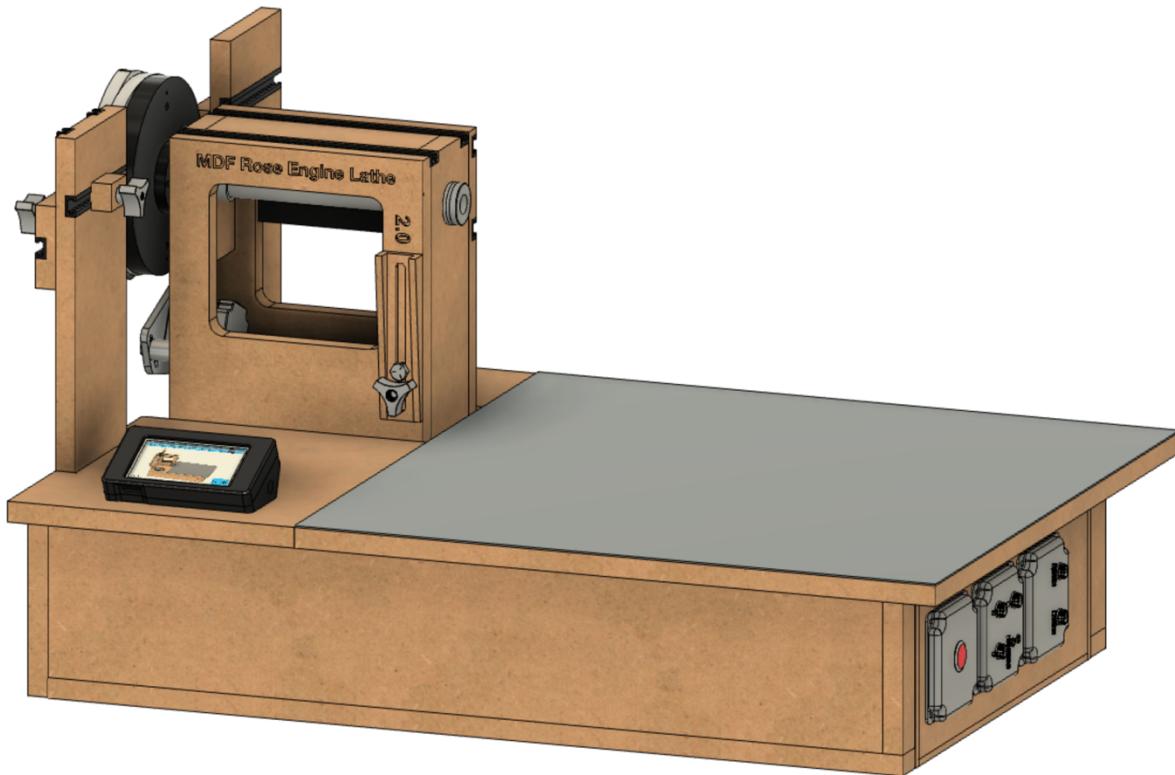


MDF Rose Engine Lathe 2.0 with Stepper Motor Drive



Instructions for Building Jigs, Fixtures, & Add-Ons

**Version 1.4.1
09 August 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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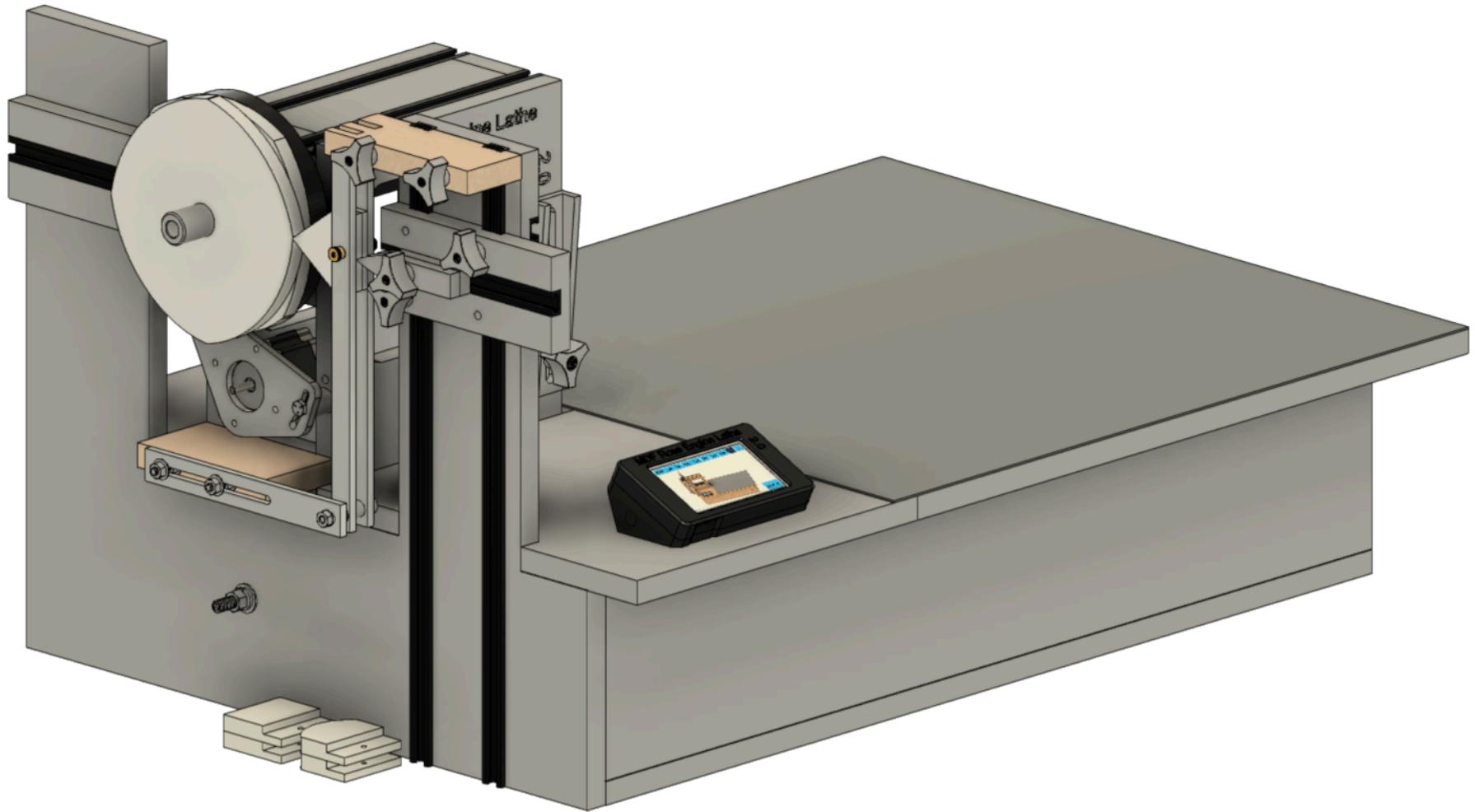
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Amplitude Adjuster

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.

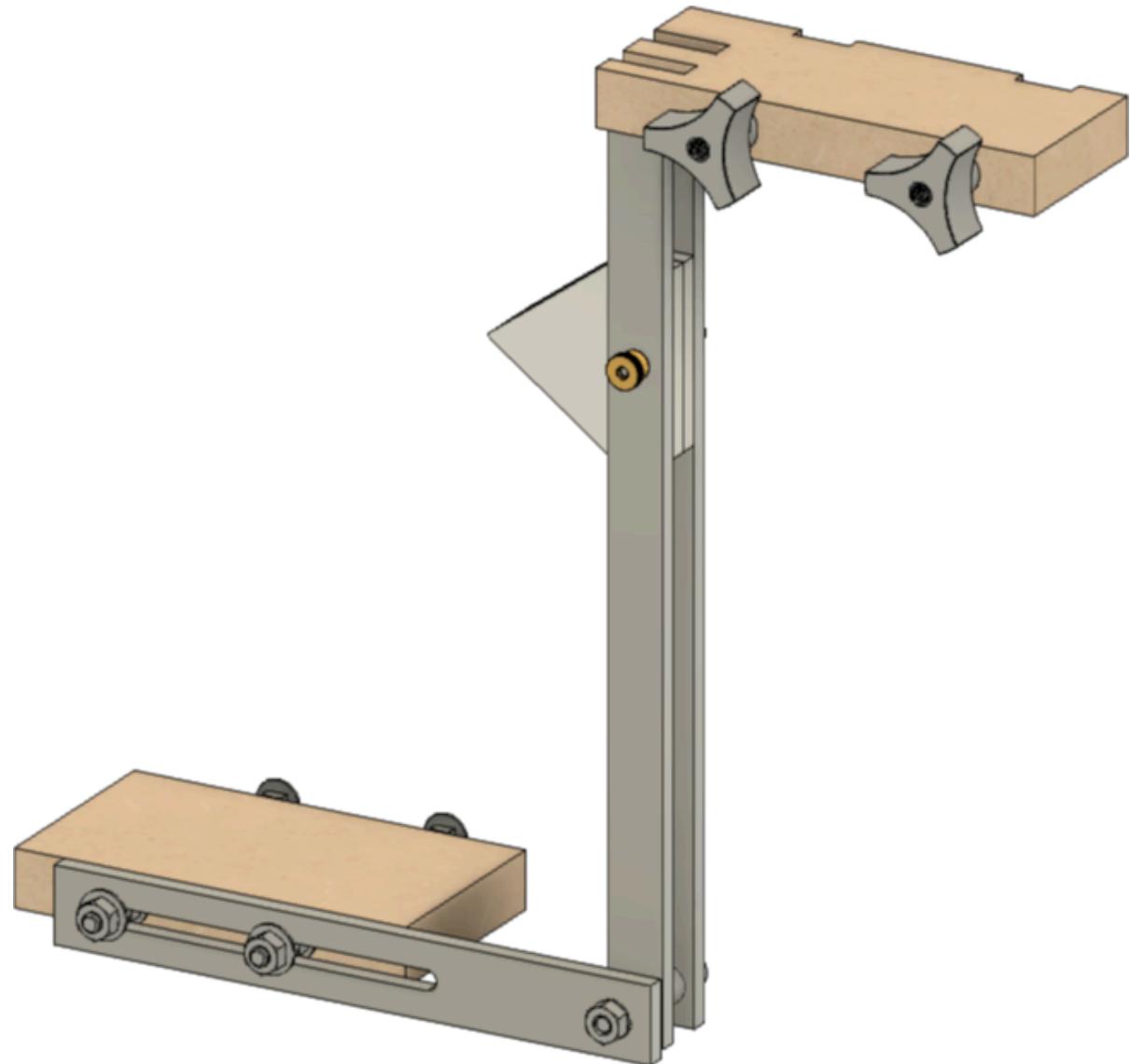
Details for building this follow the bill of materials.



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.

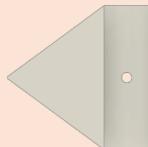
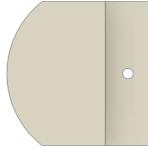


MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Bill of Materials

Parts required for building this are below.

Item Item #	Item	Qty	Source	Source Part Number	Comments
MDF Parts					
AA 1	MDF Spacer Block	1			
AA 2	MDF AA Alignment Block	1			
Machined Parts					
AA 3	Aluminum bar, $\frac{1}{4}$ " x 1"	1			A piece $7 \frac{3}{4}$ " to 8" long is needed. Used for the horizontal bar.
AA 4	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

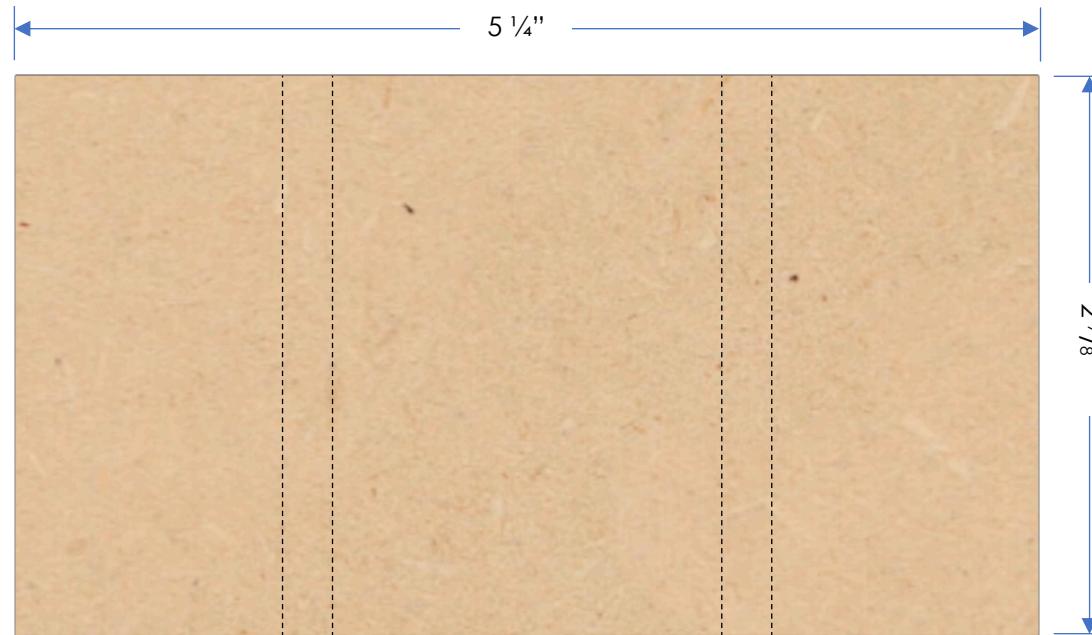
Item #	Item	Qty	Source	Source	Comments
				Part Number	
101	Carriage Bolts, $\frac{1}{4}$ "-20, 4" long	2	McMaster-Carr	93548A560	
102	Washer, $\frac{1}{4}$ "	8	McMaster-Carr	90107A029	
103	Lock Washer, $\frac{1}{4}$ "	1	McMaster-Carr	92146A029	
104	Nut, $\frac{1}{4}$ "-20	5	McMaster-Carr	95505A601	
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

