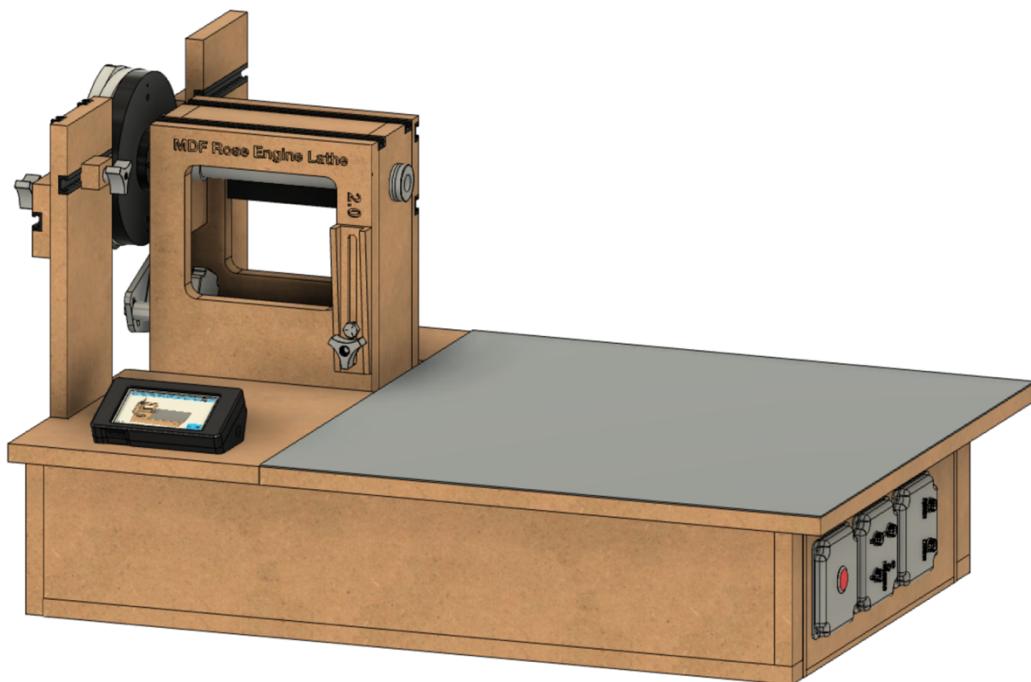


# **MDF Rose Engine Lathe 2.0 with Stepper Motor Drive**



## **Instructions for Building Jigs, Fixtures, & Add-Ons**

**Volume 2**

**Version 1.8  
02 April 2025**

# 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](http://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](http://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](mailto: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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## Curvilinear Slide

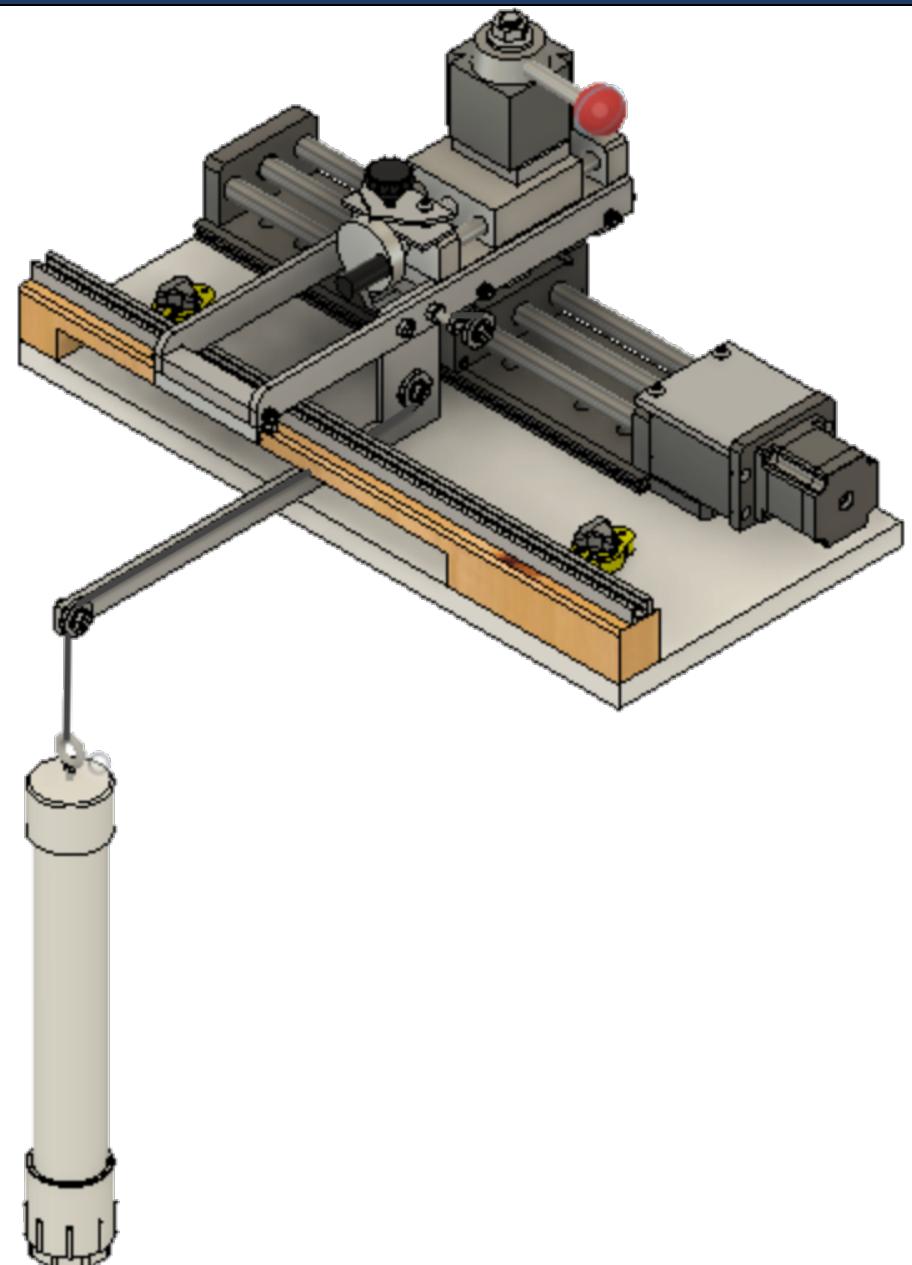
The curvilinear slide for the MDF Rose Engine Lathe 2.0 is shown in the picture to the right.

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.

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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 2<sup>nd</sup> 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
<b>Wood, Plate, and Rods</b>					
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				
<b>Purchased Components</b>					
201	Linear Stage Actuator	1	Amazon	( <a href="#">Amazon link</a> )	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 ( <a href="#">Amazon link</a> )	
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			
<b>Purchased Parts</b>					
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	
	<b>Other</b>				
901	Template	1	Designs are at the <a href="#">MDF Rose Engine Lathe 2.0 Library</a> , in the black book on 2 <sup>nd</sup> shelf, <a href="#">3D Printed Parts</a>		
902	Template follower	1	Ibid #901		
903	Signal Lamp	1	Amazon		LED Signal Tower light powered by 110V / 220V AC
904	Relay	1	Amazon		Single channel relay, 3.3 VC for the switching, and switches 110V / 220V AC. The one I purchased has an optical isolation circuit.

# 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 (#206).

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

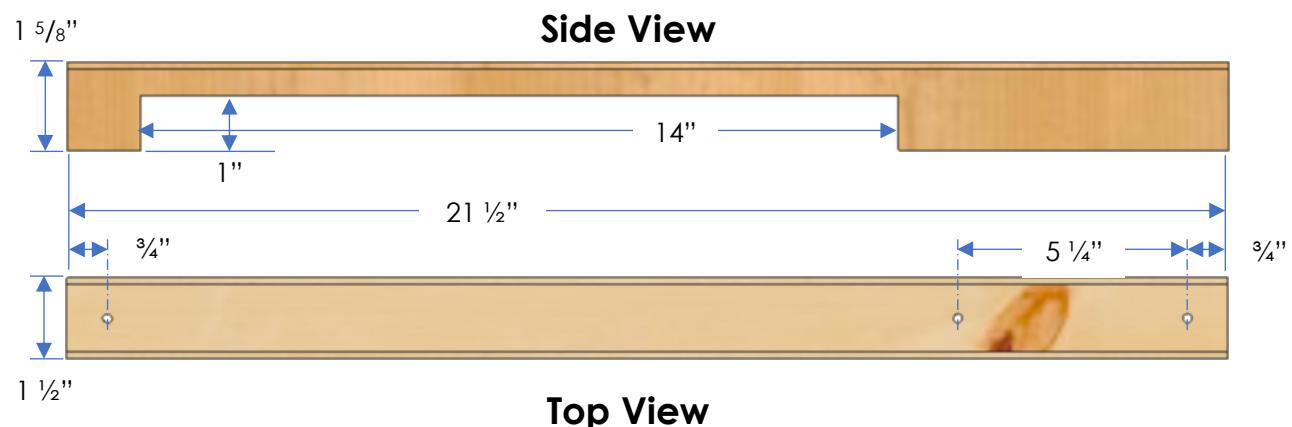
## Jigs, Fixtures, and Add-Ons

### 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

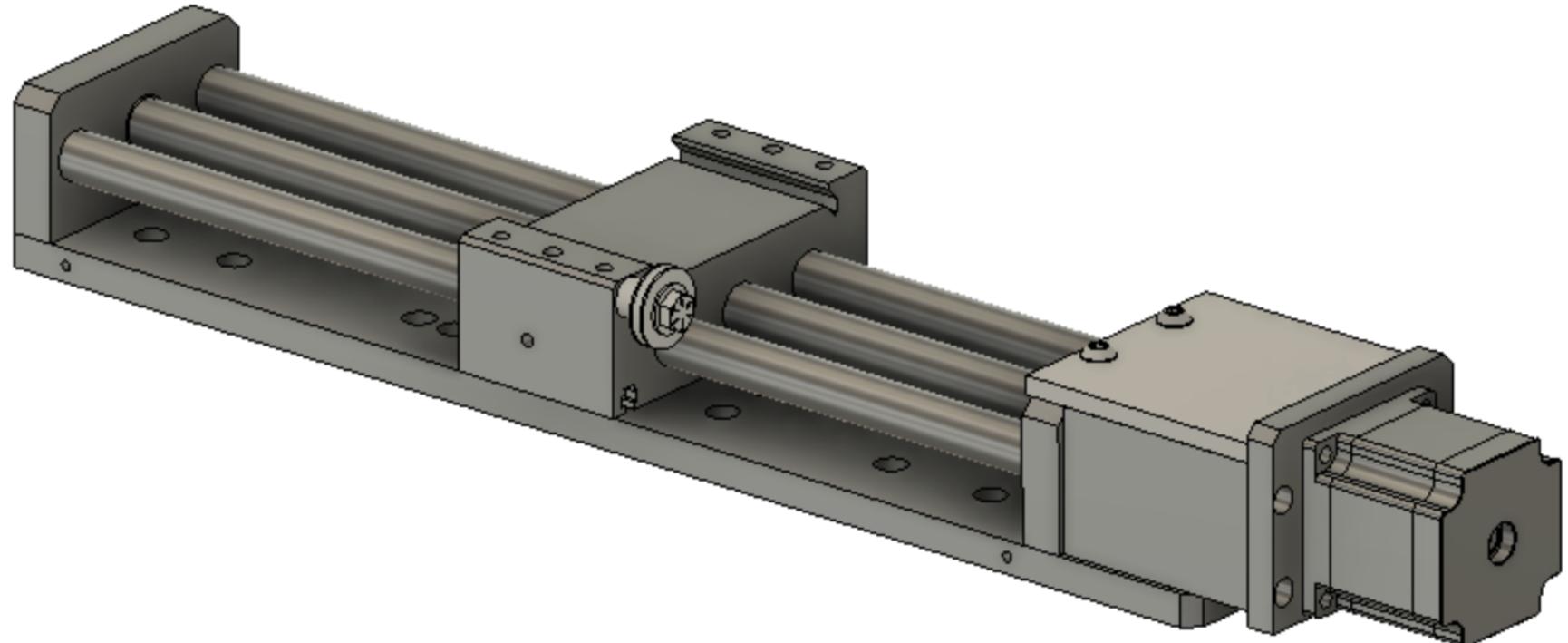
Add the two MagSwitches (#206).



## MDF Rose Engine Lathe 2.0

### Jigs, Fixtures, and Add-Ons

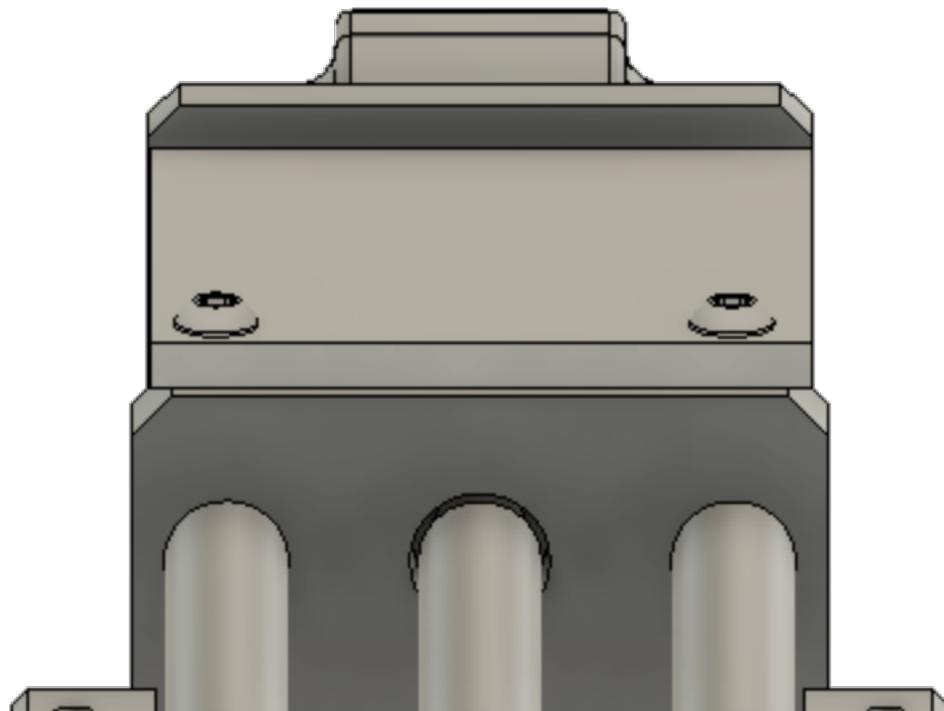
#### Linear Slide



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.

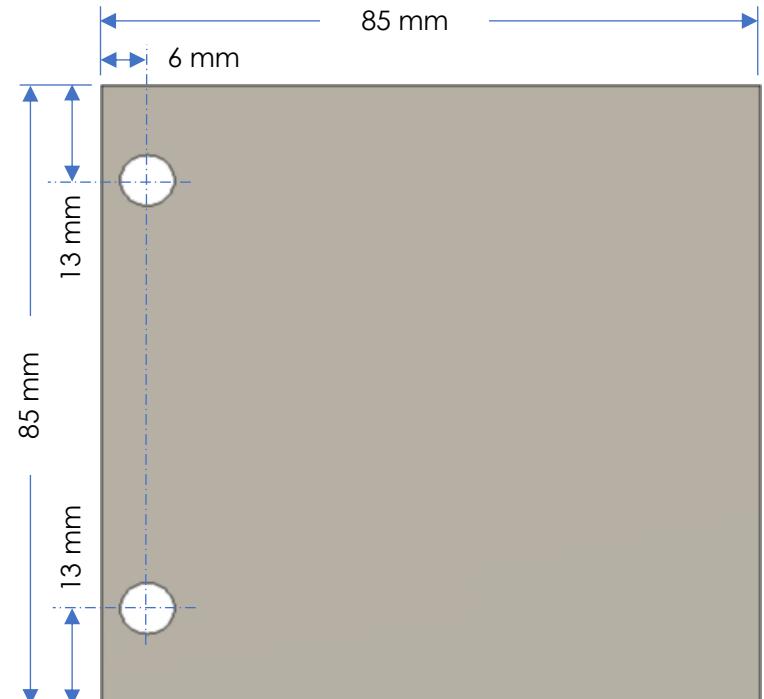
## MDF Rose Engine Lathe 2.0

### 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.



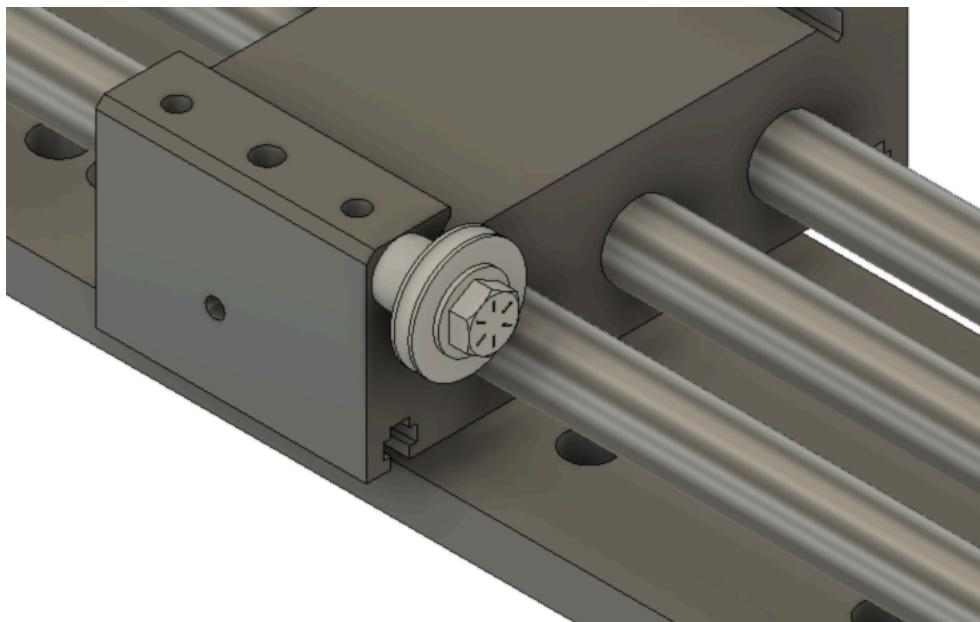
Align the screws over the rods and be sure to not drill the holes too deeply. There should be no interference with the rods. This is shown in the picture to the left.

