

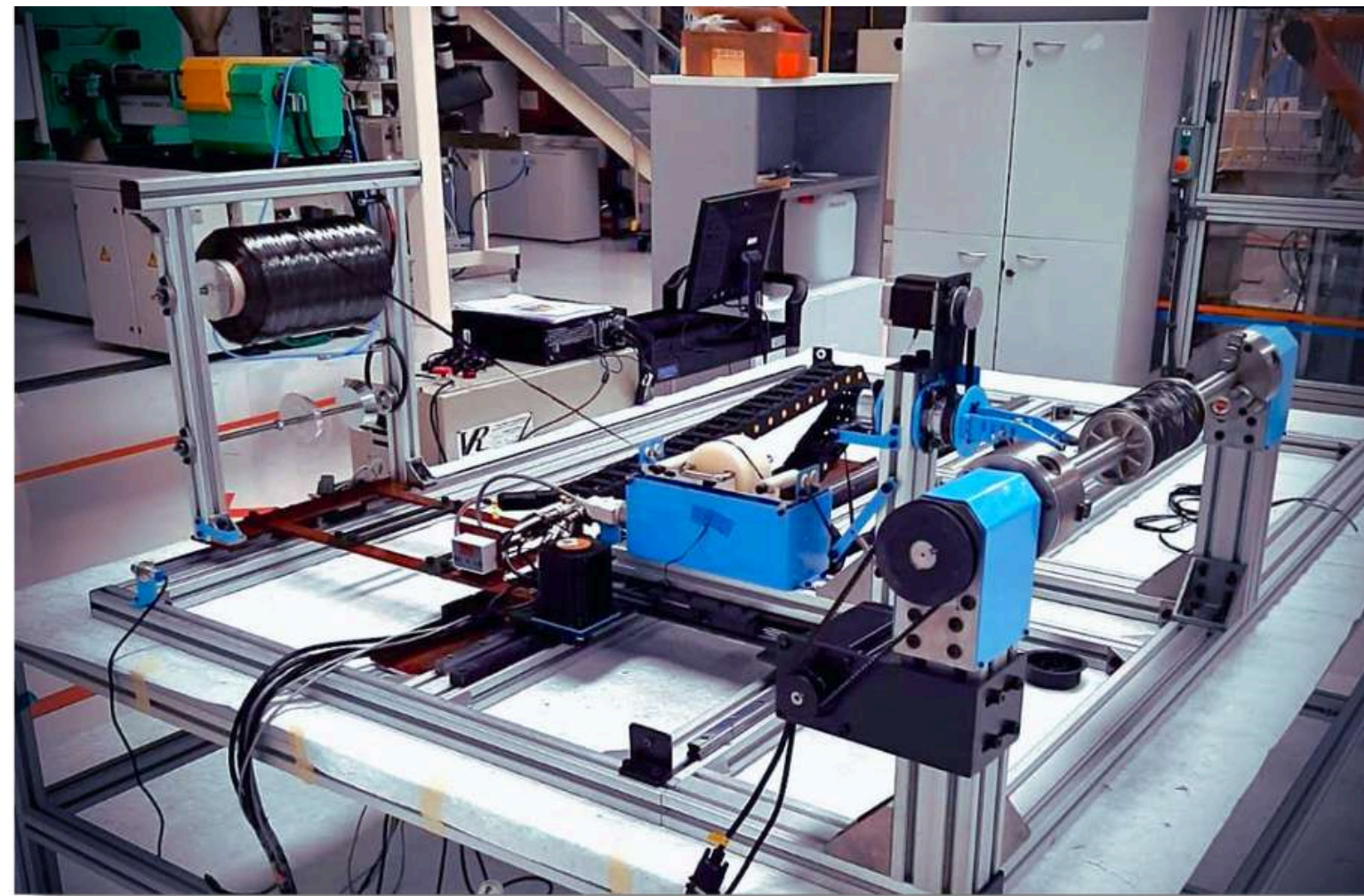


# Technical Specification– Carbon Chakra and Winding Guru.

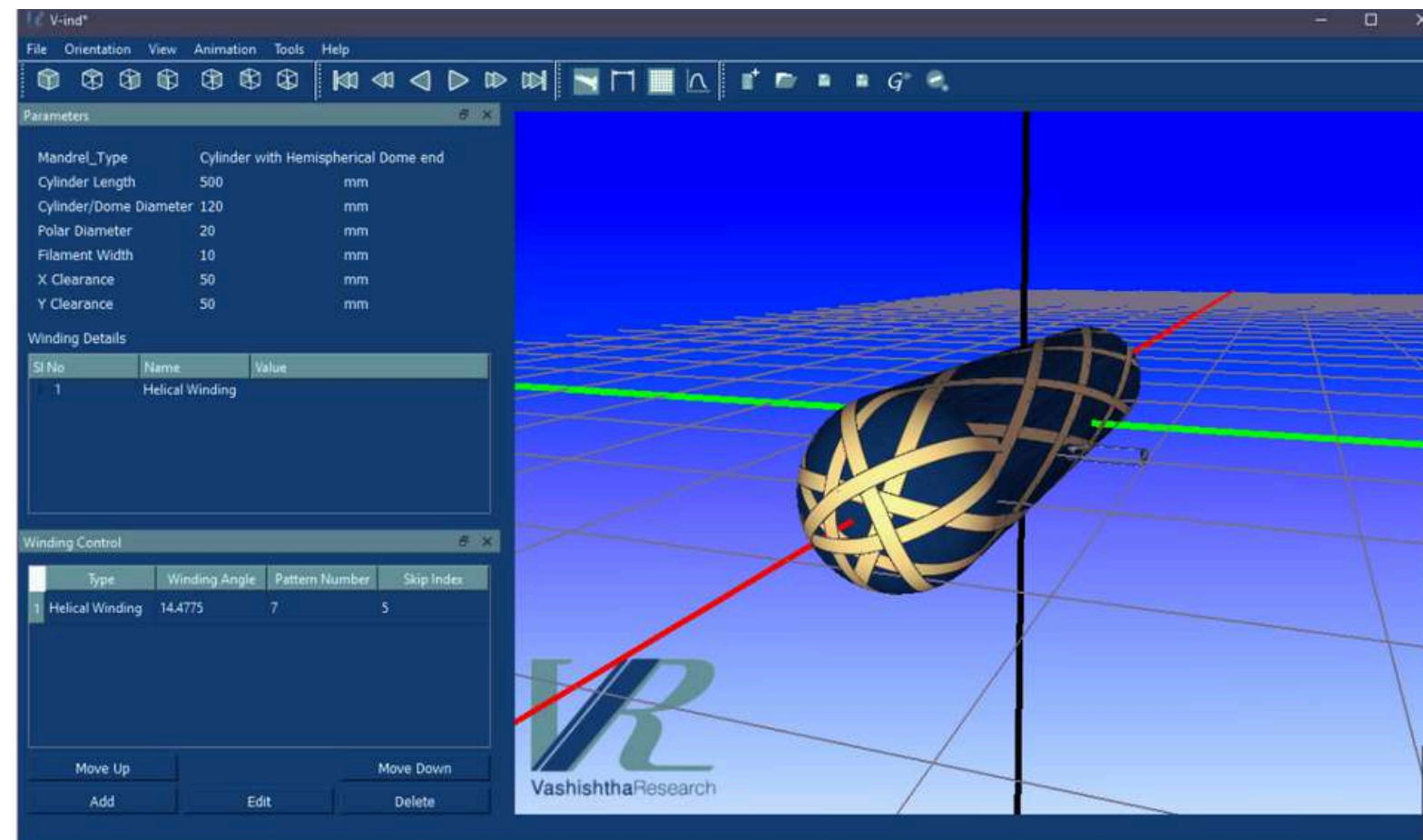
**4 Axis Filament Winding Machine  
and Software**



