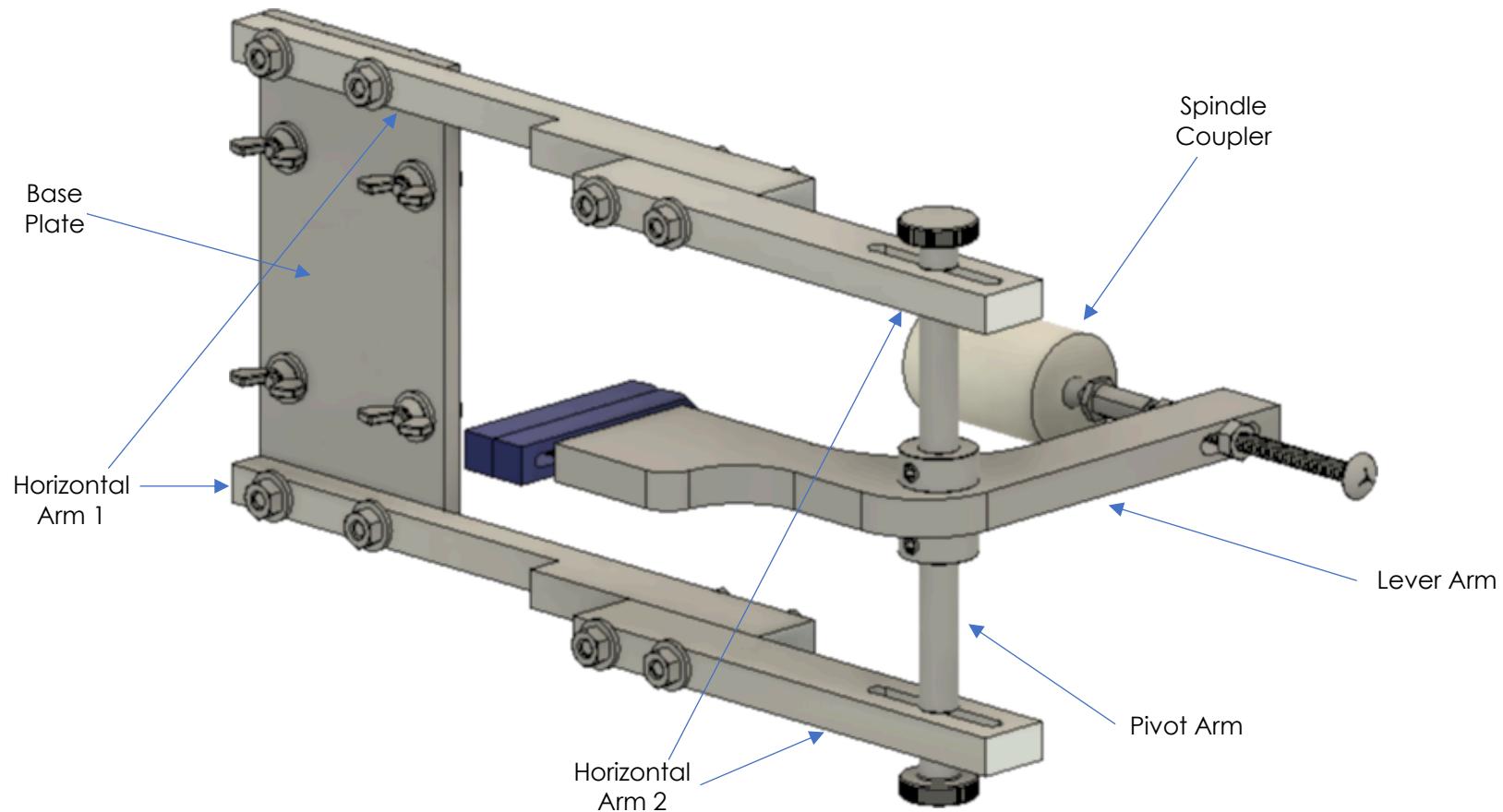
Edge View

Profile View

MDF Rose Engine Lathe 2.0

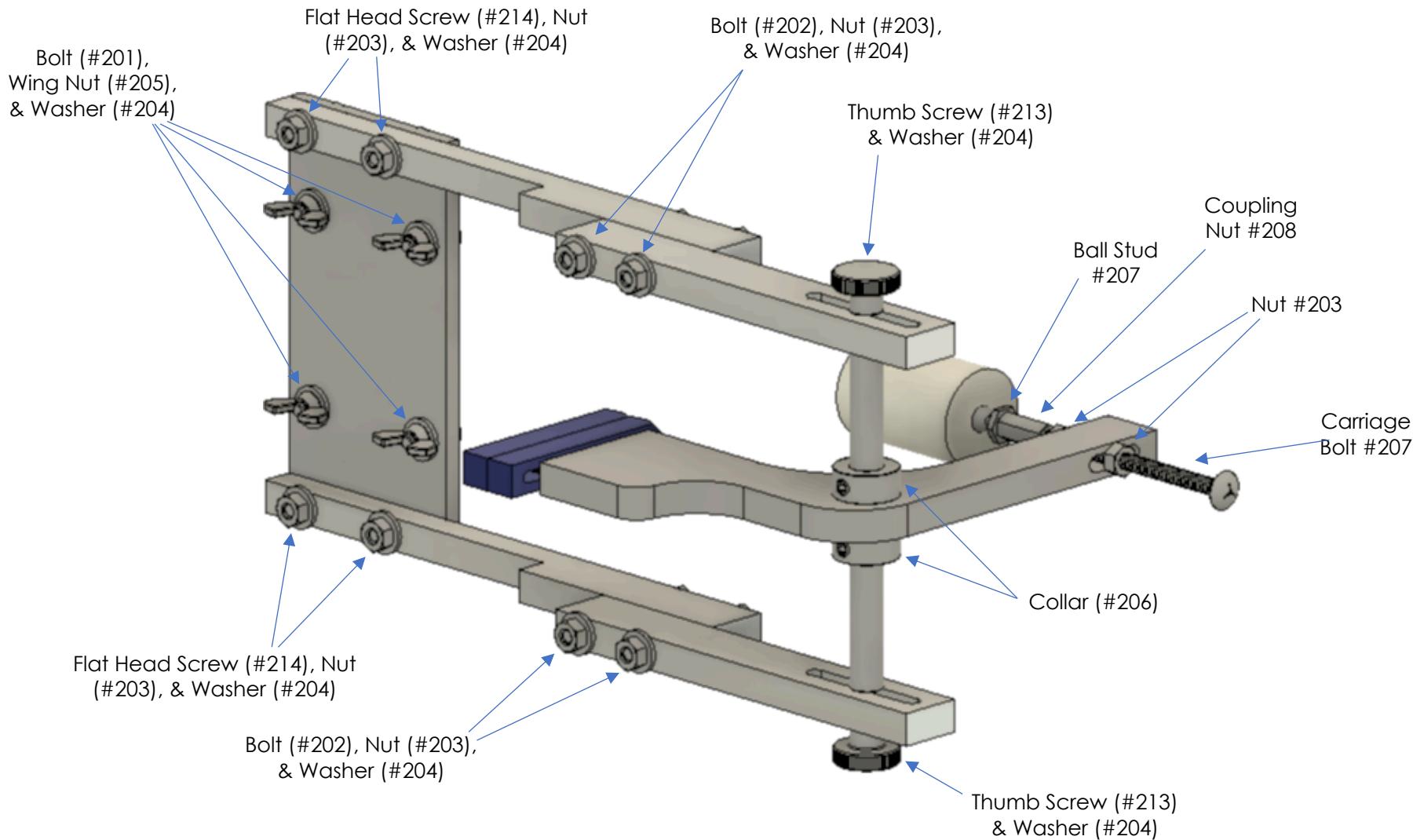
Jigs, Fixtures, and Add-Ons

Assembly

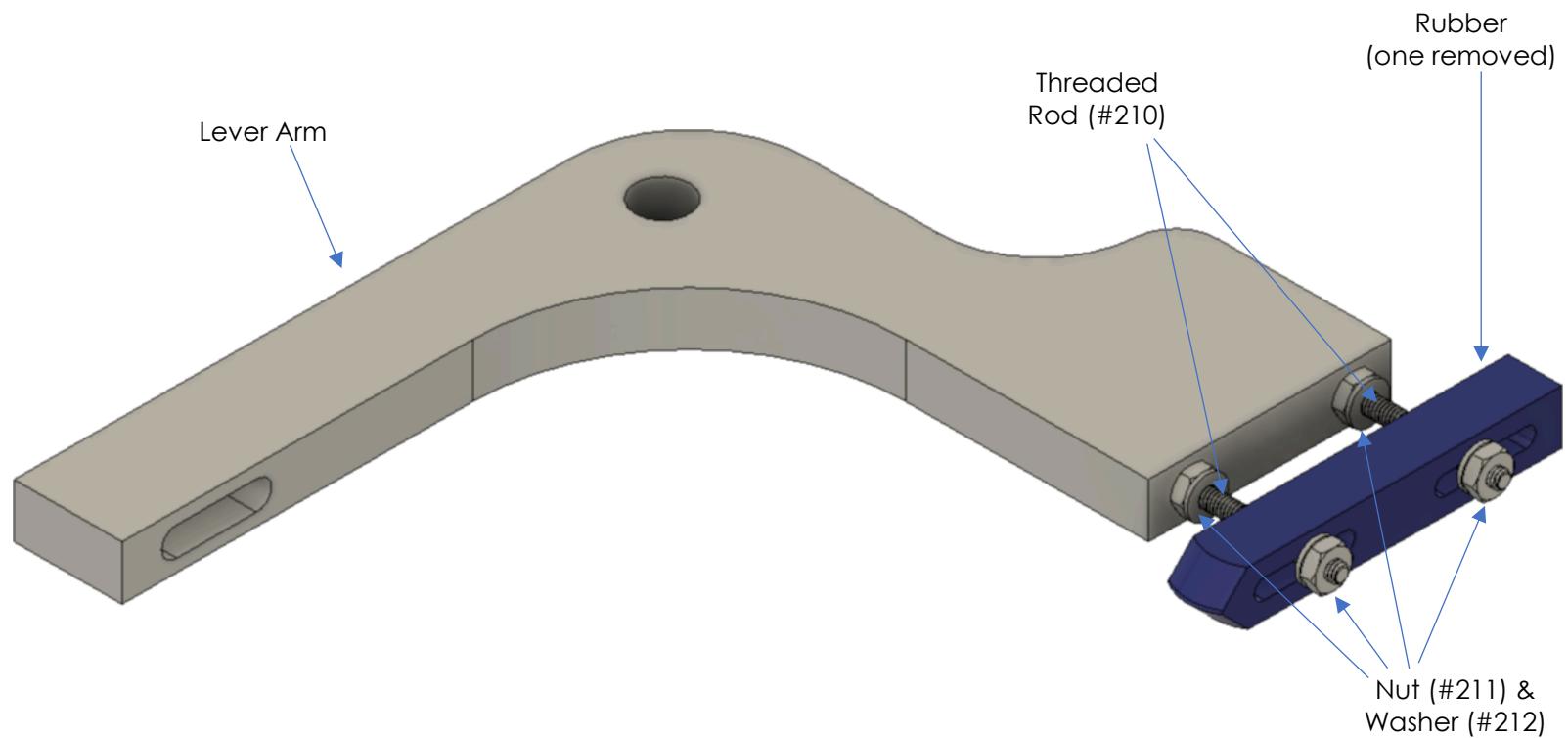


MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons



MDF Rose Engine Lathe 2.0 Jigs, Fixtures, and Add-Ons

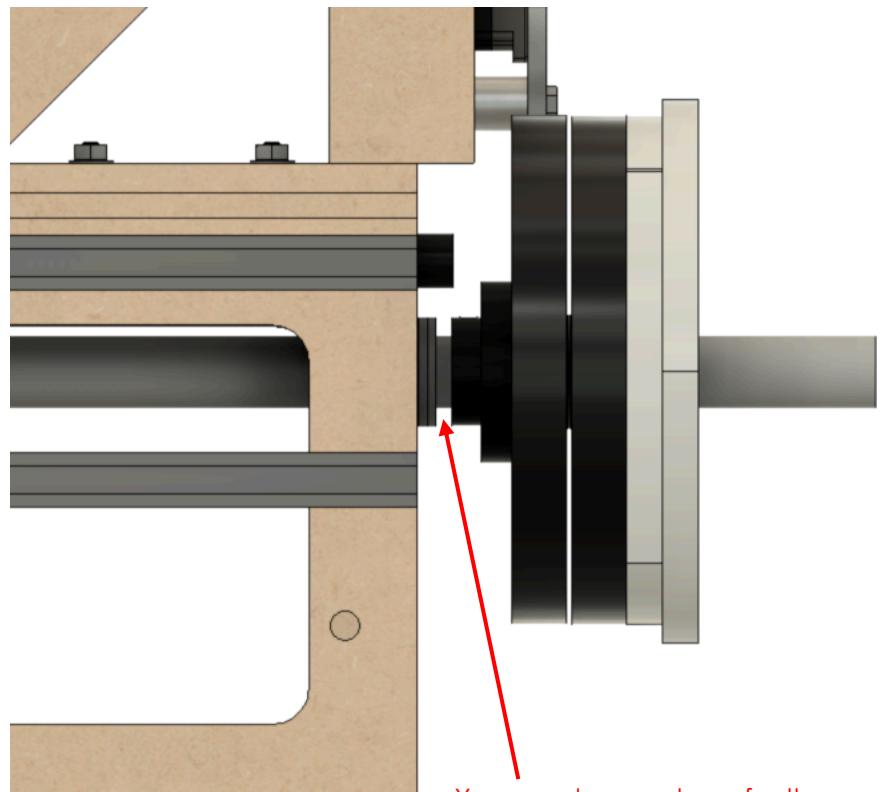


MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Installing and Aligning

Step 1 – Move the flange, gears, and rosettes to open up space for pumping

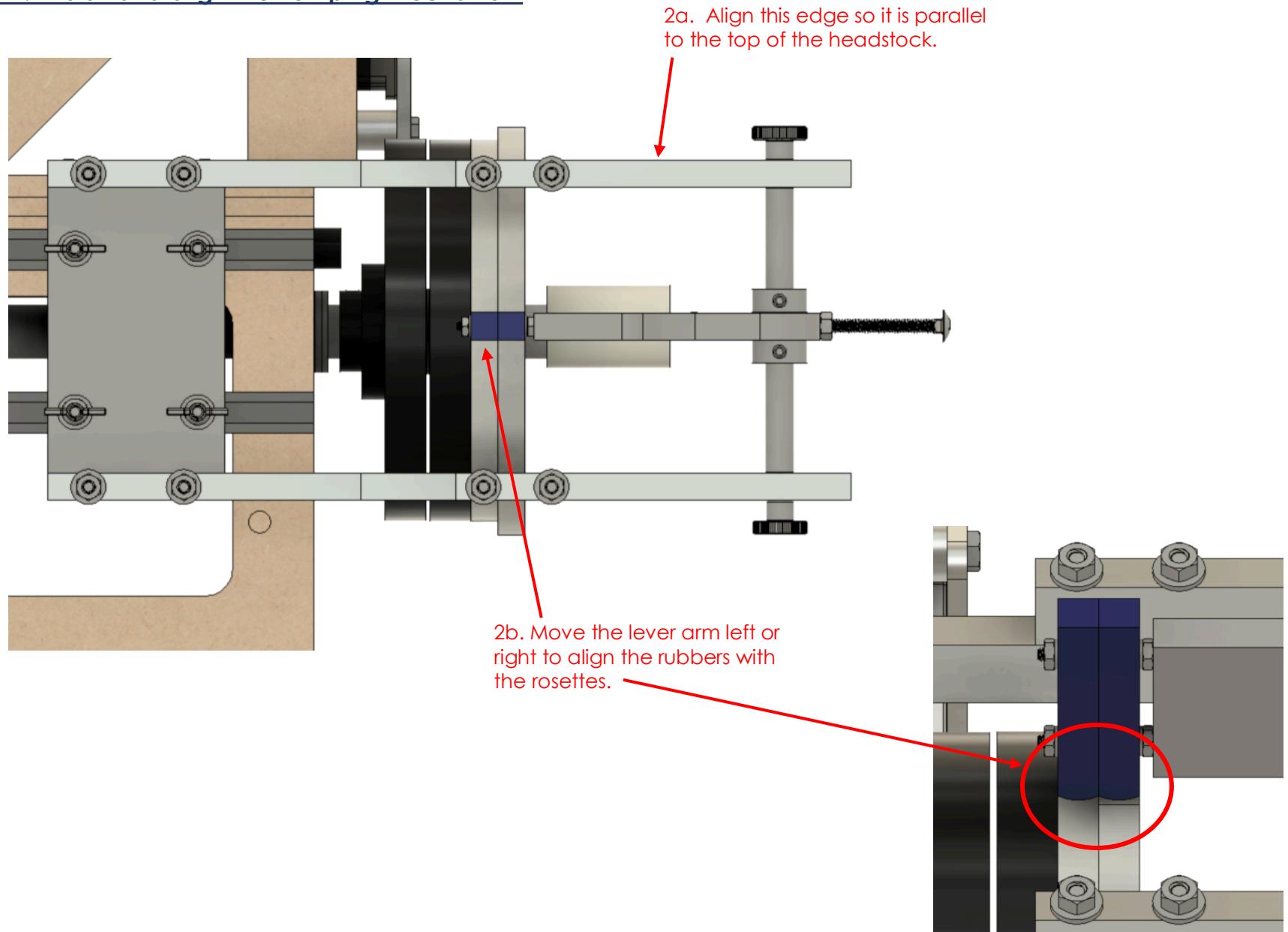


You need space here for the pumping action
to move the spindle. I aim for around $\frac{3}{16}$ ".

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

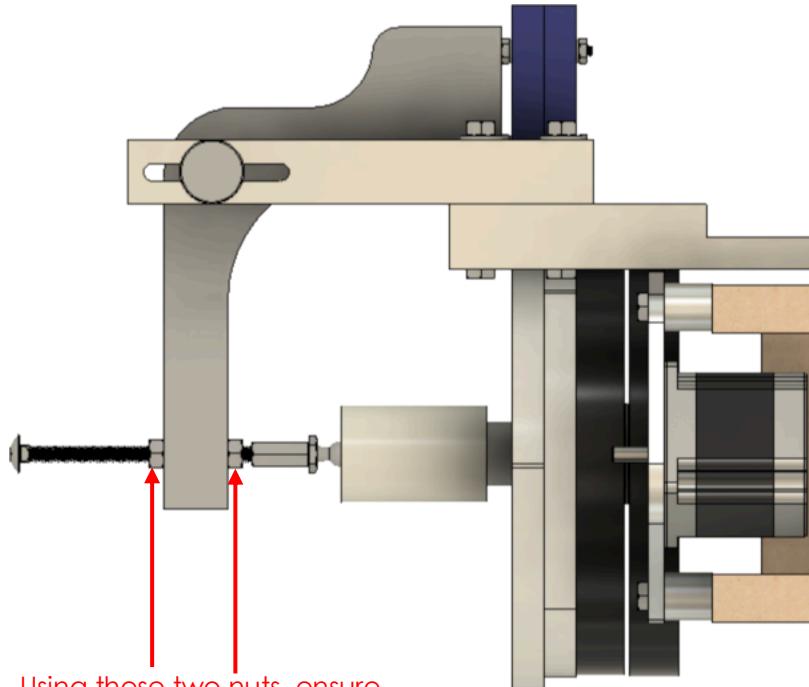
Step 2: Install and align the Pumping Mechanism



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Step 3: Tighten it up



Using these two nuts, ensure the ball stud is tightly engaged with the spindle coupler during the entire rotation of the rosette.

Move the carriage bolt in or out as necessary, but then secure it in place with both nuts.

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

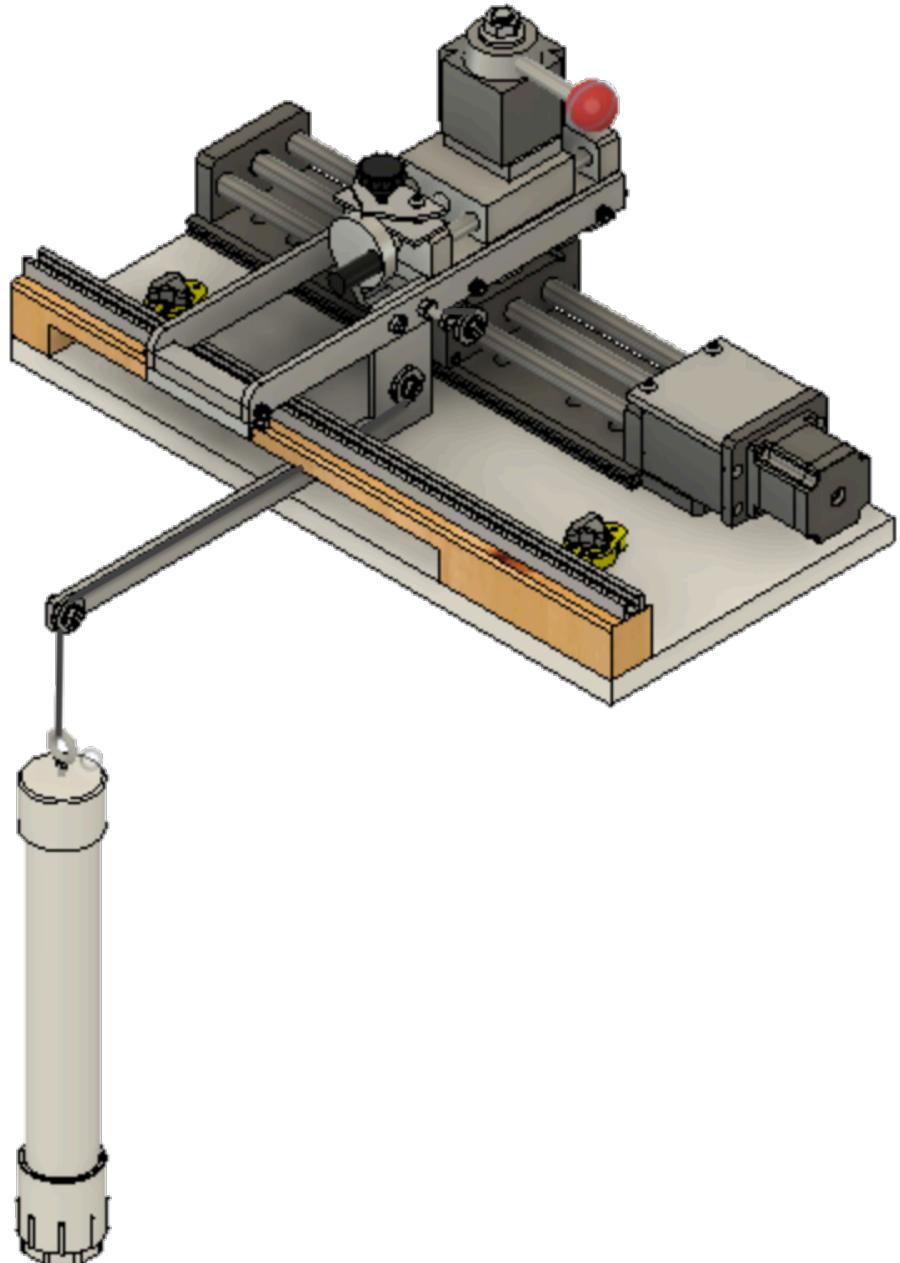
Curvilinear Slide

The curvilinear slide for the MDF Rose Engine Lathe 2.0 is shown in the picture to the right.

It was designed to be used with a weight to keep the template follower engaged with the template. There are 3D-printed templates we have designed, but you can make your own. They are held on a T-Track and can be $\frac{1}{4}$ " thick. MDF works well for limited-use templates, but more resilient materials are recommended if longer use is expected.

Details for building and assembling this follow the bill of materials.

For the templates which are 3D-printed, the directions are in the MDF Rose Engine Lathe 2.0 Library (<https://mdfre2.colvintools.com>). The book is the black one on the 2nd shelf. It is titled, "3D Printed Parts".



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Bill of Materials

Parts required for building this are below.

Item #	Item	Qty	Source	Source Part Number	Comments
Wood, Plate, and Rods					
101	MDF, $\frac{3}{4}$ " thick				
102	2x3 / 2x4 pine board				
103	Aluminum rod, rectangular - 1" x $\frac{1}{4}$ "				
104	Aluminum rod, rectangular – $\frac{3}{4}$ " x $\frac{1}{2}$ "				
105	Aluminum plate, $\frac{1}{4}$ " thick				
106	Aluminum plate, $\frac{1}{2}$ " thick				