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.

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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

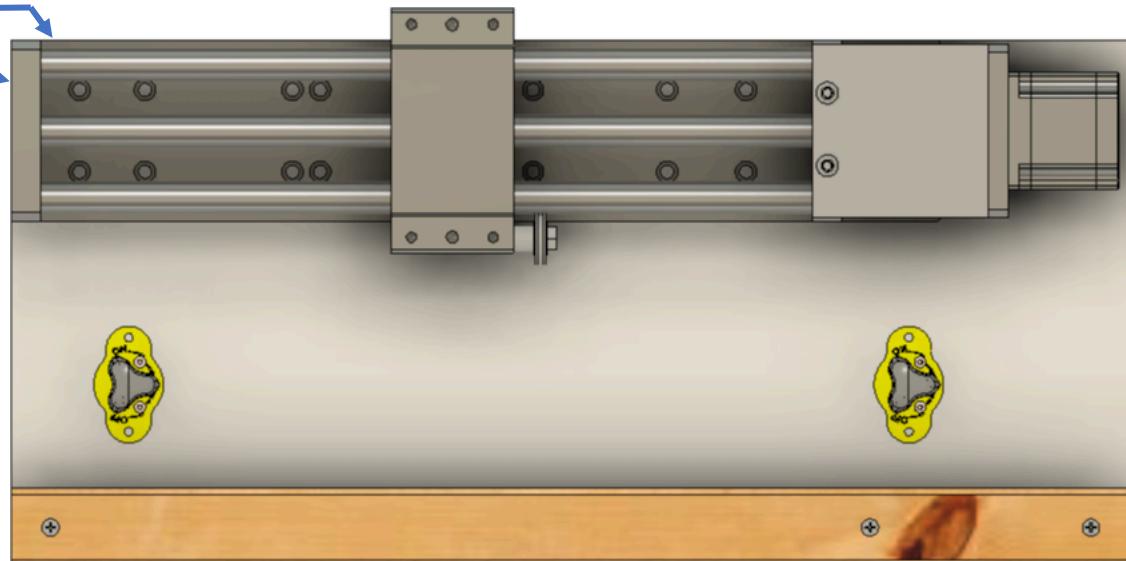
## MDF Rose Engine Lathe 2.0

### 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

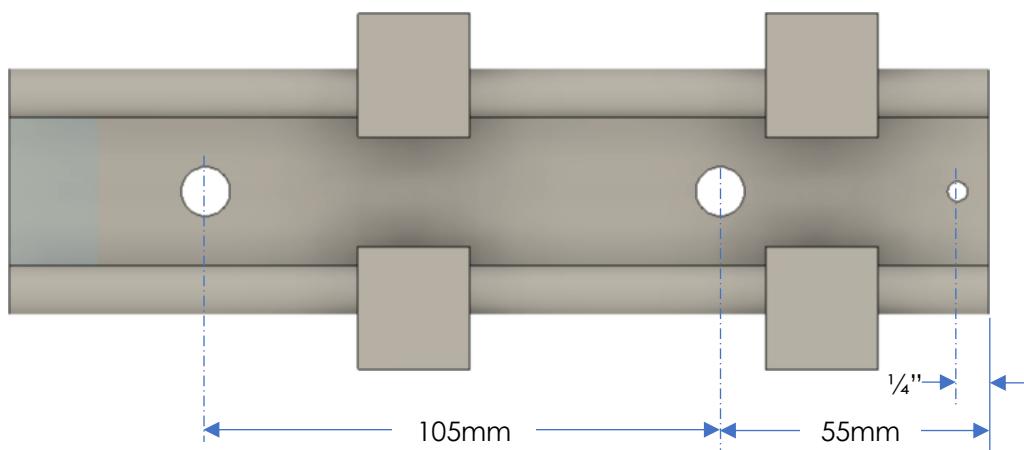
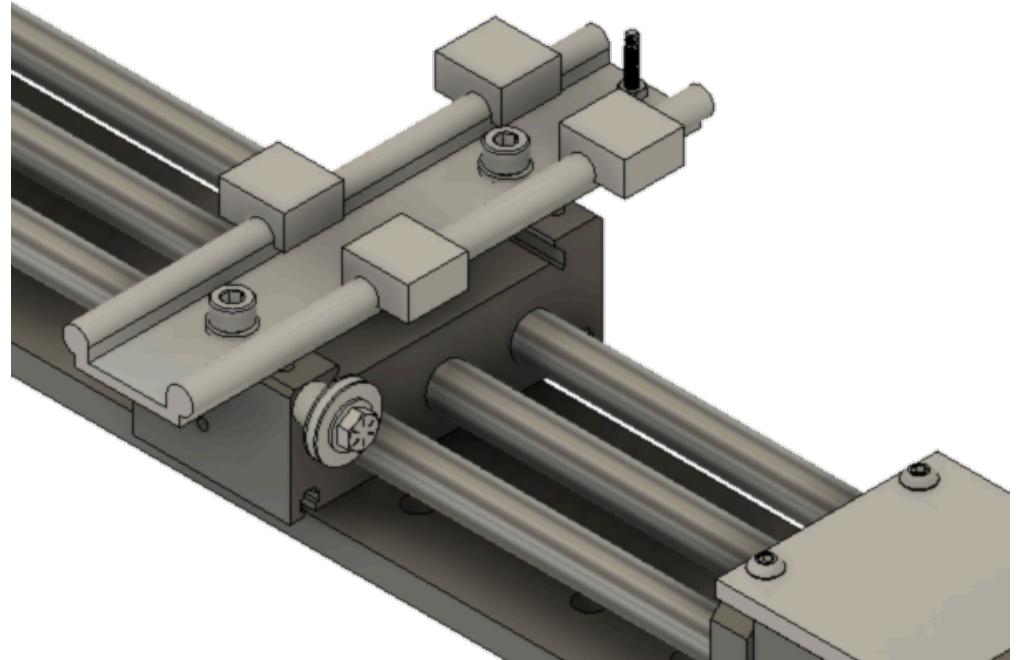
### Slider Plate

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).

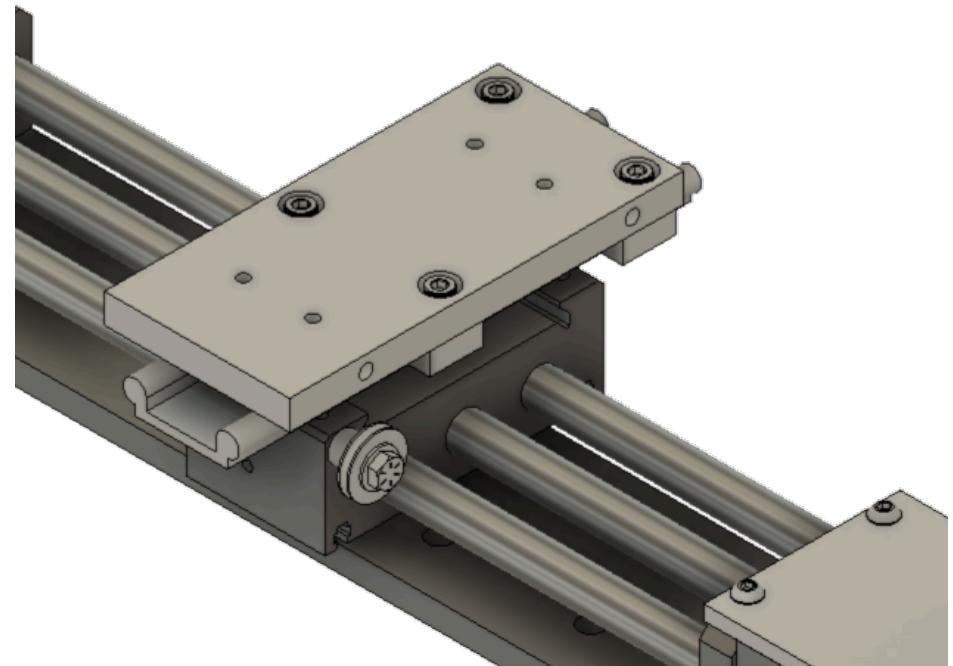
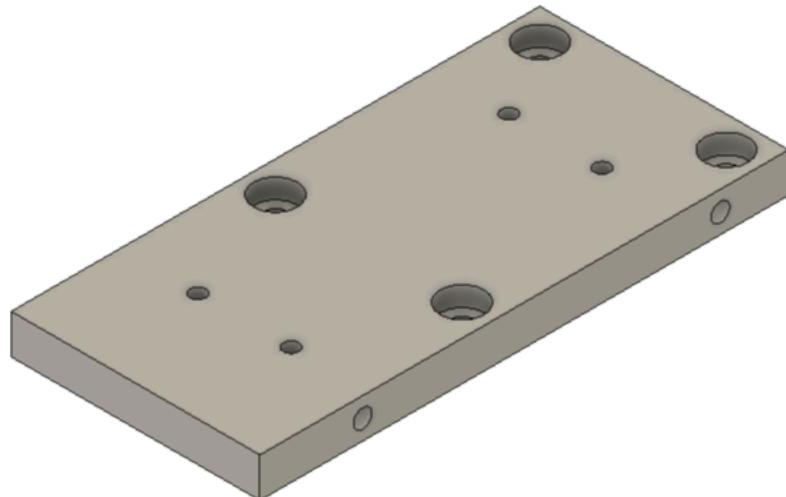


## MDF Rose Engine Lathe 2.0

### Jigs, Fixtures, and Add-Ons

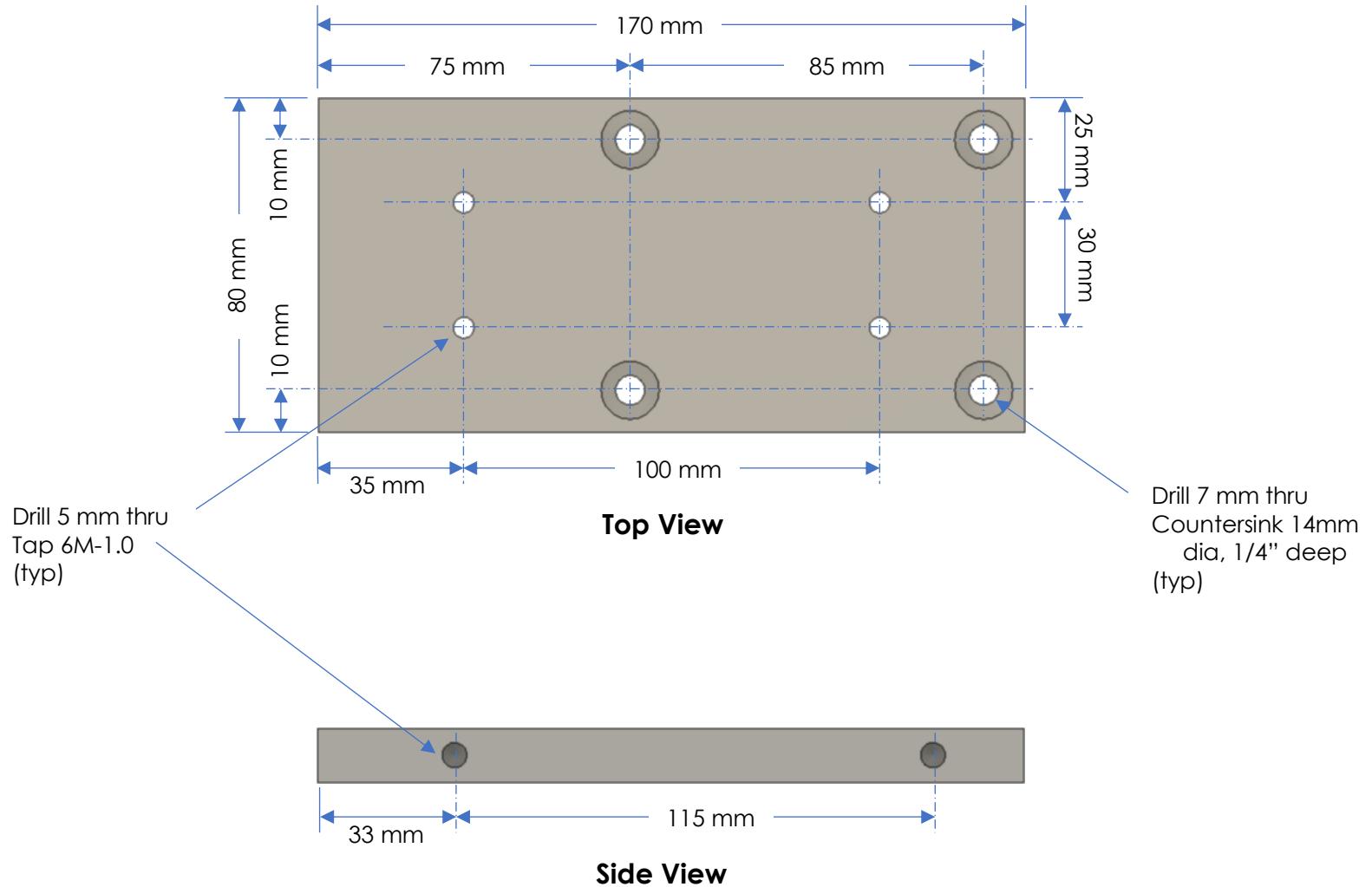
#### Connector Plate

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

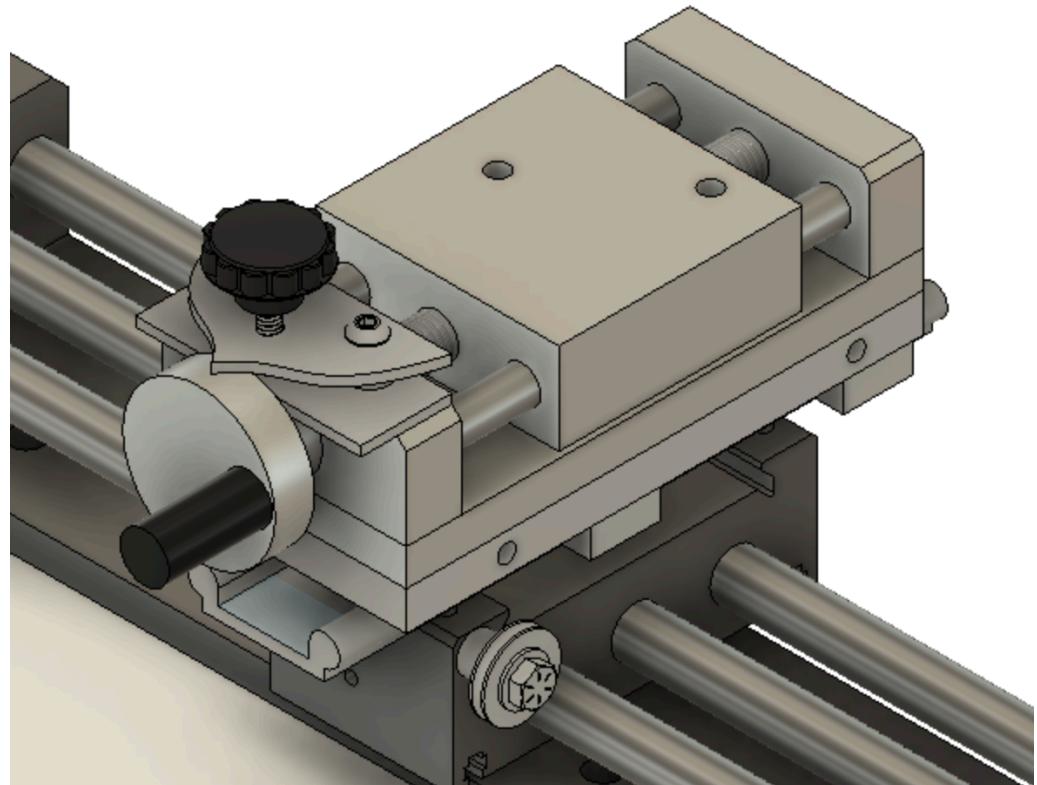
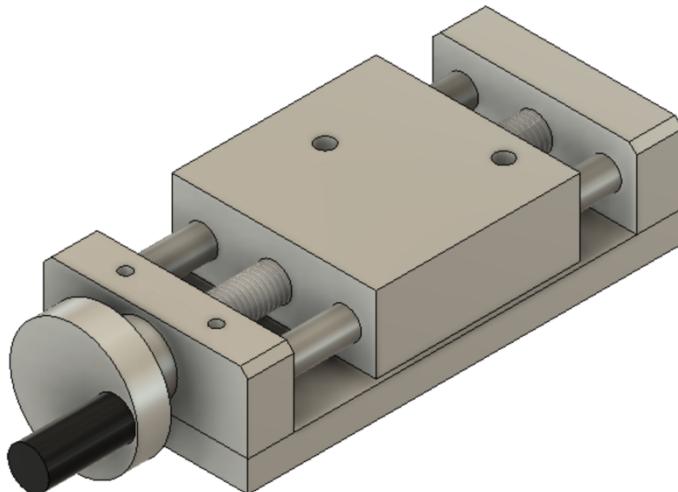
### Jigs, Fixtures, and Add-Ons

