**MDF Rose Engine Lathe 2.0**

**with Stepper Motor Drive**

**A picture containing indoor, table, desk, sitting

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**Standards**

**Version 1.0**

**11 August 2020**

This document is intended to document the standards used in the design of the MDF Rose Engine Lathe 2.0. The kit you can purchase from [www.ColvinTools.com](http://www.ColvinTools.com), and add-on parts are designed around these standards.

If you have any questions, please contact us at [ColvinTools@Gmail.com](mailto:ColvinTools@Gmail.com).

Good luck.

Rich Colvin & Jack Zimmel

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# Mechanical Standards

## Spindle

1. Work holding end will have a Morse Taper #2.
2. Shaft will accommodate a 3/8”-16 draw bar.
3. Shaft will be able to be used on the original MDF rose engine lathe.

## A close up of a device Description automatically generatedLathe Bed

1. Lathe bed shall be 24” square.

## Headstock

1. Headstock shall be positioned such that:
   1. 1/3 of the bed is behind the center line of the spindle
   2. 2/3 of the bed is forward of the center line of the spindle
2. A picture containing clock, large, city

   Description automatically generatedDistance between the center line of the spindle and the headstock’s pivot points shall be 12”.
3. T-Tracks on the headstock shall be 1 ½” from the centerline on the spindle.
   1. Two on top, and
   2. Two on the rear.

# Electrical

## Conventions in this Document

In this document,

* Standards are documented using green tables
* Recommendations are documented using blue tables

## Nextion Display

1. **Device**

|  |  |
| --- | --- |
| Item | Standard |
| Model | [Nextion](https://nextion.tech/) Enhanced HMI Display |
| Size | 4.3” |

1. **Cabling**

|  |  |
| --- | --- |
| Item | Standard |
| Conductor Type | Ethernet Cat-5 (or higher) |
| Cable Size | 8 conductors / cable |

1. **Connector**

|  |  |
| --- | --- |
| Item | Standard |
| Connector | RJ-45 |
| Cable Ends | Female plug |
| Control Box | Male Socket |
| Nextion Box | Male Socket |

1. **Connector Configuration**

|  |  |
| --- | --- |
| Item | Standard |
| Cabling Color Standard | T568A |
| Power Pins | Power over Ethernet (PoE) standard 802.3af, 10/100 Mode A (mixed DC & data) |

|  |  |  |
| --- | --- | --- |
| Pin | Cable Wire Color | Use |
| 1 | White/Green | Rx |
| 2 | Green | DC+ (5V) |
| 3 | White/Orange | Tx |
| 4 | Blue | *(unused)* |
| 5 | White/Blue | *(unused)* |
| 6 | Orange | DC- / GND |
| 7 | White/Brown | *(unused)* |
| 8 | Brown | *(unused)* |

## Stepper Motors

### Spindle Stepper Motor

|  |  |
| --- | --- |
| Item | Standard |
| Size | NEMA 23 |
| Motor Type | Bipolar Stepper |
| Step Angle | 1.8 deg |
| Microstep Resolution | 6400 |
| Min. Holding Torque | 1.9Nm (269oz.in) |
| Max. Rated Current/phase | 4A |

### Other Stepper Motors

|  |  |  |
| --- | --- | --- |
| Item | Required | Recommended |
| Size | *- n/a -* | NEMA 17 |
| Motor Type | Bipolar Stepper |  |
| Step Angle | 1.8 deg |  |
| Microstep Resolution | *- n/a -* | 6400 |
| Min. Holding Torque | *- n/a -* | (as needed) |
| Max. Rated Current/phase | 4A |  |

### General

1. **Cabling**

|  |  |  |
| --- | --- | --- |
| Item | Standard | |
| Conductor Type | | Stranded copper |
| Conductor Size | | 20 AWG |
| Cable Size | | 4 conductors / cable |

1. **Connector**

|  |  |  |
| --- | --- | --- |
| Item | Standard | |
| Connector | | GX-16, 4 pins |
| Cable Ends | | Female plug |
| Control Box | | Male Socket |
| Stepper Motor | | Male Socket |