107	T-Track				
Purchased Components					
201	Linear Stage Actuator	1	Amazon	(Amazon link)	300mm Travel, Ballscrew 1605, Double Optical Axis Linear Rail Guide Slide Stage C7 with Nema23 Motor
202	Linear Stage Table	1	Amazon or eBay	KA80-1402-50 (Amazon link)	
203	Drylin W Double Rail	1	Igus	WS-10-40	
204	Drylin W Assembled Carriage Plate WW	1	Igus	WW-10-40-10	
205	QCTP, AXA with Base	1			
206	MagSwitch 95	2			
Purchased Parts					
301	Spacer, 7mm internal diameter, 8mm long	2	McMaster-Carr	94669A172	

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Item #	Item	Qty	Source	Source Part Number	Comments
302	Screw, M6-1.0, 20mm long	4	McMaster-Carr	97763A826	
303	Knob, $\frac{1}{4}$ "-20, 1" long	1	McMaster-Carr	6479K86	
304	Screw, Socket Head, M6-1.0, 15mm long	4	McMaster-Carr	91290A320	
305	Screw, Hex Head, $\frac{1}{4}$ "-20, 1" long	1	McMaster-Carr	92620A540	
306	Screw, Hex Head, $\frac{1}{4}$ "-20, 1 $\frac{1}{2}$ " long	1	McMaster-Carr	91257A546	
307	Nut, $\frac{1}{4}$ "-20	3	McMaster-Carr	95462A029	
308	Pulley	3	McMaster-Carr	6447K5	
309	Washer, $\frac{1}{4}$ "	6	McMaster-Carr	90107A029	
310	Spacer, $\frac{3}{8}$ " Long, $\frac{1}{4}$ " ID	1	McMaster-Carr	92510A764	
311	Particle Board Screws, #6, 3/4" long, round head	6	McMaster-Carr	91555A115	
312	Flat Head Screws for Particleboard and Fiberboard, #8, 2 $\frac{1}{4}$ " long		McMaster-Carr		
313	Screw, M6-1.0, 10mm long	1	McMaster-Carr	97763A826	
314	Screw, M8-1.25, 20mm long	2	McMaster-Carr	91292A147	
315	Lock Washer, M8	2	McMaster-Carr	92148A200	
316	Screw, M4-0.7, 20mm long	1	McMaster-Carr	91290A176	
317	Nut, M7-0.7	1	McMaster-Carr	91828A231	

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Item #	Item	Qty	Source	Source	Comments
				Part Number	
318	Carriage Bolt, 1/4"-20, 2 1/2" long	1	McMaster-Carr	90185A552	
	Other				
901	Template	1	Designs are at the MDF Rose Engine Lathe 2.0 Library , in the black book on 2 nd shelf, 3D Printed Parts		
902	Template follower	1	Ibid #901		

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Instructions

Base

The base is made from $\frac{3}{4}$ " MDF.
Dimensions are as shown.

The two holes are for
MagSwitches.

If MagSwitch MagJig 95s are
used, the holes need to be 30mm.

If MagSwitch MagJig 150s are
used, the holes need to be 40mm.



MDF Rose Engine Lathe 2.0

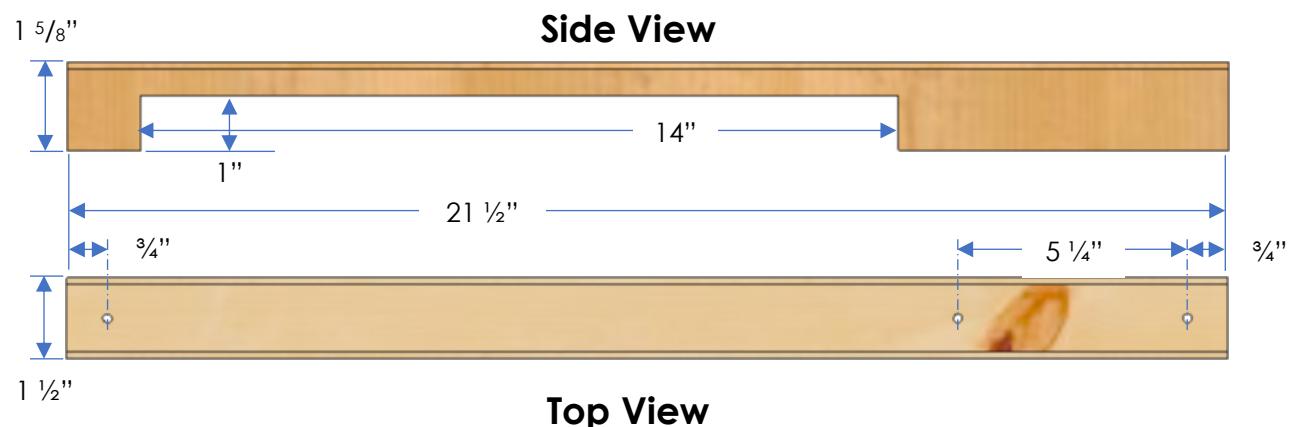
Jigs, Fixtures, and Add-Ons

Template Bar

The template bar is made from a 2x3. Dimensions are as shown.