#### 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.

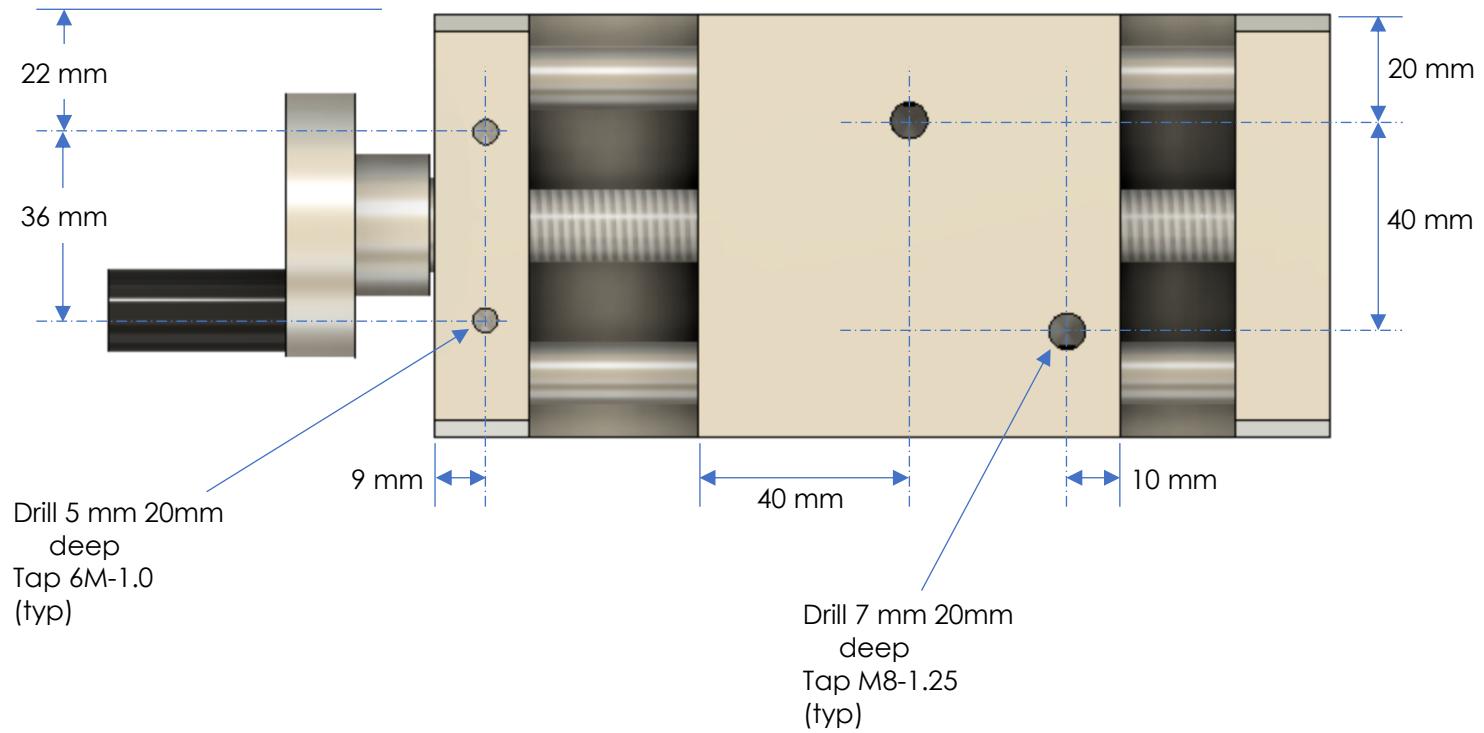
1. Drill and tap holes in the slide to attach the base for the Quick-Change Tool Post.
2. Drill and tap holes to the front to attach two plates for:
  - a. Securing the rotation dial, and
  - b. Indicating the rotational position of the rotation dial.



Those changes are shown in the picture to the left.

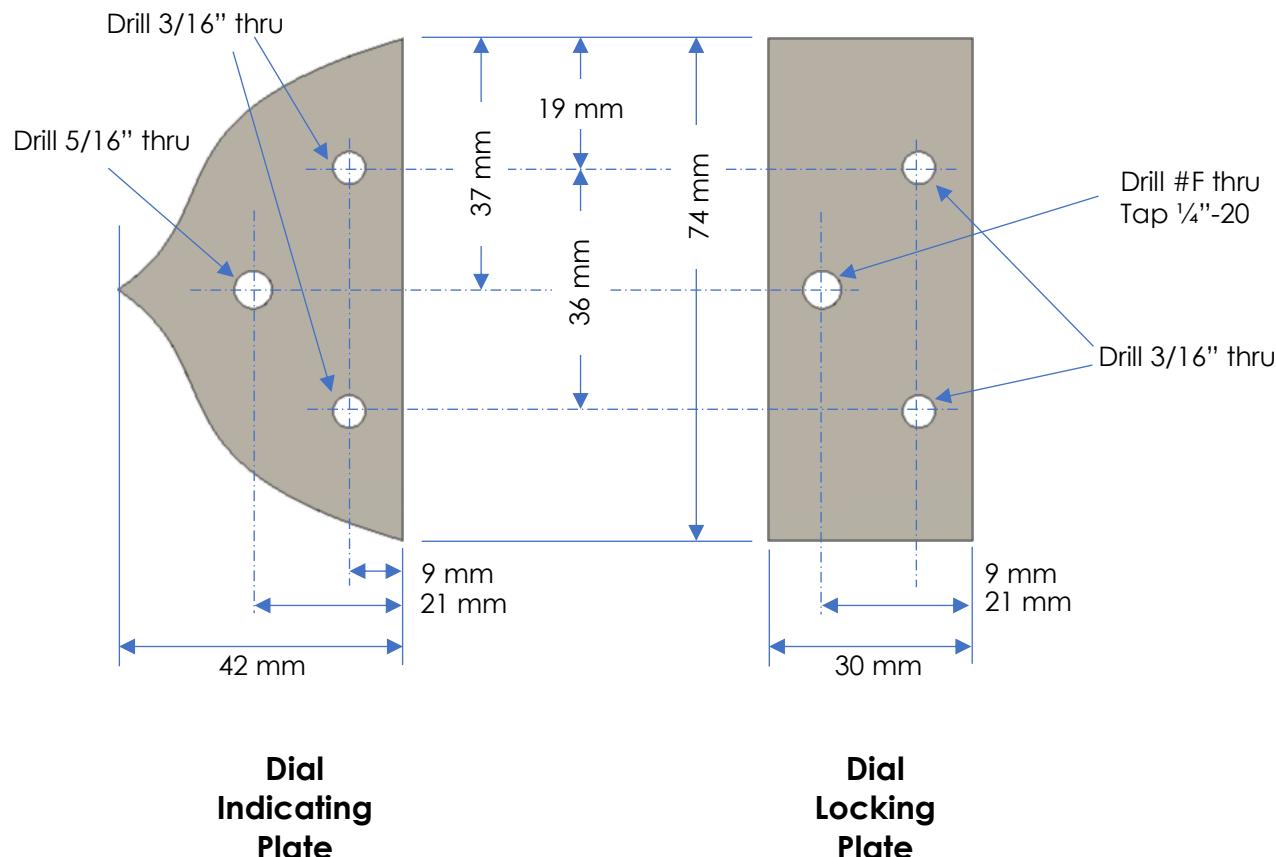
# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons



# MDF Rose Engine Lathe 2.0

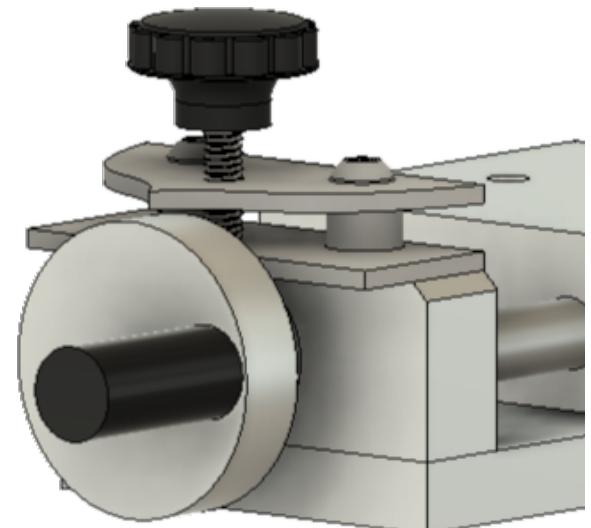
## Jigs, Fixtures, and Add-Ons



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.

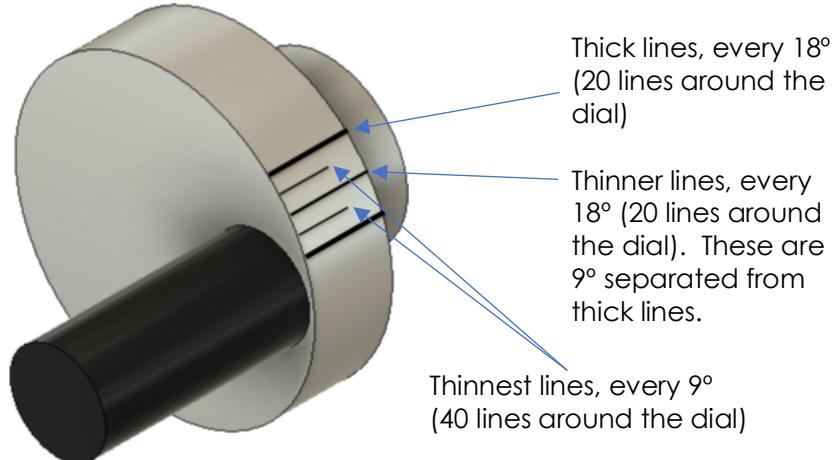
The locking knob is #303.



## MDF Rose Engine Lathe 2.0

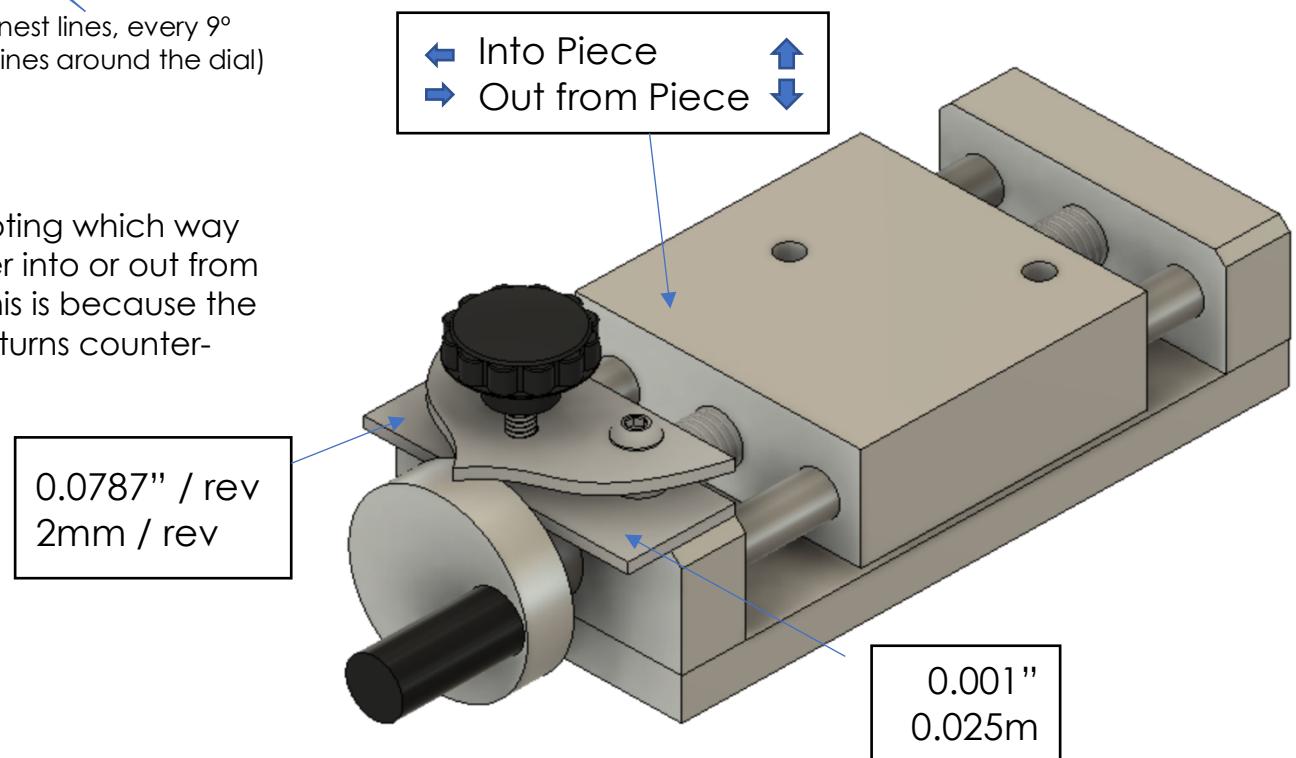
### Jigs, Fixtures, and Add-Ons

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  $4.5^\circ$ .



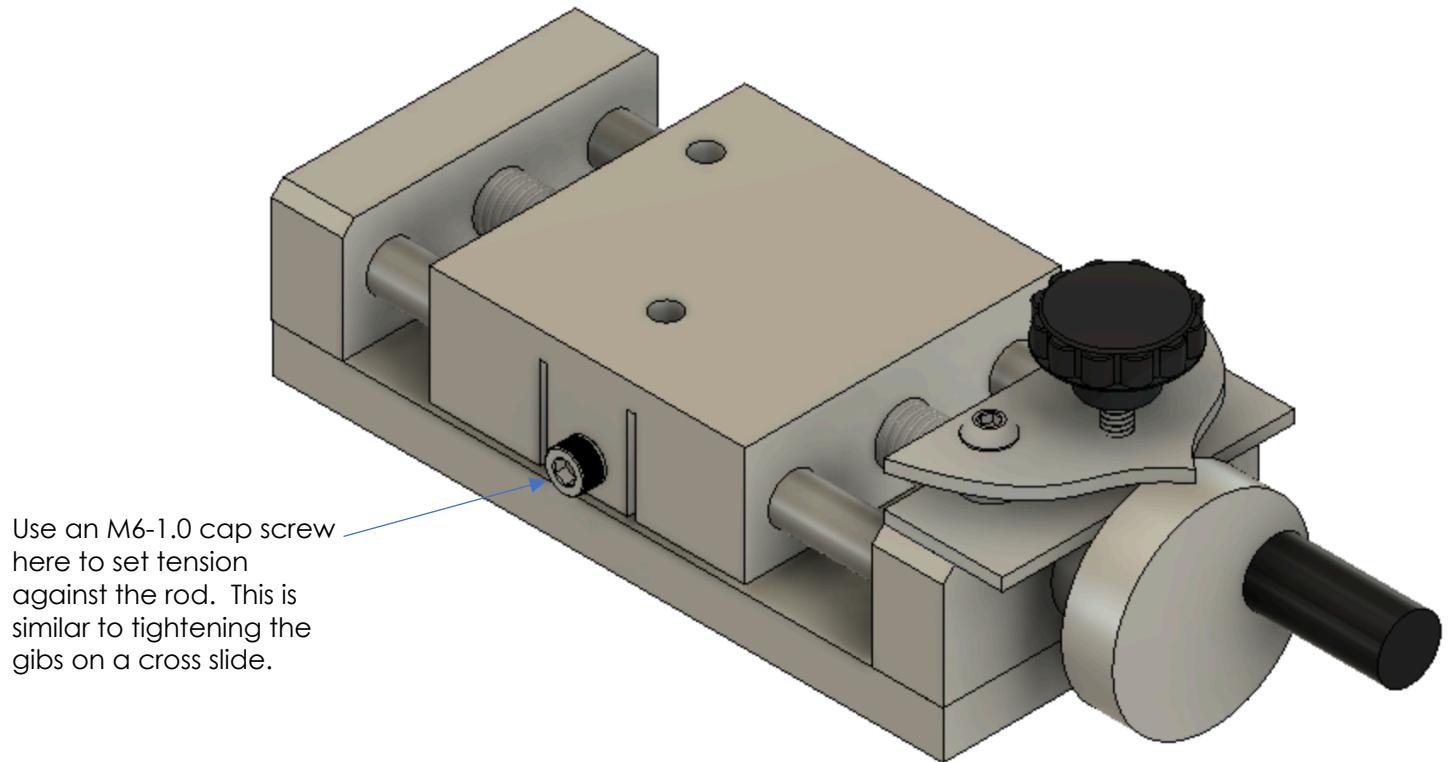
The result is that there are 80 indicating lines around the dial. The screw used to move the slide is M14-2.0, so each indicating line moves the slide by 0.025mm, which is close to 0.001".