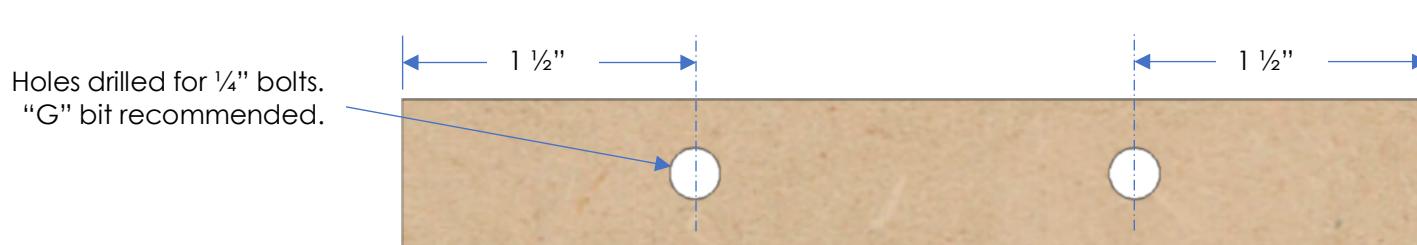
Jigs, Fixtures, and Add-Ons

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



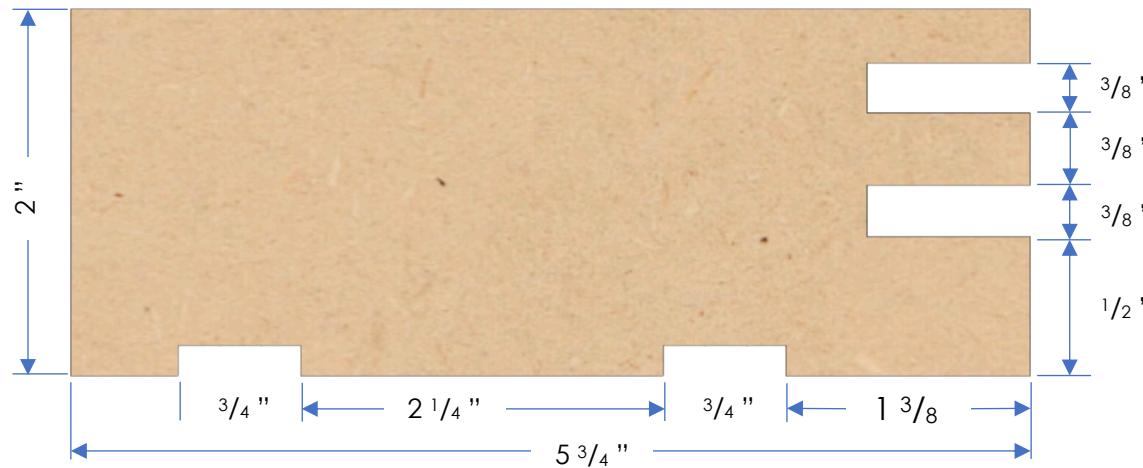
Side View

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

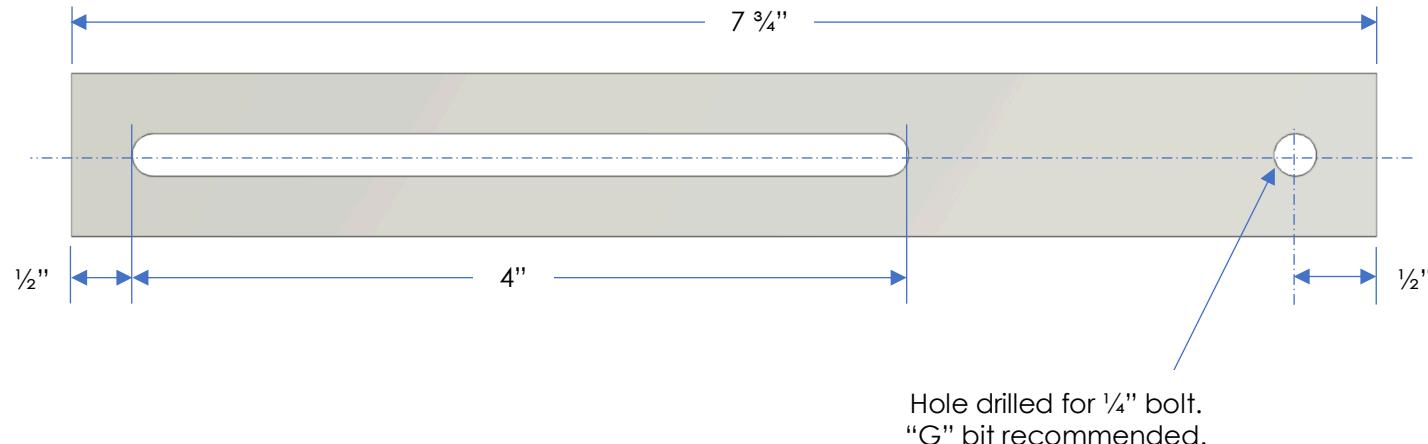
NOTE: There is also a 3D printable version in the 3D Printed Parts manual in the MDF Rose Engine Lathe 2.0 Library (<https://mdfre2.ColvinTools.com>).

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

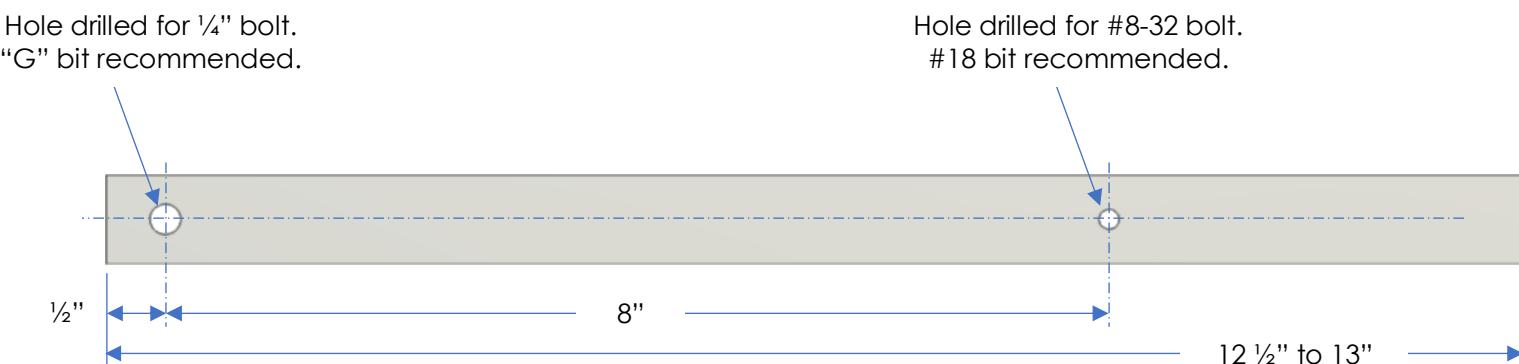
AA3 – Horizontal Bar

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.



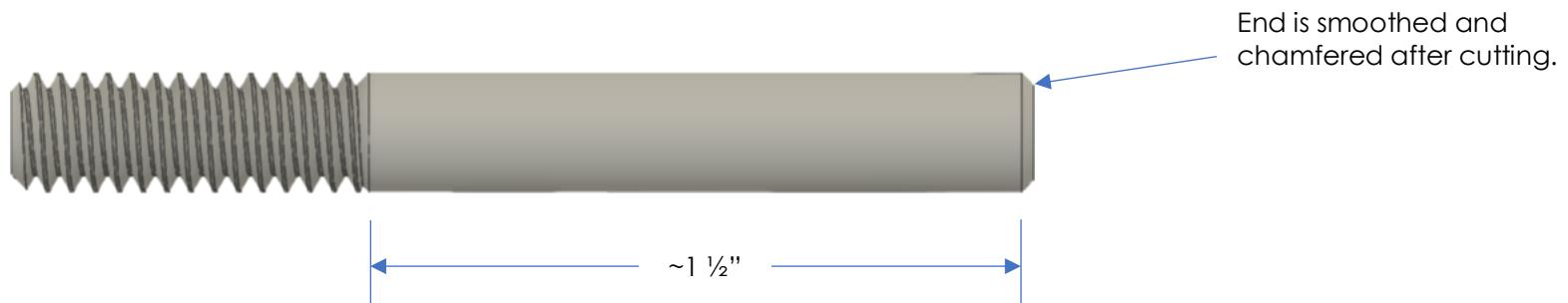
MDF Rose Engine Lathe 2.0

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.

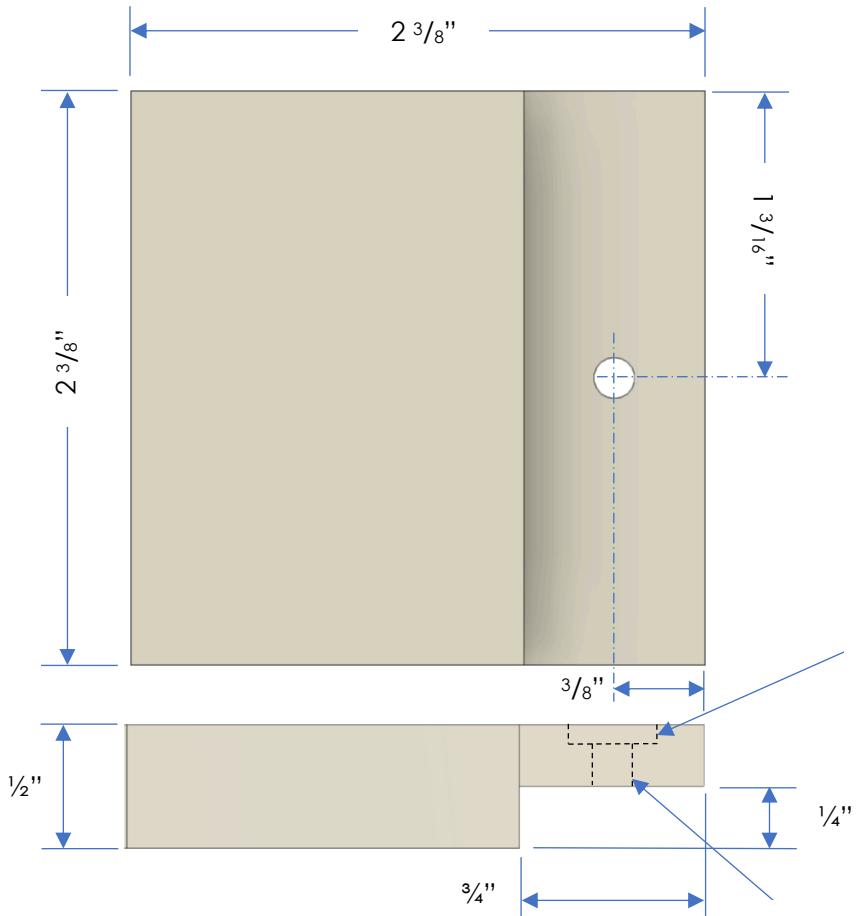


MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

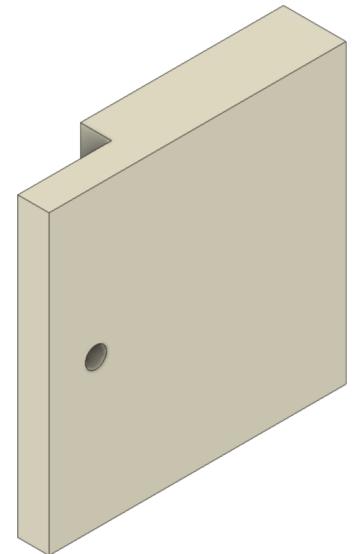
R1 – AA Rubber

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.

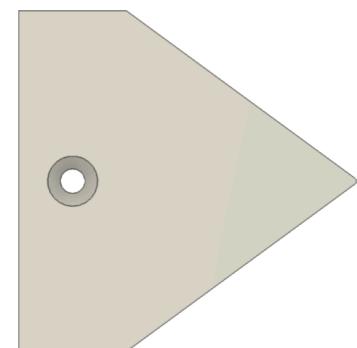


Partial hole drilled for head of #8-32 bolt. Needs to be $> 0.350''$.
 $\frac{3}{8}''$ Forstner bit recommended.
 Drill this first. The point marks where to drill the through hole.
 Depth of the partial hole is $0.100''$ to $1/8''$.