# Introduction



- **Carbon Chakra – 4 Axis filament Winding Machine.**



- **Winding Guru– 4 Axis filament Winding software.**

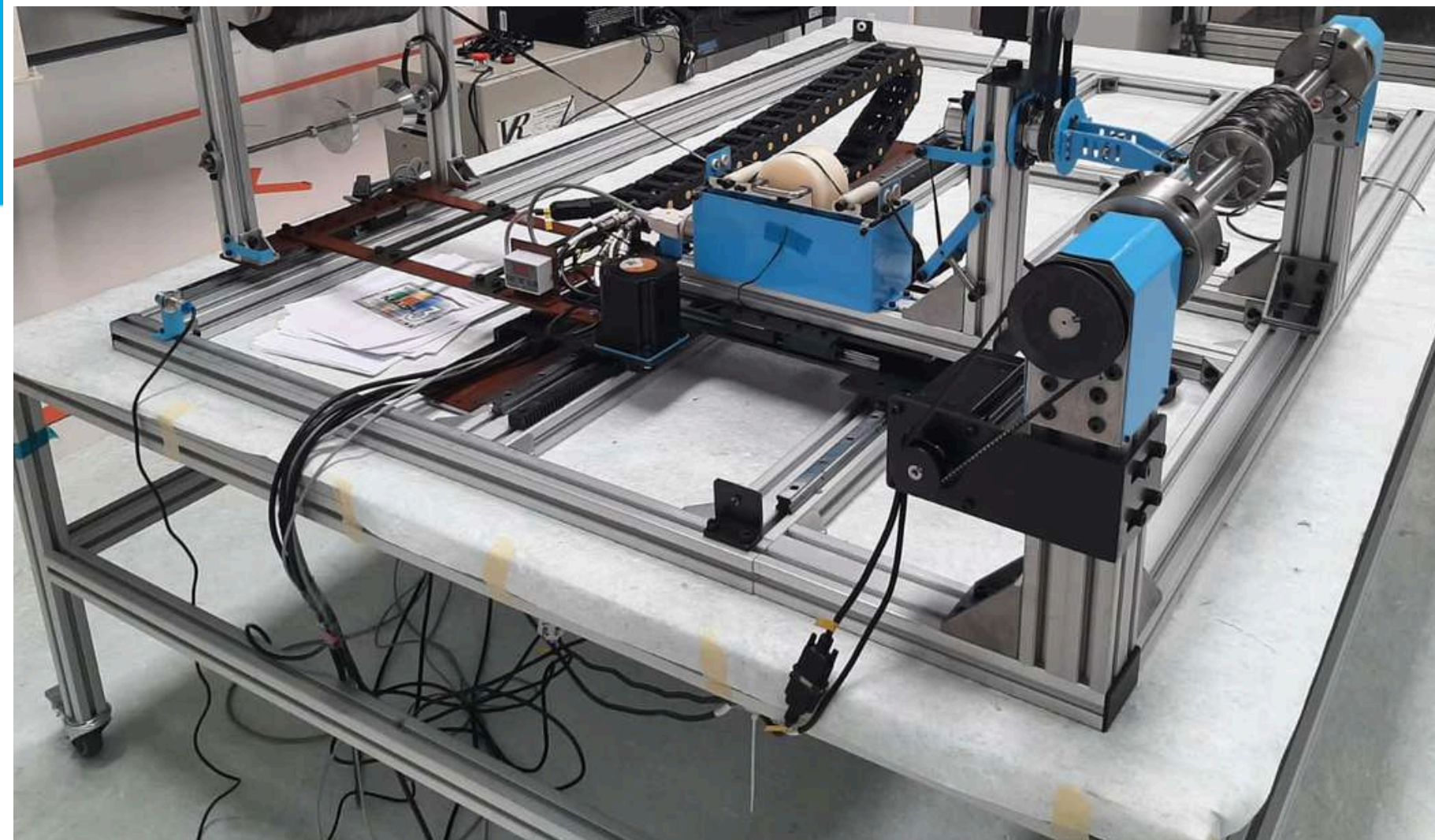
# Mandrel Specifications

- **Maximum Winding Diameter = 250 mm**
- **Minimum Winding Diameter = 10 mm**
  
- **Maximum winding length = 1500 mm**
  
- **Maximum rotating weight = 100 Kgs**
  
- **Number of simultaneous control = Four**
  
- **Number of Spindle = One**
- **Number of Spools = Two**
  
- **High quality transmission elements and bearings – HIWIN  
Linear guide ways, Helical Racks & pinions and timing belts  
& pulleys.**

## Installation requirements.

### Dimensions of the machine

- The length of the machine = 2.2m
- Width of the machine = 1.8 m
- Height of the machine = .6m
- Table of a slightly bigger dimension required for mounting the machine.
- Table and computer will not be provided along with the machine.