Drill the three holes #19 or
11/64".

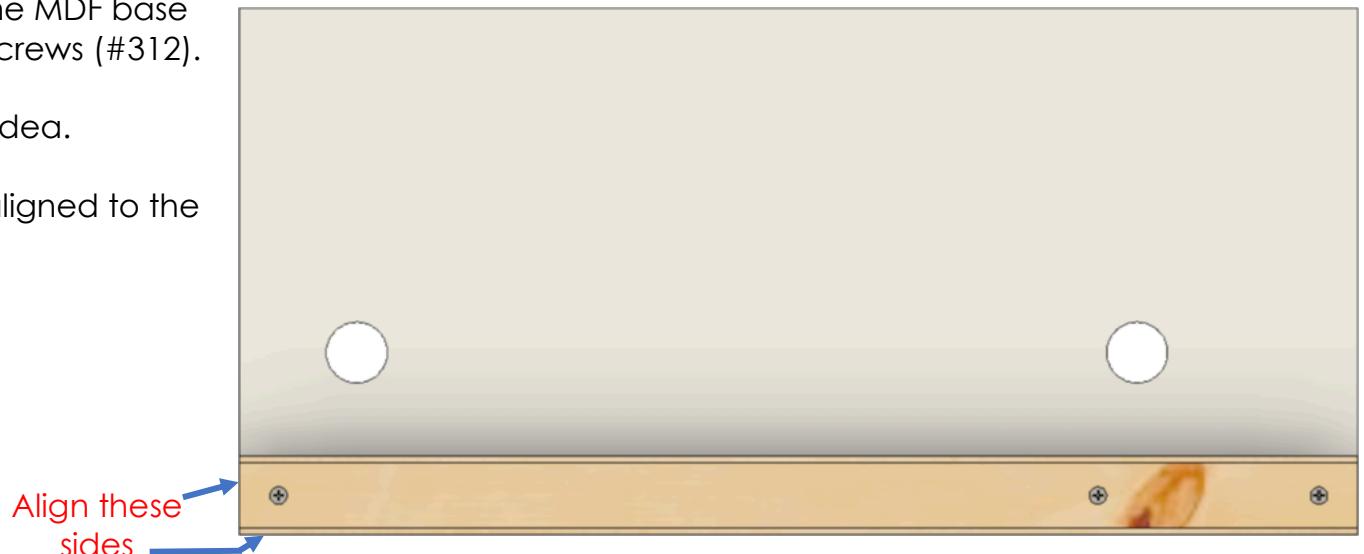
The fillets shown on the top edge are those which are already on the board from the mill. They are not critical.



Attach the template bar to the MDF base using 3 each particle board screws (#312).

Gluing to the base is a good idea.

The template bar should be aligned to the base as shown.



MDF Rose Engine Lathe 2.0 Jigs, Fixtures, and Add-Ons

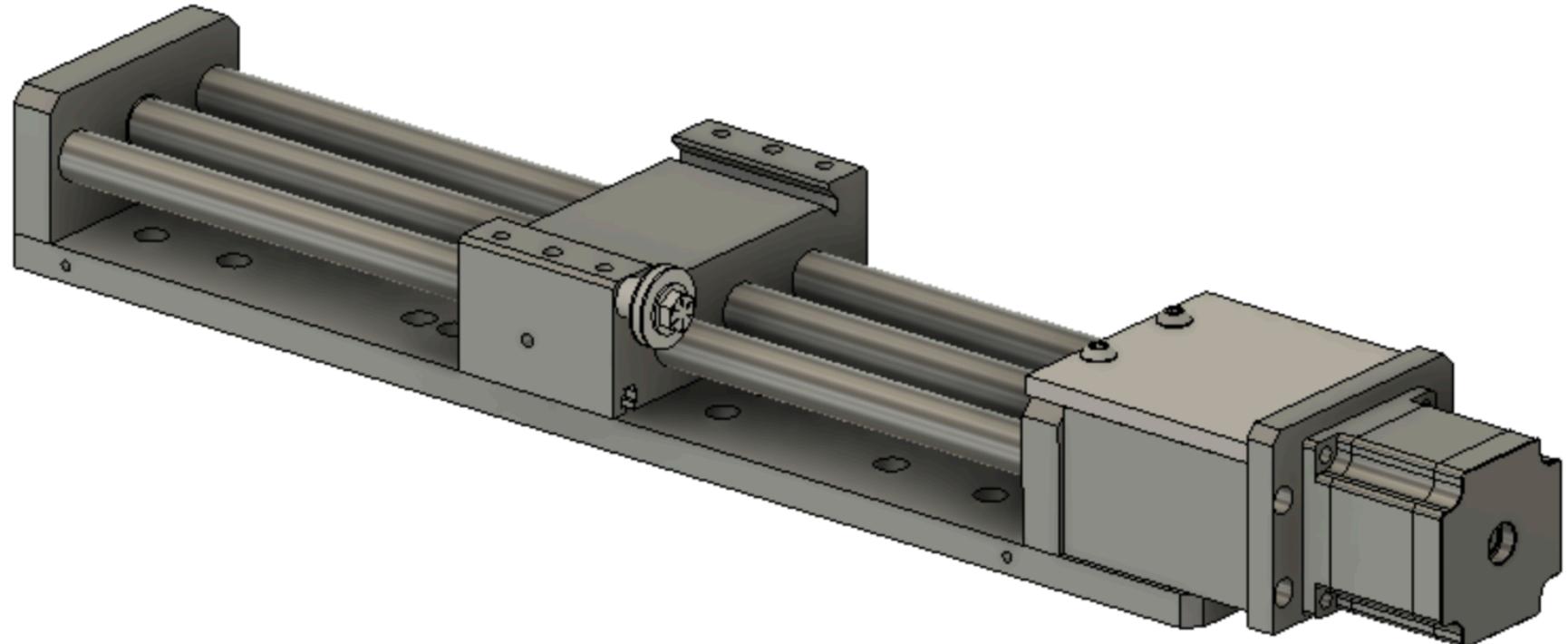
Add the two MagSwitches (#206).



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

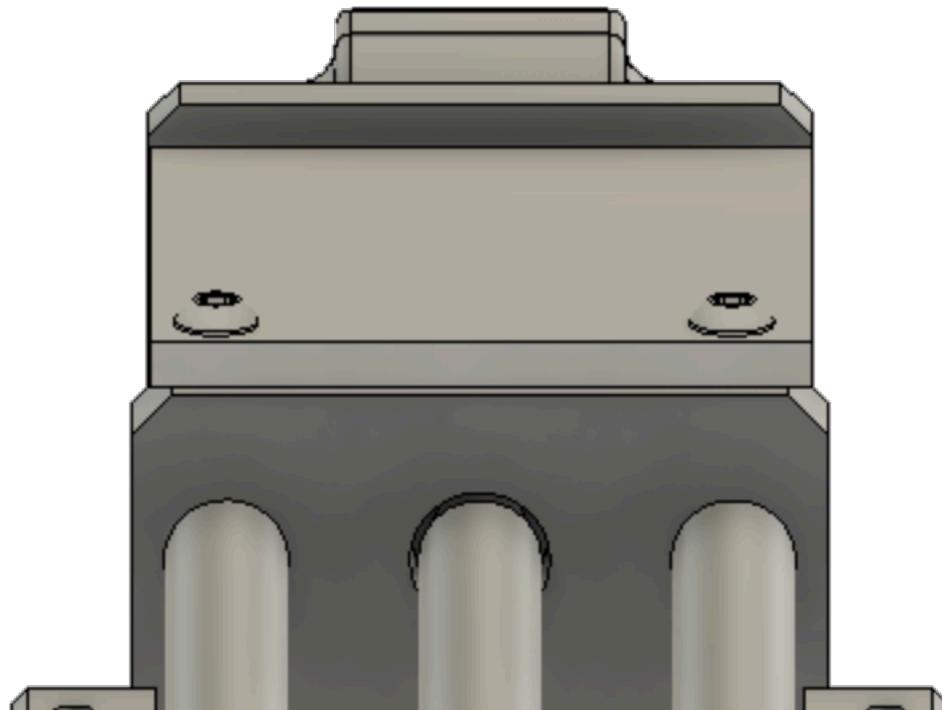
Linear Slide



The linear slide is item #201 in the BOM. Some modifications are made to this, both shown in the revised diagram above. Firstly, there is a T-Track on the bottom edge of this. It can be used for limit switches, but I removed them to provide space for movement, though that may not be necessary.

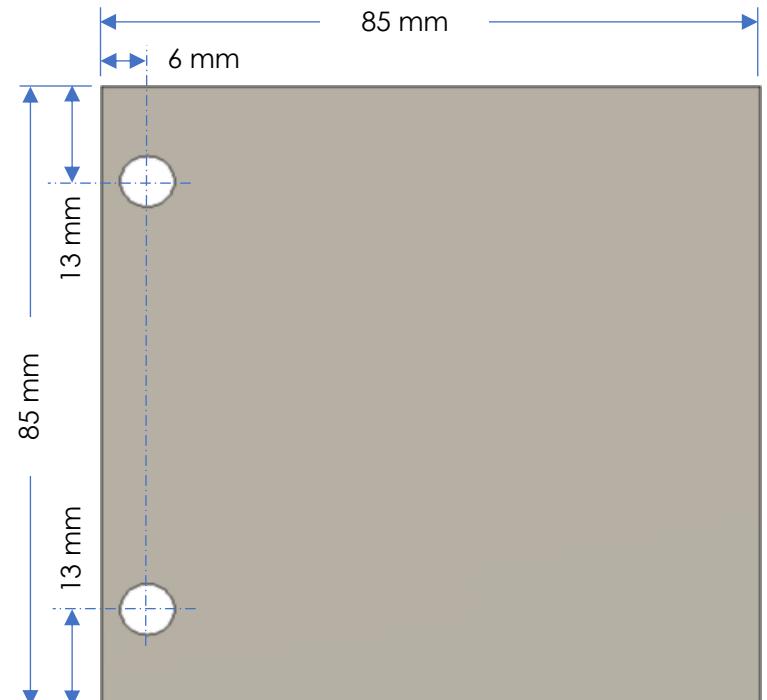
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons



Add a cover over the drive coupling. This is not critical but is in place to keep some dust out of the area.

Use $\frac{1}{4}$ " aluminum plate. Cut the plate to match the opening. 85mm x 85mm is a good estimate for the size.



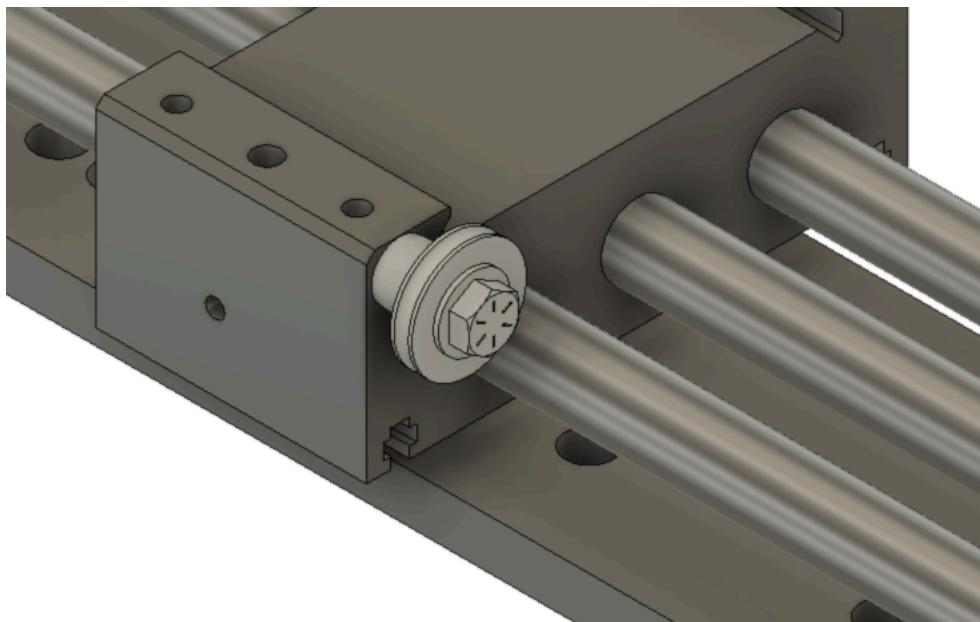
Align the screws over the rods and be sure to not drill the holes too deeply. There should be no interference with the rods. This is shown in the picture to the left.

The holes in the plate are 7mm.

The two affixing screws will need holes drilled into the block below, and these holes tapped for the relevant holes. Screws like #313 are good. In this case, drill 5mm, and tap for M6-1.0.

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons



added. The label should read as noted below.

This information is needed when setting up the control system for this stepper motor. Having this information on a label on the device is useful in the case where you have other stepper-motor driven items.

Drill and tap a hole in the slide for the weight pulley. The screw is a $\frac{1}{4}$ "-20, so drill #7 and tap.

The components attached to the slide are:

- #306 – Screw
- #308 – Pulley
- #309 – Washer (2)
- #310 – Spacer

The spacer is used to align this pulley with the two on the follower arm.