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



Flat Rubber



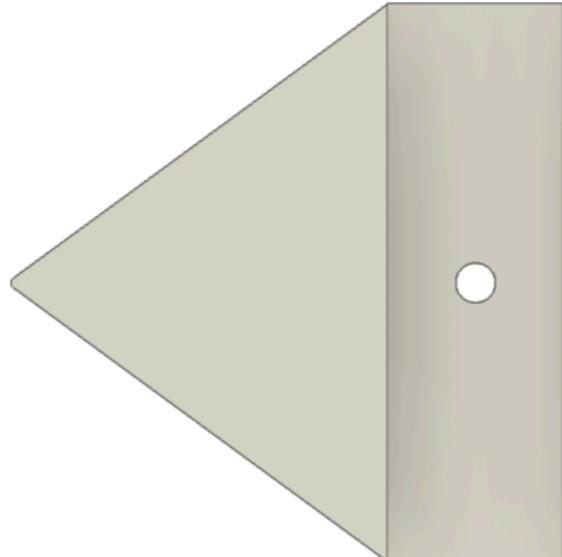
Pointed Rubber

MDF Rose Engine Lathe 2.0

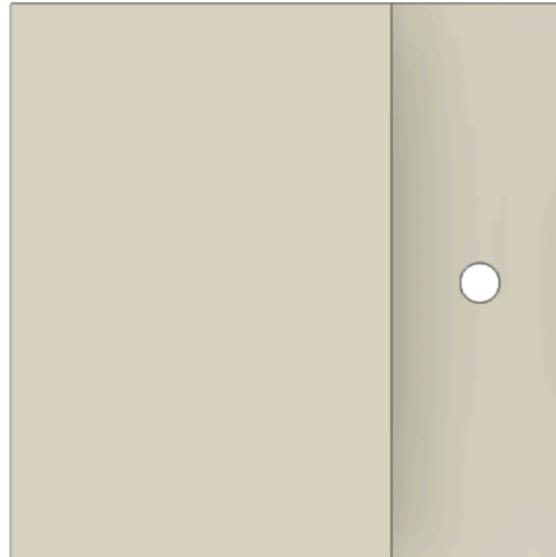
Jigs, Fixtures, and Add-Ons

Various Rubber Shapes

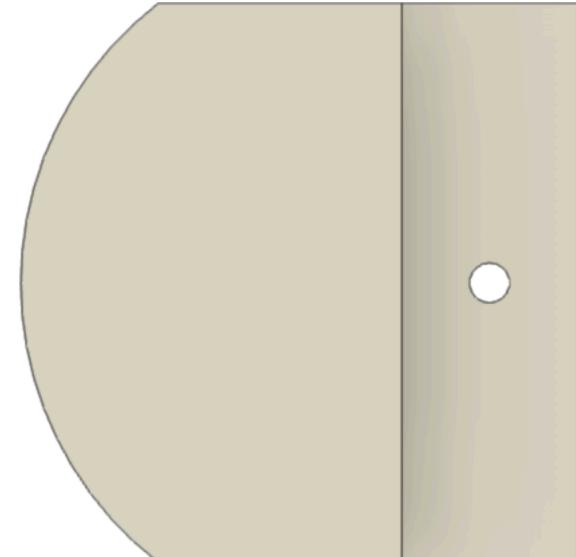
Some examples of rubber shapes are below. Others can be made to accomplish the desired results.



Pointed



Flat



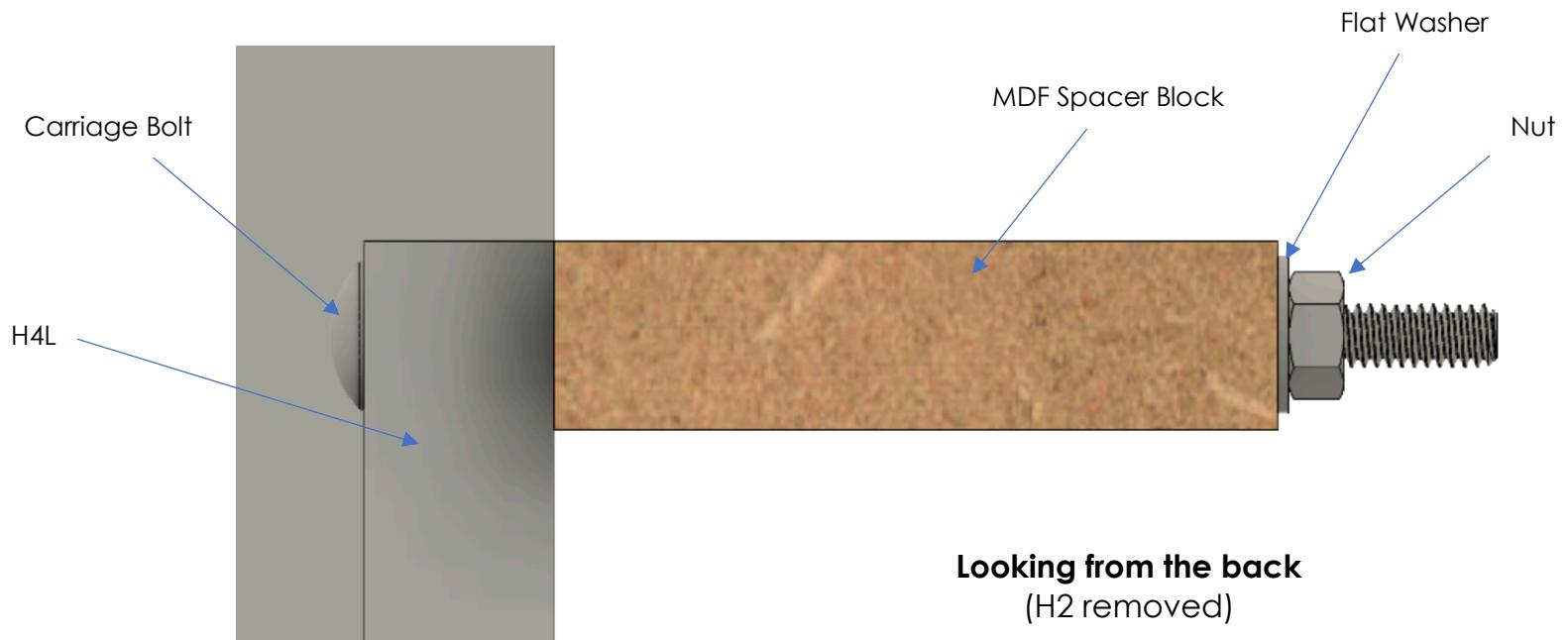
**Rounded
(2" Radius)**

MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Assembly

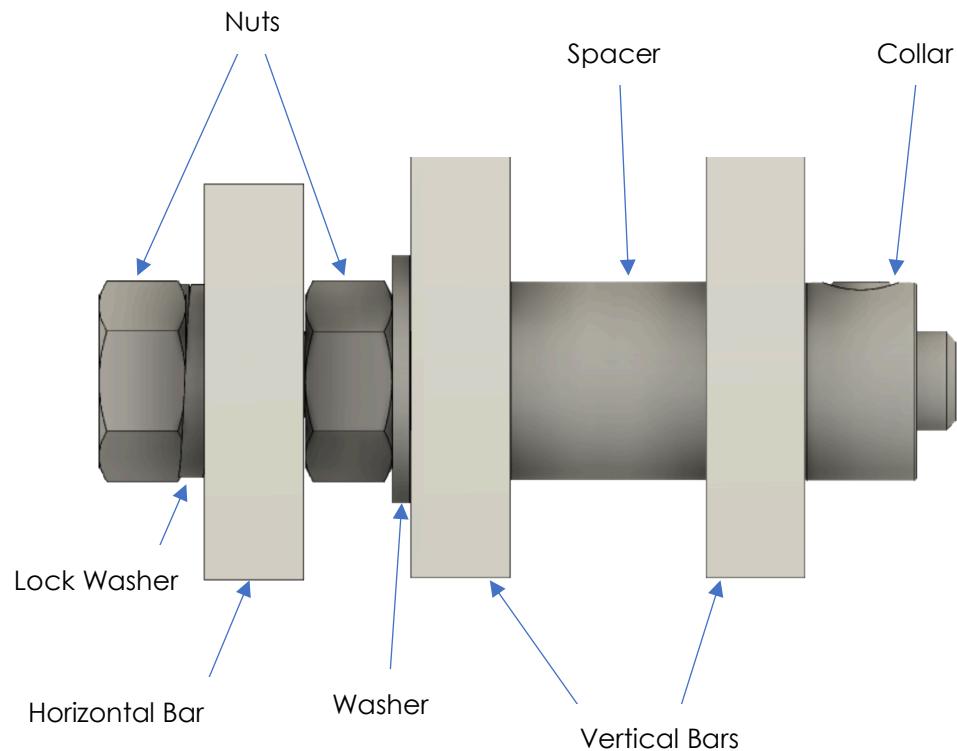
1. Drill the two holes needed in the headstock.
2. Attach the MDF Spacer Block (AA1) to the headstock using two carriage bolts with nuts and flat washers (#101, #102, & #104). The spacer block should be flush with the top of H4L.



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).