### Power Requirements

- Heating system for resin bath: 1500 W
- Maximum power of all motors: 1500 W
- Single Phase, 230 V, 50 Hz

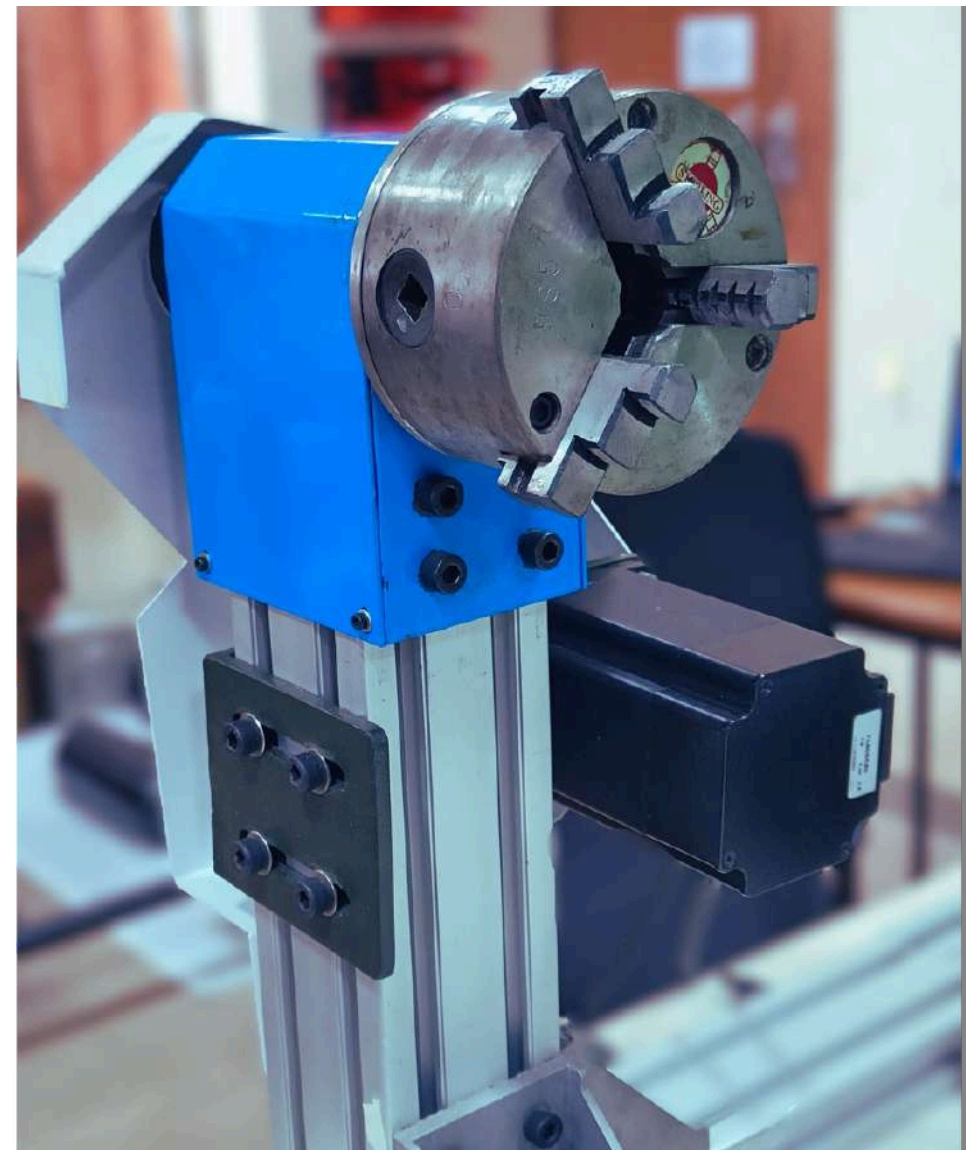


# Axes Configuration

Axis	Specification
Mandrel Axis ( A- Axis )	Stroke : 0 to 360° Speed : 0-100 rpm Maximum rotating weight = 100 Kgs
Carriage Axis ( X – Axis)	Winding length capacity : 1500 mm Stroke of traverse : 1800 mm Maximum speed of traverse : 15 m/min
Carriage Axis ( Y – Axis )	Stroke of traverse = 150mm Maximum speed = 15 m/min
Feed Eye Axis ( B – Axis )	Stroke : 0 to 360° Speed : 0-80 rpm