I recommend adding a label to this part at some place. On mine, it is in the area where the plate was

Distance/360
0.19685" / 5mm

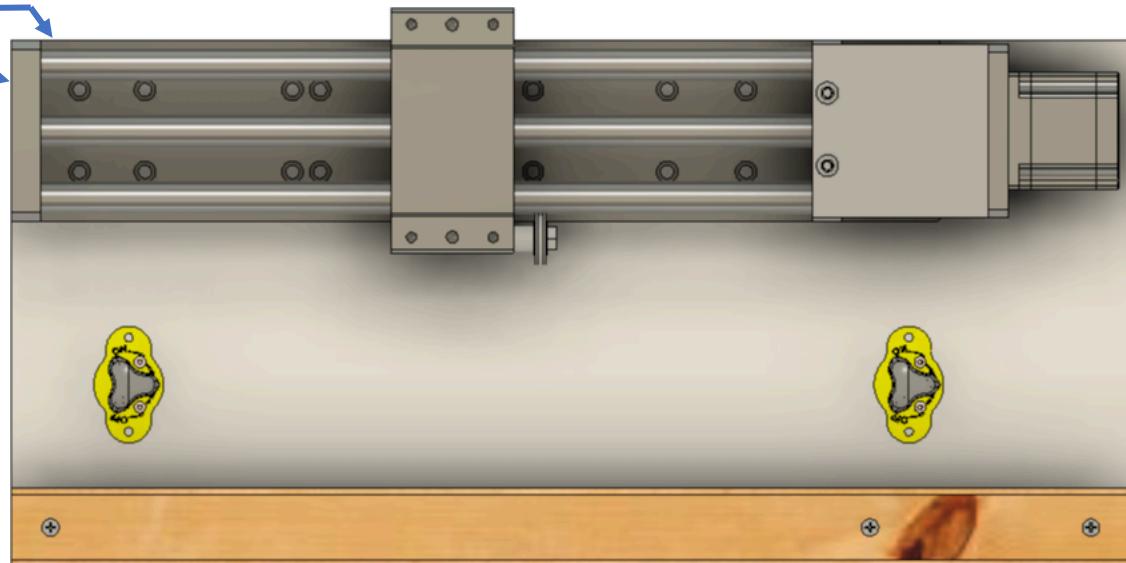
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Attach the linear slide to the MDF base using 6 or more particle board screws (#311). DO NOT use glue to attach these pieces together.

The linear slide should be aligned to the base as shown.

Align these sides



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

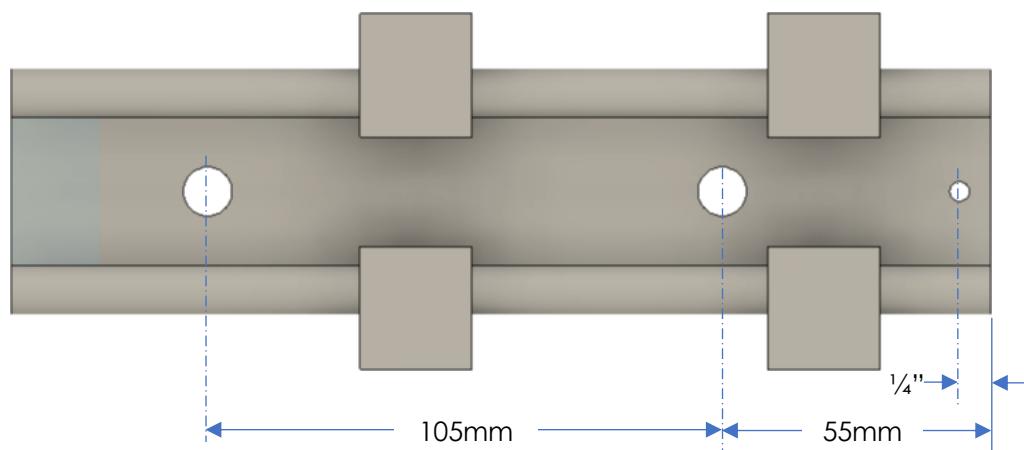
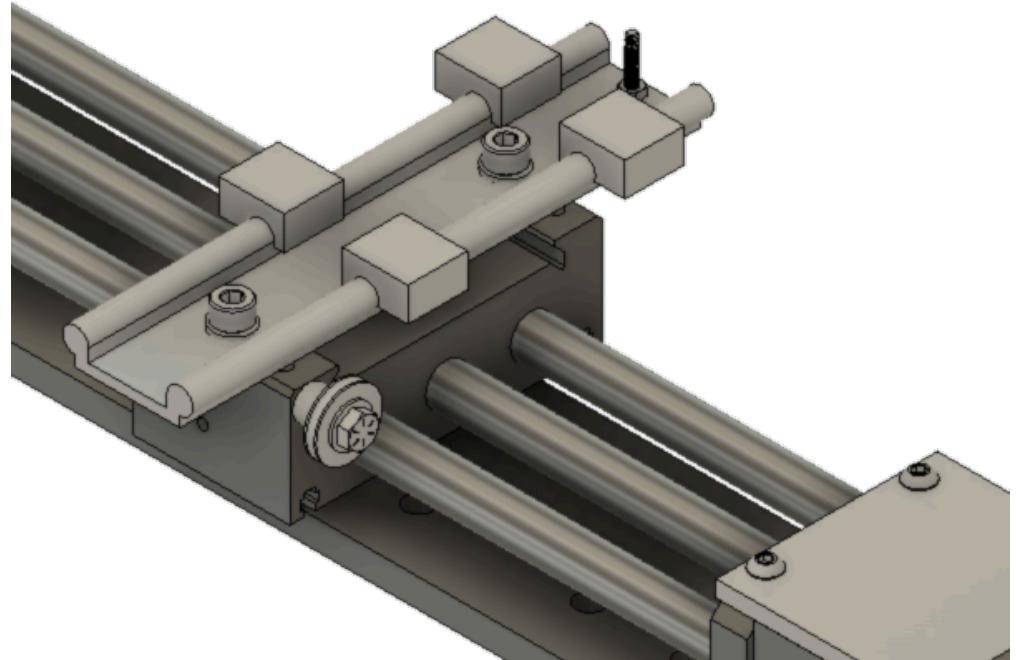
Slider Plate

The slider plate is affixed to the slide on the slide of the linear slide. This is shown in the picture to the right. (The screw holes in the sliders are not shown.)

The slider plate needs three holes drilled into it as shown in the picture below. These are centered in the trough.

The two larger holes are drilled for M8-1.25 screws (#314) but make them a bit larger than typically needed. This will allow for adjusting the alignment as needed. 11mm is recommended. Secure this in place using lock washers (#315).

The smaller hole is for an M4-0.7 screw (#316). It should be drilled 5mm. This screw is used to ensure the parts above this don't slide off the back side. Thusly, the screw should be inserted from the bottom and held in place with an M4-0.7 nut (#317).

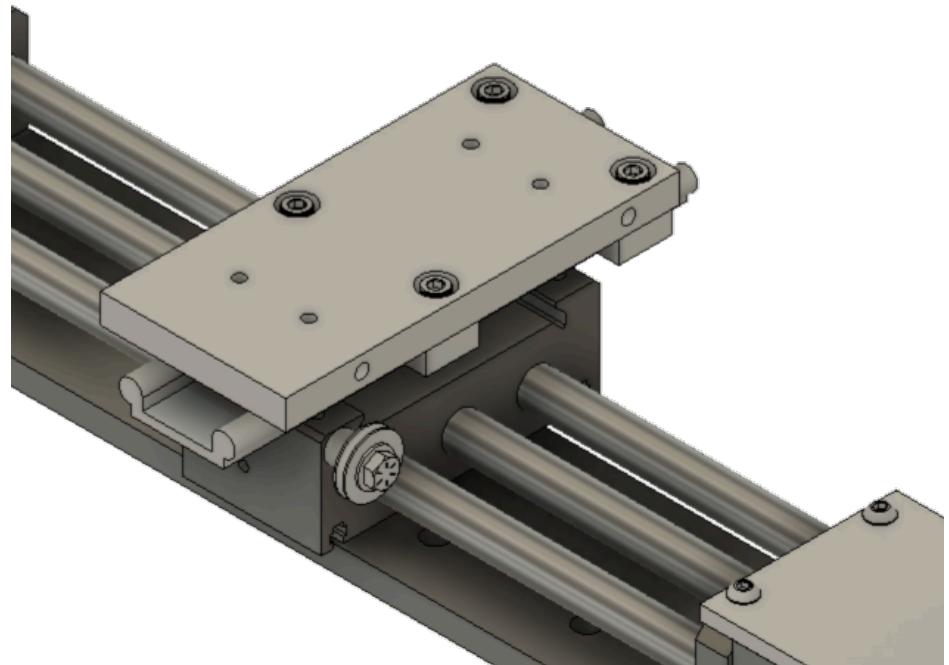
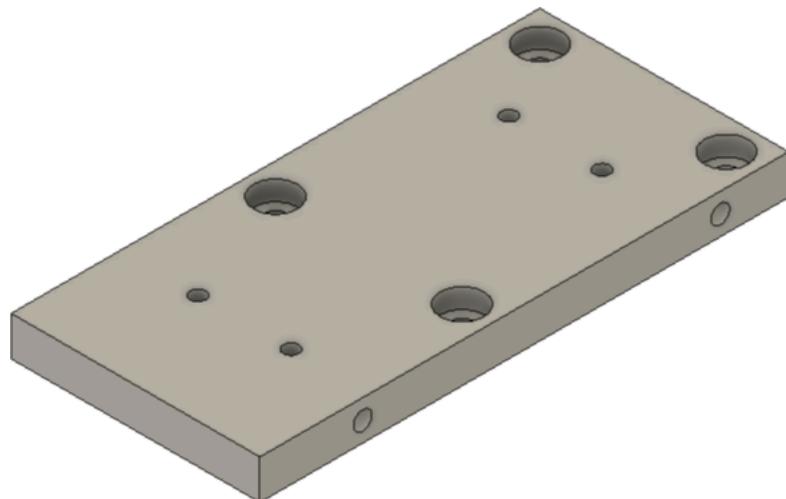


MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

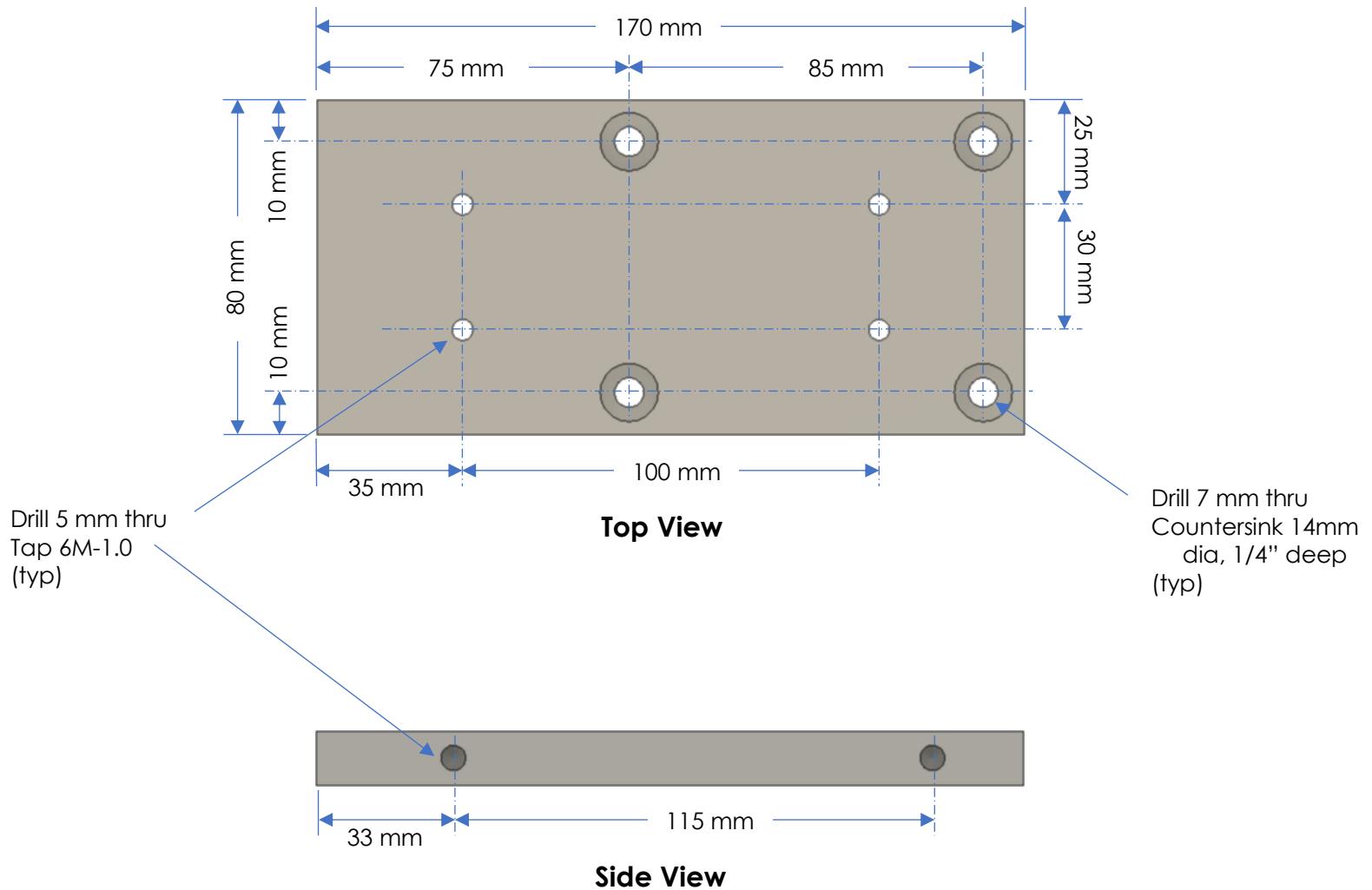
Connector Plate

The connector plate attaches to the slider plate and provides the base for attaching several other pieces. It is made from $\frac{1}{2}$ " aluminum plate. It is shown below in orthogonal projection.