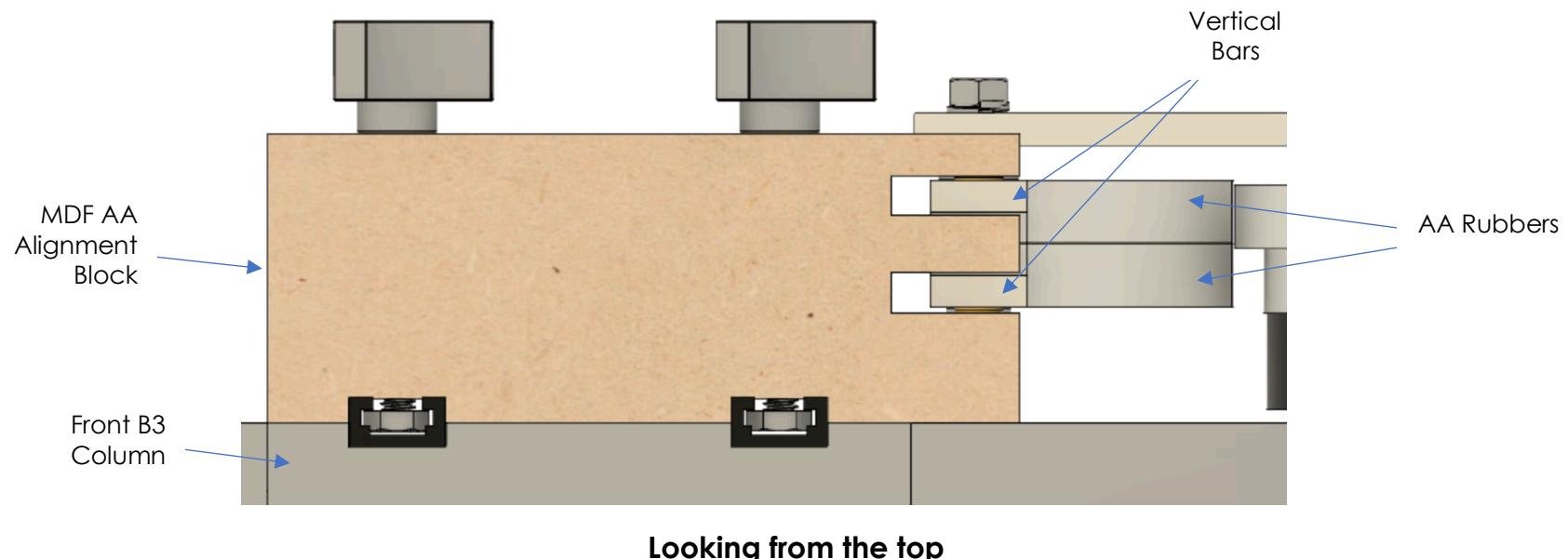
Looking from the front

MDF Rose Engine Lathe 2.0

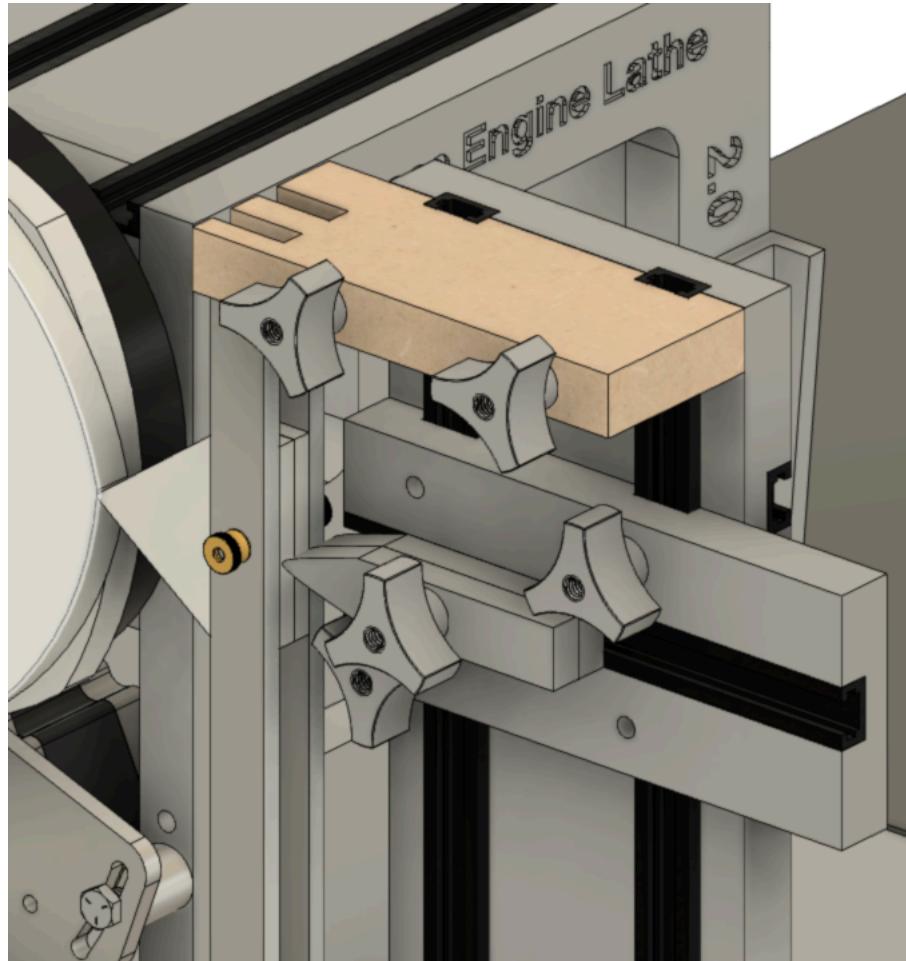
Jigs, Fixtures, and Add-Ons

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



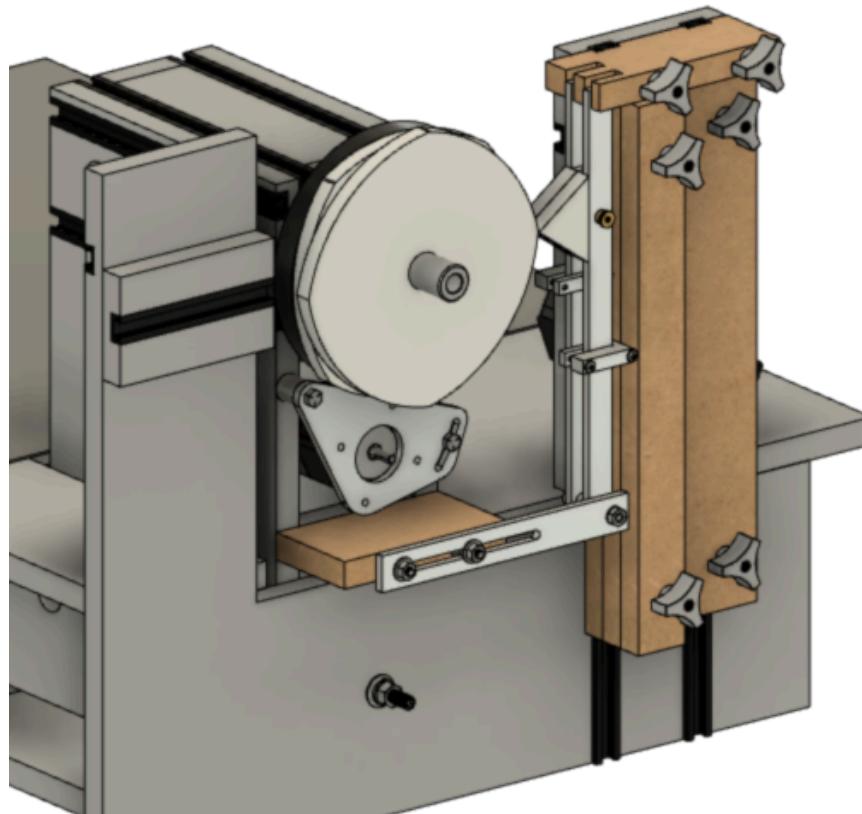
MDF Alignment Block installed at the top of the front B3 column.

- 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.

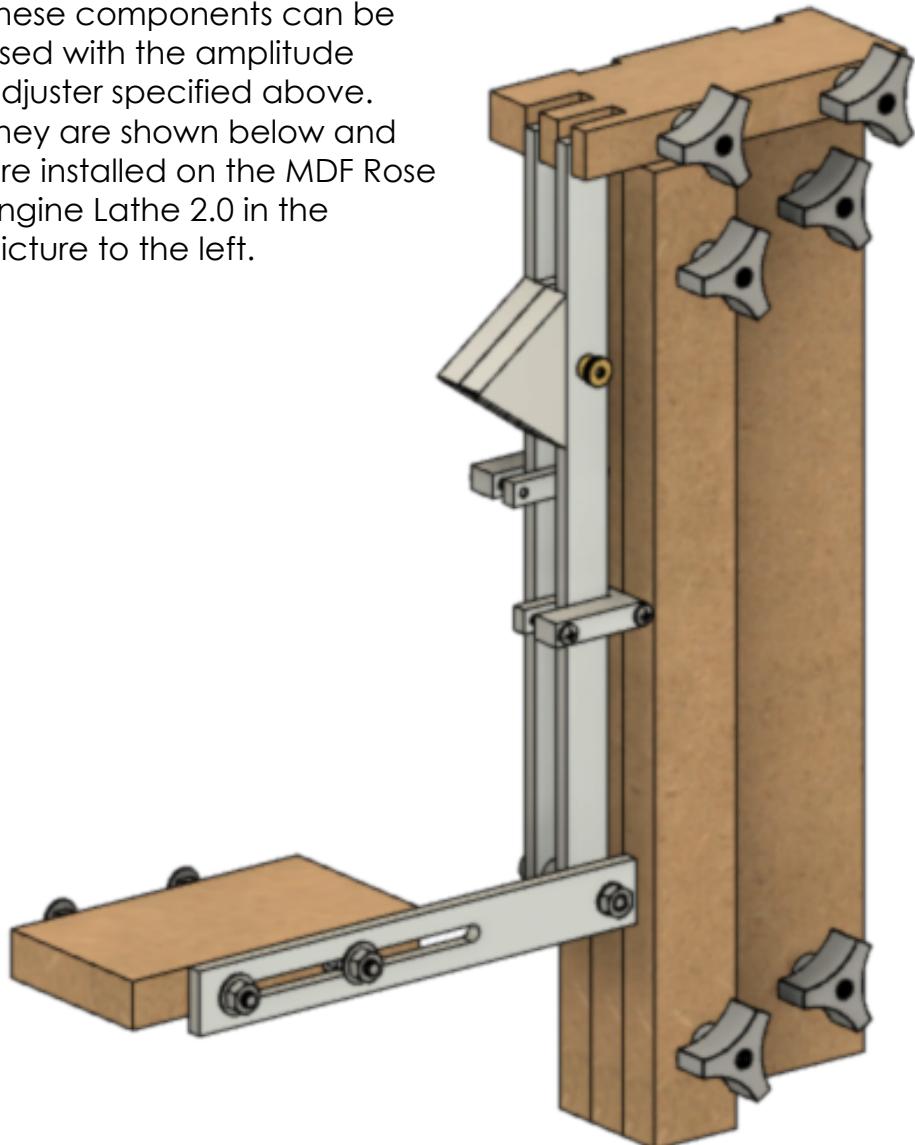
MDF Rose Engine Lathe 2.0

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.

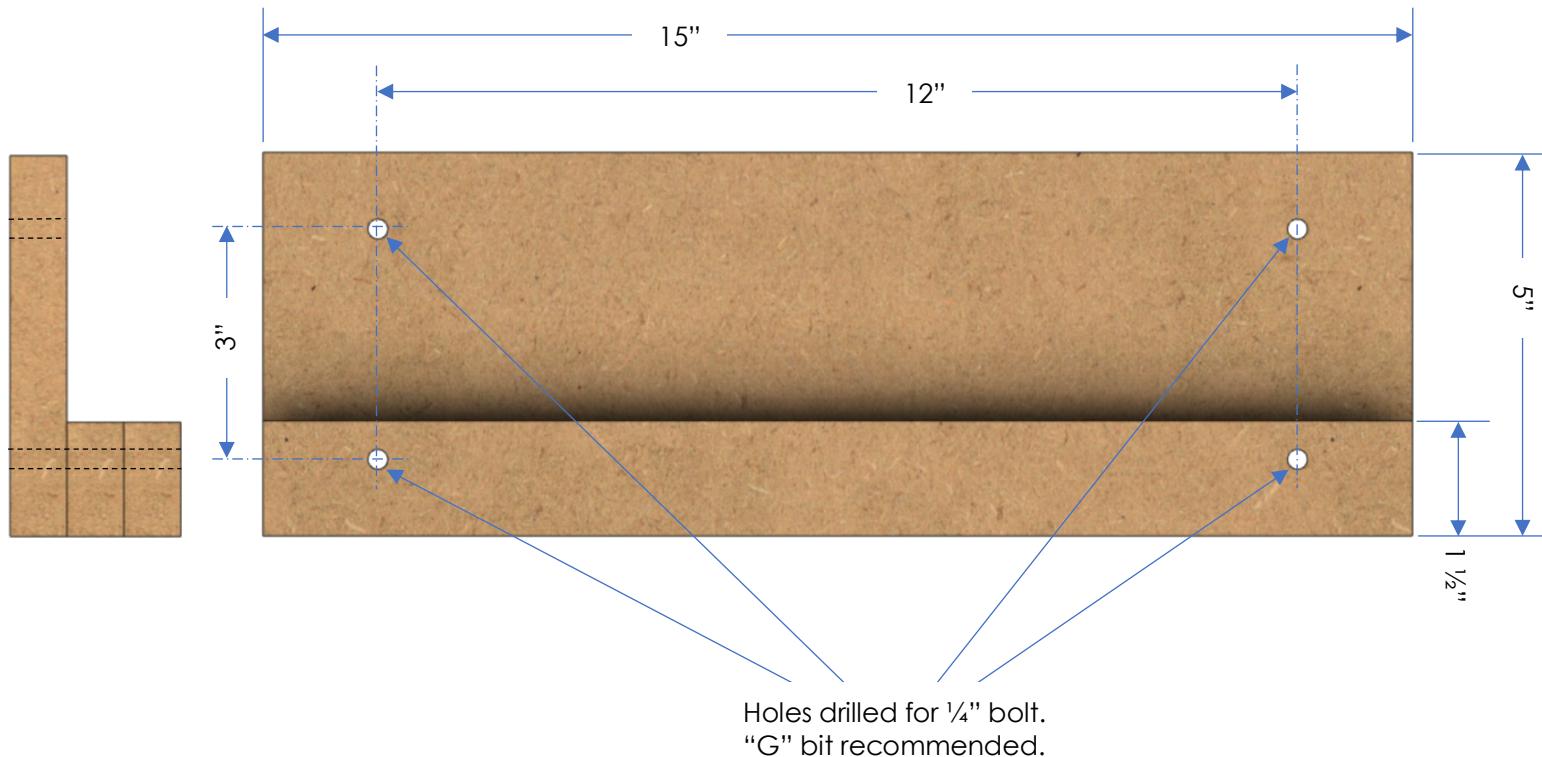


MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Backstop

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

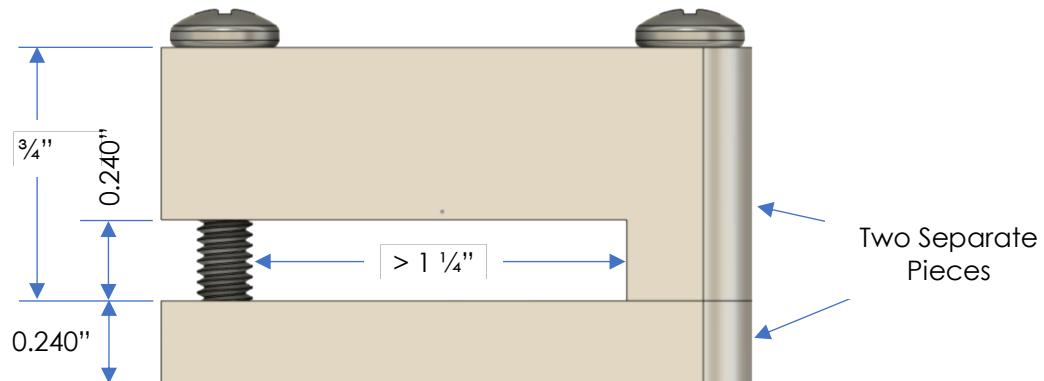


MDF Rose Engine Lathe 2.0

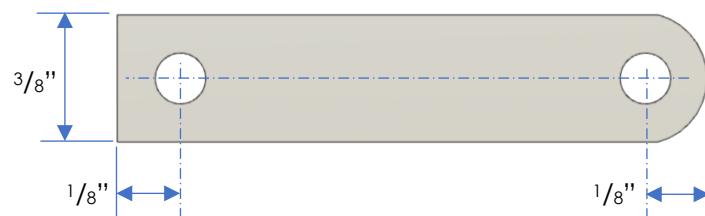
Jigs, Fixtures, and Add-Ons

Clamp

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



The two screws are #8-32.



screw.

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

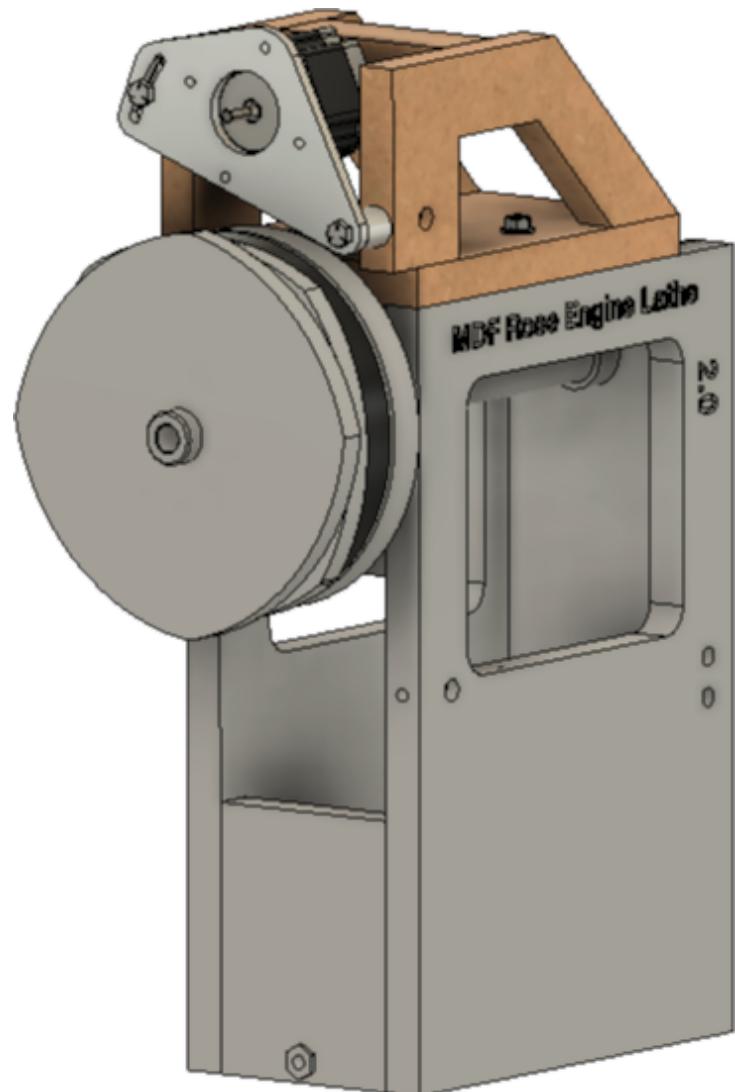
This device is used to allow a second stepper motor to drive the rosette, separately from the stepper motor driving the spindle.