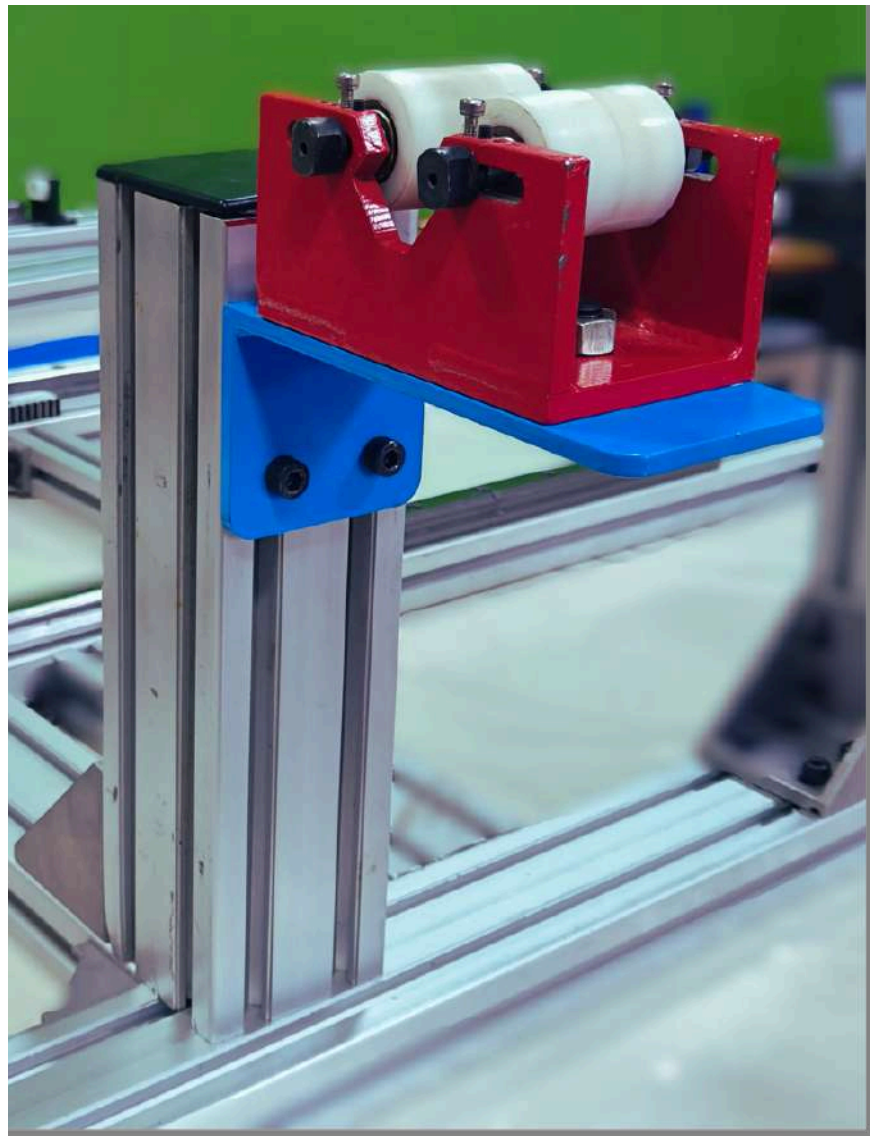


- Tail Stock on other side



- 3 Jaw self centering chuck on one side
- Distance between Chuck and tailstock is adjustable to accommodate different lengths of mandrel.