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons



MDF Rose Engine Lathe 2.0

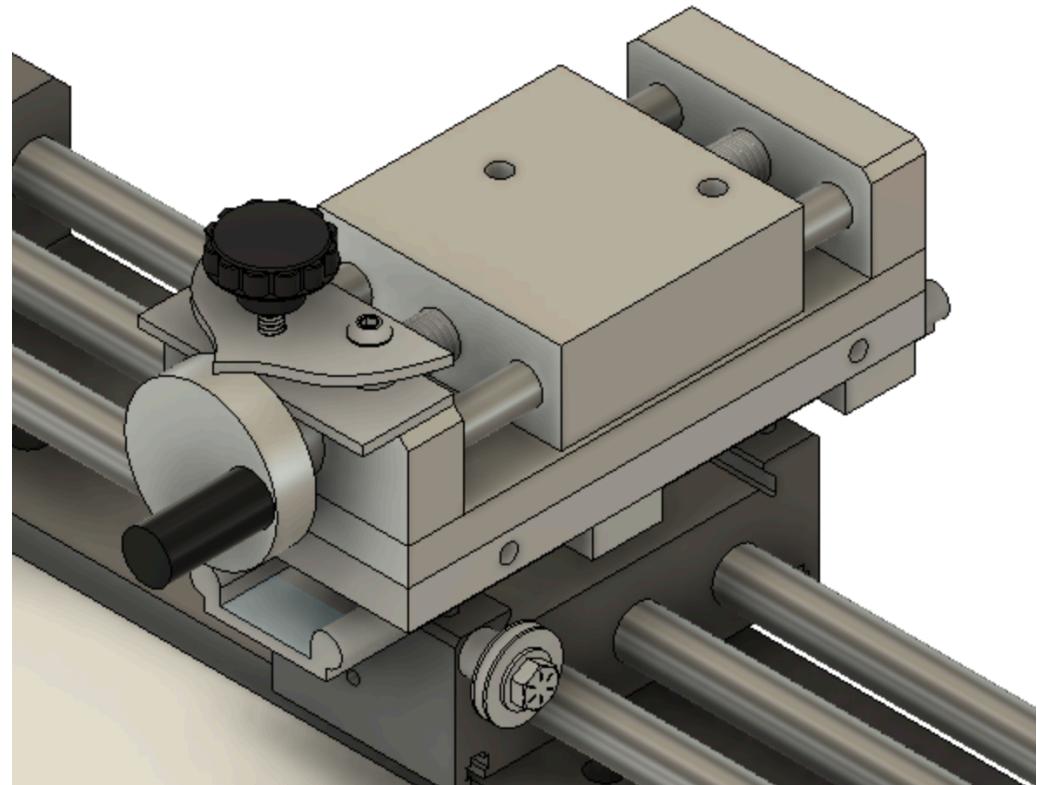
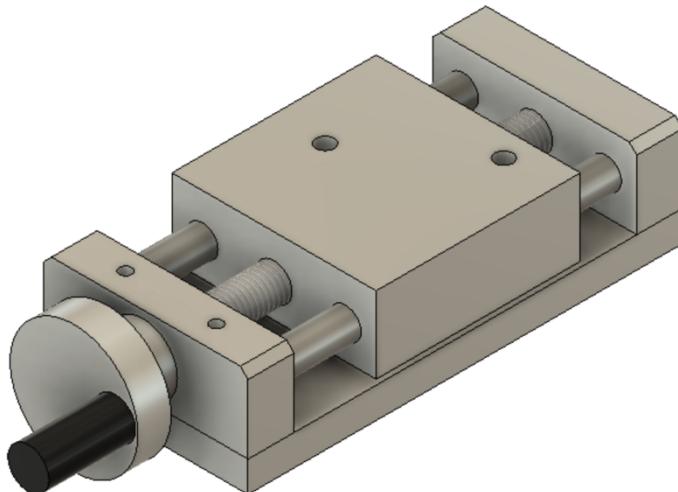
Jigs, Fixtures, and Add-Ons

Linear Stage Table

The purchased linear stage table (#202) is attached to the Connector Plate with 4 ea. Socket Head Screws, M6-1.0, 15mm long (#304).

It needs a few modifications before attaching it to the Connector Plate.

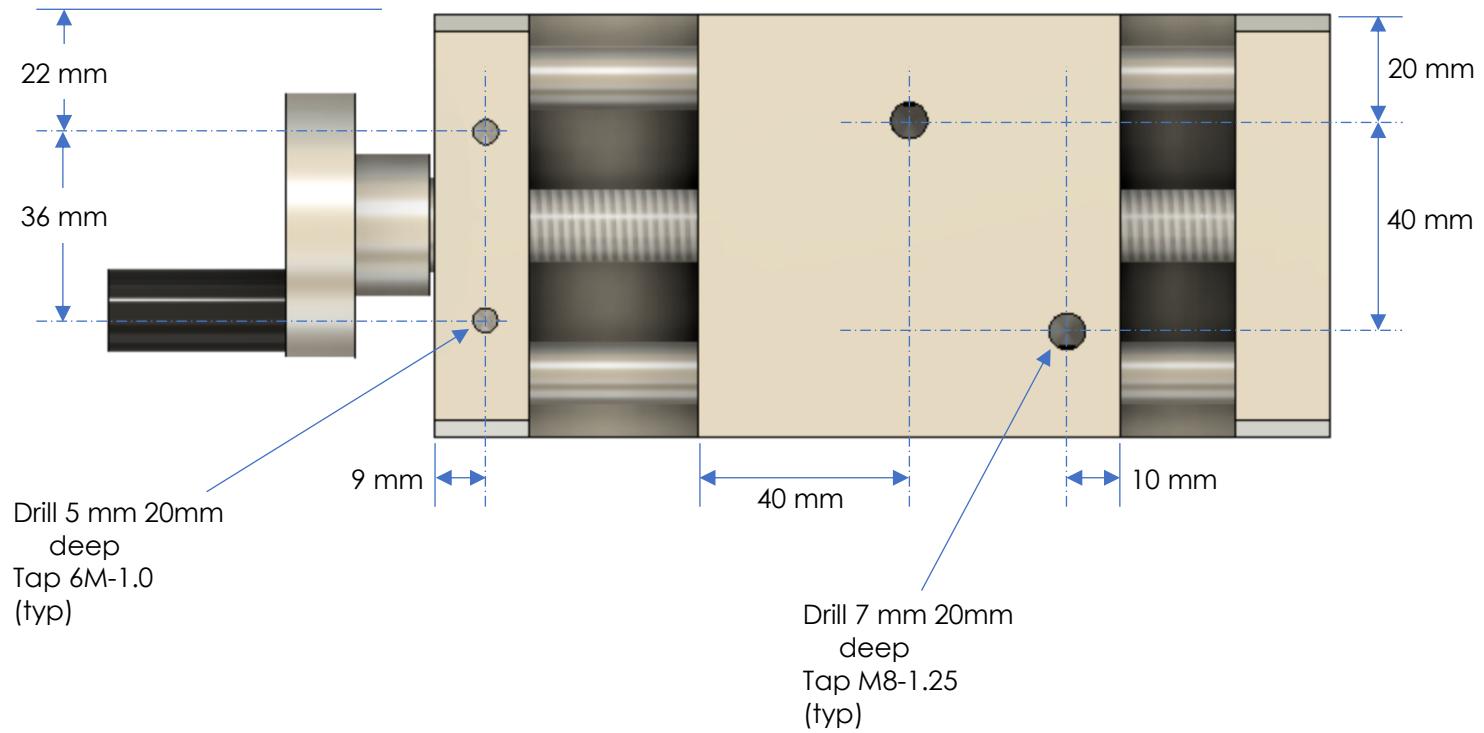
1. Drill and tap holes in the slide to attach the base for the Quick-Change Tool Post.
2. Drill and tap holes to the front to attach two plates for:
 - a. Securing the rotation dial, and
 - b. Indicating the rotational position of the rotation dial.



Those changes are shown in the picture to the left.

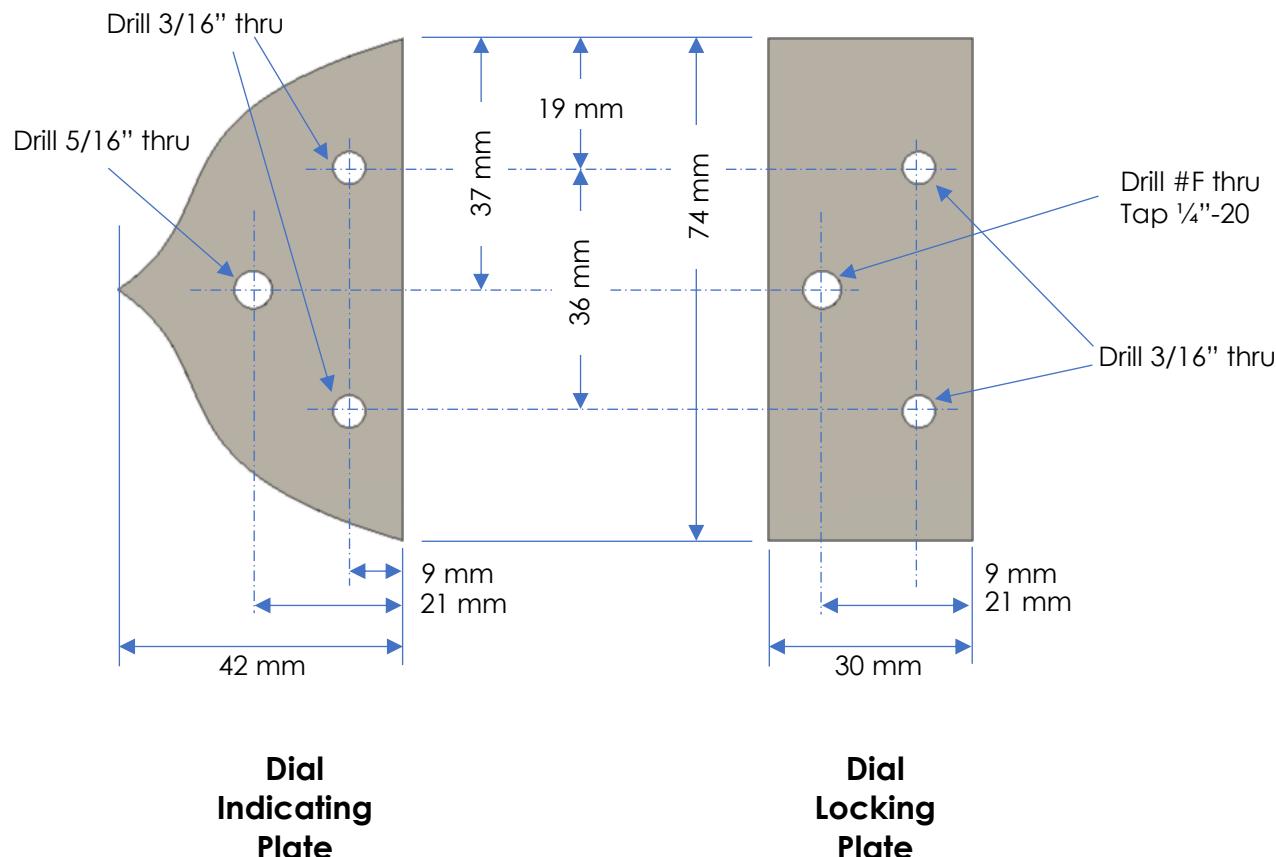
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons



MDF Rose Engine Lathe 2.0

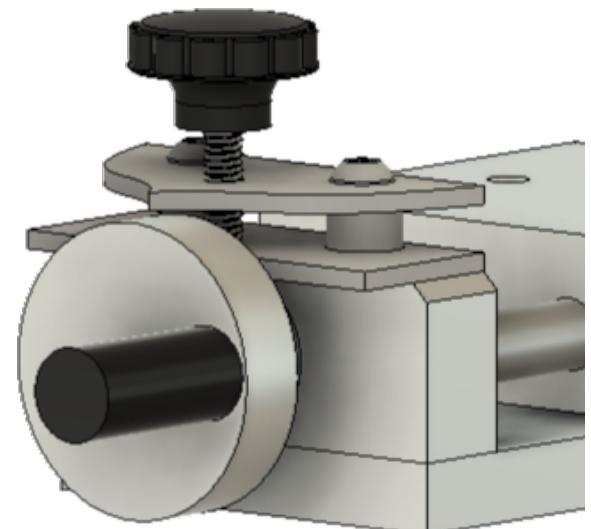
Jigs, Fixtures, and Add-Ons



The two plates used for the dial are shown to the left and shown installed in the picture below.

The two plates are attached to the linear stage table using M6-1.0 screws (#302). A spacer (#301) is between the Dial Locking Plate and the Dial Spacer Plate.

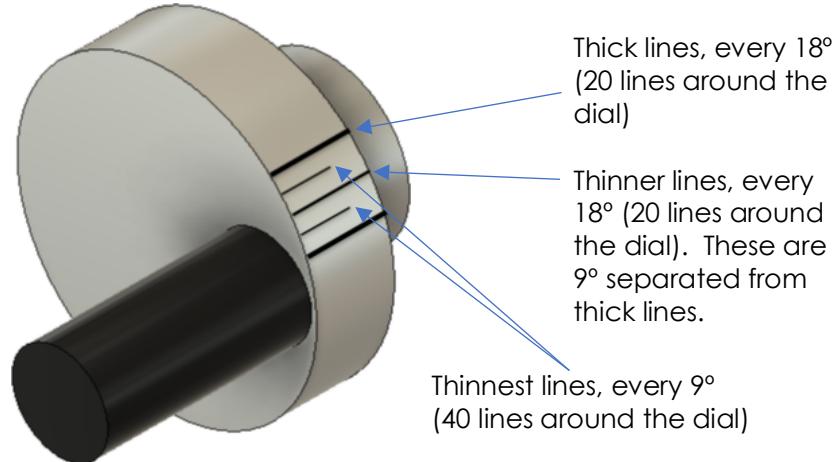
The locking knob is #303.



MDF Rose Engine Lathe 2.0

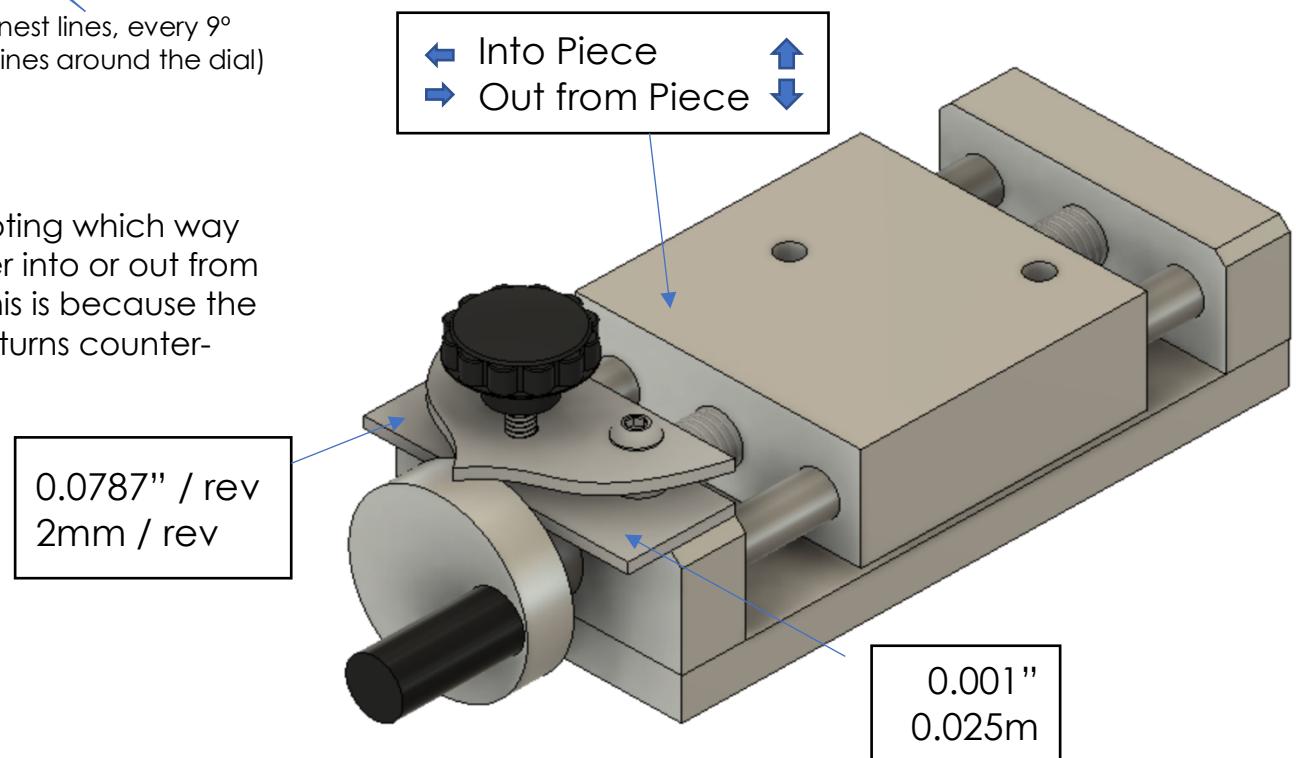
Jigs, Fixtures, and Add-Ons

The dial should have indexing lines added. An example is shown below (all the lines are not shown). Placing them at the indicated spacing puts a line every 4.5° .