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.

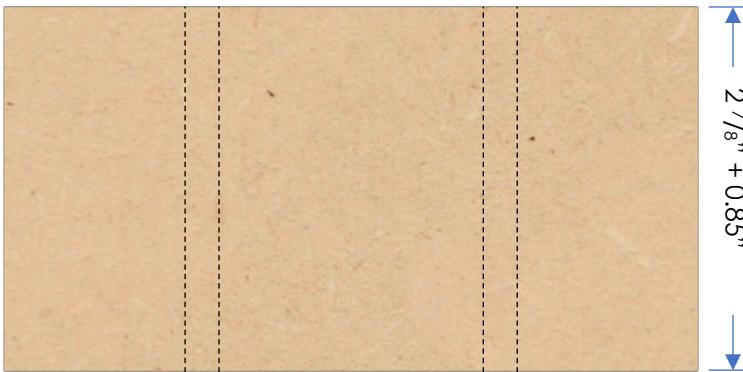


MDF Rose Engine Lathe 2.0

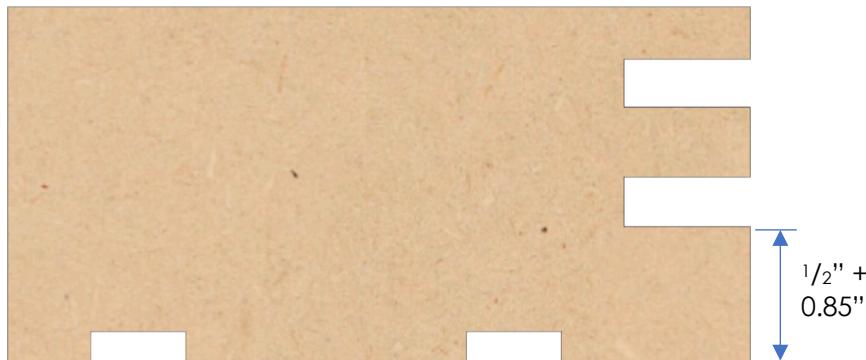
Jigs, Fixtures, and Add-Ons

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.

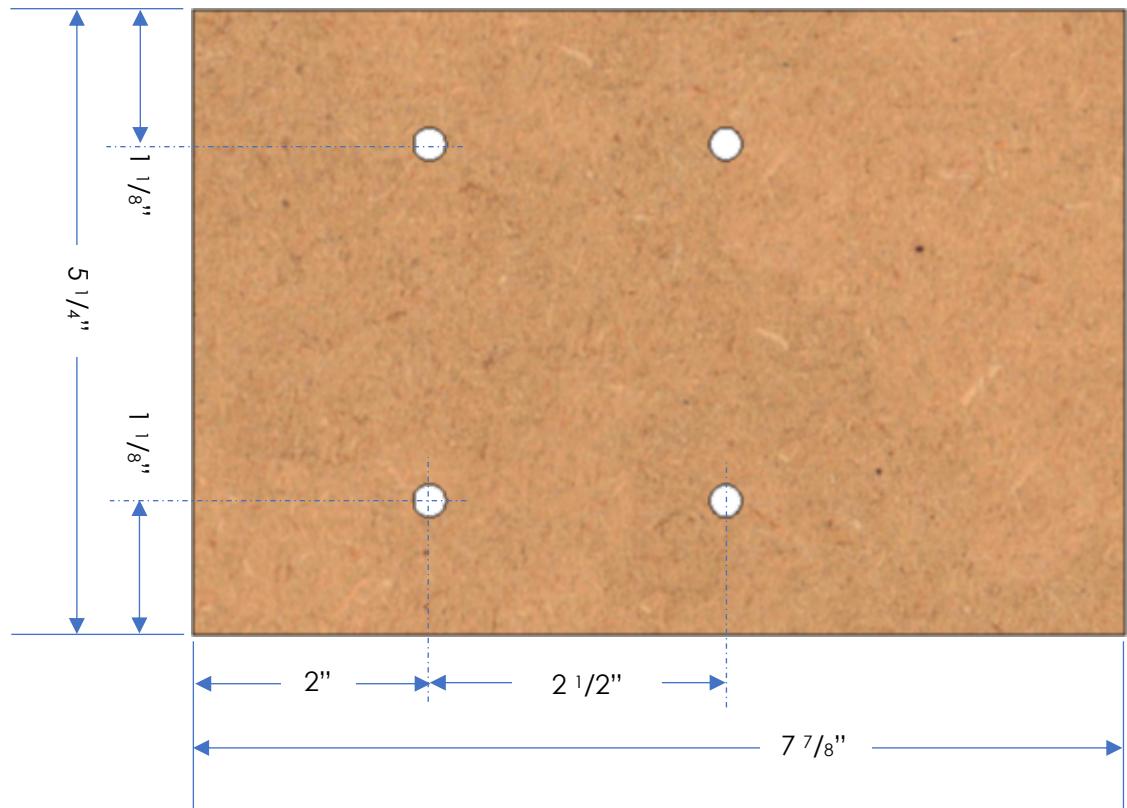
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Bottom Piece

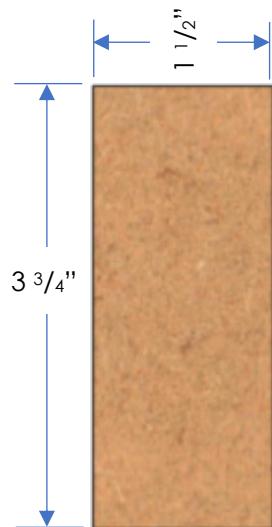
This is made from $\frac{3}{4}$ " MDF. One is needed.

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

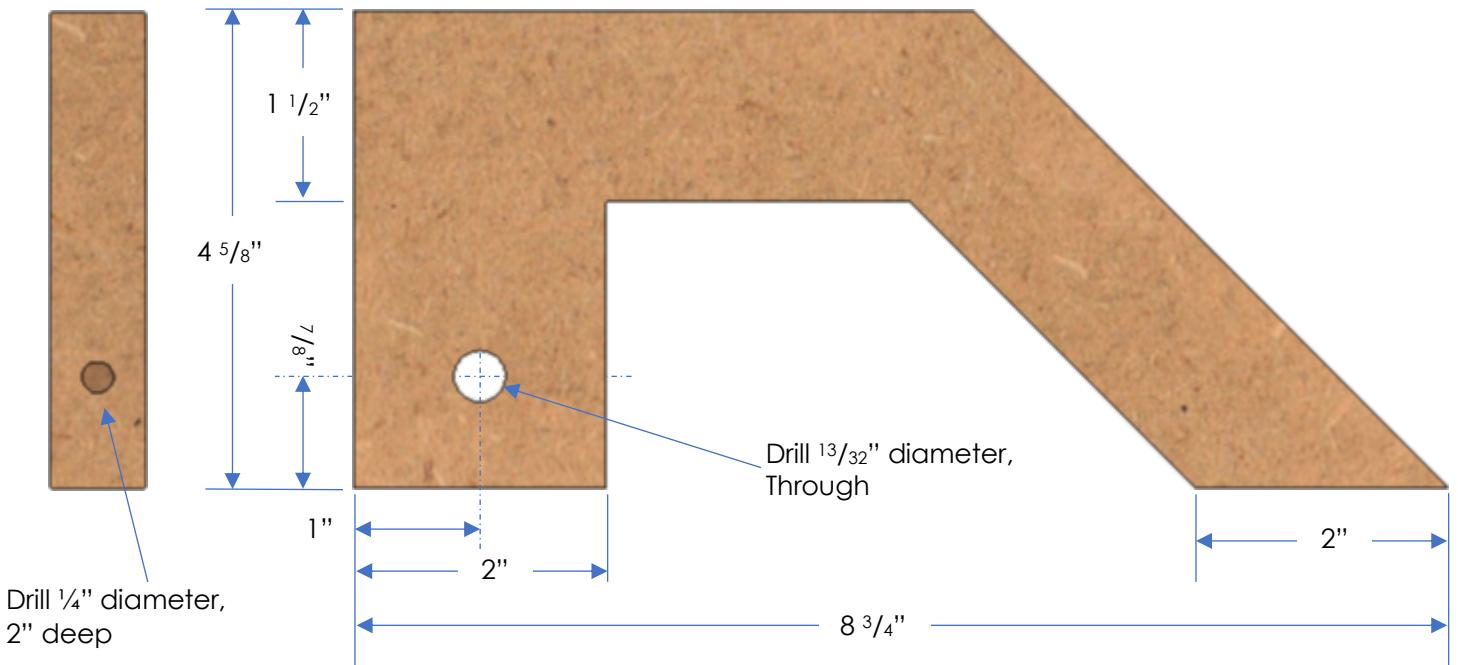
Jigs, Fixtures, and Add-Ons

Side Pieces

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

On the front piece, drill holes as shown.

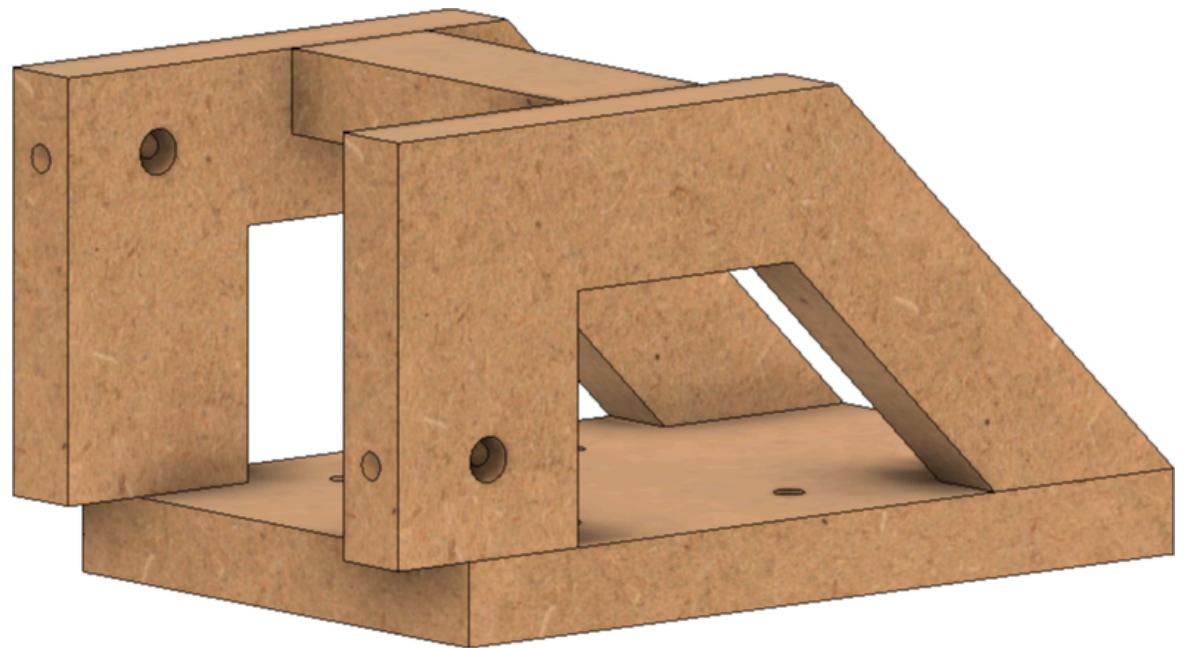
Do not drill into the back one yet piece yet; drill those after aligning the stepper motor bracket.



MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Once assembled, the MDF pieces will look like this.



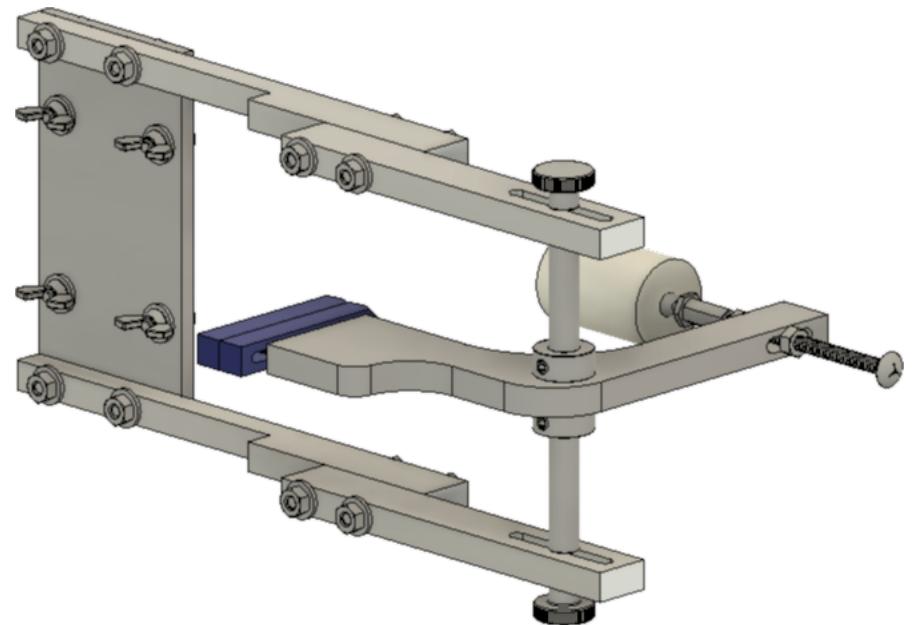
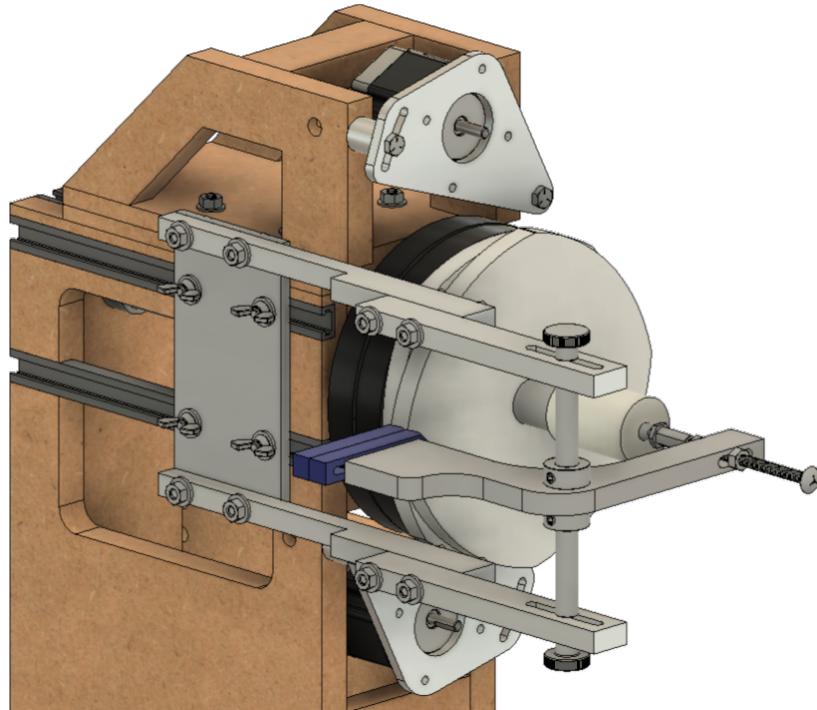
MDF Rose Engine Lathe 2.0