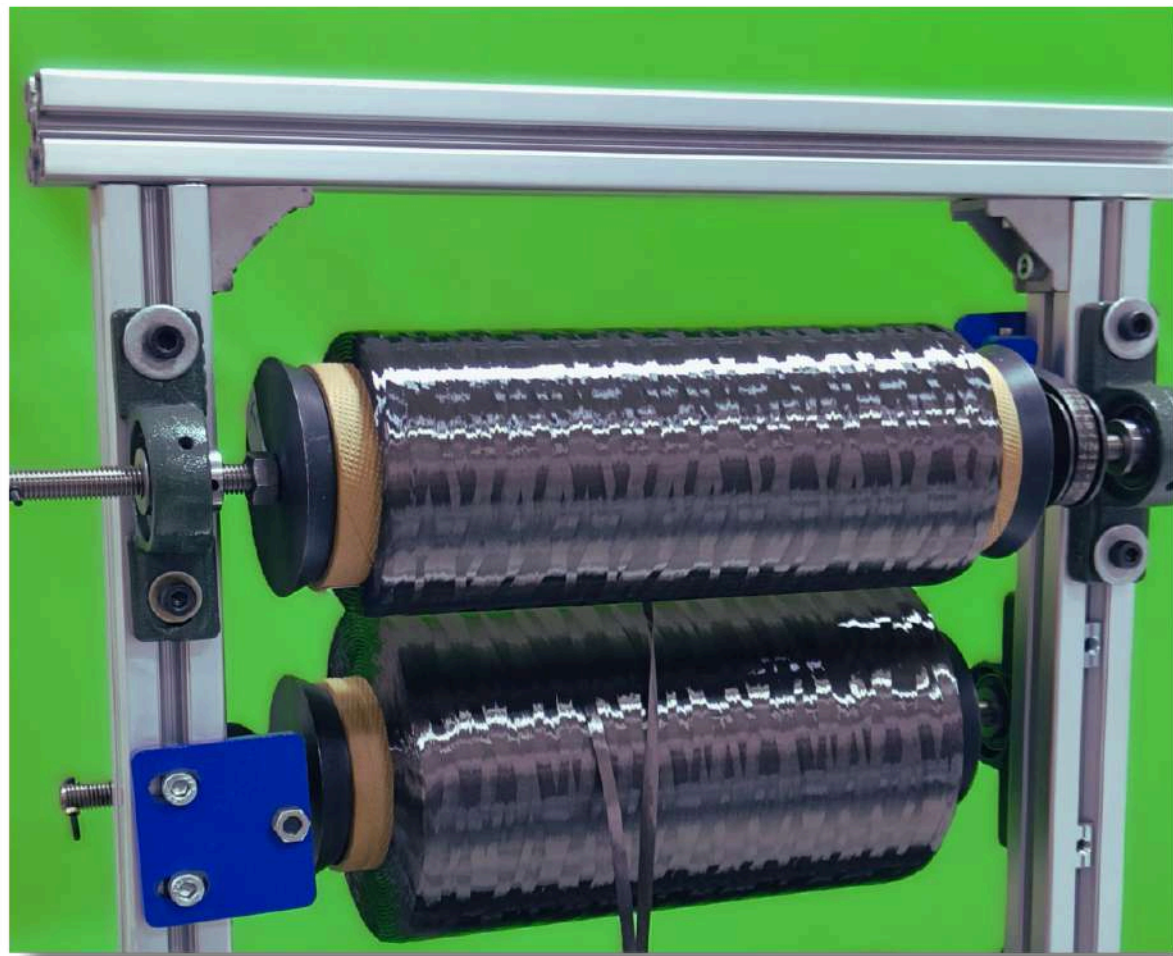
## Mandrel Holding Arrangement



- **Supporting rollers**
- **(For heavy mandrels and Cantilever winding)**



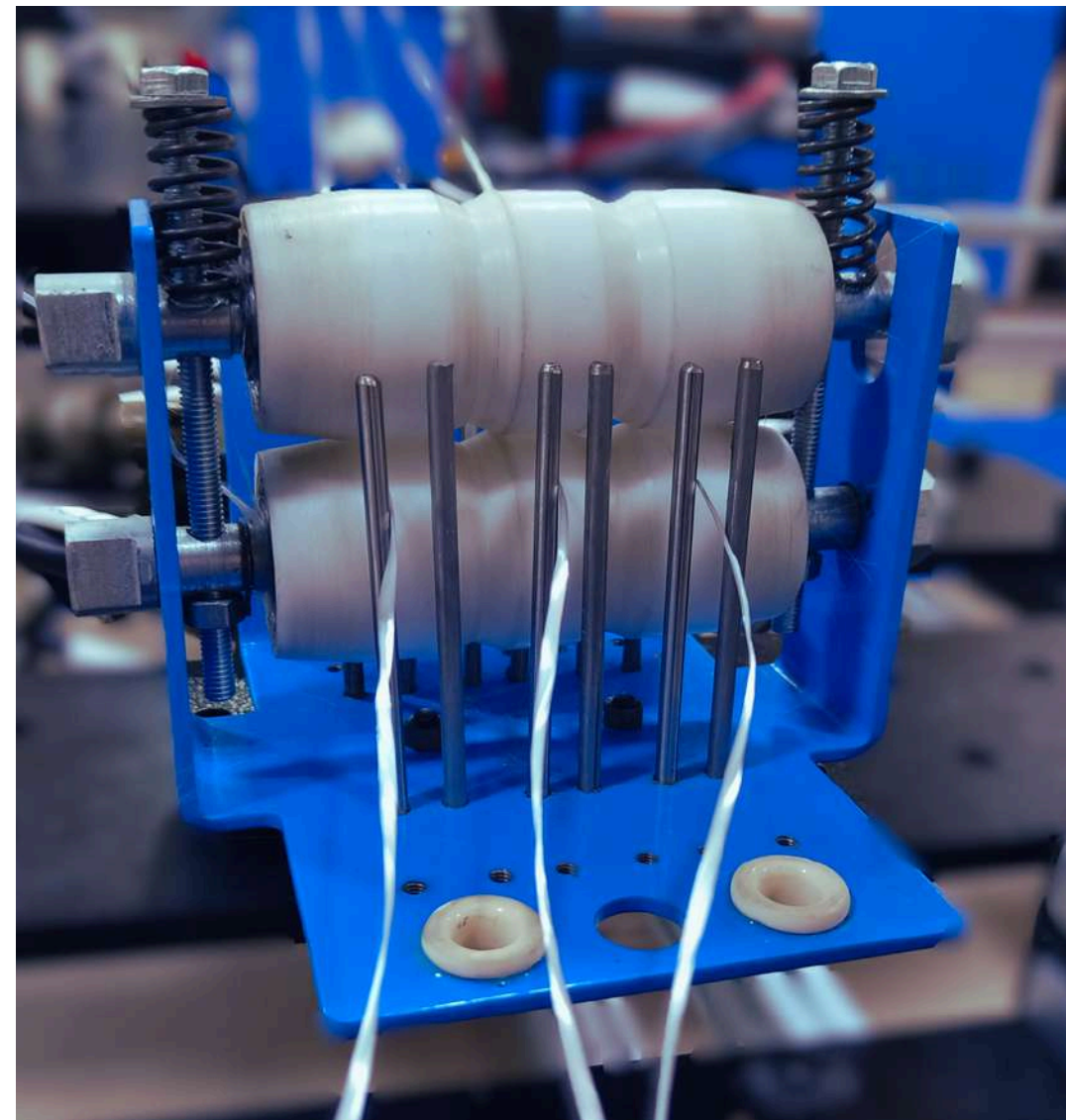
## Mandrel Holding Arrangement



- Hold upto 2 carbon fiber spools

## Spool holding

- Attachment for glass fiber entry.
- Types of spool supported - Carbon fiber and Glass fiber







