

MDF Rose Engine Lathe 2.0

with Stepper Motor Drive

Design Goals

Version 1.0
04 July 2020

MDF Rose Engine 2.0 – Design Goals

This document is intended to outline the design goals around which the machine is specified.

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

Good luck.

Rich Colvin & Jack Zimmer

MDF Rose Engine 2.0 – Design Goals

Table of Contents

Guiding Principles.....4

General – Target User..... 4

General – Overall Design 4

Kit Offered for Sale..... 5

Design Criteria.....6

Headstock 6

Base 6

Spindle Drive 7

Other..... 7

MDF Rose Engine 2.0 – Design Goals

Guiding Principles

General – Target User

1. The target user for the MDF rose engine lathe is
 - a. An experienced wood turner, with
 - b. The basic woodworking skills that would have been garnered in shop class.
2. The design will ensure it can be built by the woodworker:
 - a. Using a kit of parts we will provide,
 - b. Possessing basic woodworking skills, and
 - c. Using tools which can reasonably be expected to be available or easily accessible.

General – Overall Design

1. The intent is to stay consistent with the original overall design outlined by Jon Magill, especially the designs built into the rosettes.
2. The design will continue to use MDF as the primary building material for the headstock and base.
3. The design will include commonly implemented updates to the original design, including:
 - a. Stepper motor for the spindle drive,
 - b. Metal sheet on the lathe's bed,
 - c. Magnetic hold-downs (MagSwitches) for locking the cross slide into position on the lathe bed,
 - d. Front and rear rubbers, and
 - e. Amplitude adjusting (front rubbers only).
4. The design will not include previously offered features which would make the overall design cumbersome or expensive. In particular, hand cranking capabilities will not be included,
5. The design will provision for known future options / expansions:
 - a. Multiple stepper motors with controls for the multiple stepper motors, and
 - b. Pumping on the spindle.

MDF Rose Engine 2.0 – Design Goals

Kit Offered for Sale

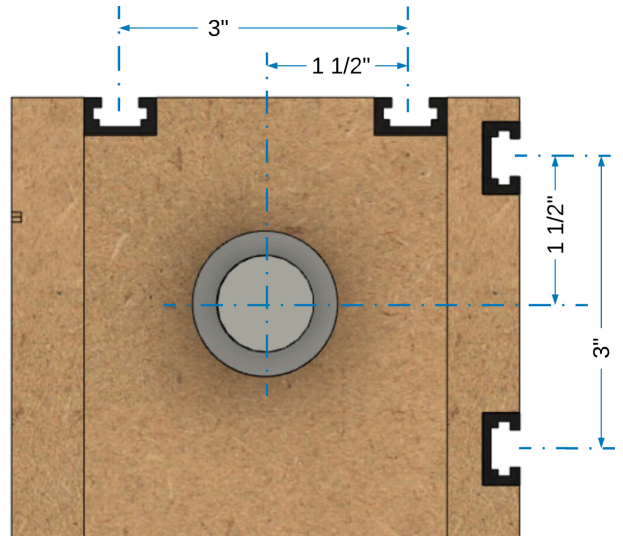
1. The design should enable a complete rose engine lathe to be built from a kit for less than \$2,000. And the design should be designed to be lower if the user opts to make their own parts.
2. The kit offered for sale will provide options which, in total, will supply the hobbyist with all the parts needed (including the MDF).
 - a. Using standard, off-the-shelf parts, with a conscious decision being made when customized parts are to be used,
 - b. Sourcing parts from vendors likely to provide the parts for a reasonable time into the future (i.e., minimizing rework of the designs), and
 - c. Sourcing more expensive parts from vendors who will accommodate drop-shipments. This reduces the investment in inventory for the provider of the kits.
3. The kit offered for sale will provide options where it makes reasonable sense. Option selections include:
 - a. **Spindle drive option** – Everything needed to drive the spindle with a stepper motor (*stepper motors allow the spindle's speed to be slowed down to multiple minutes per revolution*)
 - i. Or allow the builder to build or source their own approach, and
 - ii. Also, provision existing MDF rose engine lathe owners to add this to their system.
 - b. **Cutting frame option** - Enabling the builder to
 - i. Select a universal cutting frame with an integrated motor,
 - ii. Select a universal cutting frame with an overhead drive,
 - iii. Make their own cutting (or drilling frame), or
 - iv. Source one from a different source.
 - c. **Tool holder (cross slide and tool post) option** – Enabling the builder to
 - i. Select a pre-defined set of cross slide, quick-change tool post, and tool holders (AXA), or
 - ii. Source one from a different source.
 - d. **Case Option** – Enabling the builder to
 - i. Select a pre-cut MDF kit with all the pieces for the body and headstock, already cut to size and ready for assembly
 - ii. Source and build the case and headstock on their own.