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

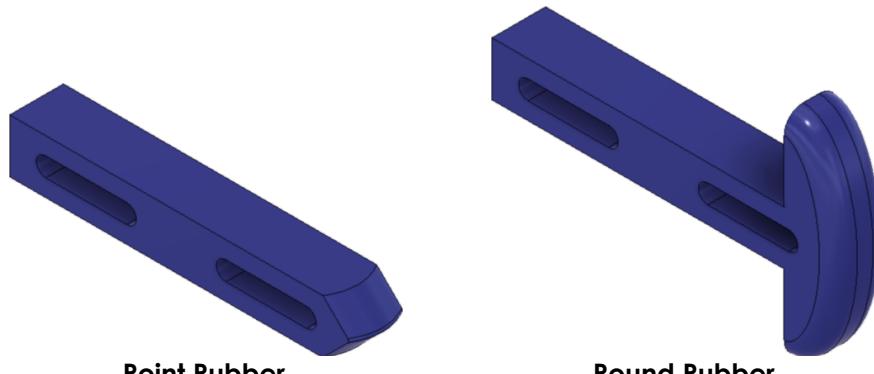
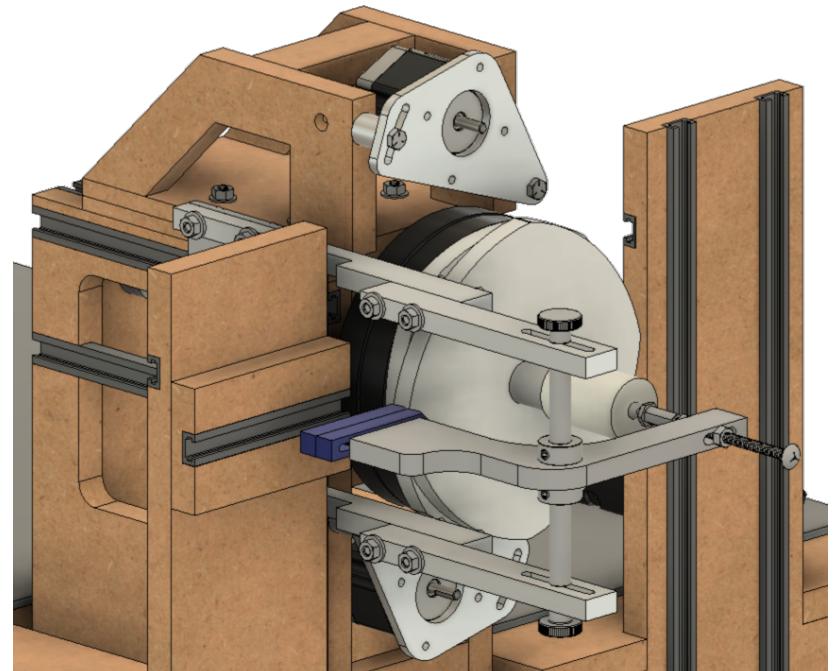
Jigs, Fixtures, and Add-Ons

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		Comments
			Source	Part 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

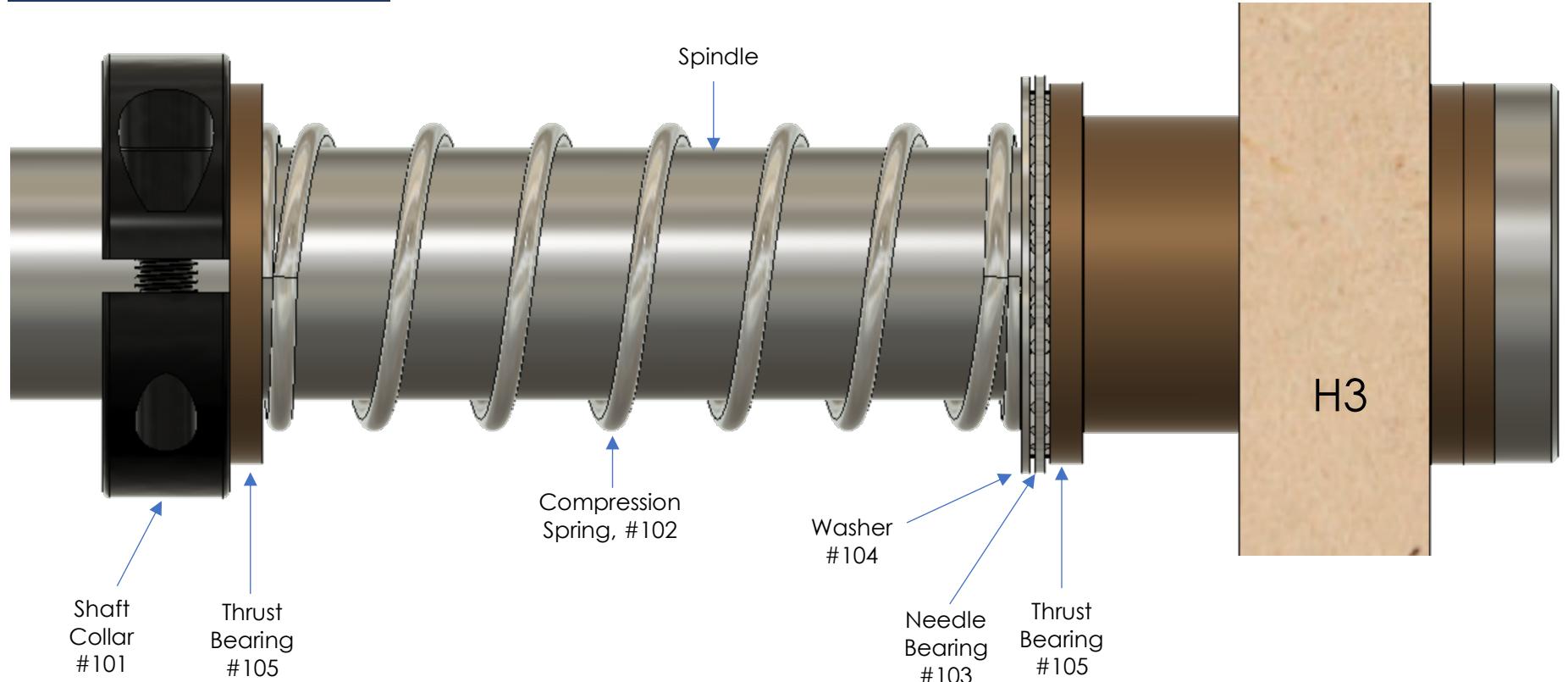
Item #	Item	Qty	Source	Source	Comments
				Part Number	
209	Carriage Bolt, 1/4"-20 4" Long	1	McMaster-Carr	90185A415	
210	Threaded Rod, #8-32, 2-1/2" Long	2	McMaster-Carr	95412A882	
211	Nut, #8-32	4	McMaster-Carr	90480A009	
212	Washer, #8	4	McMaster-Carr	92141A009	
213	Thumb Screw, 1/4"-20 1" Thread 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

Spindle Parts

Assembly of the Spindle Parts



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

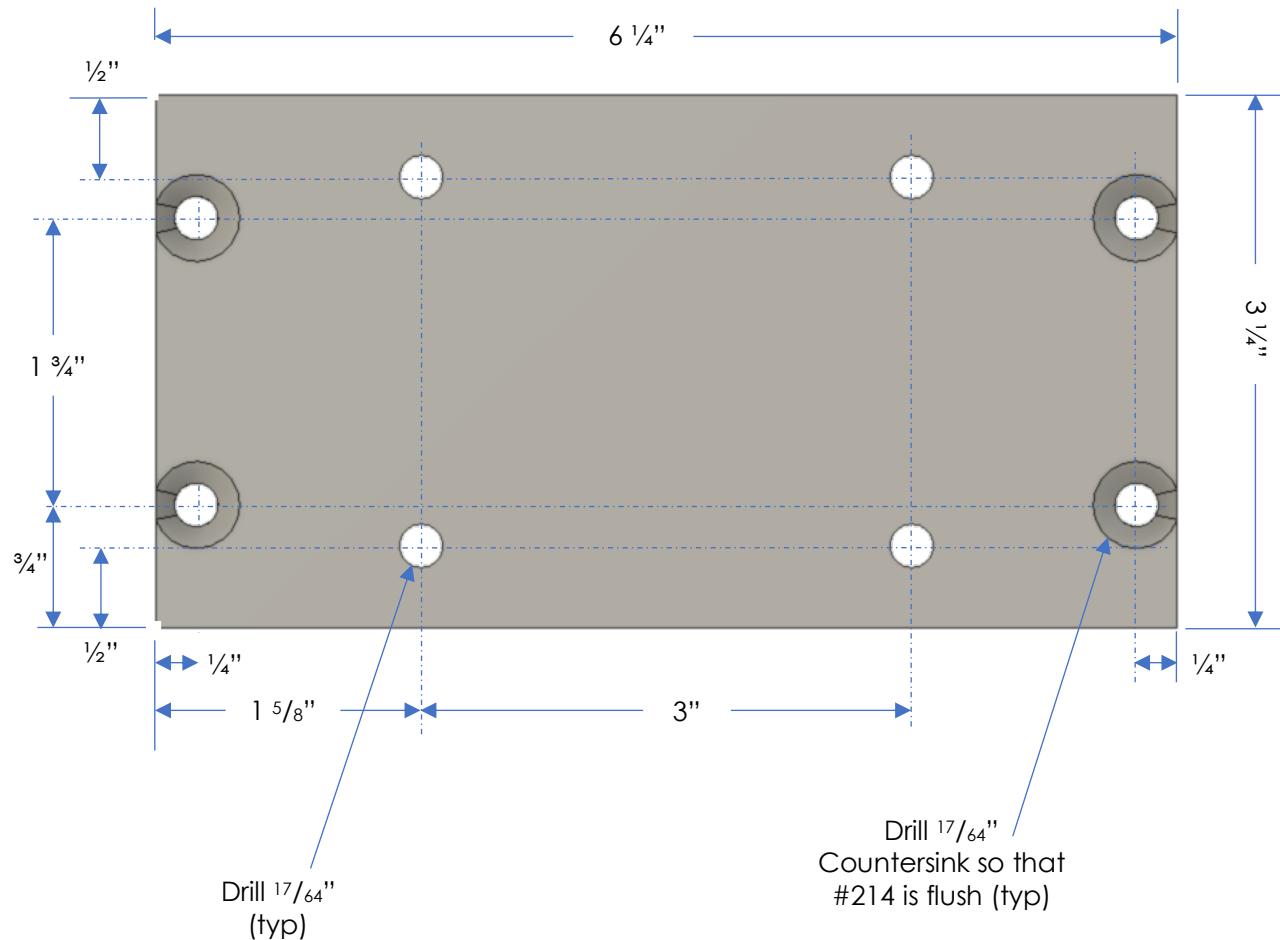
MDF Rose Engine Lathe 2.0

Jigs, Fixtures, and Add-Ons

Frame Parts

Base Plate

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



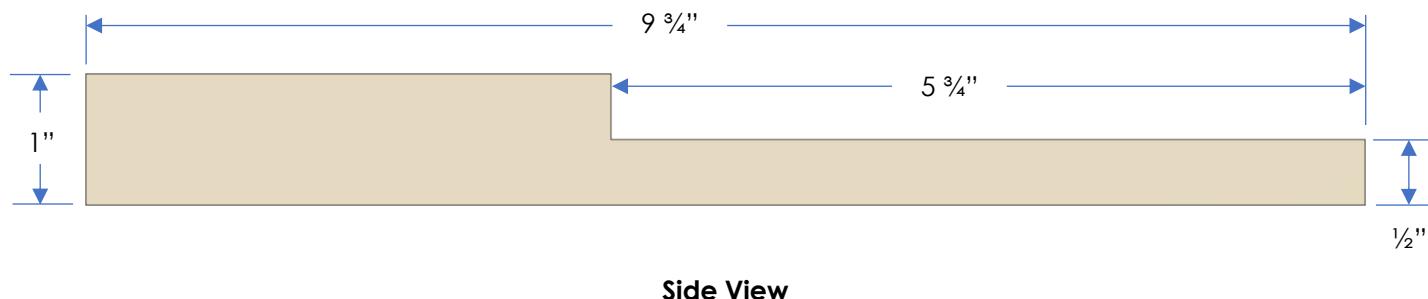
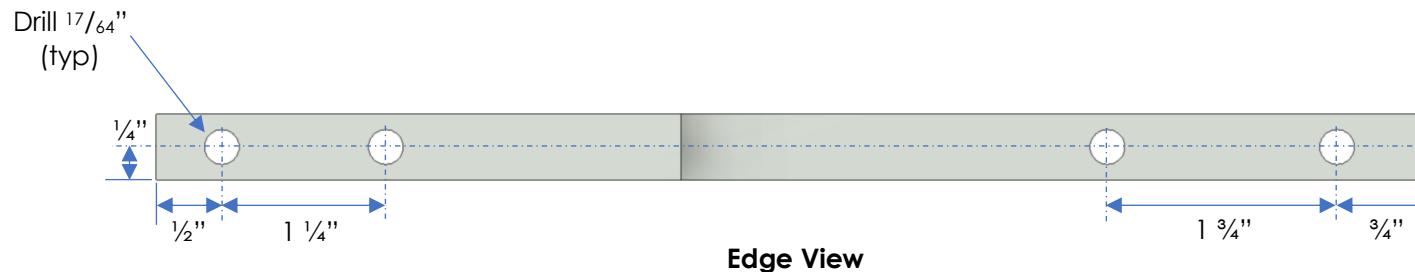
MDF Rose Engine Lathe 2.0

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.