- **Spring loaded mechanical tensioning to ensure proper tension while winding**

## Tensioning Systems



- **Fiber pull back mechanism**

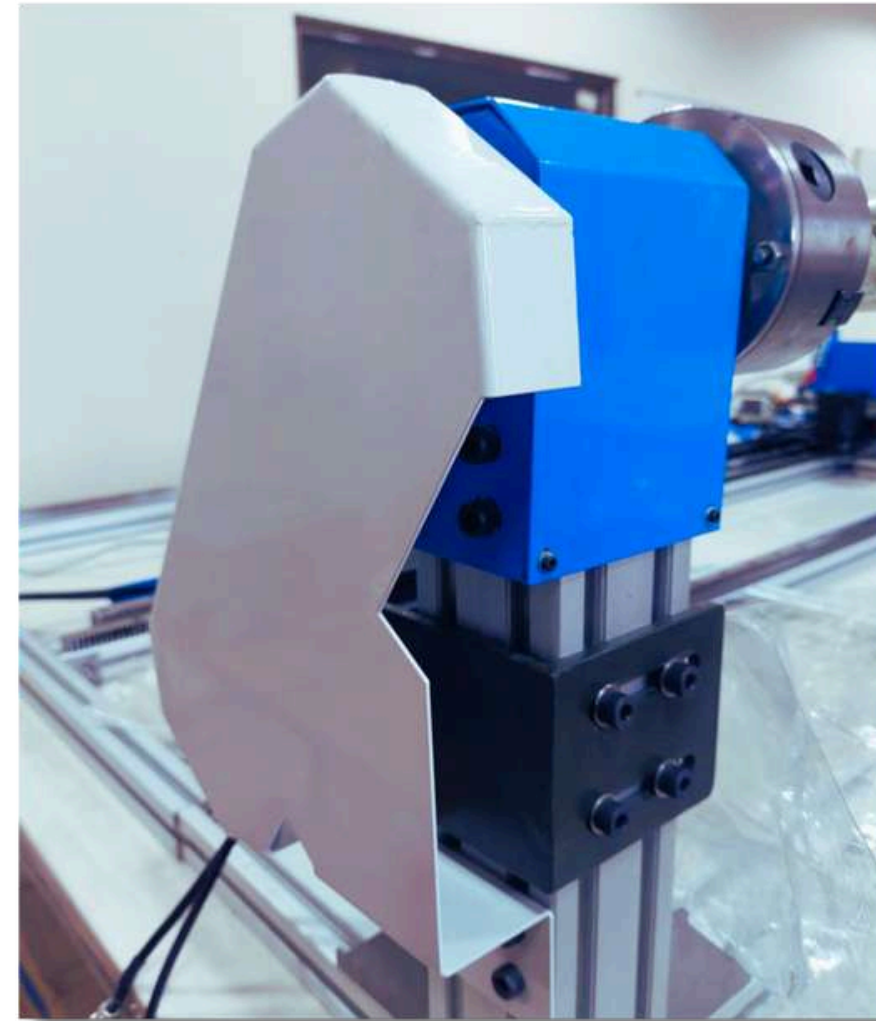


## Resin Bath

- **Temperature controlled heated resin bath. (Range 20°C -100°C)**
- **Resin bath capacity-500ml**



- **Limit Switches**
- **Mechanical stoppers**



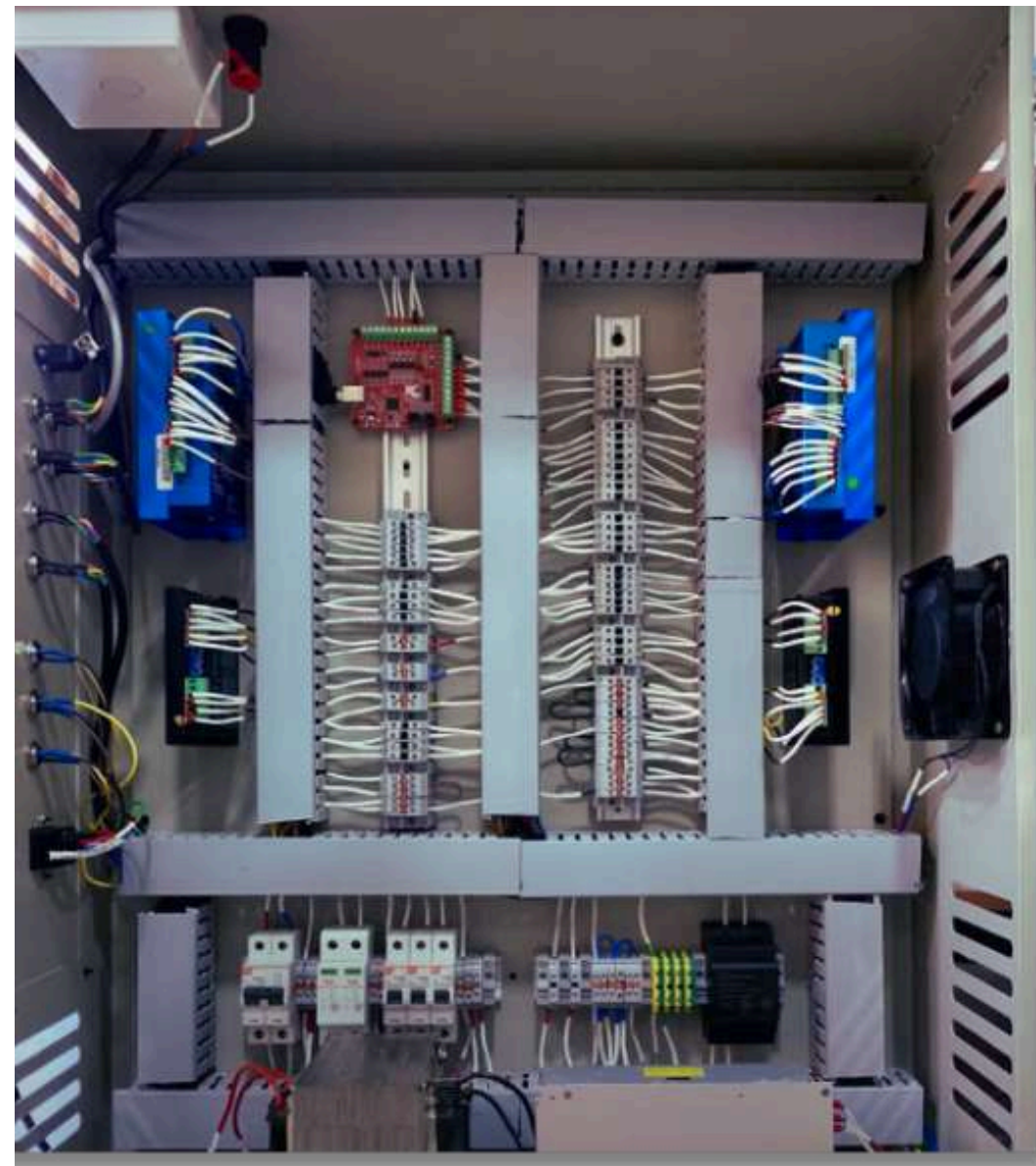
- **Covers at appropriate locations**

## Safety Features



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Research

# Control System



- Step-Servo motors for Mandrel axis and carriage axis
- Stepper motor for Cross Carriage axis and Feed Eye Axis
- Mach 3 – 4 axis cnc controller is used
- Safety protection system such as limit switches and emergency stop switch along with over voltage and over current protections will be provided.
- Emergency stop switch provided on top of the control cabinet
- Professional Panel box wiring

