

# The Filament Winder Task List

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**Purpose:** This document guides repeatable, basic operation of The Filament Winder.

**Description:** The Filament Winder is a CNC machine capable of wrapping a tow around a circular surface to a desired pattern. The machine can be used to produce make wet layup or pre-impregnated composite components.

## 1 SAFETY REQUIREMENTS

### 1.1 Operator Requirements

1.1.1 Primary operator must have yellow tag certification in the Student Machine Shop.

### 1.2 Machine Operation

1.2.1 Machine should be treated like a lathe. Lathe safety tips are covered by the yellow tag certification in the Student Machine Shop.

1.2.2 Move the machine out to the hanger bay with the adjacent bay doors open when using a resin.

1.2.3 Use appropriate PPE for materials being used. A default is long pants, closed toe shoes and safety glasses.

1.2.4 Ensure no personnel are in the path of the carriage when the machine is running.

1.2.5 No personnel should go behind the machine while the machine is in operation.

### 1.3 Materials and Chemicals

1.3.1 Choose and wear proper Personal Protective Equipment (PPE) according to the material manufacture's recommendation, the CPSS advisor, and/or MSDS's. PPE may include, but not limited to: safety glasses, long pants and closed toe shoes. Safety glasses may be borrowed for CPSS and are in a tub in the tool room.

1.3.2 Nitrile gloves are located in the tool room in various sizes.

1.3.3 Safety glasses are available to use in a tub in the tool room

1.3.4 MSDS's are located on the cloud drive under "Safety and Technical Specs", accessible by the club computers in the conference room and are located in a physical binder on top of the flammables cabinet in the filament winder room.

1.3.5 Refer to "Task List Composite Layup" on the CPSS cloud drive, accessible via a club computer in the conference room and in the Task list folder residing in the conference room.

## **2 CADWIND**

CADWIND is the CNC software designed for filament winding applications. The program is located on one of CPSS computers in the conference room. CADWIND is separate from the winder's computer.

The output code from the program is G-Code and is inputted into the machine via a floppy disk.

## **3 MACHINE SETUP**

### **3.1 Machine Parameters**

3.1.1 Maximum diameter is 24 inches and maximum length is 9 feet.

### **3.2 Machine power**

3.2.1 The machine requires 208V power connection. Plug the 208V power cord into the nearest outlet. This may require crossing the shop floor in front of the club cages. Be sure the cord is not in another club's way.

3.2.2 Computer requires 110V power and has a plug located inside the machine.

### **3.3 Computer and G-Code setup**

3.3.1 There is a program called "CadWind" and is located on the desktop.

3.3.1.1 Run "CMC"

3.3.2 Load G-Code into the program using a floppy disk.

### **3.4 Machine Setup**

3.4.1 Make sure mandrel is installed correctly by checking for wobble and if the mandrel can move parallel to the rotating axis. Eliminate wobble and ensure the mandrel cannot move.

3.4.2 Ensure all emergency stop buttons are released and the red trip wire is installed and properly tensioned. (The machine will not run without the trip wire installed or tensioned.)

3.4.3 Tow spools go on the rollers below the carriage.

3.4.4 Verify tensioner is providing tension to fibers.

3.4.5 Adjust eye distance to part. Update CADWIND with actual eye distance. Eye distance is critical to a quality wrap.

3.4.6 Pour resin into resin bath (if resin is required).

## **4 MACHINE OPERATION**

- Treat the machine like a lathe and a CNC machine. Pause the machine as needed to ensure part quality and machine health
- Ensure no personnel are in the path of the carriage when the machine is running.

## **5 CLEAN UP AND SHUTDOWN**

### **5.1 Clean up**

- 5.1.1 Clean resin out of the resin bath. Clean all the rollers. Clean the eye.
- 5.1.2 Clean the mandrel once the part is taken off.
- 5.1.3 Clean any resin that has dripped on the machine or the floor.

### **5.2 Shutdown**

- 5.2.1 Shut down the computer
- 5.2.2 Power down the machine and click in one of the emergency stops
- 5.2.3 Un-plug the machine cord and coil neatly