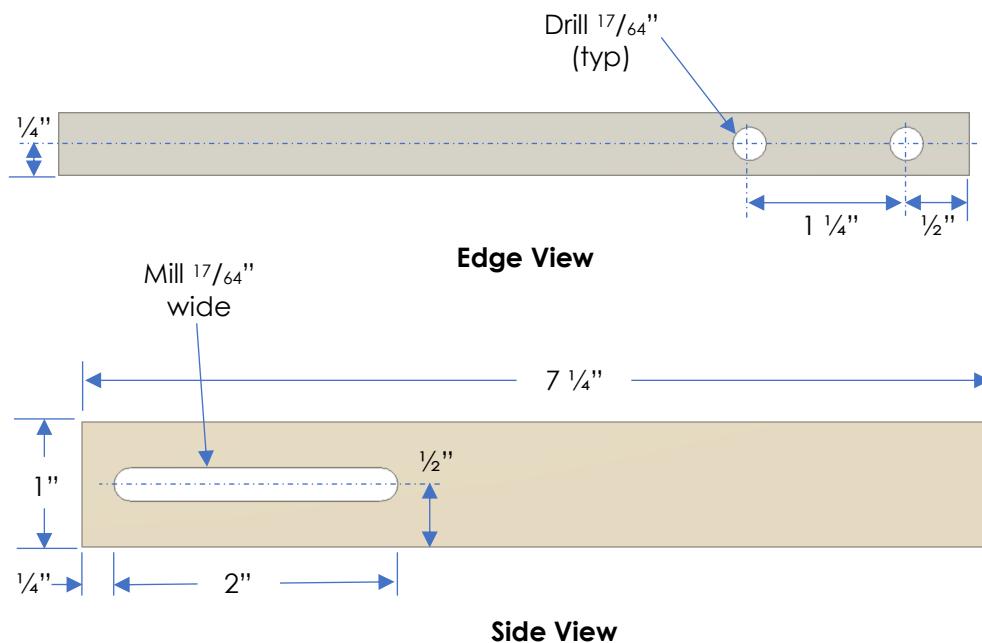
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Jigs, Fixtures, and Add-Ons

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.



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Jigs, Fixtures, and Add-Ons

Pivot Arm

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

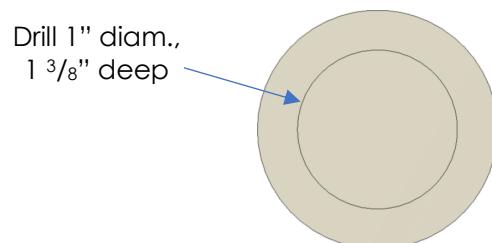
The piece is $5\frac{1}{4}$ " long. Drill and tap both ends for a $\frac{1}{4}$ "-20 bolt. Be sure to allow for at least $\frac{3}{4}$ " of threads.



Spindle Coupler

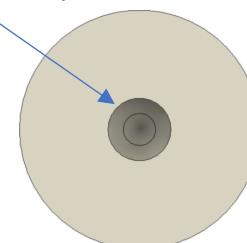
The spindle coupler is made from $1\frac{1}{2}$ " diameter HDPE (or similar) round rod (#305). 1 is required.

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



Inboard Side

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



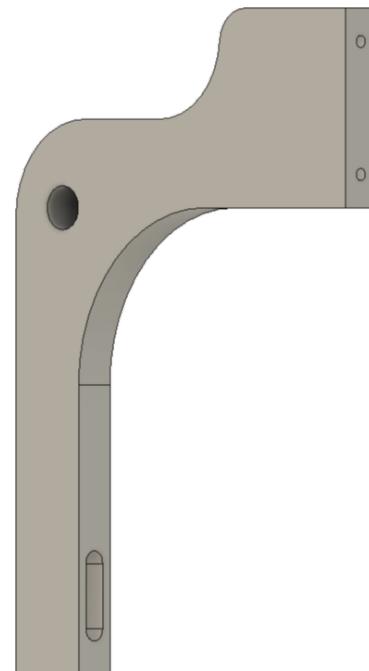
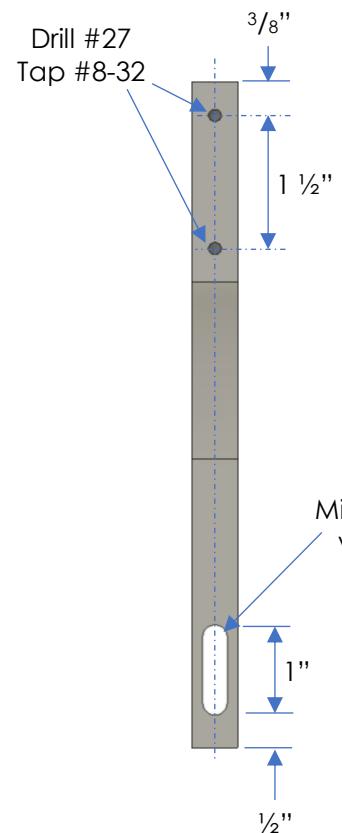
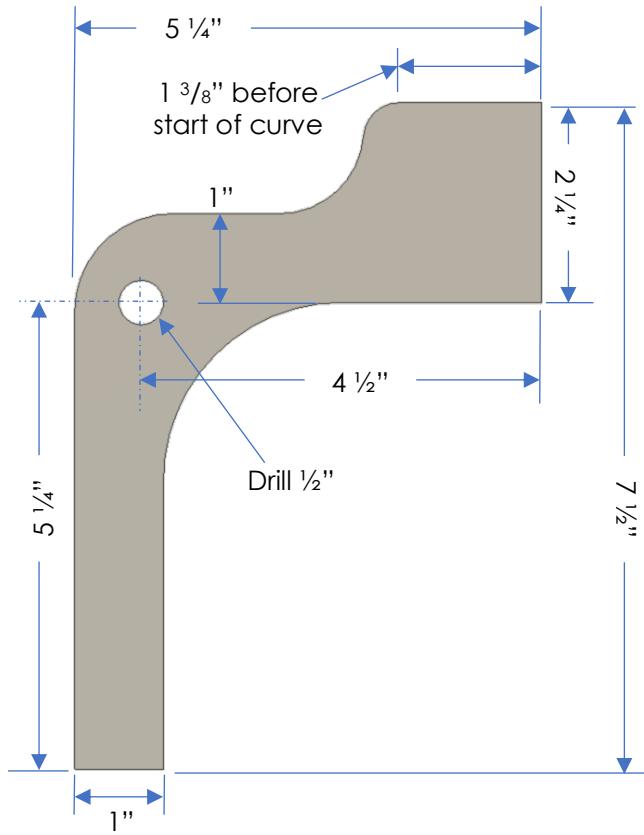
Outboard Side

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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

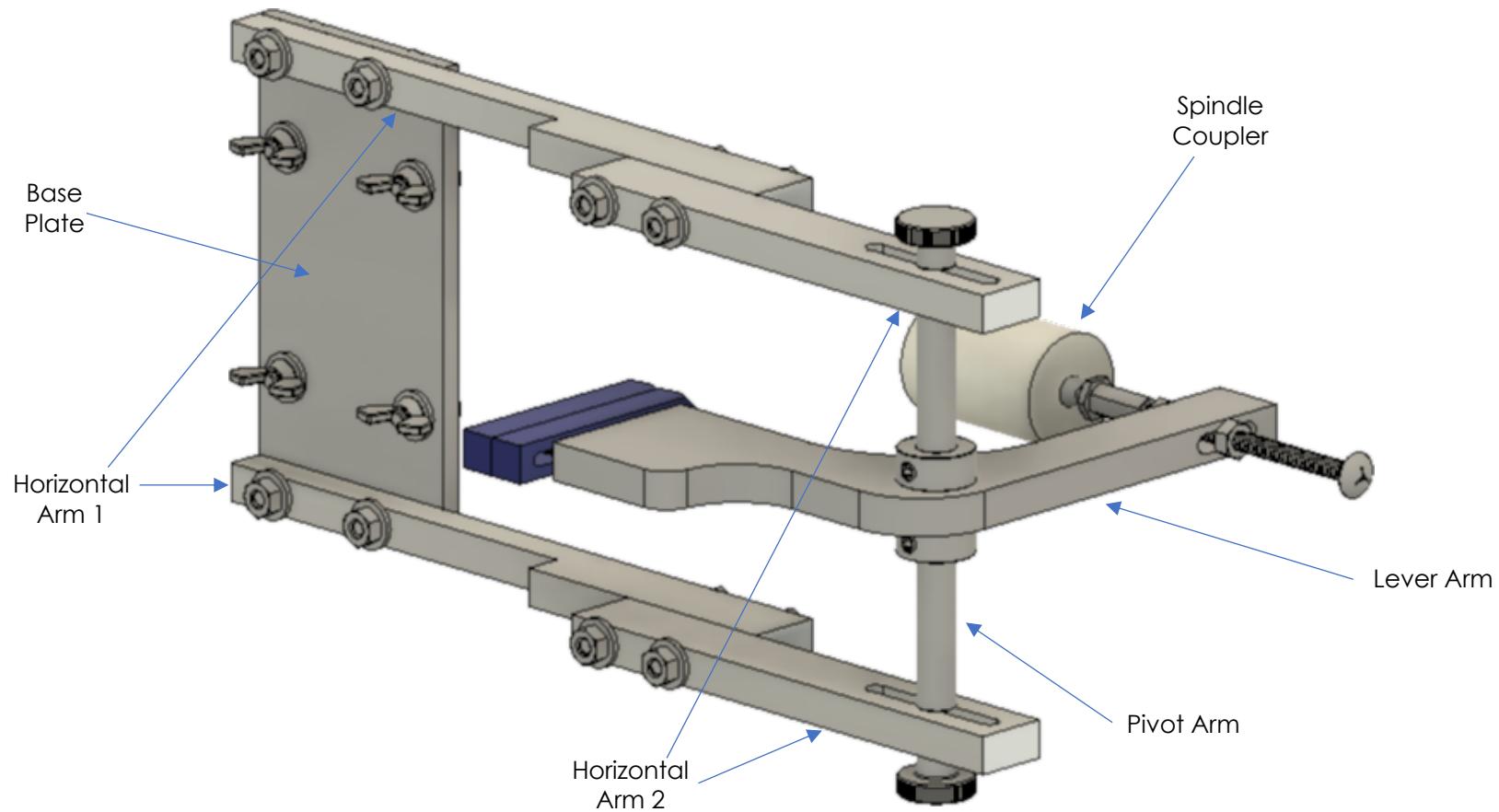
Edge View

Profile View

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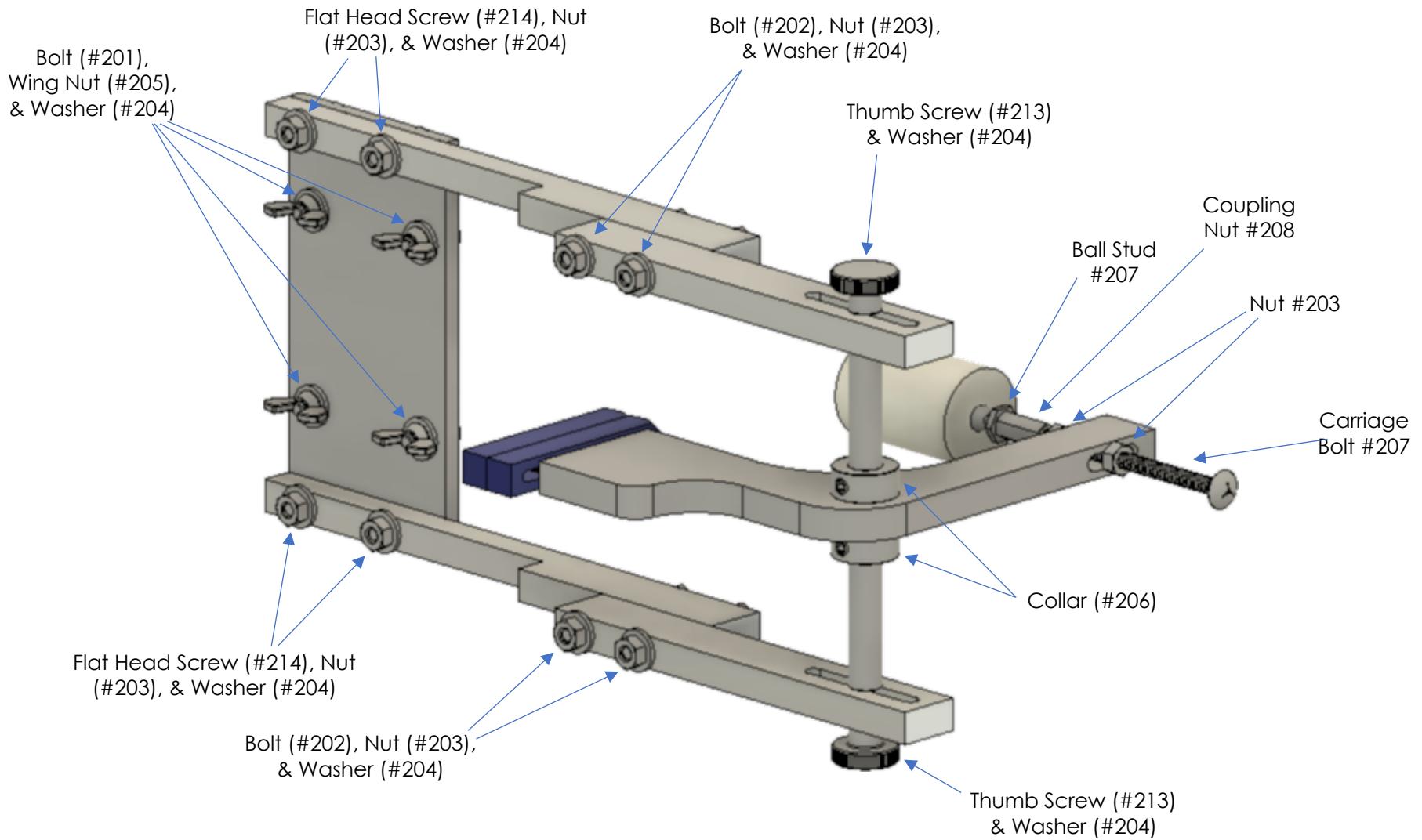
Jigs, Fixtures, and Add-Ons