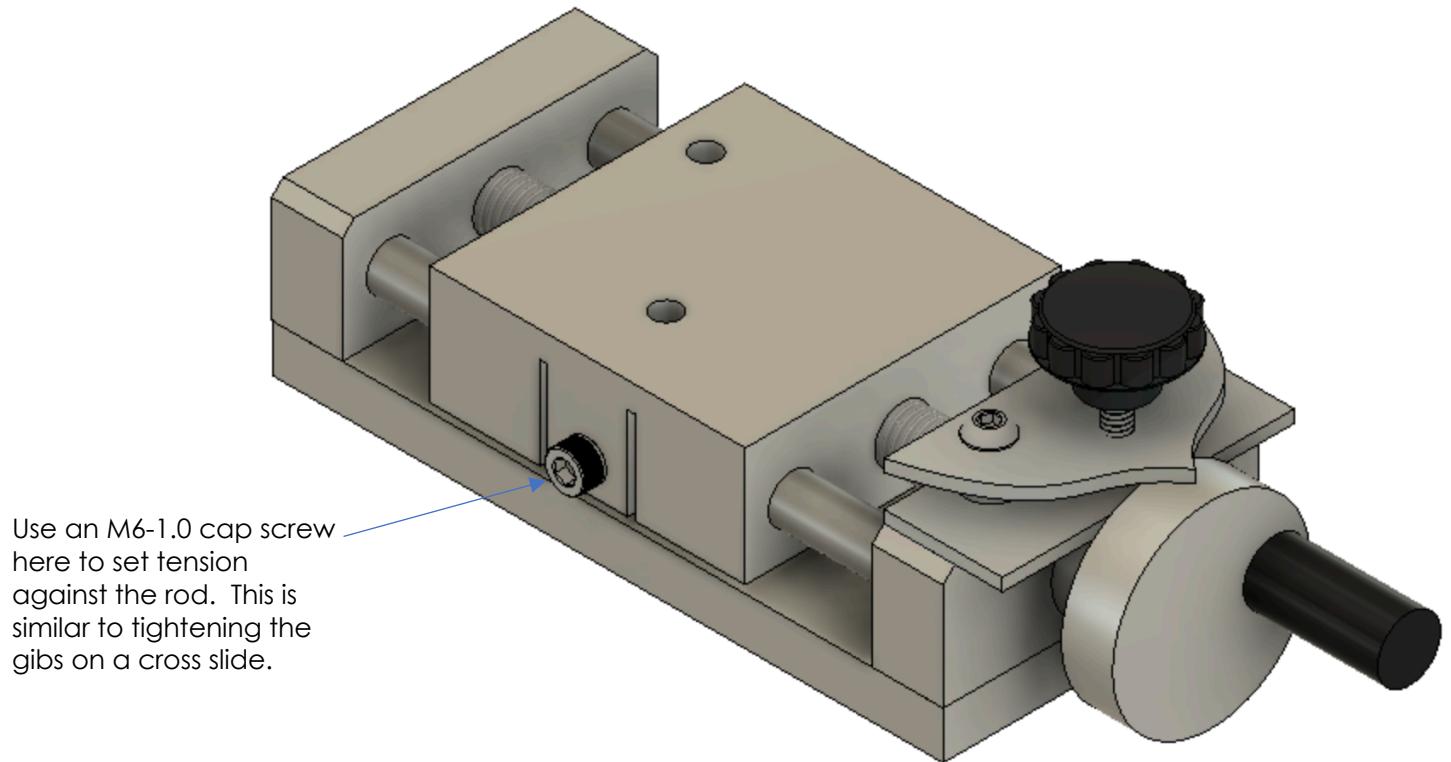
The result is that there are 80 indicating lines around the dial. The screw used to move the slide is M14-2.0, so each indicating line moves the slide by 0.025mm, which is close to 0.001".

Finally, add labels. The one denoting which way to turn the dial to move the cutter into or out from the piece is particularly useful. This is because the screw is not reverse threads, so it turns counter-intuitively.



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons



MDF Rose Engine Lathe 2.0

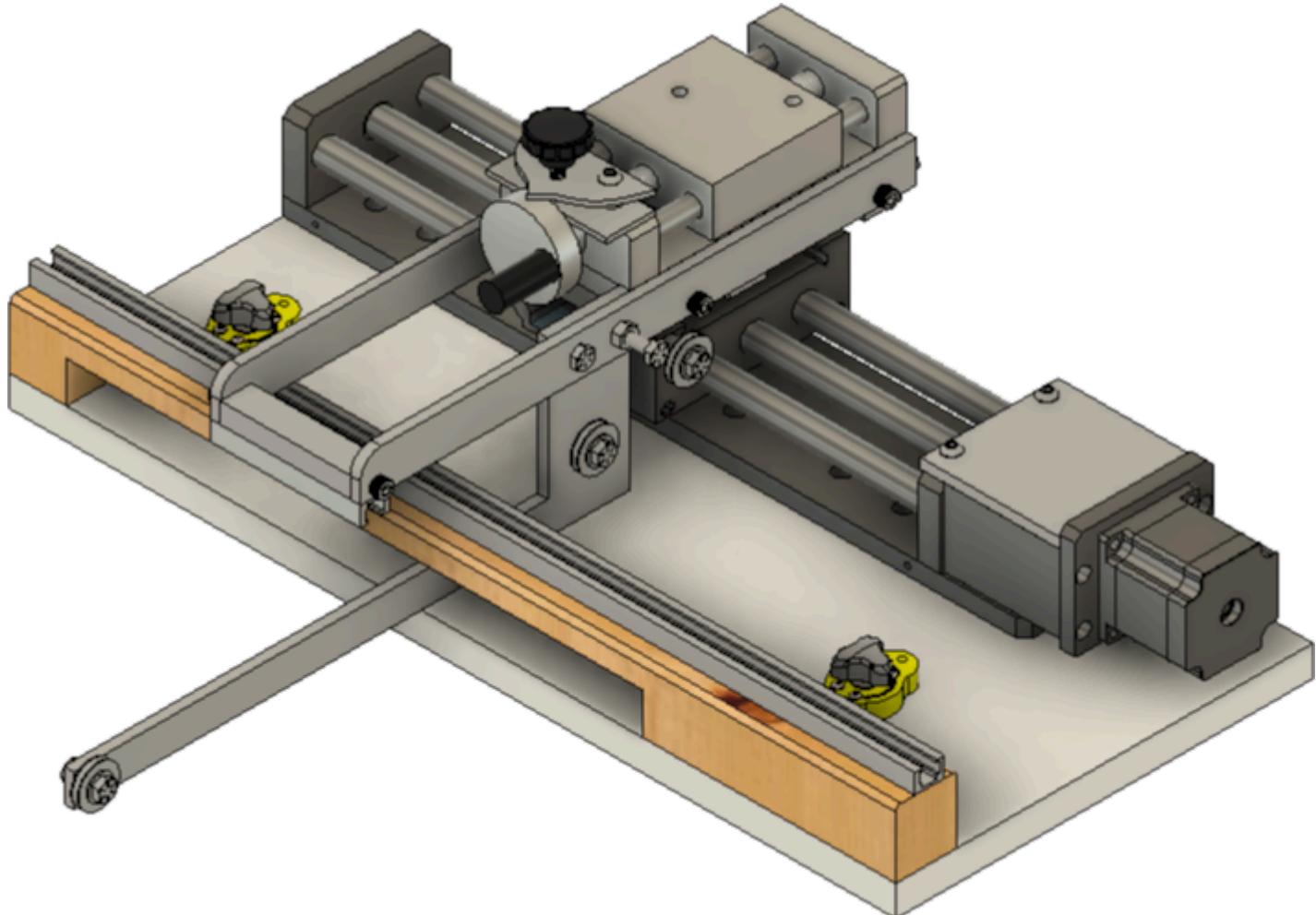
Jigs, Fixtures, and Add-Ons

Follower Arms

The Follower Arms are used to move the cutter in the path outlined by the template. It also provides pulleys for the weight cable.

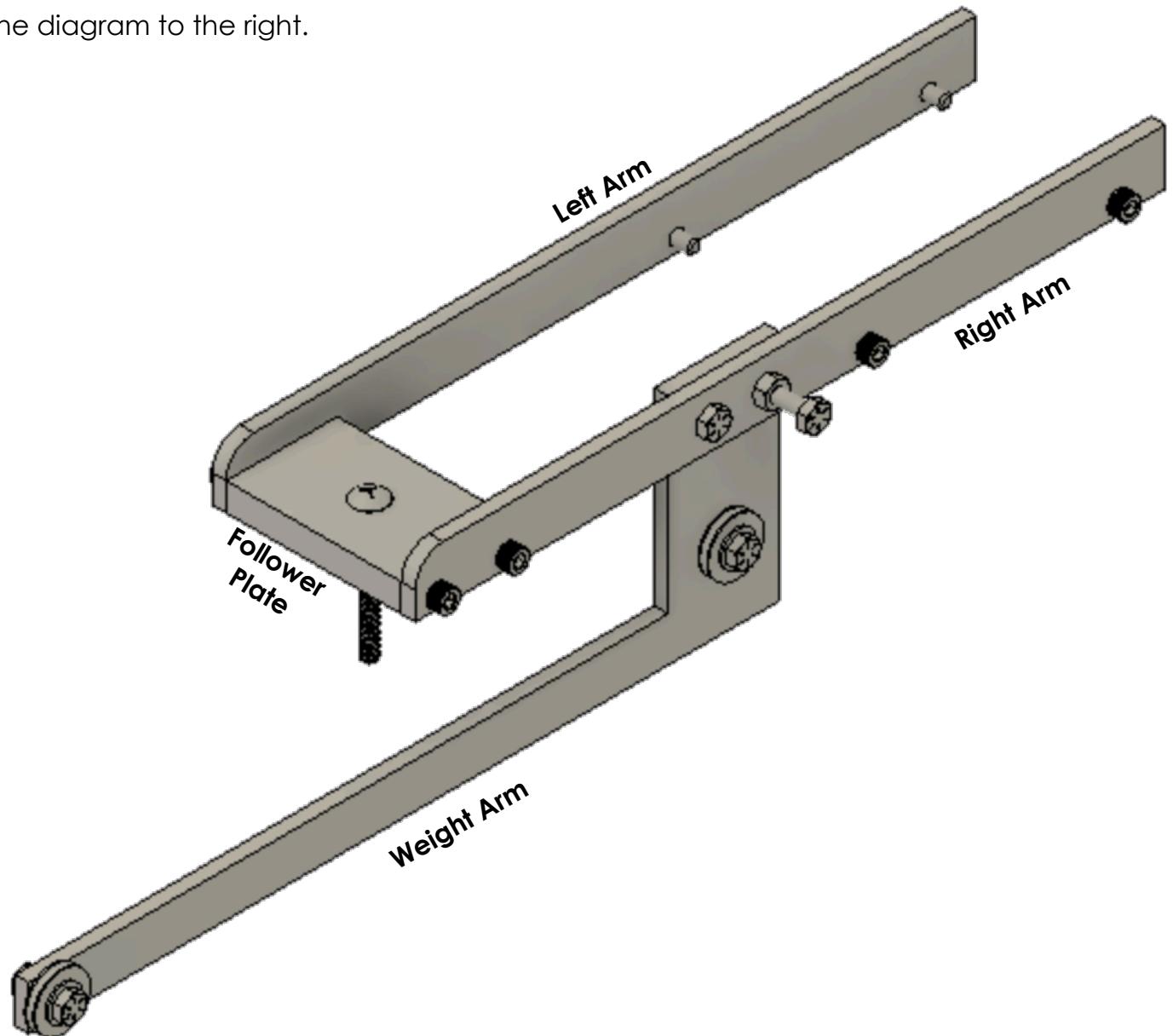
These arms are attached to the Connector Plate with 4 ea. Socket Head Screws, M6-1.0, 15mm long (#304).

The pieces are detailed below.