MDF Rose Engine 2.0 – Design Goals

Design Criteria

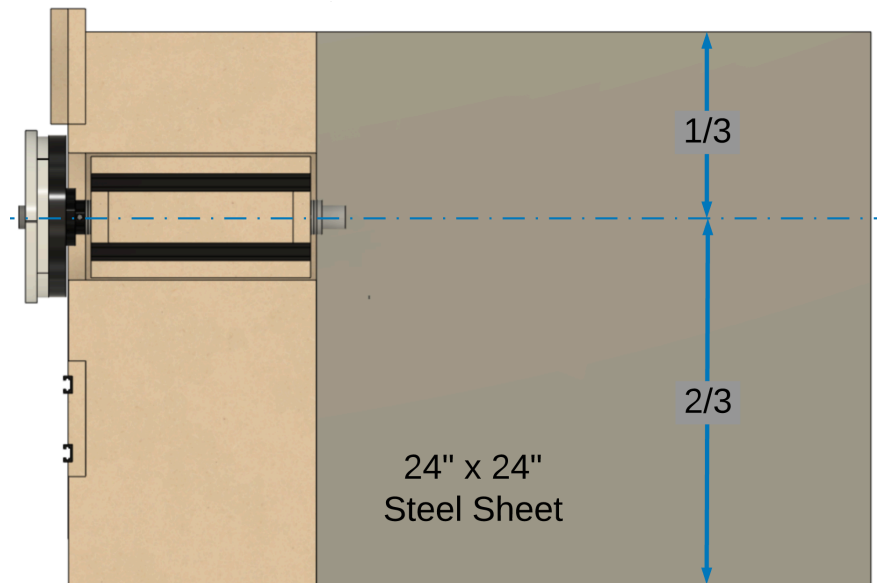
Headstock

1. The distance from the center of the rocking pivots to the center of the spindle shall be 12 inches. The rosettes are designed around this.
2. The rocking pivot points are to be aligned so that the rotation of the headstock is fully aligned with the rotation of the spindle.
3. T-Tracks will be implemented on the headstock for standardized add-ons.
 - a. The T-Tracks will be aligned to be parallel with the spindle,
 - b. The center of each T-Track shall be 1-1/2" from the center of the spindle (as shown to the right),
 - c. There shall be two T-Tracks on the top of the headstock, and
 - d. There shall be two T-Tracks on the rear of the headstock.



Base

1. The lathe's bed shall be sized to accommodate the attachment of a 24" x 24" sheet of steel.
2. The sheet of steel on the lathe bed shall be minimally 16 gauge, and the design shall be able to accommodate upgrading that sheet to a thickness of 1/8".
3. The lathe's bed (B1 / B1A) shall:
 - a. Overhang the base by 2" on the front, back, and right sides (in the picture to the right, those are the right, top, and left sides),
 - b. Be flush against the left side (B3 / the rubber support post), and
 - c. Be positioned front-to-back so that it has approximately 1/3 behind the spindle's axis of rotation, and 2/3 in front of that axis.



MDF Rose Engine 2.0 – Design Goals

Spindle Drive

1. The spindle drive shall use a NEMA 23 stepper motor.
2. The controls will be implemented the Teensy/Nextion controls.
 - a. The power supply (EDR-120-24) will be expandable as necessary for future options.
 - b. The design will be based on the DM542T motor drivers; however, the user could opt to use other drivers such as the DRV8825.
3. The connectors for the stepper motors and aviation plugs with 4-wire connections.

Other

1. Tool holding is designed around the AXA standard.

MDF Rose Engine 2.0 – Design Goals

To the extent that material may appear to be infringed, we assert that such alleged infringement is permissible under fair use principles in U.S. copyright laws. If you believe material has been used in an unauthorized manner, please contact me at ColvinTools@Gmail.com.

Portions of this document are copyrighted by Jon Magill and are used with his permission.