## Features of Winding Guru Software:

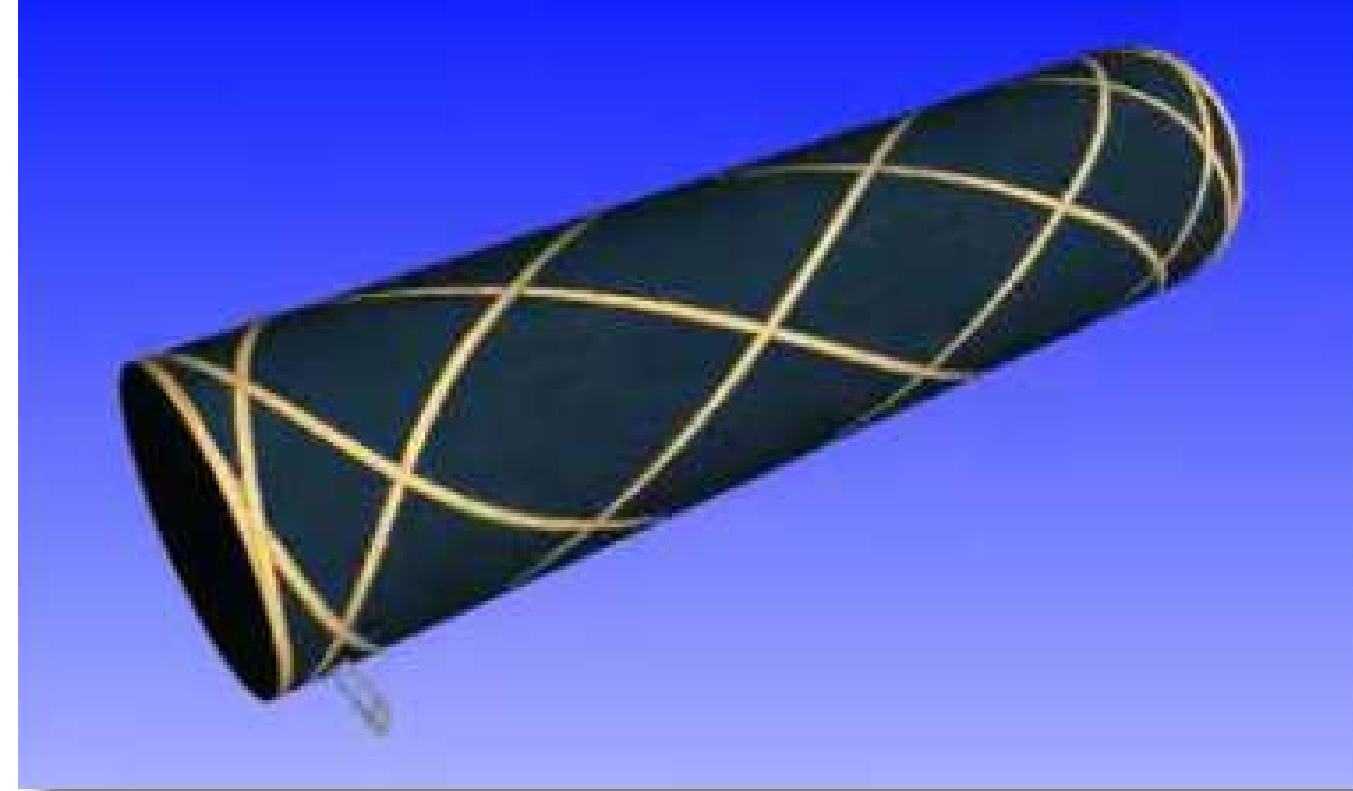
### Winding Guru - Features

- Helical Winding on cylindrical parts, e.g. pipes, drive shafts
- Hoop winding and multi-stage hoop winding on cylinders parts
- Helical winding on cylinders with dome ends. (Spherical, Elliptical, Tori-spherical)
- Mandrel Model Generator (Circular cross section mandrels)
- Winding simulation and pattern calculations –
  - Physical modeling
  - List of all possible winding angles
  - Variable winding angle
  - Friction modeling
- Filament path generation and Feed Eye Path generation
- Output for control system in G-Code format
- G-code optimization for filament winding machine
- **The computer to run the software is not included with the machine.** A copy of the filament winding software and a dongle used to authenticate the system will be provided.



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Supported  
Geometries :  
Cylindrical  
Pipes.