MDF Rose Engine Lathe 2.0 Jigs, Fixtures, and Add-Ons

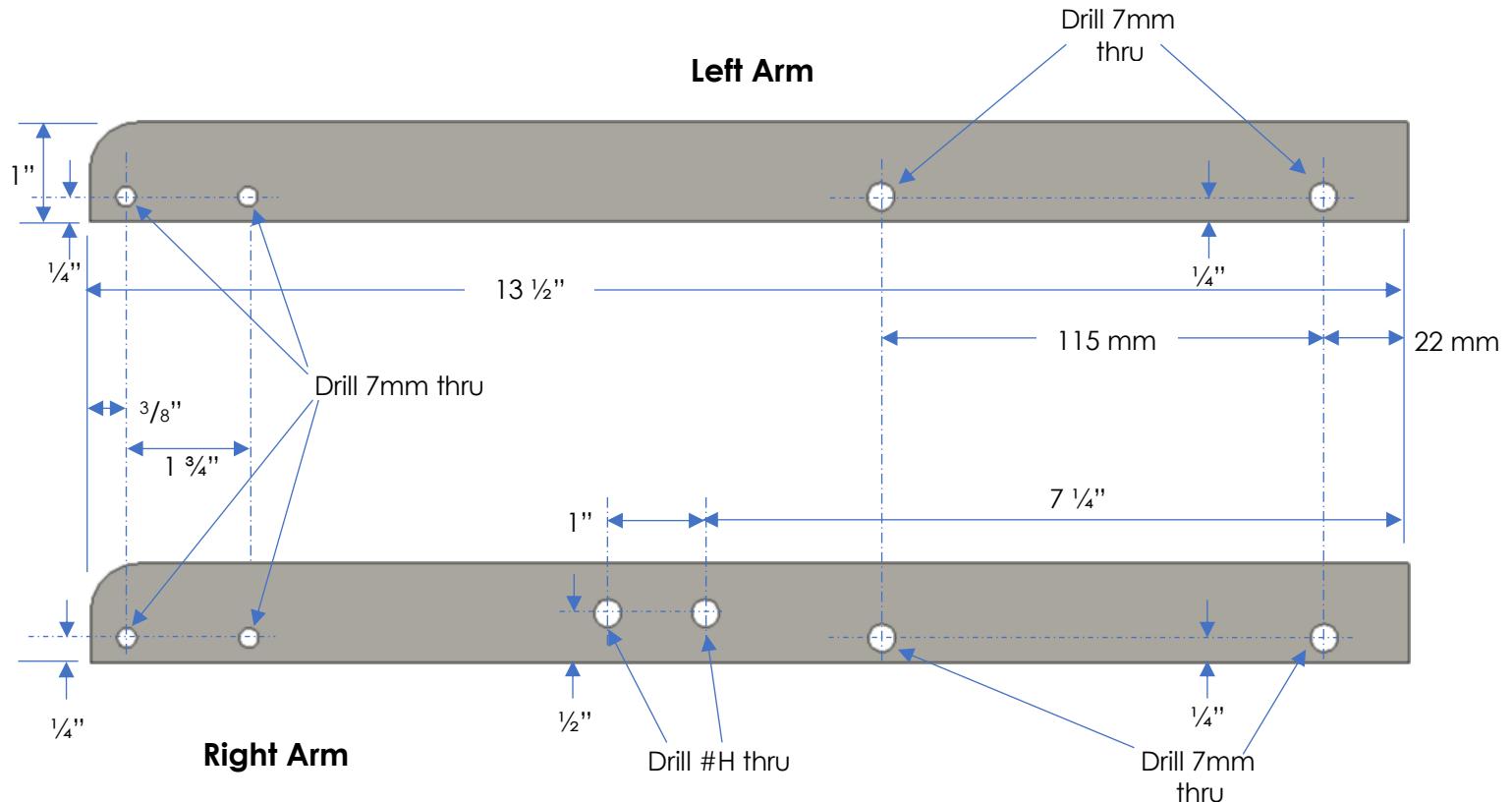
The key parts are shown in the diagram to the right.



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

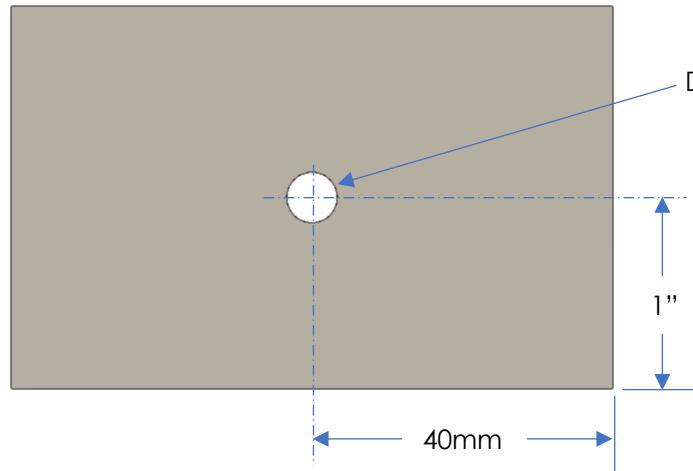
These two parts are made from 1" x $\frac{1}{4}$ " aluminum rod.



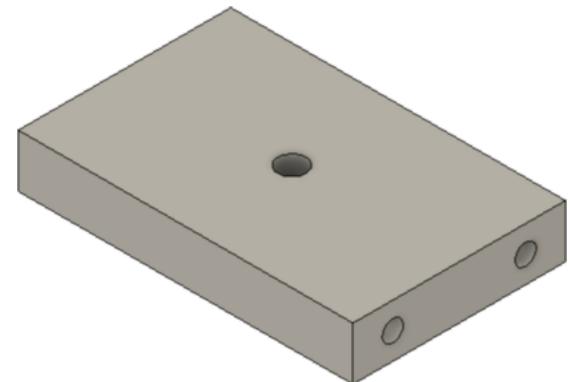
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

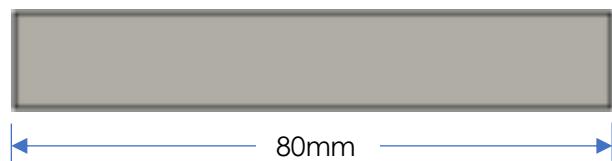
These Follower Plate is made from $\frac{1}{2}$ " aluminum plate.



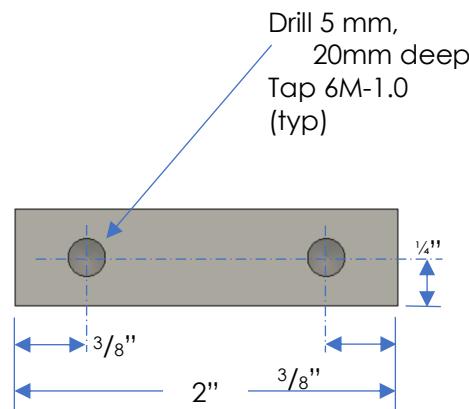
Top View



Orthogonal View



End View



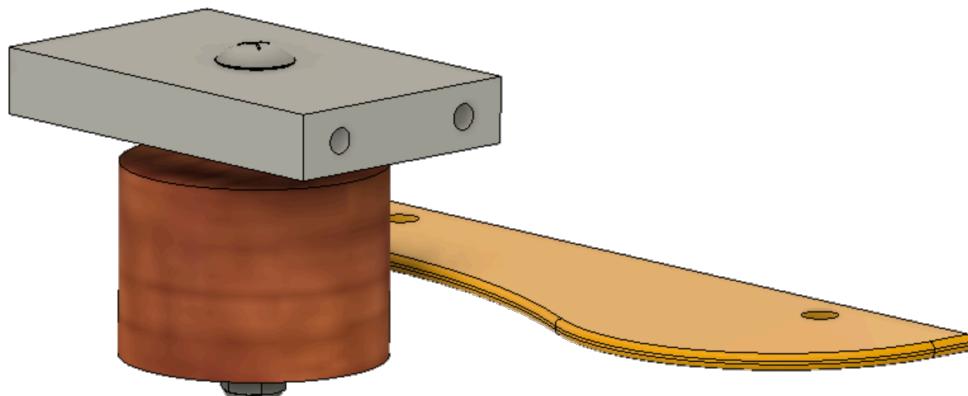
Side View

MDF Rose Engine Lathe 2.0

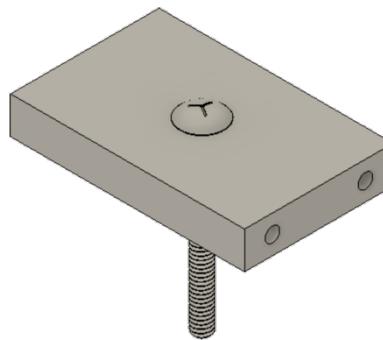
Jigs, Fixtures, and Add-Ons

The Follower Plate has a carriage bolt (#318) and nut (#307) added. The carriage bolt will have to be hammered into place.

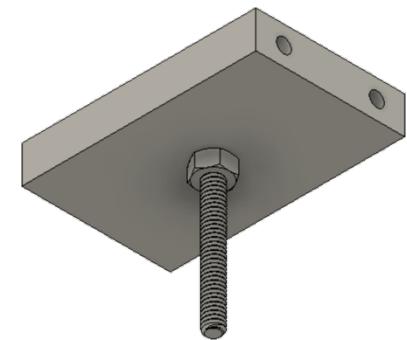
This bolt is used to hold the template follower / rubber. The template follower / rubber can be made in the shape desired by the artist.



An example is shown to the left. The brown piece was turned on a lathe, and the yellow template is what it is following.



Top View



Bottom View

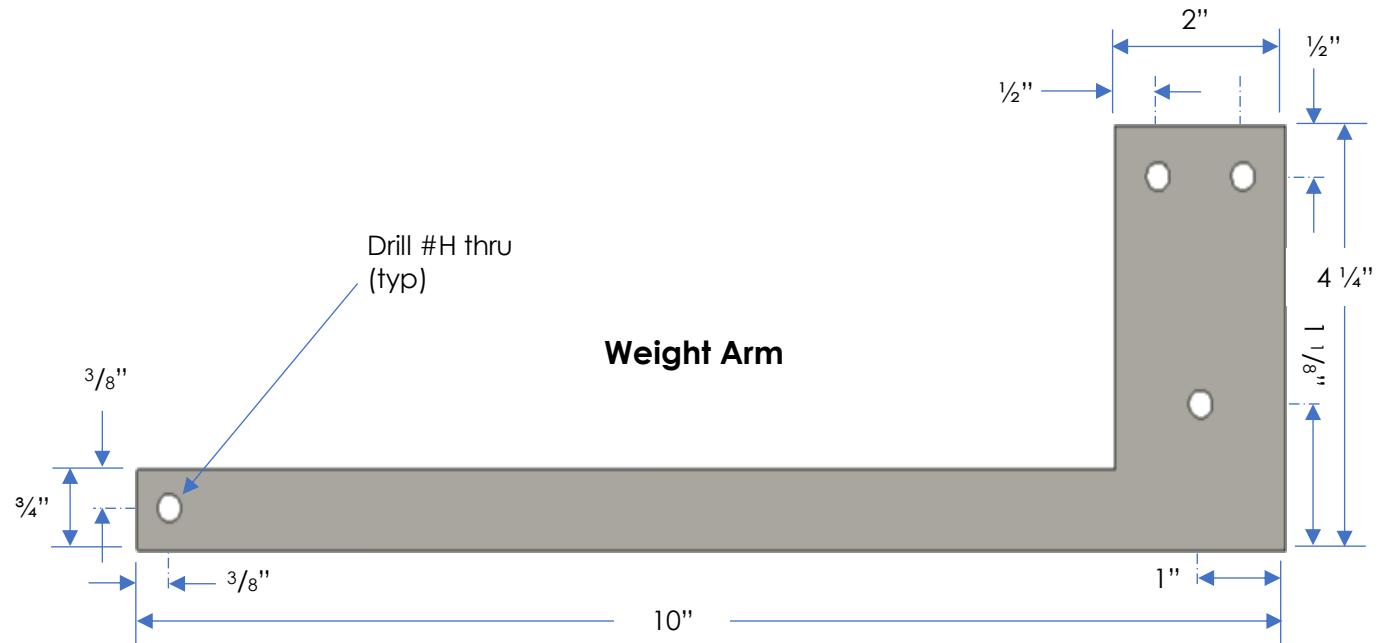
For example, if one needed is 2" diameter, then it is easy to make such a cylinder on a traditional lathe. It is 1 $\frac{3}{4}$ " long, and a hole needs to be bored thru it for the $\frac{1}{4}$ "-20 carriage bolt. Such a hole should be drilled with an H or $\frac{17}{64}$ " bit.

A locknut holds the wooden piece in place.

MDF Rose Engine Lathe 2.0

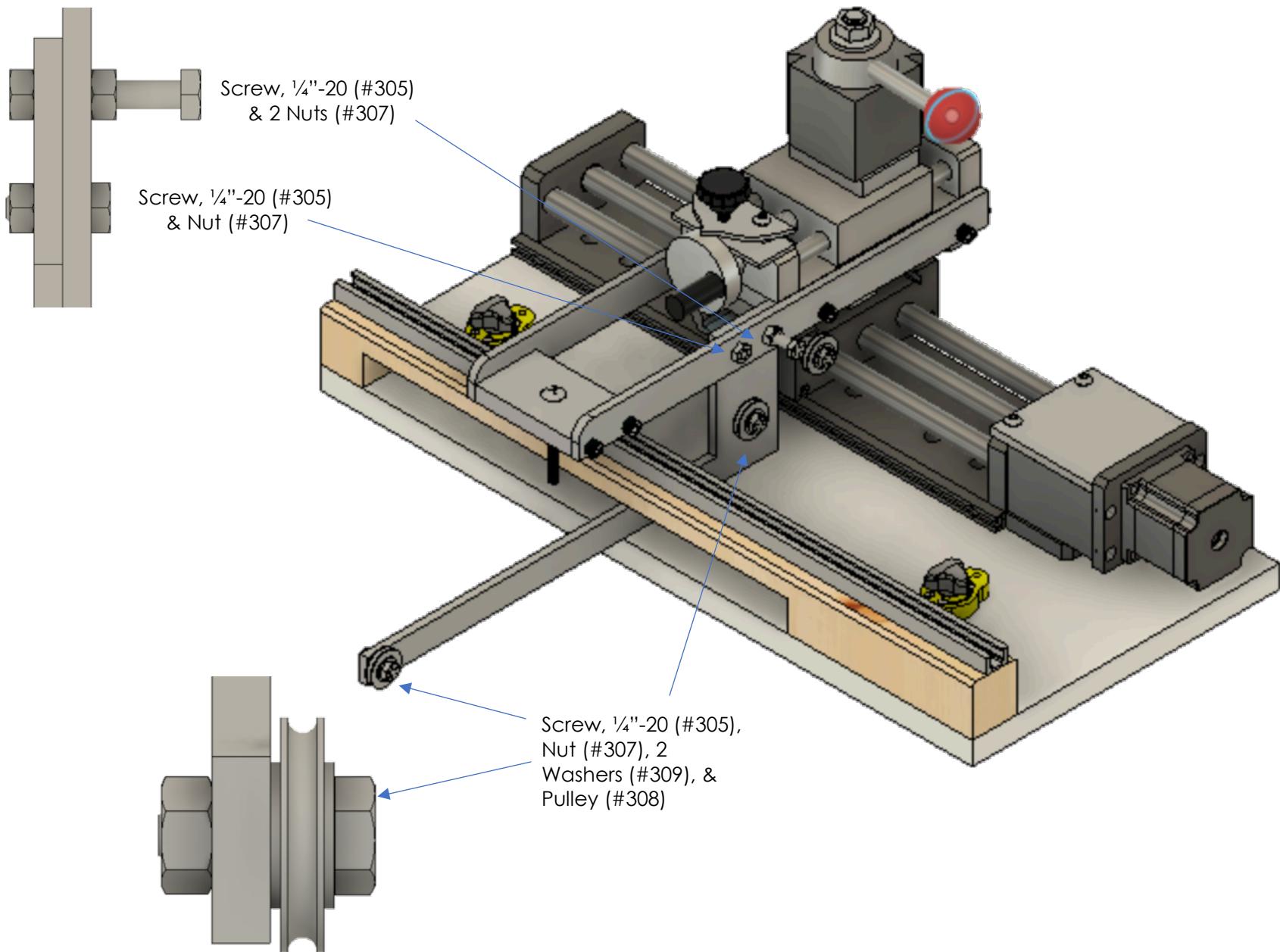
Jigs, Fixtures, and Add-Ons

The Weight Arm is made from $\frac{1}{4}$ " aluminum plate.