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

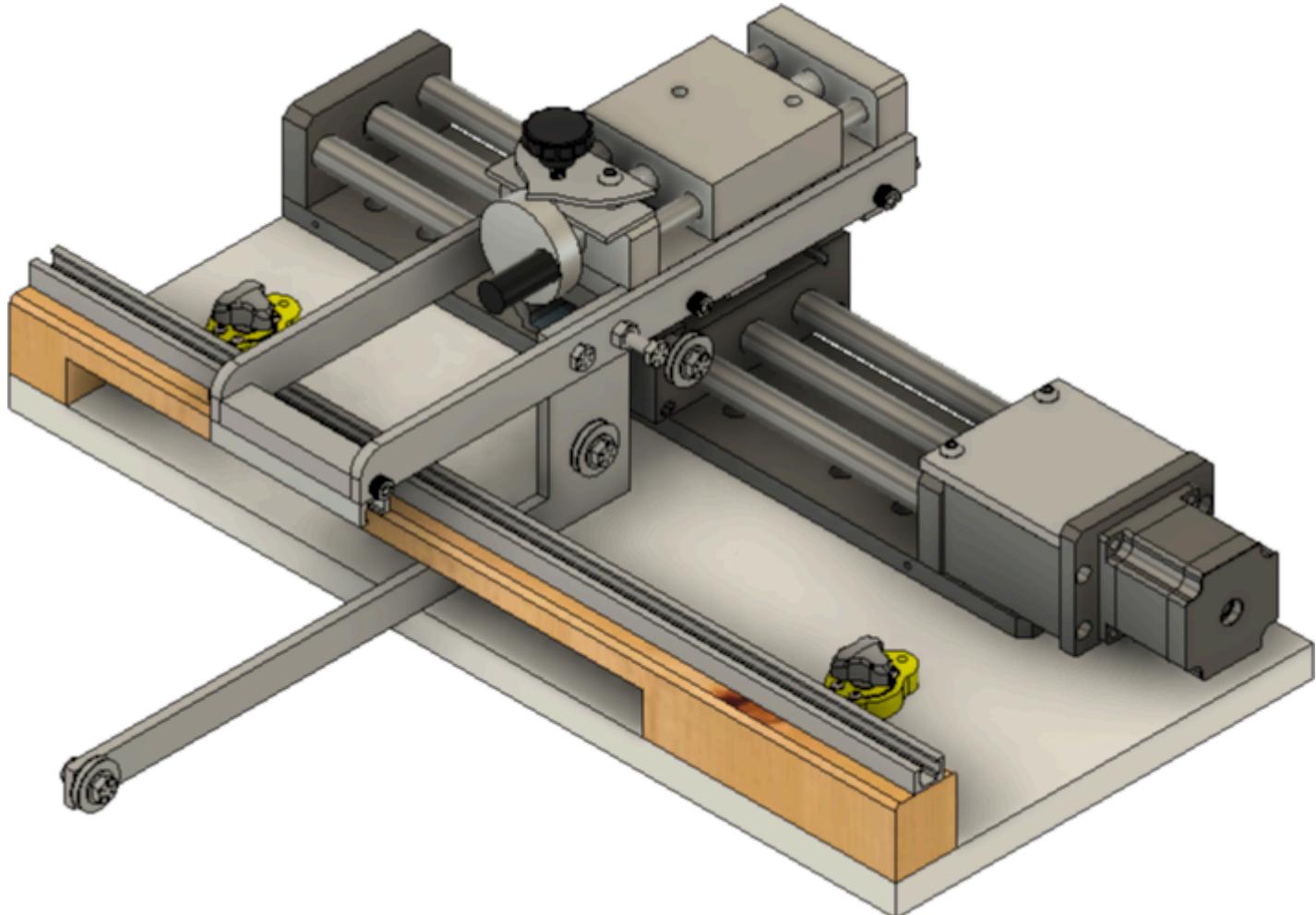
### Jigs, Fixtures, and Add-Ons

#### 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.

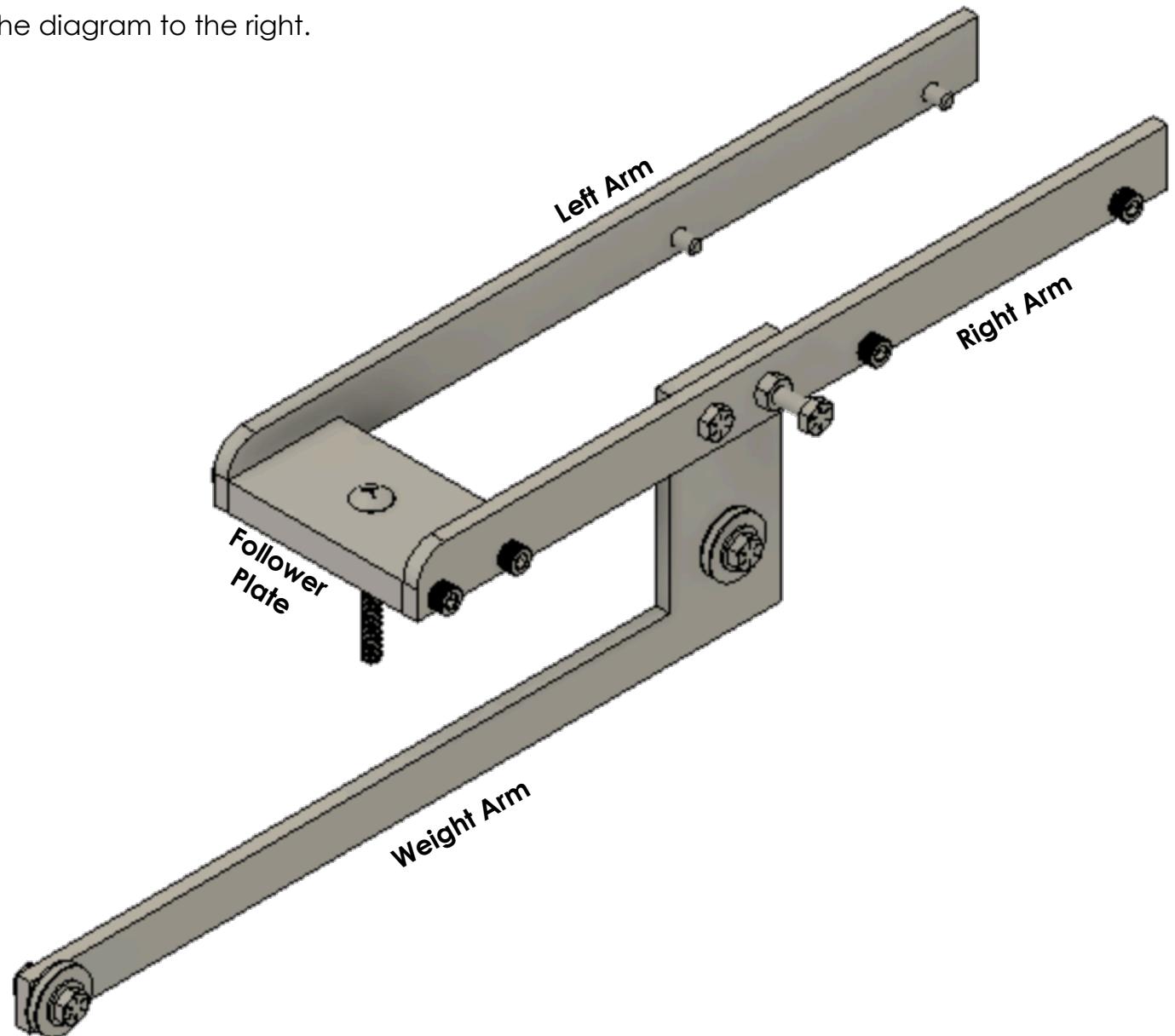
These arms are attached to the Connector Plate with 4 ea. Socket Head Screws, M6-1.0, 15mm long (#304).

The pieces are detailed below.



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

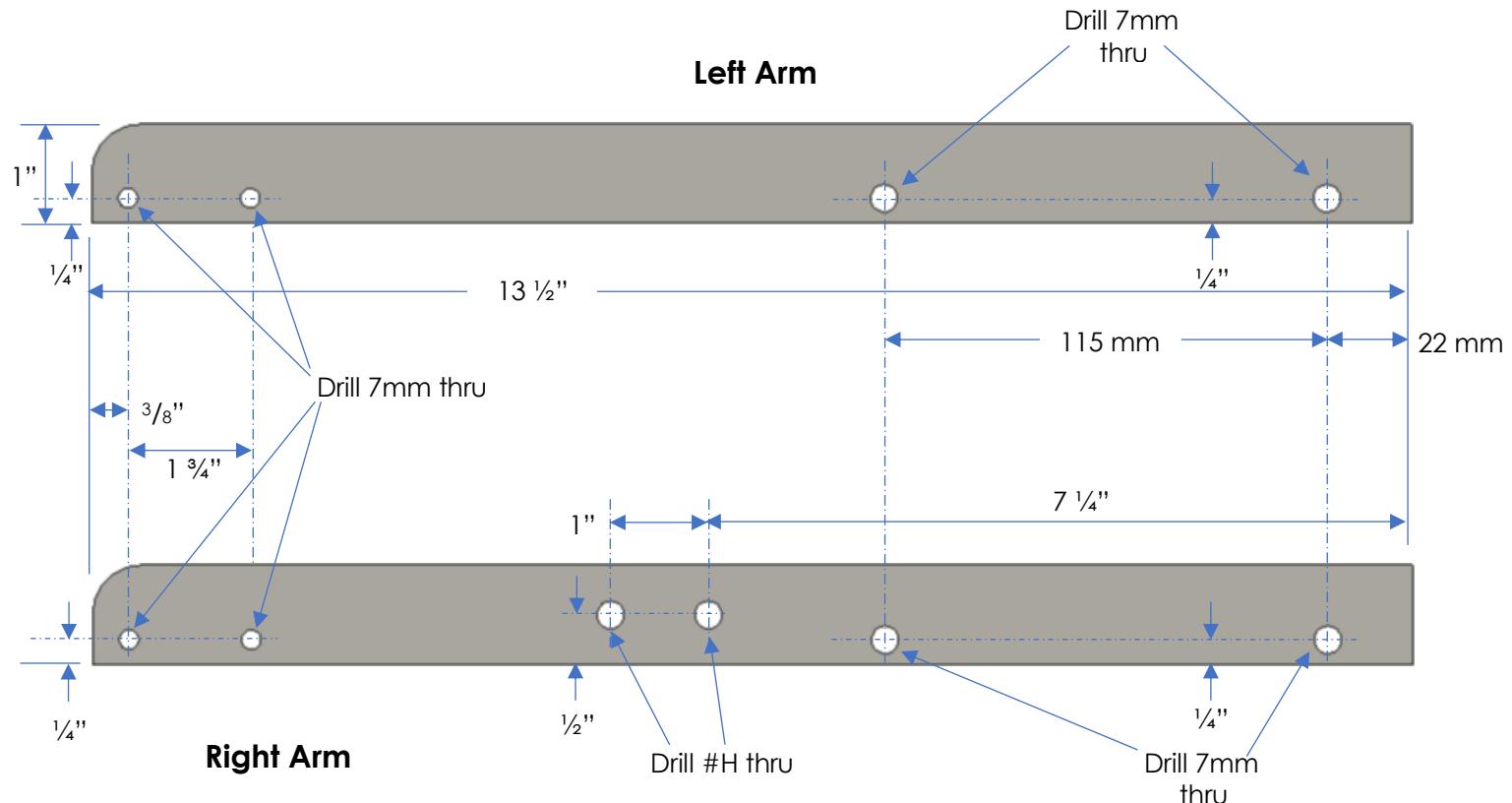
The key parts are shown in the diagram to the right.



## MDF Rose Engine Lathe 2.0

### Jigs, Fixtures, and Add-Ons

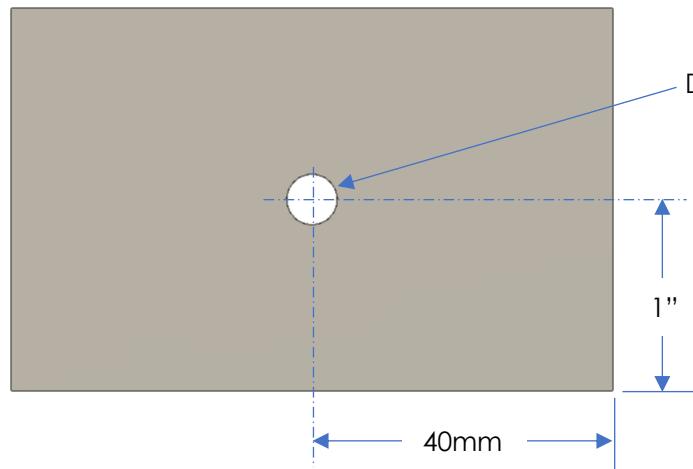
These two parts are made from 1" x  $\frac{1}{4}$ " aluminum rod.



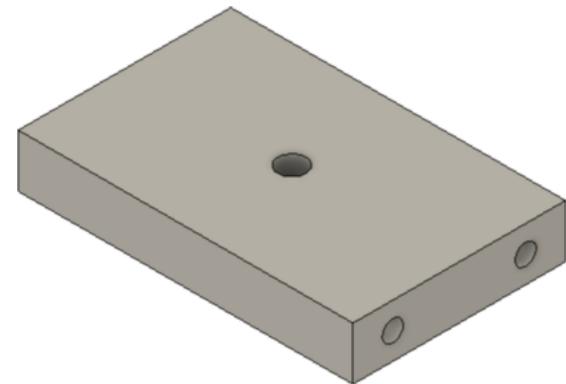
## MDF Rose Engine Lathe 2.0

### Jigs, Fixtures, and Add-Ons

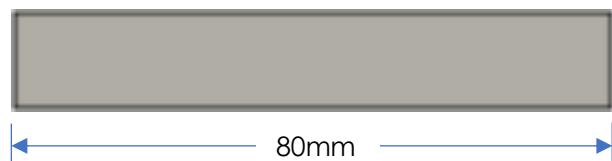
The **Follower Plate** is made from  $\frac{1}{2}$ " aluminum plate.



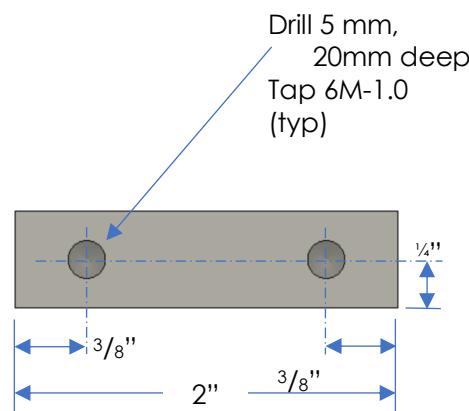
**Top View**



**Orthogonal View**



**End View**



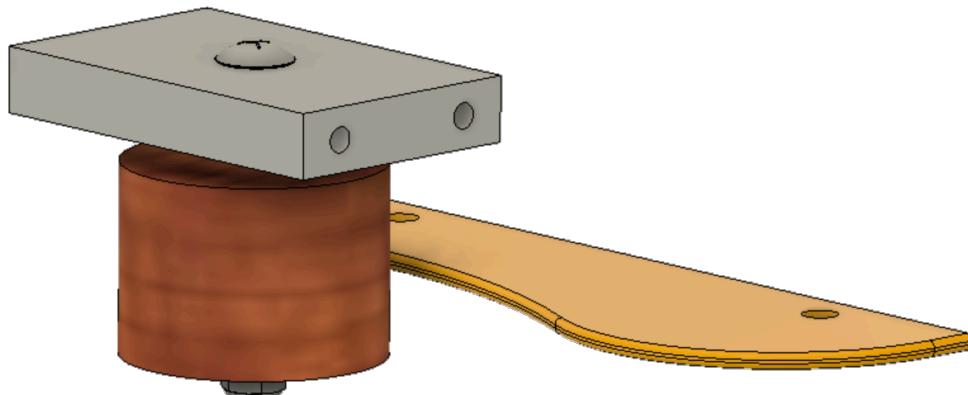
**Side View**

## MDF Rose Engine Lathe 2.0

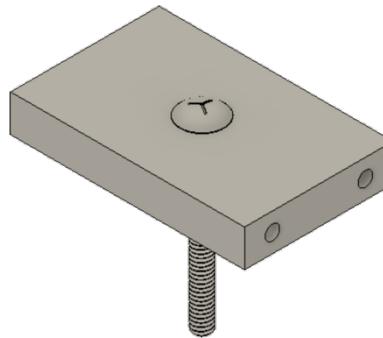
### Jigs, Fixtures, and Add-Ons

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

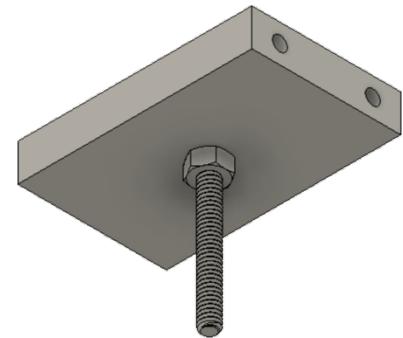
This bolt is used to hold the template follower / rubber. The template follower / rubber can be made in the shape desired by the artist.