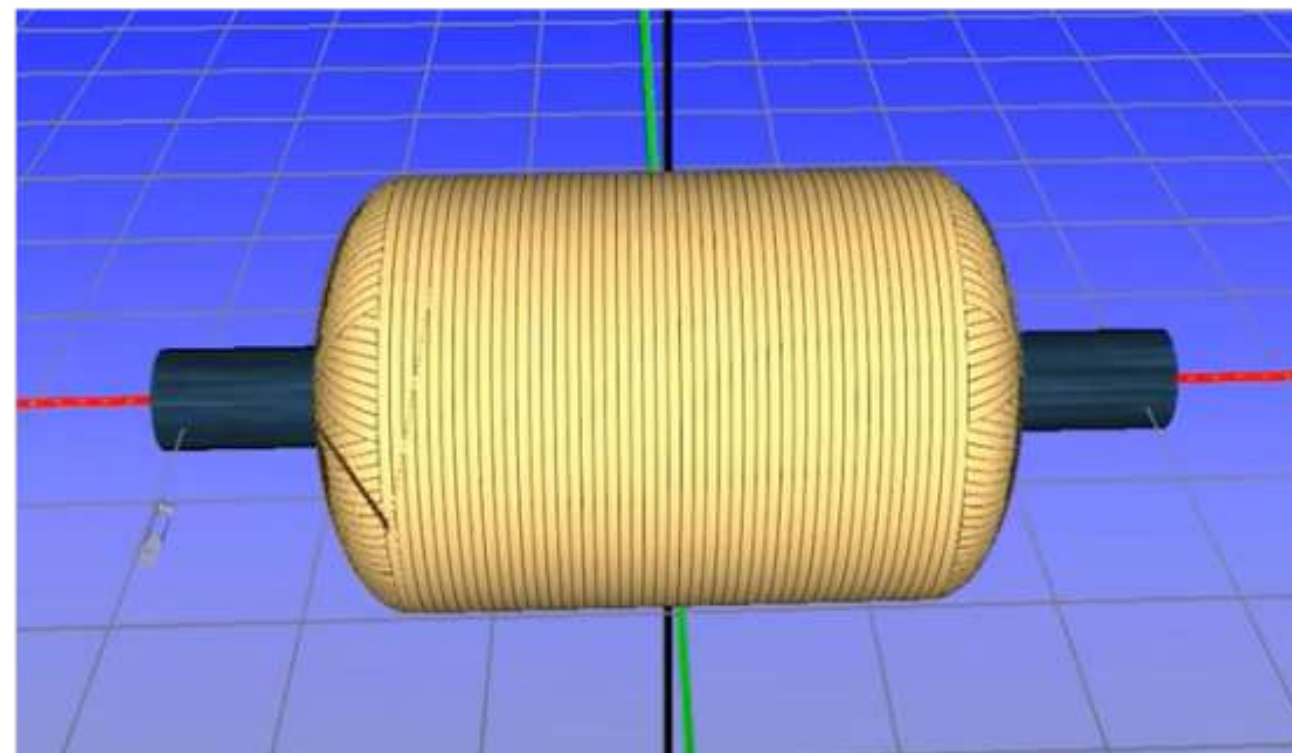
**Cylindrical  
Pipes**



# Equal opening on both sides.



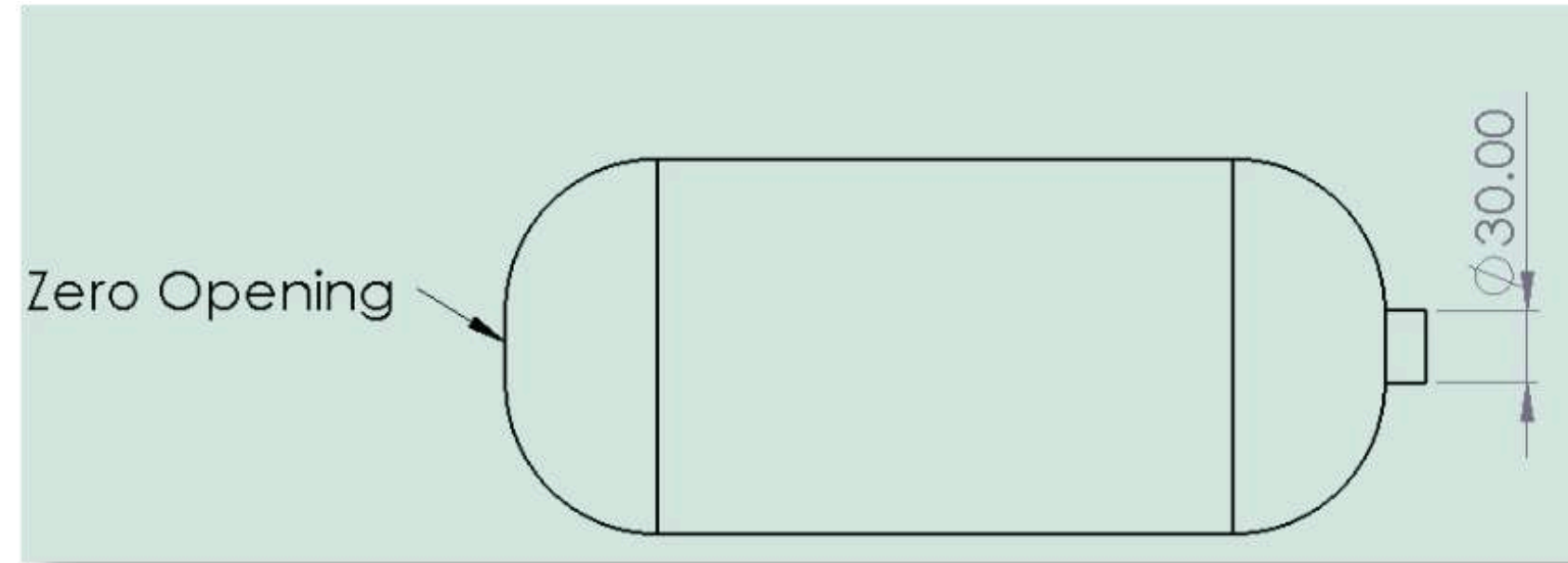
Cylinder with dome shapes.



**SUPPORTED  
GEOMETRIES**  
Hemisphere, Elliptical,  
Tori-spherical, Disc

# Unequal opening on both sides.

Supported  
Geometries







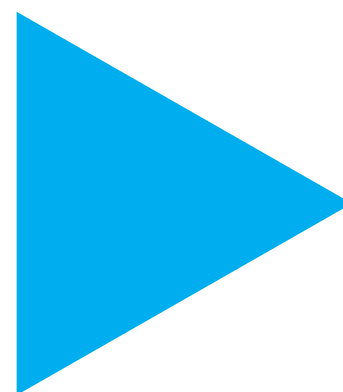
- IIT JAMMU, India
- CIDETEC, Spain.
- DATUM Composites, India.
- Shapoorji Pallonji, India
- TC Rolls and Covers Spain.

## Our Past Installations



- **Click here** for filament winding of Cylindrical tubes.
- **Click here** to see filament winding of **Type IV** pressure vessel.
- **Click here** to see filament winding of **Type III** pressure vessel.

**CARBON CHAKRA  
& WINDING GURU**



**Click  
here**

**WATCH  
NOW**



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THANK YOU