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons



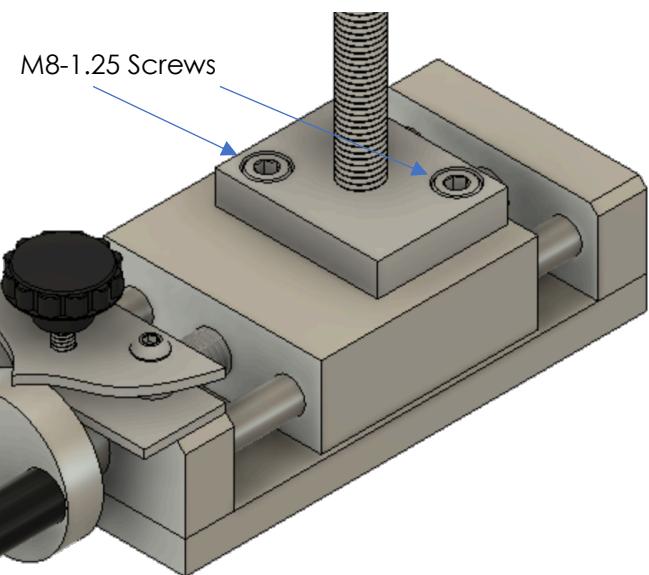
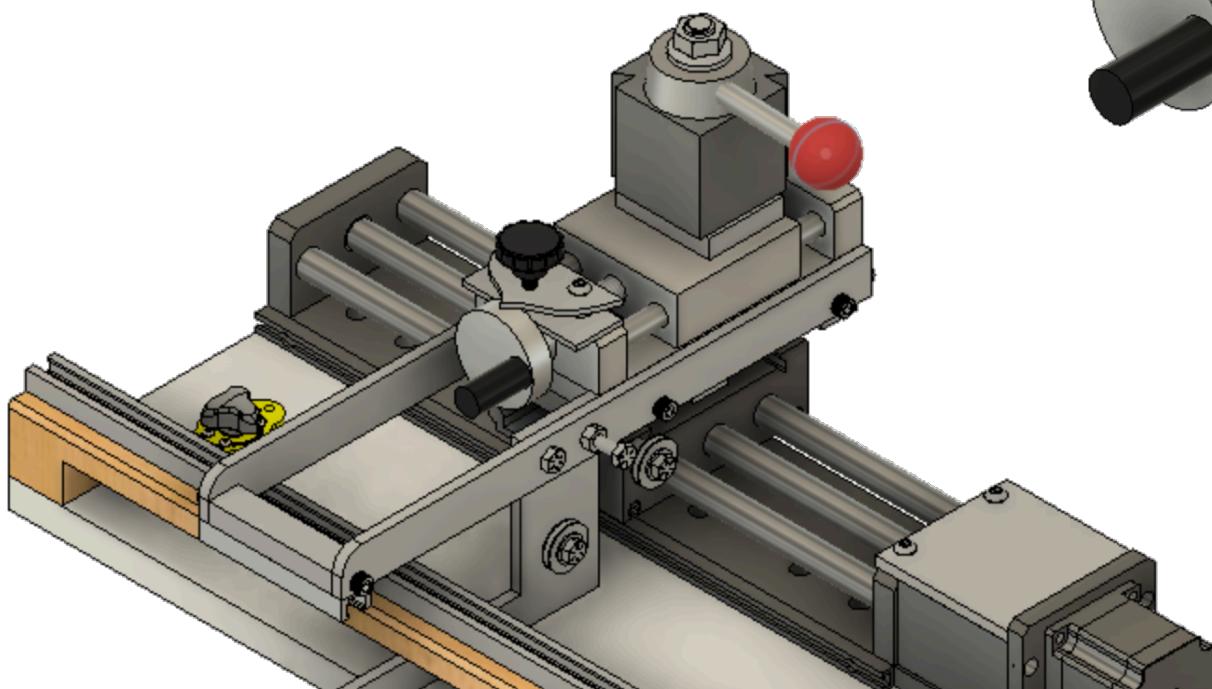
MDF Rose Engine Lathe 2.0

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Quick-Change Tool Post

The quick-change tool post is attached to the top of the Linear Stage Table using M8-1.25 screws.

Once the rest of the QCTP parts are installed, it will look like the picture below.

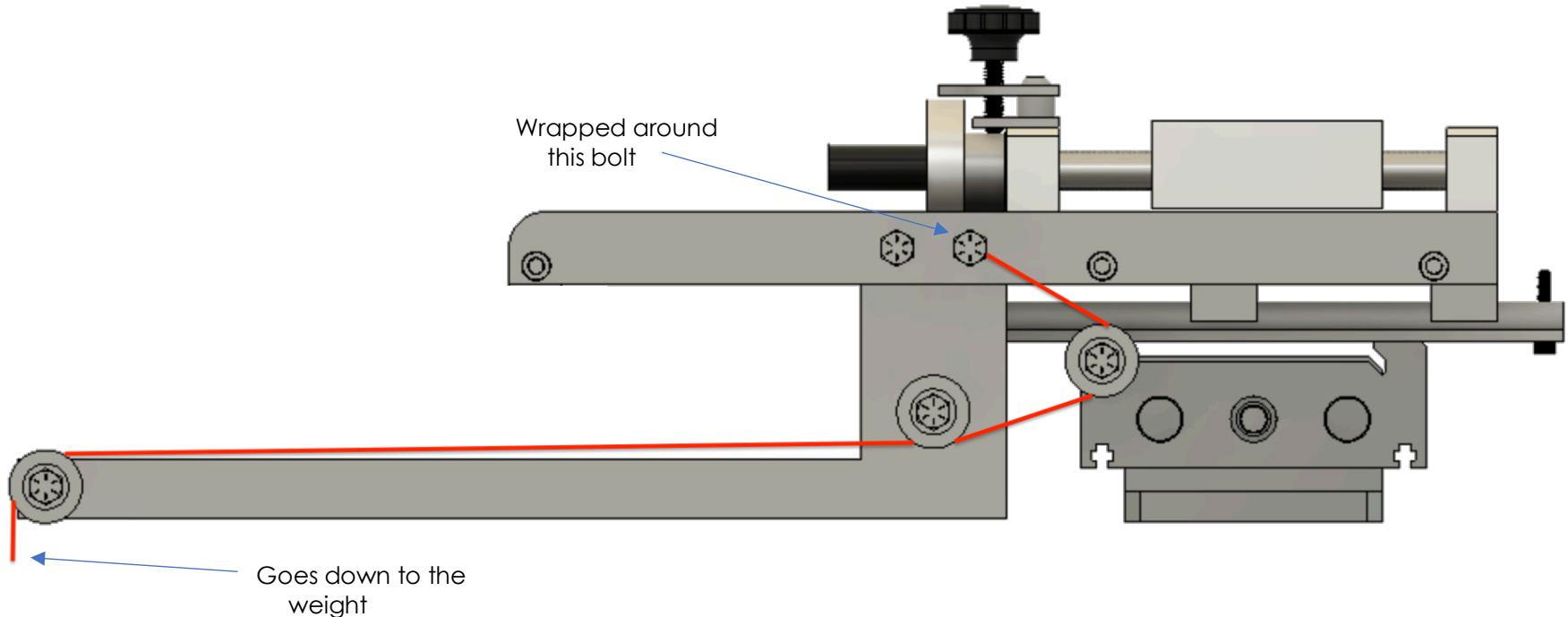


MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Weight & Cable

The cable for the weight is installed along the path shown in red below.



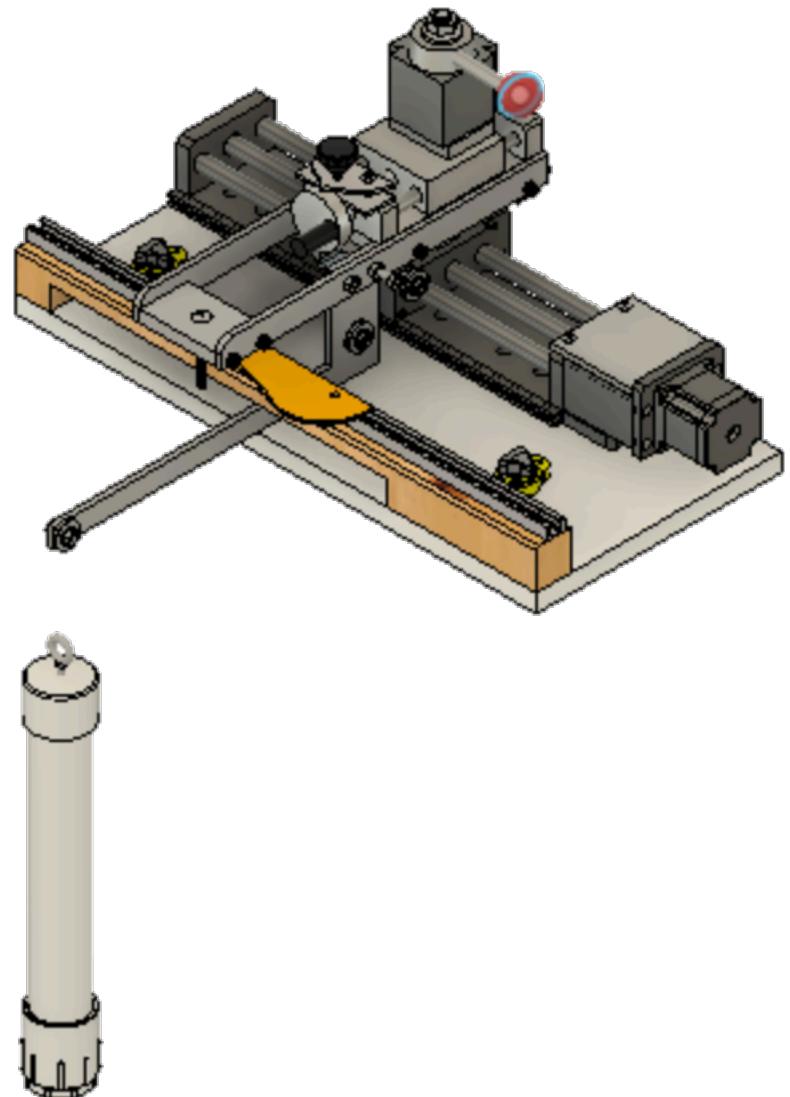
MDF Rose Engine Lathe 2.0

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When the weight is attached to the weight arm, it will hang down like the picture to the right.

The weight can be made from many things. What is proposed is to use 1 ½" PVC Pipe, Schedule 40. The one shown has a cap on the top, and a screw-in fitting on the bottom.

The top has an eyebolt in it. A ¼"-20 eyebolt is sufficient. Fill the tube with something to give it a total weight of 5 lbs. You may need to adjust that weight to have it work as expected. When the weight is correct, the slide will be pulled towards the back of the rose engine, keeping it engaged with the template.



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Jigs, Fixtures, and Add-Ons

Additional Instructions

Starting with version 3.0.6, there is an **Auxiliary Pin** function.

When using certain functions (such as Sync and MultiSync), the final pass can take quite a long time -- many hours is not uncommon. This function was requested so that a signal light can indicate when an activity is still underway.

The idea was to have a light (such as the one to the right) lit when activity is underway, and not lit when the activity has stopped. This allows the operator to walk away from the machine when using these long-running operations and monitor the activity periodically by glancing over to the machine to identify if the activity has stopped.

How It Works

The activity diagram on the right shows the timings.

When an activity is initiated on the Nextion touch screen (the top line), the Teensy will take the output for the selected pin from 3.3 VDC to 0 VDC (the second line).

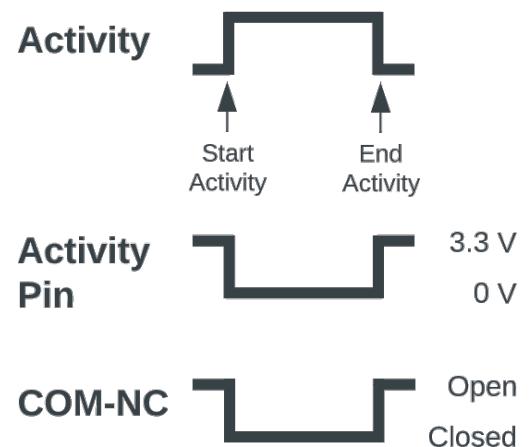
When that activity is completed, the Teensy will take the output for the selected pin from 0 VDC back up to 3.3 VDC.

When that activity is completed (e.g., when using Sync or MultiSync) or stopped by the user, the Teensy will take the output for the selected pin from 0 VDC back up to 3.3 VDC.

This output is then used to switch a relay.

Identifying the Pin Used

Using the Config More panel, a pin is identified for this use (which matches the one wired for this use).



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Wiring The Components

The switching side of the relay (left side in the picture to the right) needs to be connected to the printed circuit board.

- **VCC** is connected to any place on the PCB which supplies 3.3 VDC. Do not connect it to the 5 VDC point as that will overload the relay module.
- **IN** is connected to the pin number on the PCB which corresponds to the one identified in the setup (Config More).
- **GND** is connected to any place on the PCB which is the common GND.

The switched side of the relay (right side in the picture to the right) needs to be connected to the power supply for the signal lamp.

- **NC** (normally closed) is connected to the load supply for the signal lamp.
- **COM** is connected to the load from the power supply. This can be switched to turn this function off if it is not needed. The addition of the switch helps the usefulness of this as it is easy to enable or disable without having to go back into the configuration settings. This also makes it so you don't have to remember which pin number was used for the function.
- **NO** (normally open) is not used.

As shown, Neutral and GND are connected from the power supply to the signal lamp.



1 Channel DC 3V/3.3V Relay Power Switch Module

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Jigs, Fixtures, and Add-Ons

Parts

- The relay is a single channel relay which uses 3.3 VC for the switching, and switches 110V / 220V AC. The one I purchased has an optical isolation circuit. It was also purchased from Amazon.

Do not remove the two jumpers from the board.

- The activity light is an LED Signal Tower light powered by 110V / 220V AC. It was purchased from Amazon.