Assembly

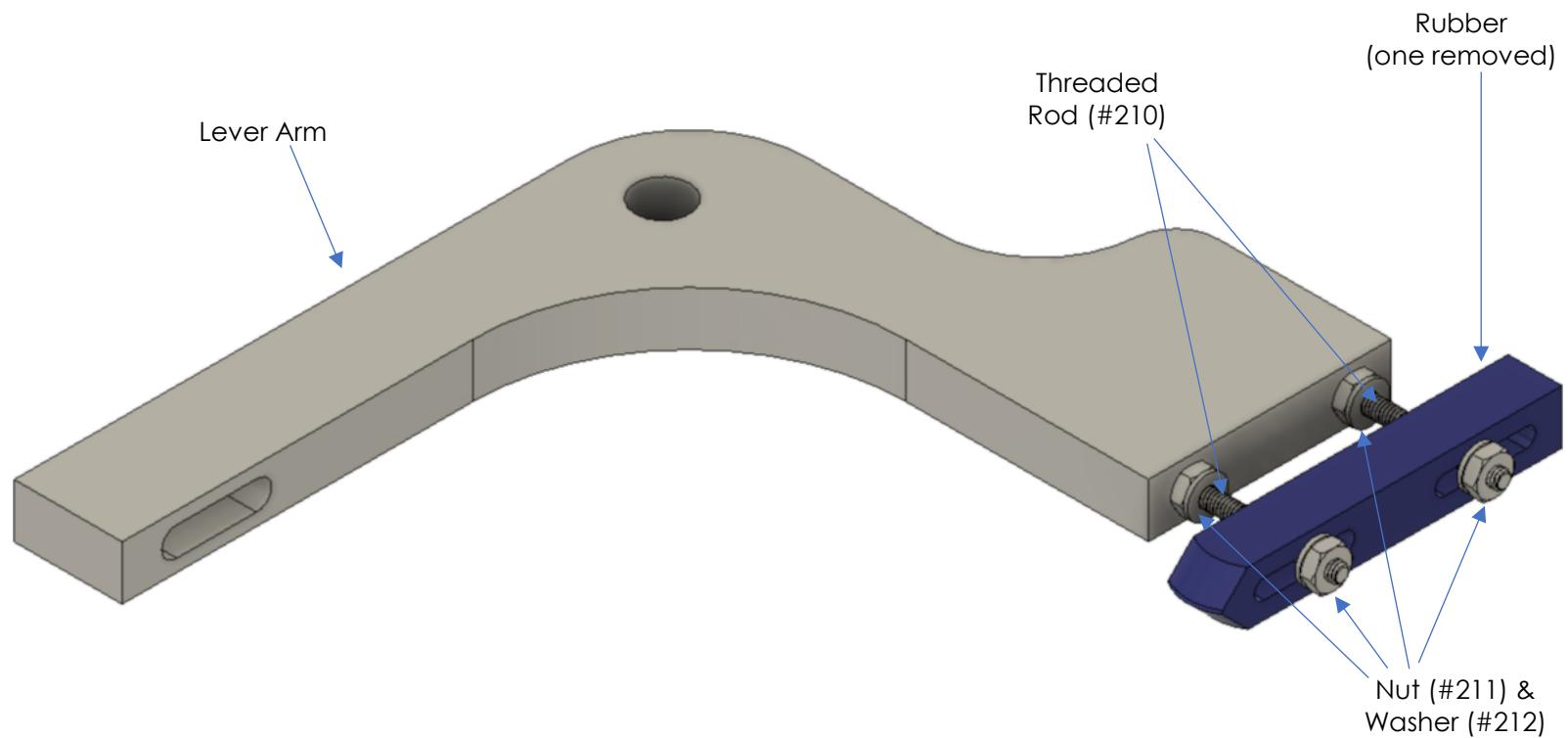


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Jigs, Fixtures, and Add-Ons



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

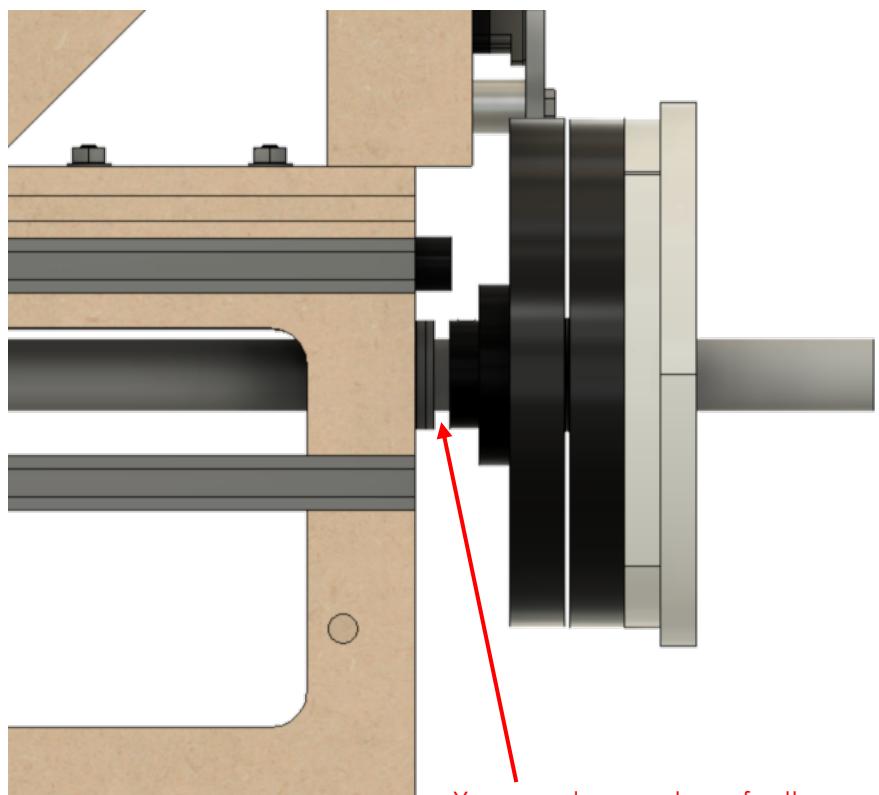


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Jigs, Fixtures, and Add-Ons

Installing and Aligning

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

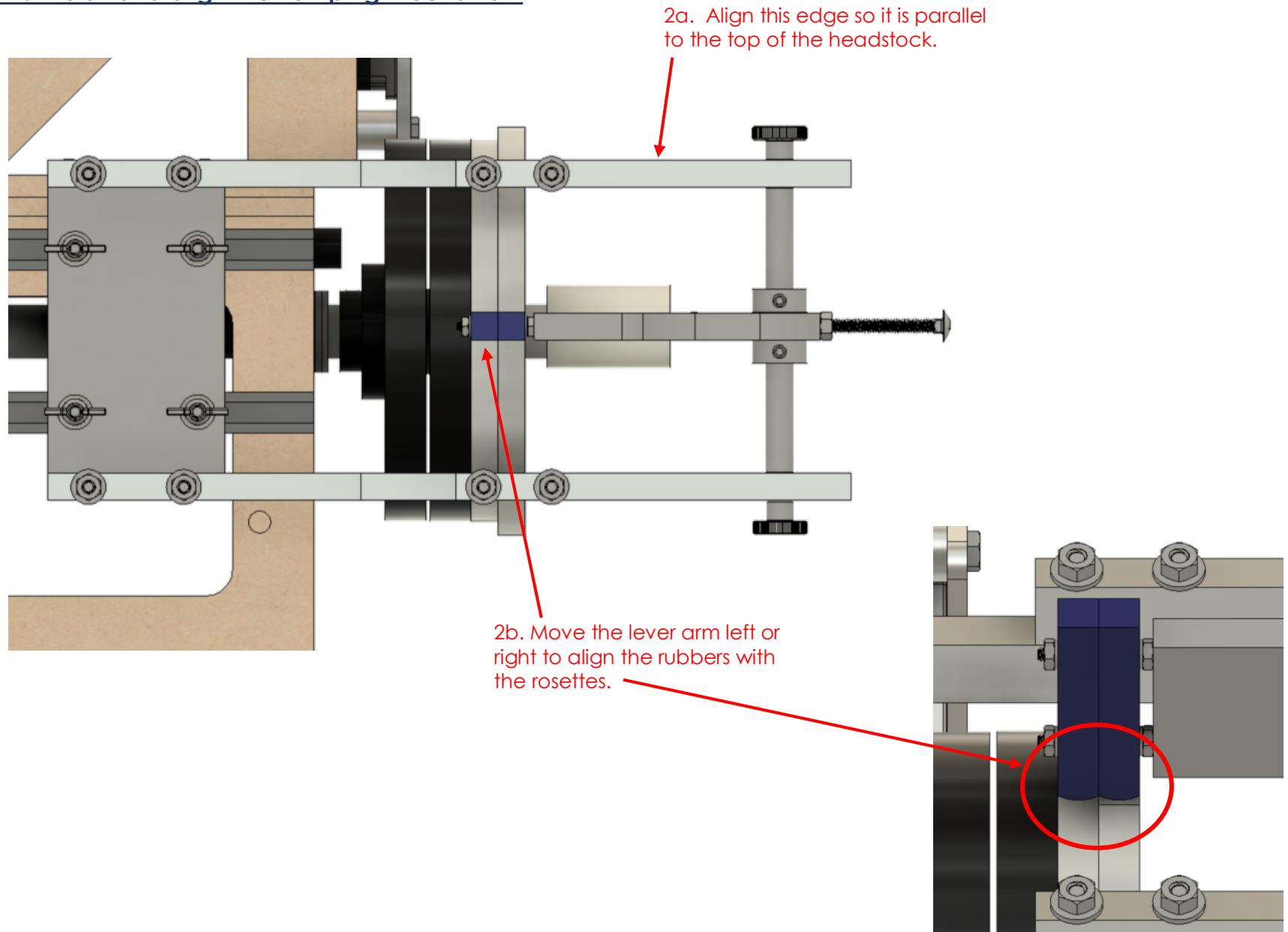


You need space here for the pumping action
to move the spindle. I aim for around $\frac{3}{16}$ ".

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Jigs, Fixtures, and Add-Ons

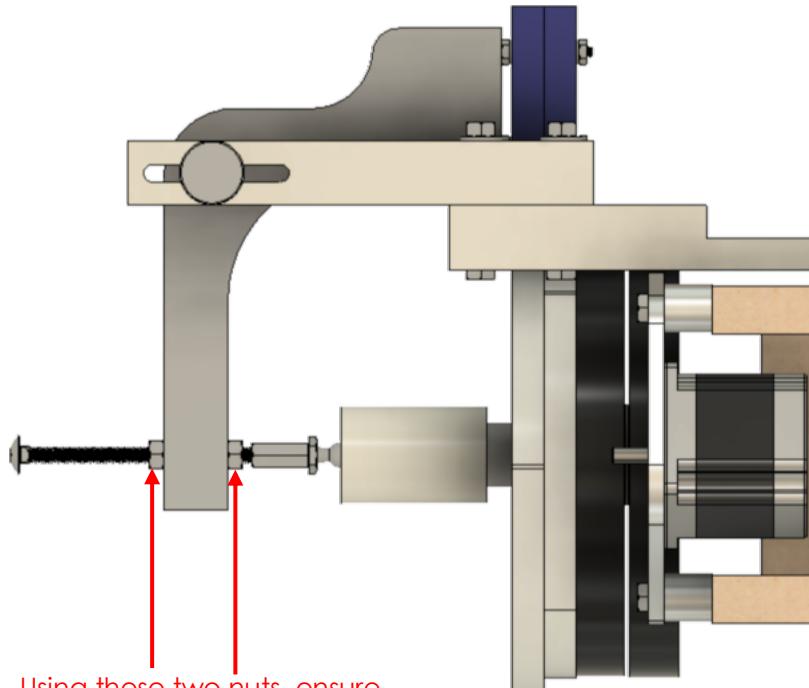
Step 2: Install and align the Pumping Mechanism



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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.