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**

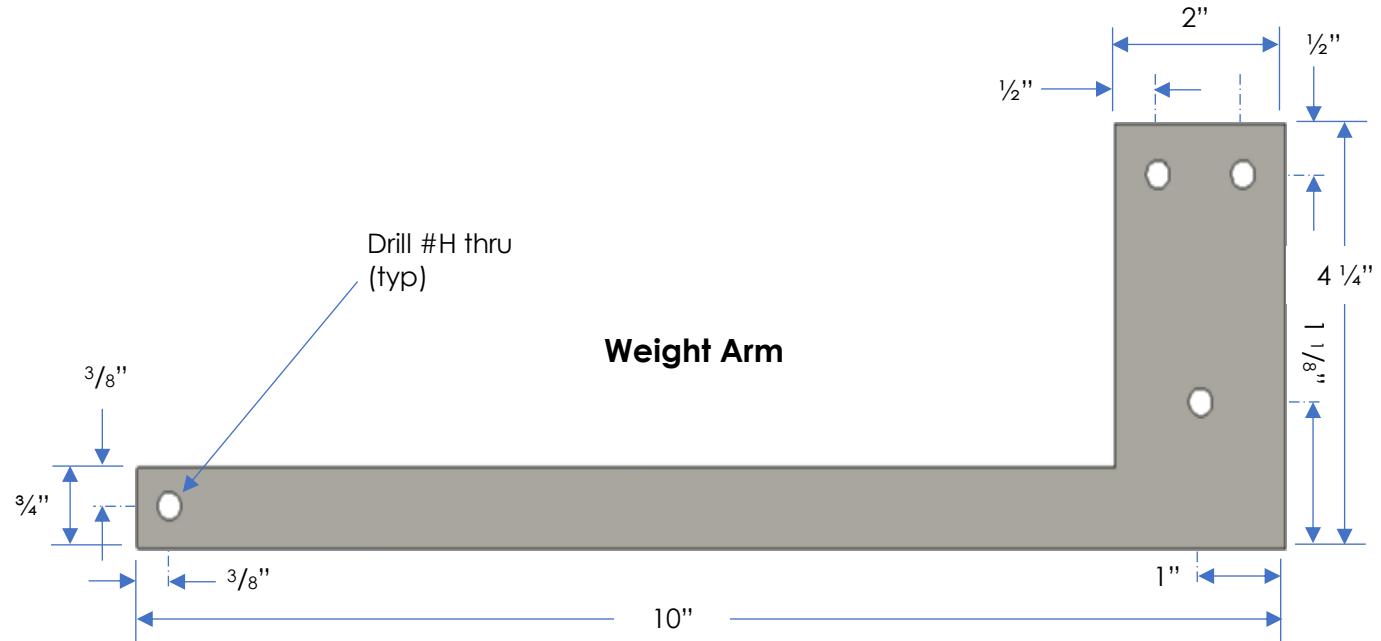
For example, if one needed is 2" diameter, then it is easy to make such a cylinder on a traditional lathe. It is 1  $\frac{3}{4}$ " long, and a hole needs to be bored thru it for the  $\frac{1}{4}$ "-20 carriage bolt. Such a hole should be drilled with an H or  $\frac{17}{64}$ " bit.

A locknut holds the wooden piece in place.

## MDF Rose Engine Lathe 2.0

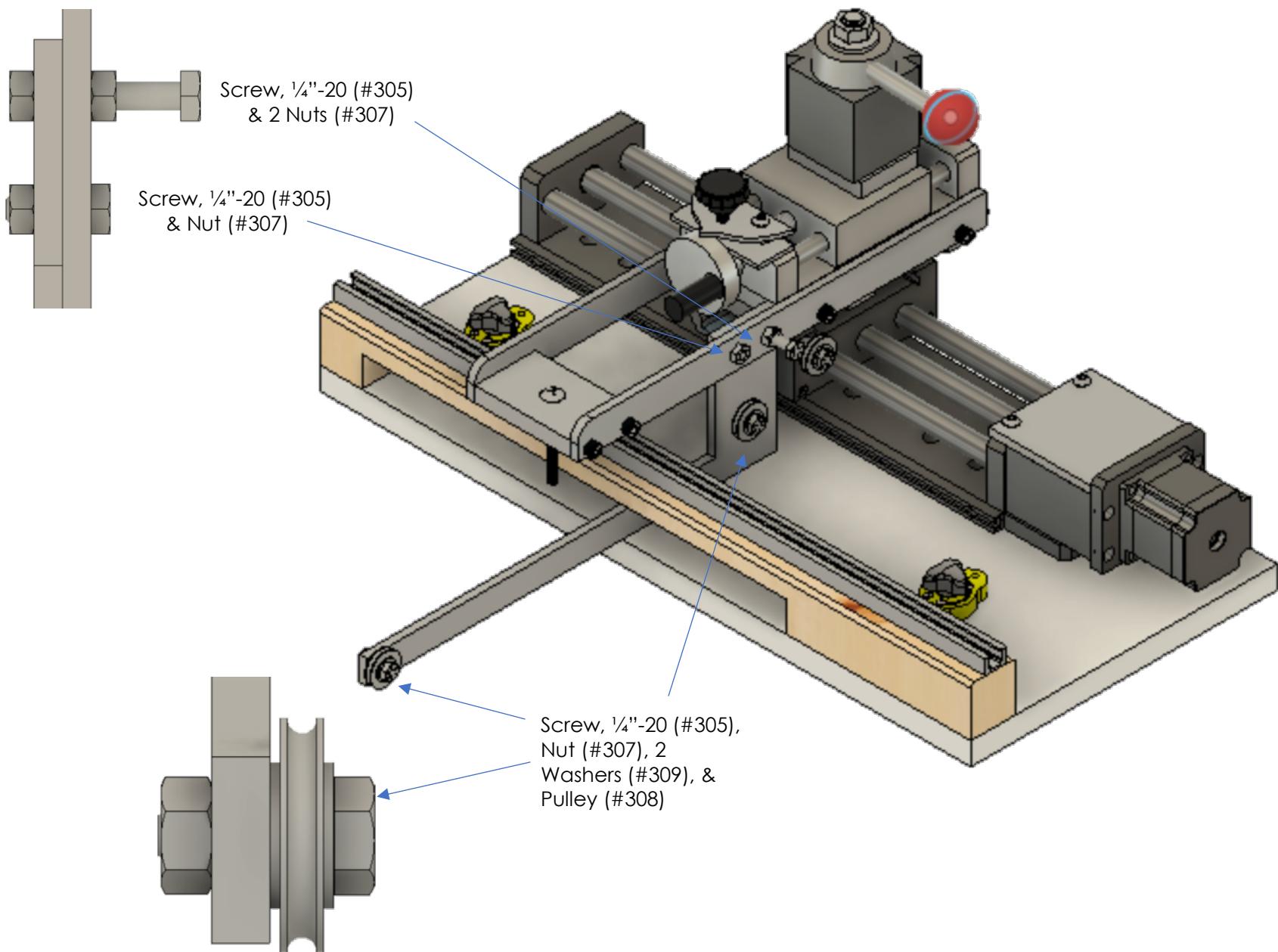
### Jigs, Fixtures, and Add-Ons

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



## MDF Rose Engine Lathe 2.0

### Jigs, Fixtures, and Add-Ons



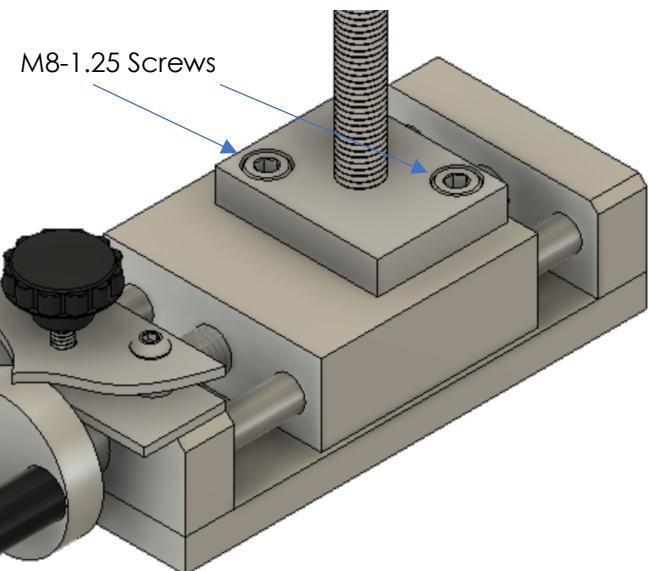
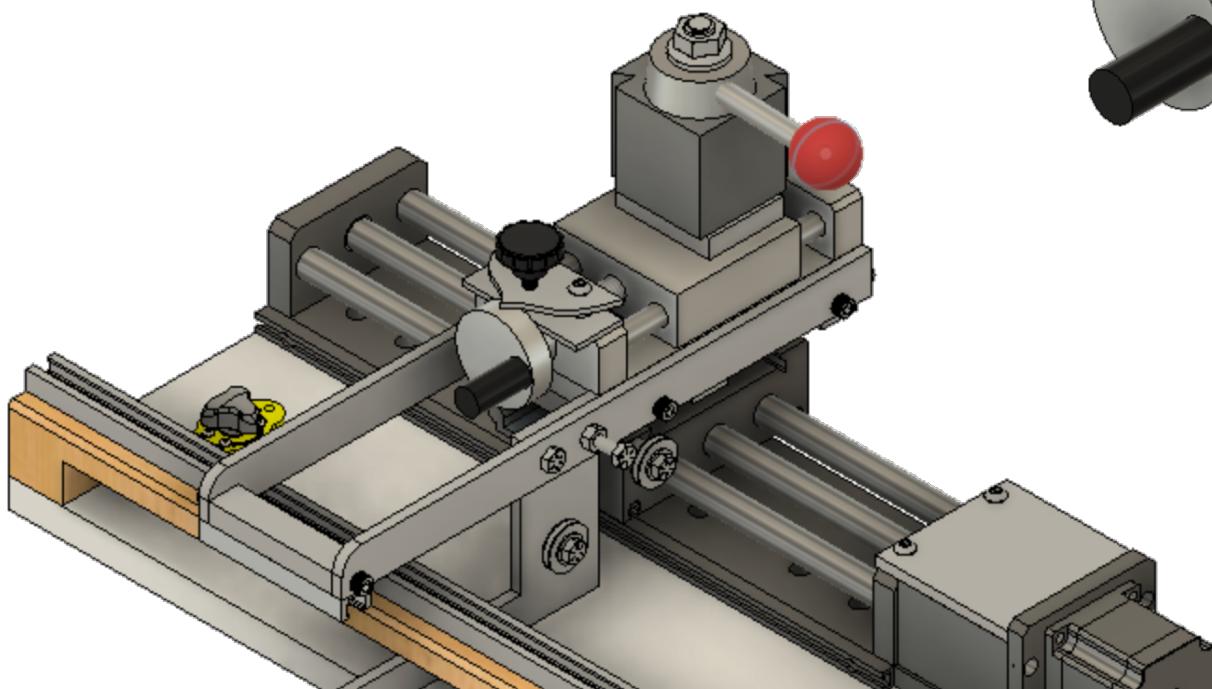
## MDF Rose Engine Lathe 2.0

### Jigs, Fixtures, and Add-Ons

#### Quick-Change Tool Post

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

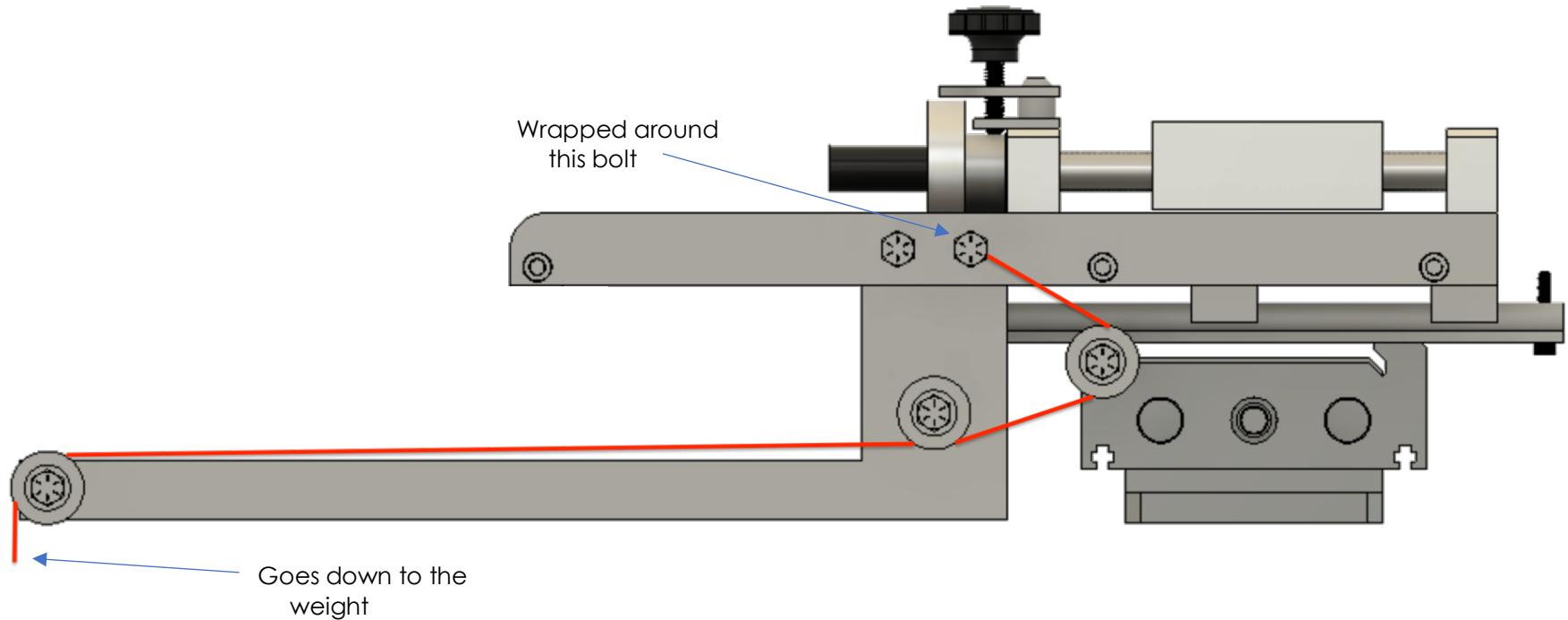
Once the rest of the QCTP parts are installed, it will look like the picture below.