1. **Connector Configuration Standard**

|  |  |
| --- | --- |
| Pin | Use |
| 1 | A+ / A1 |
| 2 | A- / A2 |
| 3 | B+ / B1 |
| 4 | B- / B2 |

1. **Connector Connection Recommendation**

|  |  |  |  |
| --- | --- | --- | --- |
| Pin | Use | Cable Wire Color | StepperOnline Stepper Motor Lead Color |
| 1 | A+ / A1 | Black | Black |
| 2 | A- / A2 | Yellow | Green |
| 3 | B+ / B1 | Red | Red |
| 4 | B- / B2 | White | Blue |

## Stepper Motor Drivers

1. **Device**

|  |  |  |
| --- | --- | --- |
| Item | Standard | |
| Model | | DM542T |

1. **Power Cabling**

|  |  |  |
| --- | --- | --- |
| Item | Standard | |
| Conductor Type | | Stranded copper |
| Conductor Size | | 20 or 22 AWG |
| Cable Size | | 2 conductors / cable |

1. **Power Cabling Configuration**

|  |  |
| --- | --- |
| Item | Cable Wire Color |
| Positive (+) | Red |
| Negative (-) | White (or Black) |

1. **Signal Cabling**

|  |  |  |
| --- | --- | --- |
| Item | Standard | |
| Conductor Type | | Stranded copper |
| Conductor Size | | 20 AWG |
| Cable Size | | 4 conductors / cable |

1. **Connectors**: Cable conductors are directly connected to the DM542T using the provided screw terminals.
2. **Power Cabling Configuration**

|  |  |  |
| --- | --- | --- |
| Item | Cable Wire Color | |
| Pulse + | | Black |
| Pulse - | | White (GND) \* |
| Direction + | | Red |
| Direction - | | White (GND) \* |
| Enable + | | Yellow |
| Enable - | | White (GND) \* |

\* GND wires tied / bonded together.

## DC Power Supply

1. **Device**

|  |  |  |
| --- | --- | --- |
| Item | Standard | |
| Model (USA) | | Mean Well EDR-120-24 |
| Output | | 24 VDC |

1. **DC Power Cabling**

|  |  |  |
| --- | --- | --- |
| Item | Standard | |
| Conductor Type | | Stranded or solid copper |
| Conductor Size | | 20 or 22 AWG |
| Cable Size | | 2 conductors / cable |

1. **DC Power Cabling Configuration**

|  |  |  |
| --- | --- | --- |
| Item | Cable Wire Color | |
| Positive (+) | | Red |
| Negative (-) | | White (or Black) |

1. **AC Power Cabling**

|  |  |  |
| --- | --- | --- |
| Item | Standard | |
| Conductor Type | | Stranded copper |
| Conductor Size | | 16 AWG (min) |
| Cable Size | | 3 conductors / cable |

1. **AC Power Cabling Configuration**

|  |  |  |
| --- | --- | --- |
| Item | Cable Wire Color | |
| Hot (or live or active) | | Black |
| Neutral | | White |
| Ground | | Green |

1. **AC Power Switching Configuration**: Hot (or live or active) is switched on the infeed to the DC power supply.

## Limit Switches

### General

1. **Cabling**

|  |  |  |
| --- | --- | --- |
| Item | Standard | |
| Conductor Type | | Stranded copper |
| Conductor Size | | 22 AWG |
| Cable Size | | 2 conductors / cable |

1. **Connector**

|  |  |  |
| --- | --- | --- |
| Item | Standard | |
| Connector | | 3.5mm (1/8”) mono |
| Cable Ends | | Female plug |
| Control Box | | Male Socket |
| Limit Switch | | (directly cabled) |

1. **Connector Configuration**

|  |  |  |
| --- | --- | --- |
| Pin | Standard | Cable Wire Color |
| Tip | DC+ | Red |
| Sleeve | GND | White |

### Limit Switch

|  |  |
| --- | --- |
| Item | Standard |
| Switch Type | Normally open, momentary close |

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