## 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.



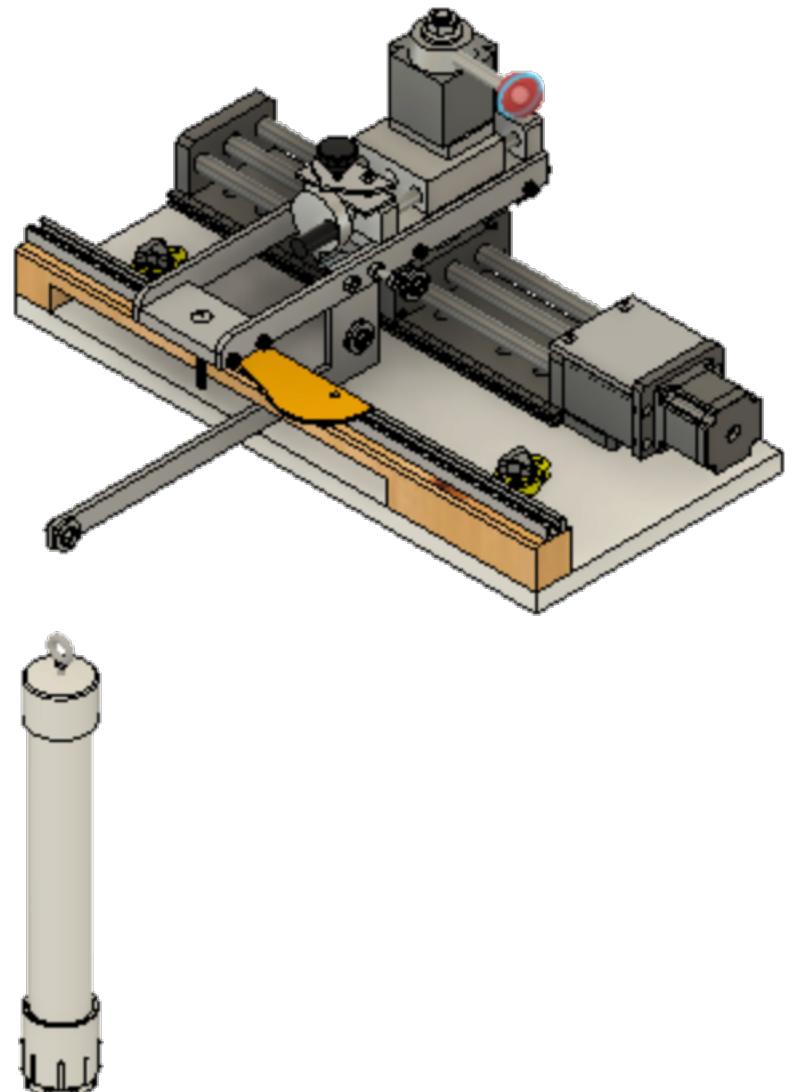
## MDF Rose Engine Lathe 2.0

### Jigs, Fixtures, and Add-Ons

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.



# MDF Rose Engine Lathe 2.0

## 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).

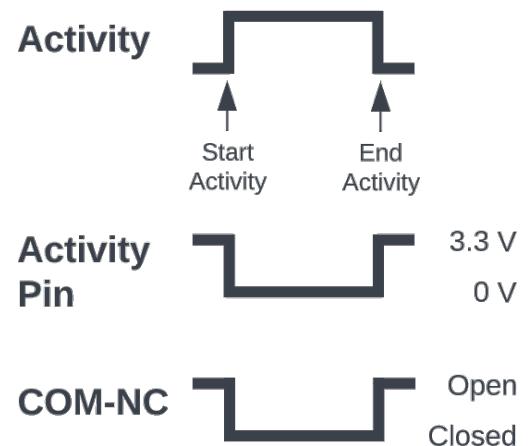
When that activity is completed, the Teensy will take the output for the selected pin from 0 VDC back up to 3.3 VDC.

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).



# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

### 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.



## MDF Rose Engine Lathe 2.0

### 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.

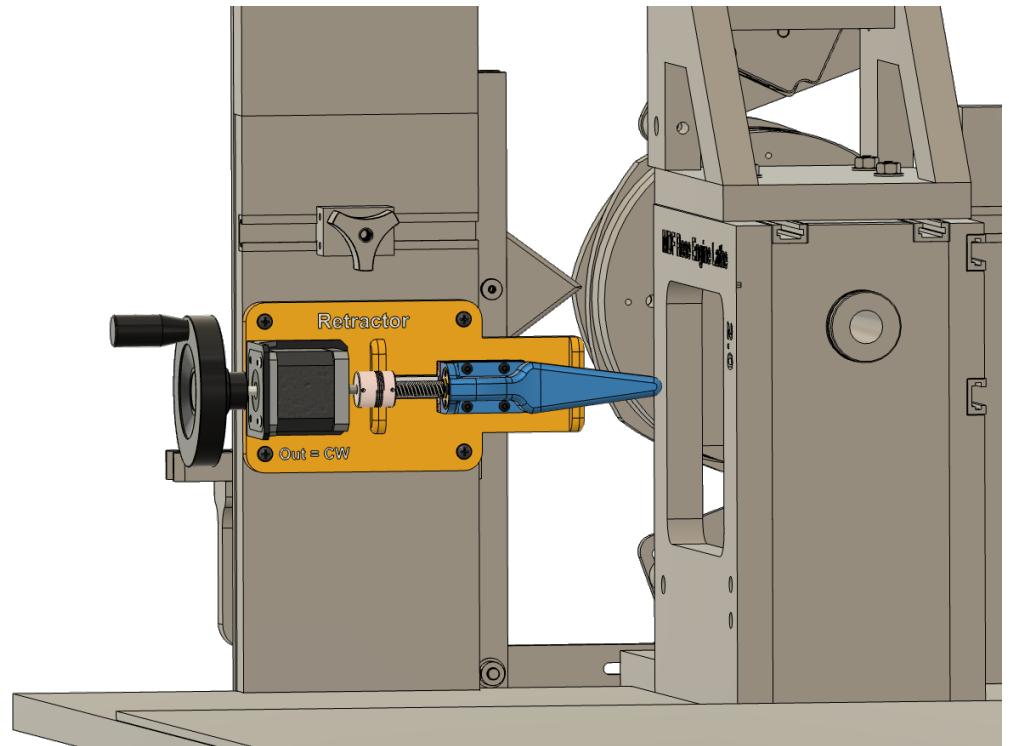
- The activity light is an LED Signal Tower light powered by 110V / 220V AC. It was purchased from Amazon.

# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

### Retractor

The retractor is shown to the right.



# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

### Bill of Materials

The screws listed below are needed. There are also 2-3 parts which are 3D-printed.

Item #	Item	Qty	Source	Source Part Number	Comments
101	Button Head Hex Drive Screws M3-050, 6mm long	4	McMaster-Carr	92095A179 or 97763A812	Hex drive is not required; Phillips drive can be used.
102	Button Head Hex Drive Screws M3-050, 10mm long	6	McMaster-Carr	92095A182	Hex drive is not required; Phillips drive can be used.
103	Button Head Hex Drive Screws M3-050, 16mm long	4	McMaster-Carr	92095A184	Hex drive is not required; Phillips drive can be used.
104	Button Head Hex Drive Screws M4-070, 12mm long	4	McMaster-Carr	92095A192	Hex drive is not required; Phillips drive can be used.
105	Screws for Particleboard and Fiberboard, Rounded Head, Black-Oxide Steel, Number 8 Size, 3/4" Long	4	McMaster-Carr	91555A104	
201	MGN12 Linear Rail Guide, 100mm long, with MGN12H Carriage Block	1	Amazon		
202	Lead Screw, T8, 8mm diameter, 100mm long - with copper nut for trapezoidal thread	1	Amazon		If the trapezoidal nut does not come with it, that will have to be also ordered.
203	Trapezoidal nut, T8	1	Amazon		If not provided with #202
204	Stepper motor, dual shaft, NEMA 17, bipolar, 1.8deg, 4 wire	1	Stepper Online	17HS19-1684D	Needs to be dual shafted
205	Stepper Motor bracket for NEMA 17 stepper motor	1	Stepper Online	ST-M1	

## MDF Rose Engine Lathe 2.0

### Jigs, Fixtures, and Add-Ons

Item #	Item	Qty	Source		Comments
			Part Number		
206	Flexible Coupling, 5mm to 8mm	1	Amazon		Connects the NEMA 17 stepper motor's shaft (5mm) to the lead screw (8mm)
207	Hand wheel for 5mm diameter shaft	1	Amazon		There are many options, but the one used must fit a 5mm shaft.

### Bill of Tools Needed

The specialized tools needed are listed below, and the McMaster-Carr part numbers are added so you can order them at the same time as you order the screws noted above. The carbon steel taps are not required per se; however, they are the lowest cost and will work well for tapping the 3D-printed parts.

Item #	Item	Qty	Source	Source Part Number	Comments
T1	Taper Tap, M3-050, carbon steel	1	McMaster-Carr	25995A511	
T2	Bottoming Tap, M3-050, carbon steel	1	McMaster-Carr	25995A542	
T3	Taper Tap, M4-070, carbon steel	1	McMaster-Carr	25995A512	
T4	Tap Wrench	1	McMaster-Carr	25605A63	

# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

### Instructions

#### 3D-print the two pieces

There are two parts which get 3D-printed: the base and the arm. The files needed to print these are in the MDF Rose Engine 2.0 Library in the book titled, 3D Printed Parts.

You can optionally also 3D-print a cover for the back of the stepper motor to make the wire management cleaner.

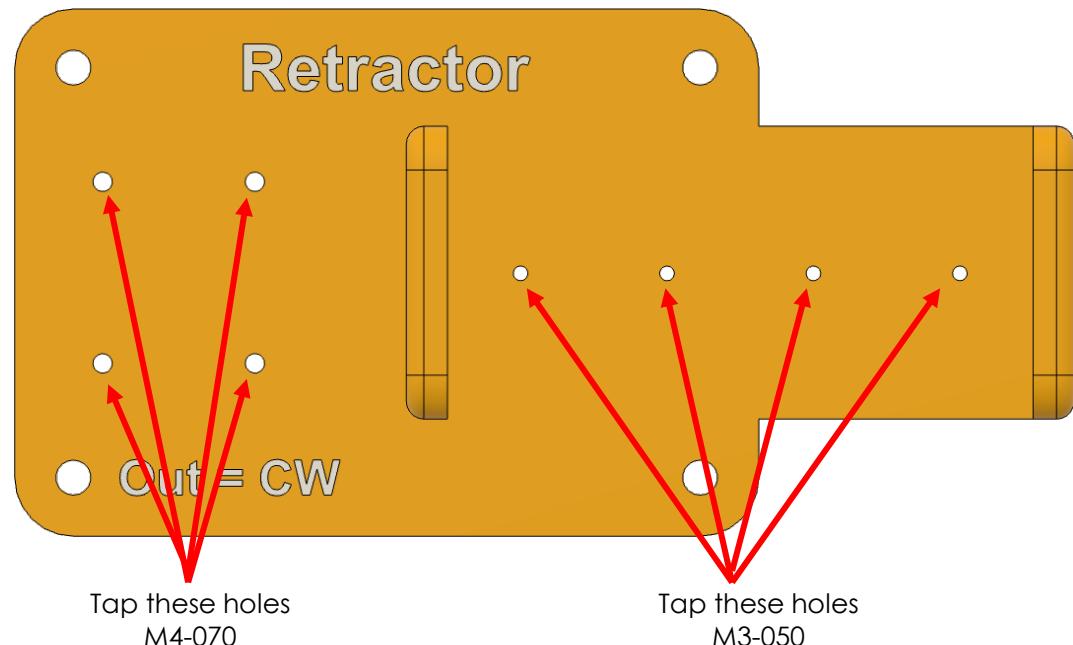
#### Connect the stepper motor's wires

Connect the stepper motor to the cable and plug needed. The ELFOS manual in the MDF Rose Engine 2.0 Library, Hardware: Building the Case and Electronics, can be used for this task. Look at the section about Stepper Motor Cables.

#### Tap the Screw Holes in the Base

Tap the indicated holes in the base using the noted taper taps.

As the 3D-printed material is not extremely rigid, be careful when doing this.



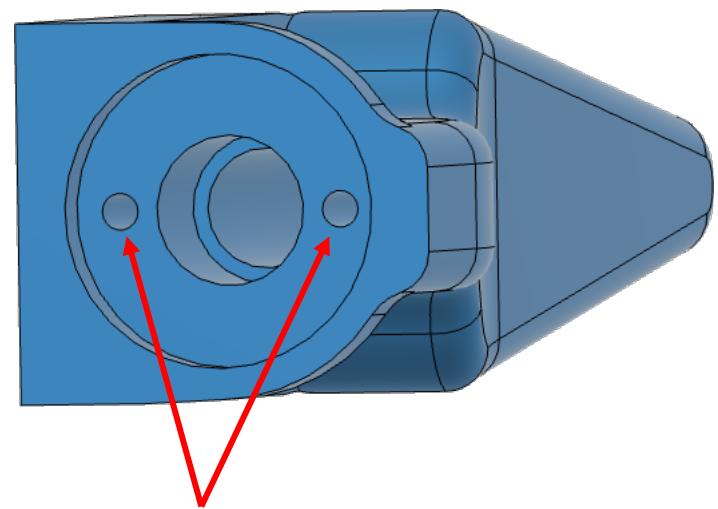
# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

### Tap the Screw Holes in the Arm

Tap the indicated holes in the arm. The two holes tapped are for holding the trapezoidal nut to the arm. Start the holes with the taper tap and then complete them with the bottoming tap to provide deeper threads in the two holes.

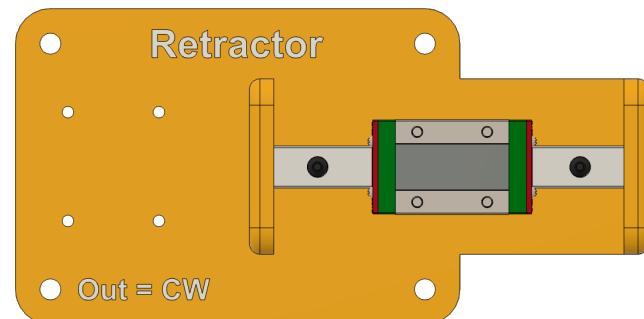
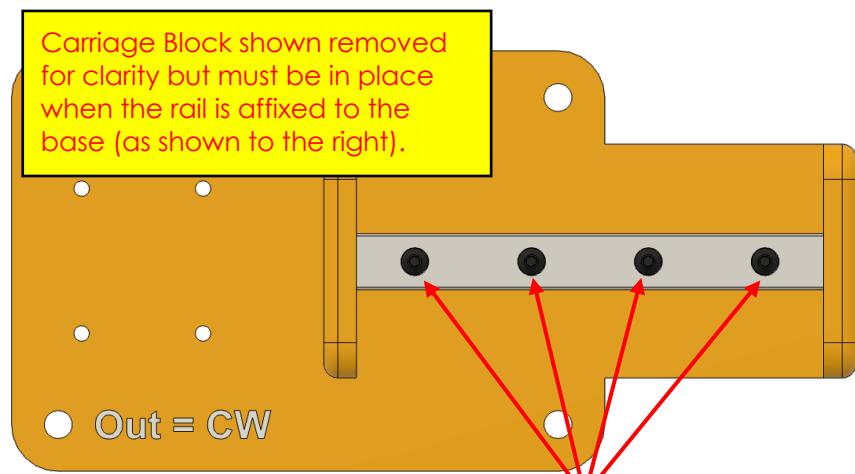
As the 3D-printed material is not extremely rigid, be careful when doing this.



Tap these holes  
M3-050

### Attach the linear rail guide to the base

Using four of the #102 screws, attach the linear rail to the base.

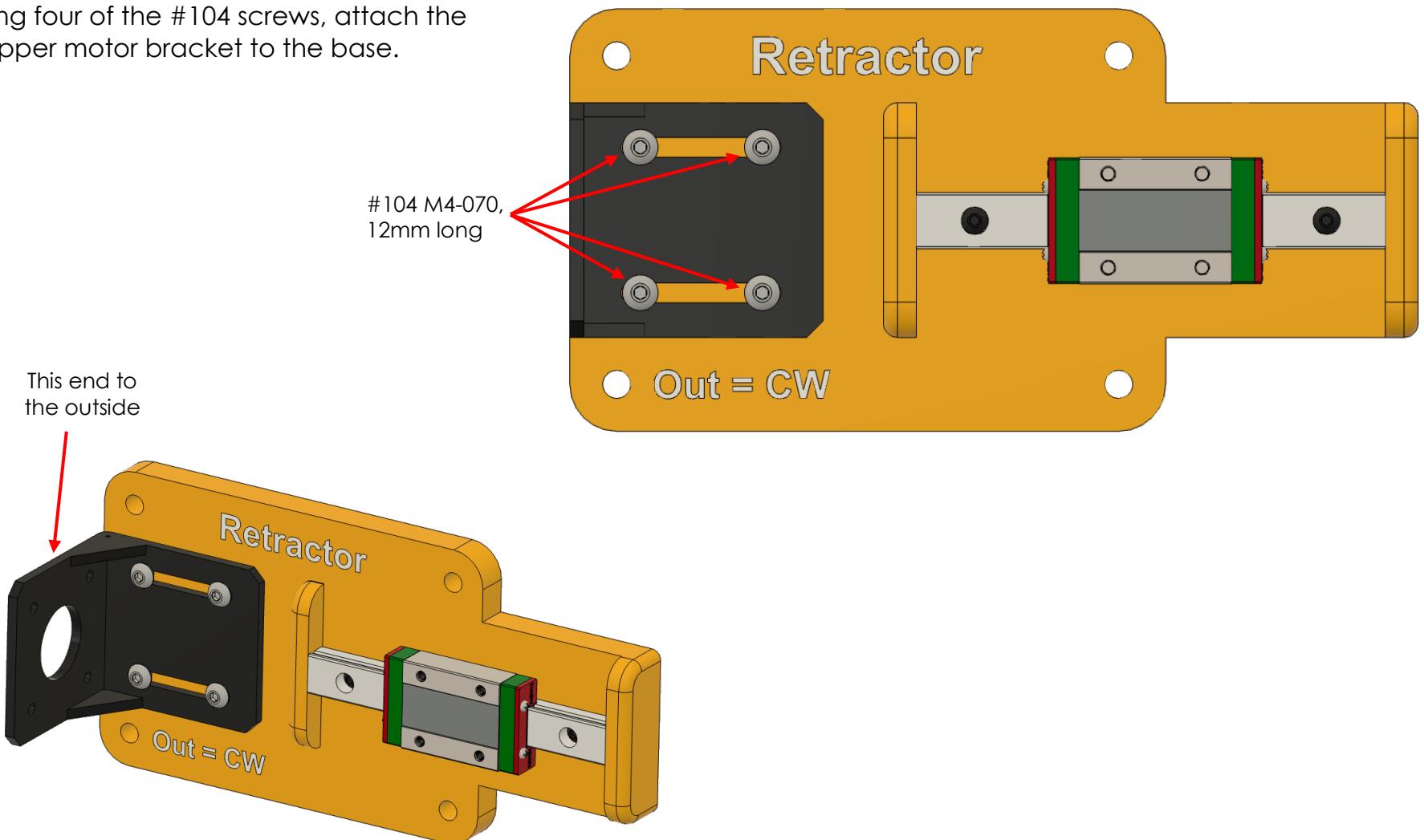


# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

### Attach the stepper motor bracket to the base

Using four of the #104 screws, attach the stepper motor bracket to the base.

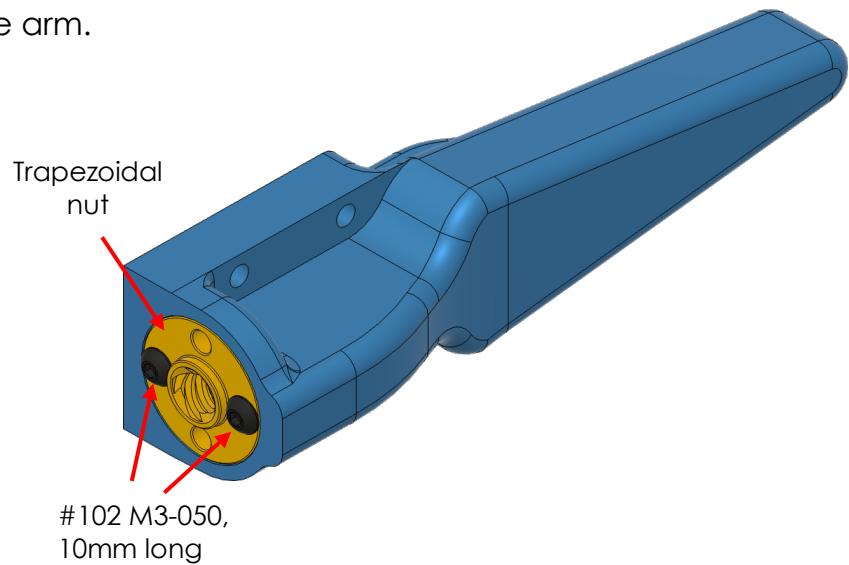


# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

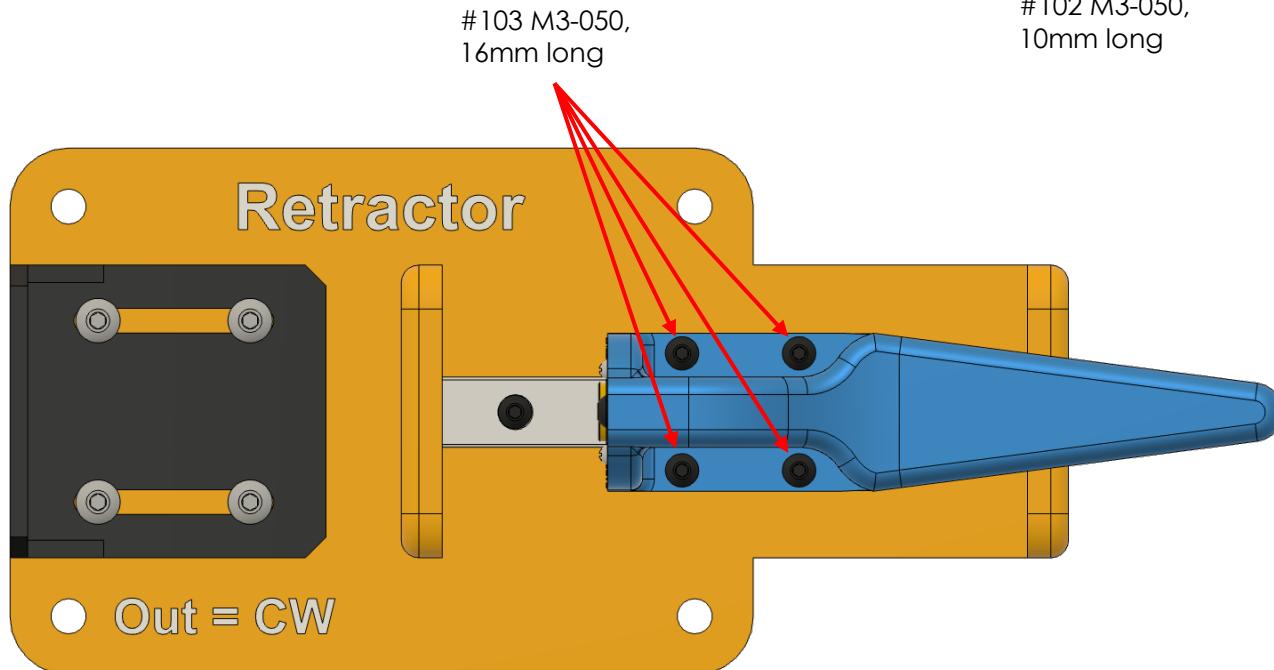
### Attach the trapezoidal nut to the arm

Using two of the #102 screws, attach the trapezoidal nut to the arm.



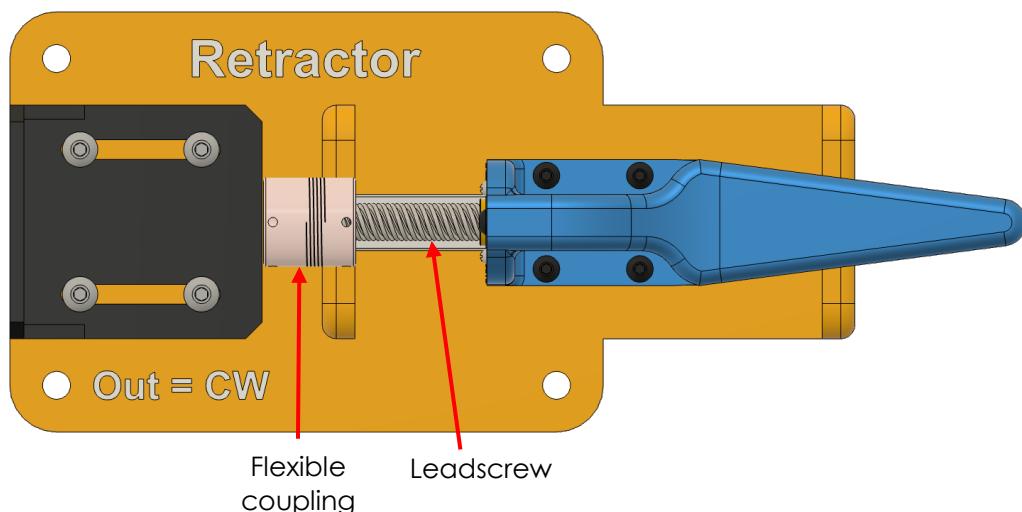
### Attach the arm to the linear rail's carriage block

Using four of the #103 screws, attach the arm nut to the carriage block on the linear rail.



# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

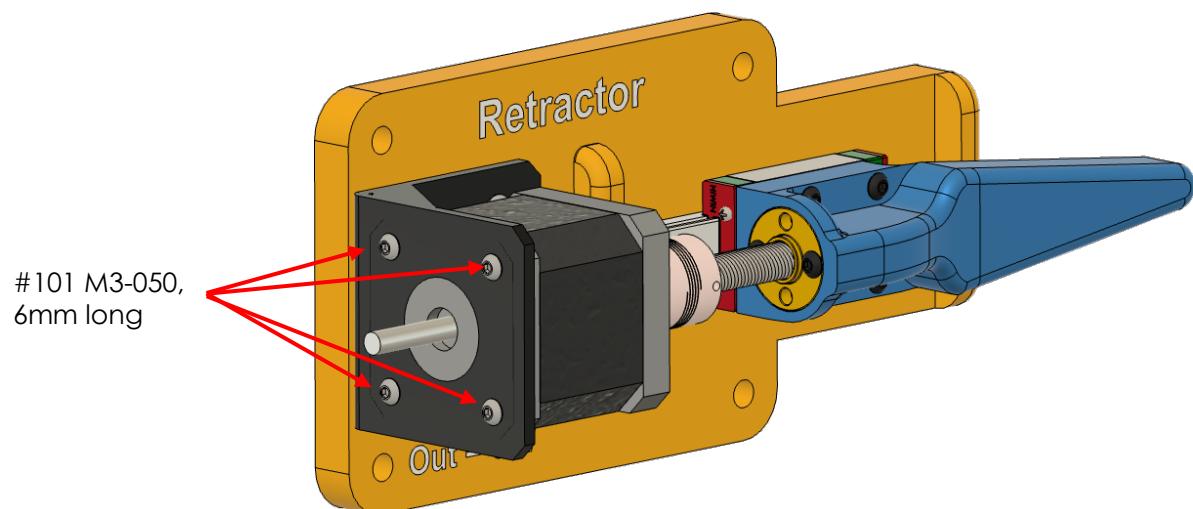


### Screw the leadscrew into the arm

Screw the leadscrew into the arm as far as it easily goes. Slide the flexible coupling over the leadscrew, but do not tighten it down just yet.

### Attach the stepper motor to the stepper motor bracket

Using four of the #101 screws, attach the stepper motor to the stepper motor bracket.



## MDF Rose Engine Lathe 2.0

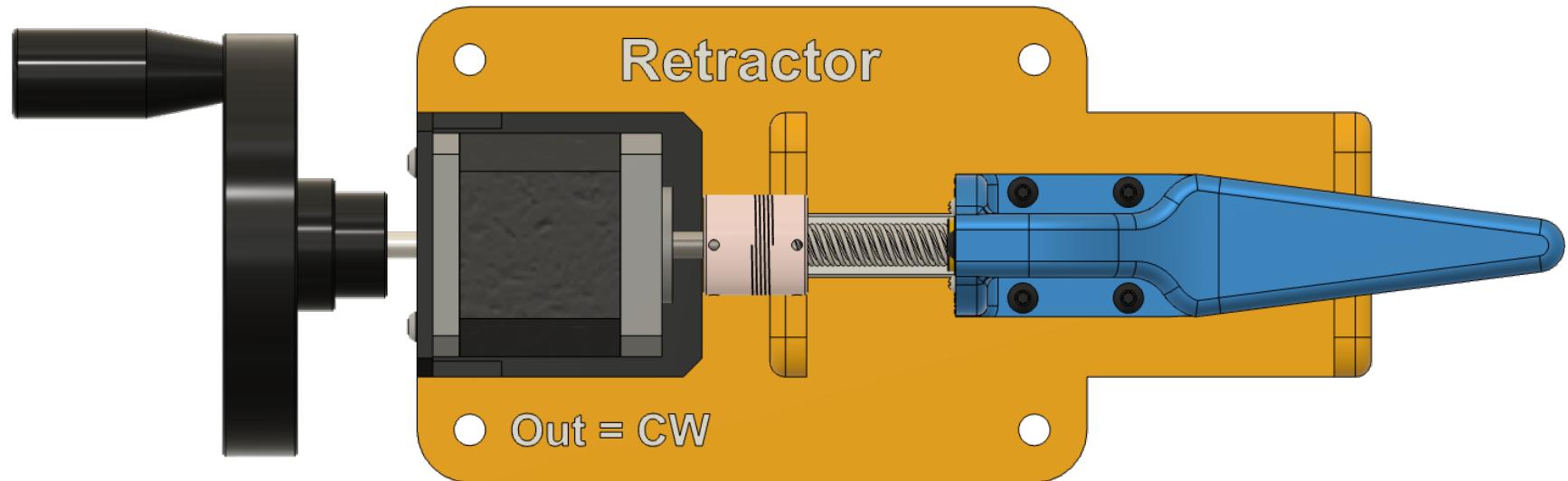
### Jigs, Fixtures, and Add-Ons

#### Couple the leadscrew and the stepper motor

Slide the arm towards the stepper motor and slide the flexible coupler over the stepper motor's drive shaft. The flexible coupler should now be fully engaged with both the leadscrew and the stepper motor's drive shaft.

Tighten the set screws on the flexible coupling to the leadscrew and the stepper motor's drive shaft.

Add the handwheel to the stepper motor's other drive shaft.



# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

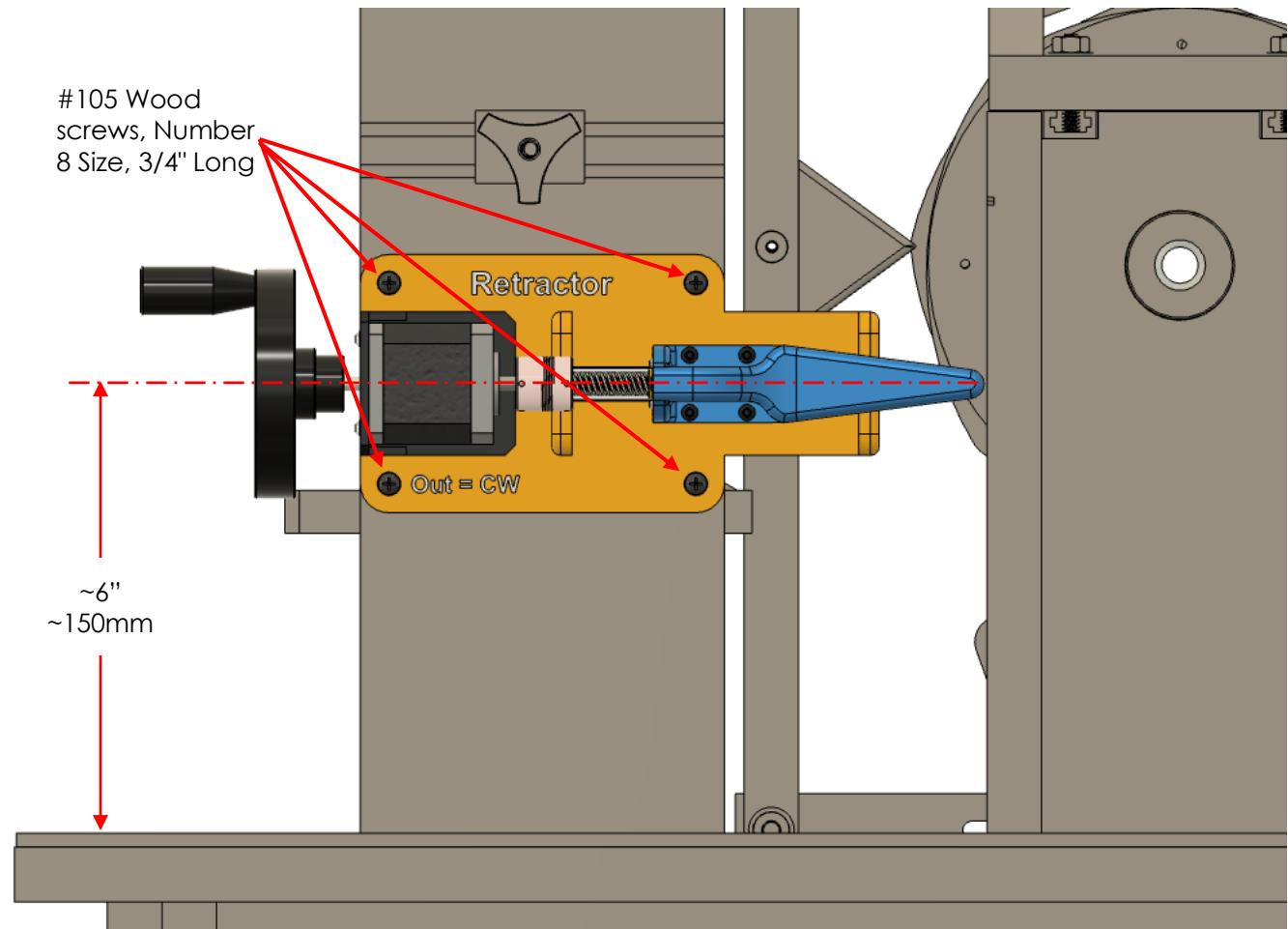
### Attach the retractor to the MDF Rose Engine

Using four of the #105 screws, attach the retractor to the B3 column so that the tip of the arm is around 6" / 150mm above the top of the lathe's base. This distance is not critical; however, you don't want it so high that it interferes with the use of bungie cord block to set the tension on the headstock.

### Recommendation

Add a label to the retractor that notes the configuration settings for ELFOS.

0.07874" / 360°  
2mm / 360°

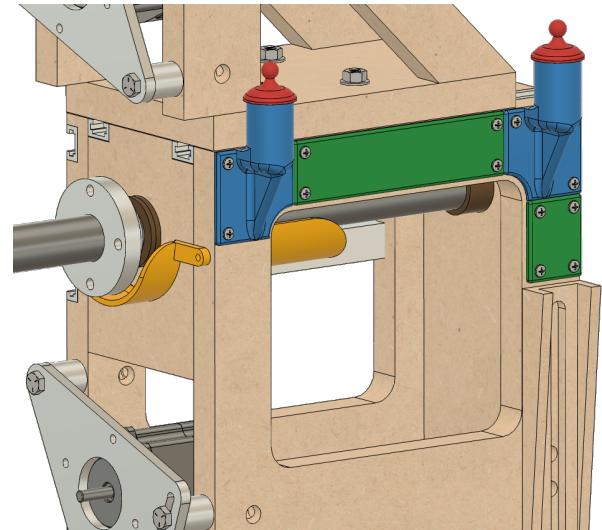
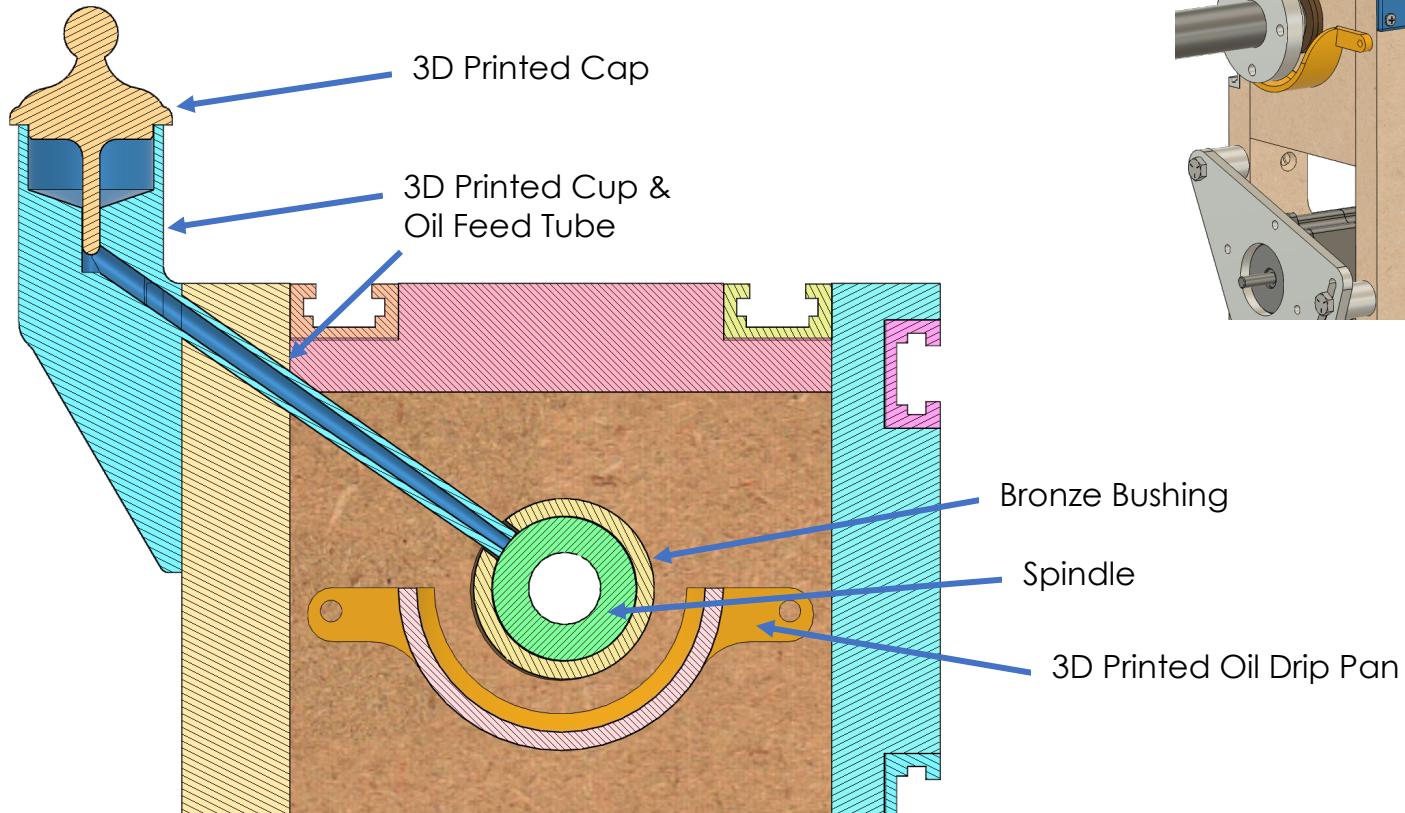


# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

### Spindle Oilers

The 3D-printed oilers for the MDF Rose Engine 2.0 are shown to the right. They are the red, blue, and yellow parts. The green parts are used as name plates for decorative purposes.



# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

### Bill of Materials

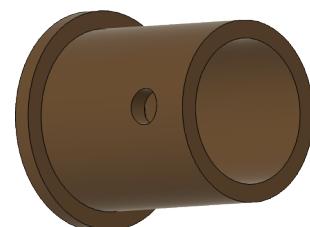
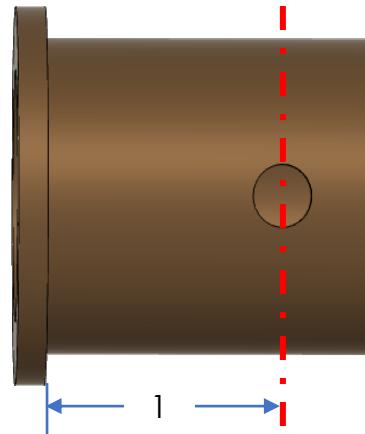
Other than the attachment screws, no additional parts are needed for this. All the rest are 3D-printed.

Item #	Item	Qty	Source	Source Part Number	Comments
101	Screws for Particleboard and Fiberboard, Rounded Head, Black-Oxide Steel, Number 6 Size, 1/2" Long	10	McMaster-Carr	91555A101	
102	Socket Head Screw 1/4"-20 Thread Size, 2" Long, Fully Threaded	2	McMaster-Carr	90044A125	

### Instructions

#### Drill Holes in the Spindle Bushings

Drill a  $\frac{1}{4}$ ' hole in both spindle bushings. Only drill through one side.

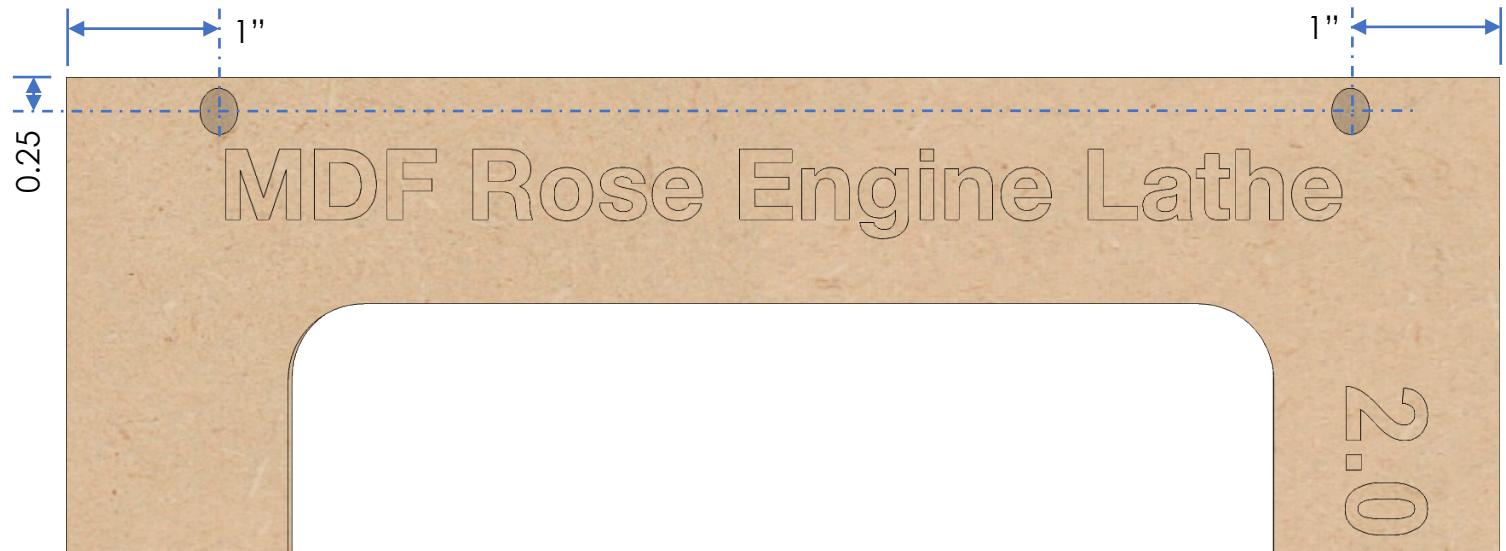


## MDF Rose Engine Lathe 2.0

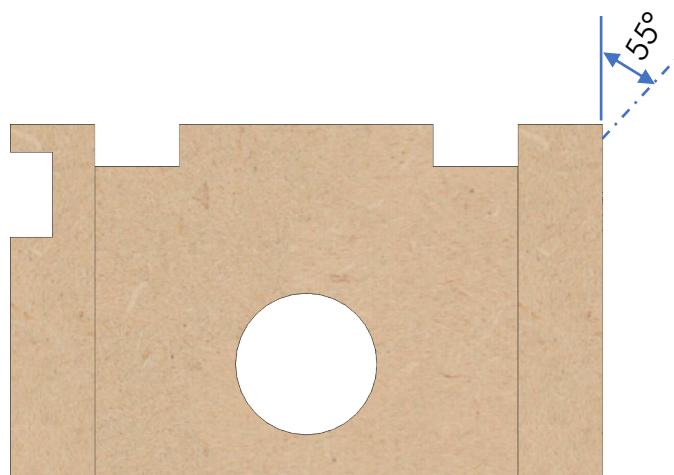
### Jigs, Fixtures, and Add-Ons

#### **Drill the Front of the Headstock**

Drill two holes in front side of the headstock. The holes need to be drilled using a 9/32" drill.



Both holes need to be 1" in from the sides, and  $\frac{1}{4}$ " down from the top.  
Angle the drill at 55° as shown in the bottom picture.



# MDF Rose Engine Lathe 2.0

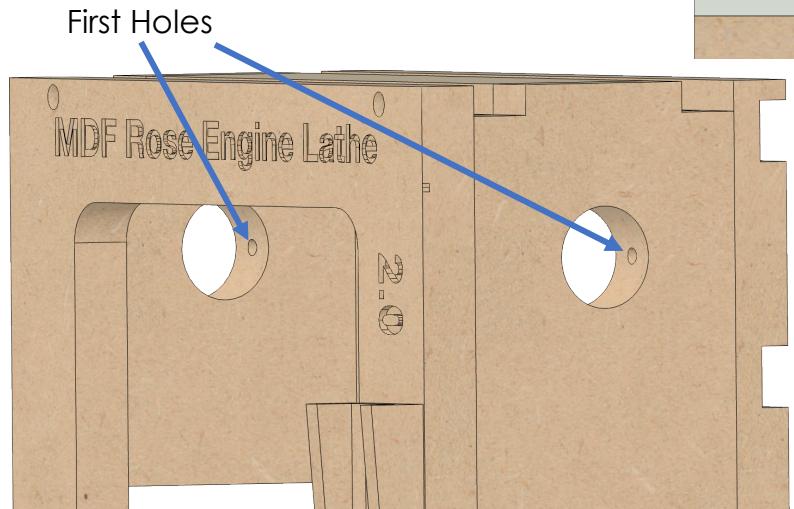
## Jigs, Fixtures, and Add-Ons

### Drill the Back of the Headstock

Drill two sets of holes in back side of the headstock.

First, drill holes at the indicated points using a #7 or 7/32" drill. These need to be drilled from the back thru to the spindle hole.

Second, drill holes at the same points using a 5/8" Forstner bit. These need to be 1 1/4" deep.

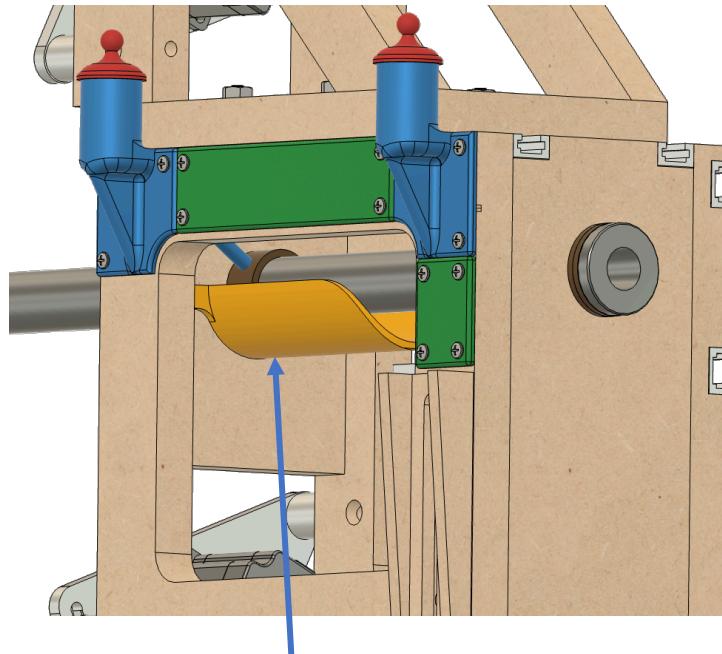


Tap the smaller holes using a 1/4"-20 tap. You should then fill the holes with thin CA glue, let it dry, and tap them again.

# MDF Rose Engine Lathe 2.0

## Jigs, Fixtures, and Add-Ons

### Install the Inside Oil Drip Pans

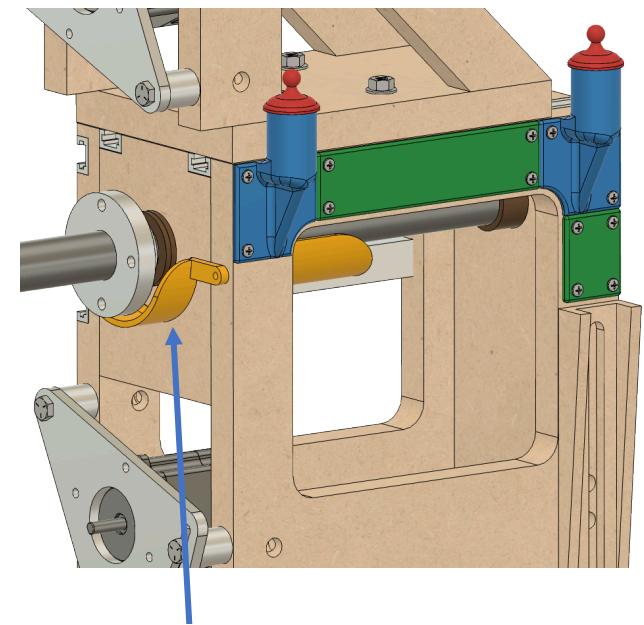


**3D Printed Inside Oil Drip Pan**

First, install the inside oil drip pan before assembling everything else. This is the yellow part in the drawing to the left.

It is hard enough to get your hand into the headstock but should be done next as it is easier before the spindle and everything else is in place. The #101 screws noted in the BOM are used for this.

Next, install the outside oil drip pan. Again, the #101 screws are used for this.



**3D Printed Outside Oil Drip Pan**

### Install the Oiler Cups

The cups should be aligned with the top corners of the headstock. As shown, there is a curve to each to align with the headstock's opening. Secure them in place using the #101 screws noted in the BOM.

## MDF Rose Engine Lathe 2.0

### Jigs, Fixtures, and Add-Ons

#### Install the Spindle and Spindle Bushings

Be sure the holes in the bushings align with the tubes projecting into the headstock from the oiler cups.

#### Install the Spindle Bushing Securing Screws

These screws help ensure the spindle bushings do not move when the spindle is rotated or pumped. The #102 screws in the BOM are used for this. You can use standard,  $\frac{1}{4}$ -20 bolts with a  $\frac{7}{16}$ " head. A long,  $\frac{1}{4}$ " drive socket will fit into the  $\frac{5}{8}$ " hole.

Be sure to not over tighten these bolts. They need to hold the bushings in place, but should not cause them to move such that they bind on the spindle.

#### Install the Rest the Parts

Once everything is in place, add 2-3 drops of machine oil to the oiler cups and re-install the caps. Be sure to not add more than 1-2 drops going forward. The intent is to keep the spindle lubricated, but not to force the oil out of the bushings.

Get something made.