

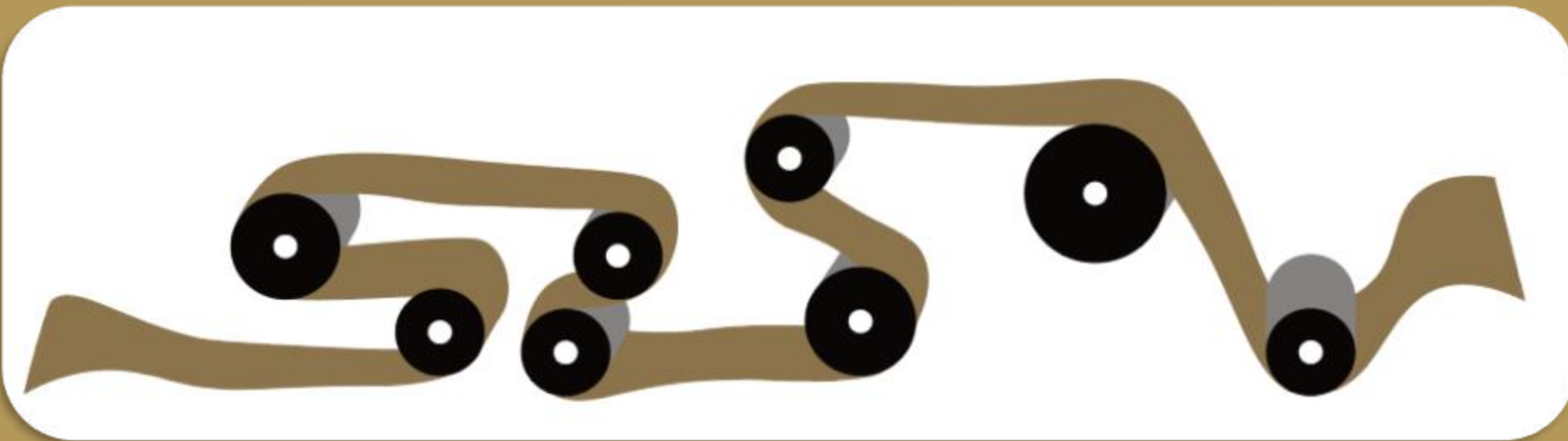
# M 1.06 - Calendaring Roll Mill

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## Calendaring Process

- Fabric will be submerged in resin bath
- Excess resin is squeezed out by two carbon steel rollers
- Impregnated fabric is then run through heated laminator rolls to partially cure resin
- Fabric is rolled through oven achieving B stage in cure process
- Pre-preg is then rolled onto a spool to be stored in a freezer for later use



## Problem

- Pre-impregnated composite material is expensive and not always available with desired parameters or quantity
- Machines to manufacture small batches are very expensive

## Schematic

### CAD Drawings

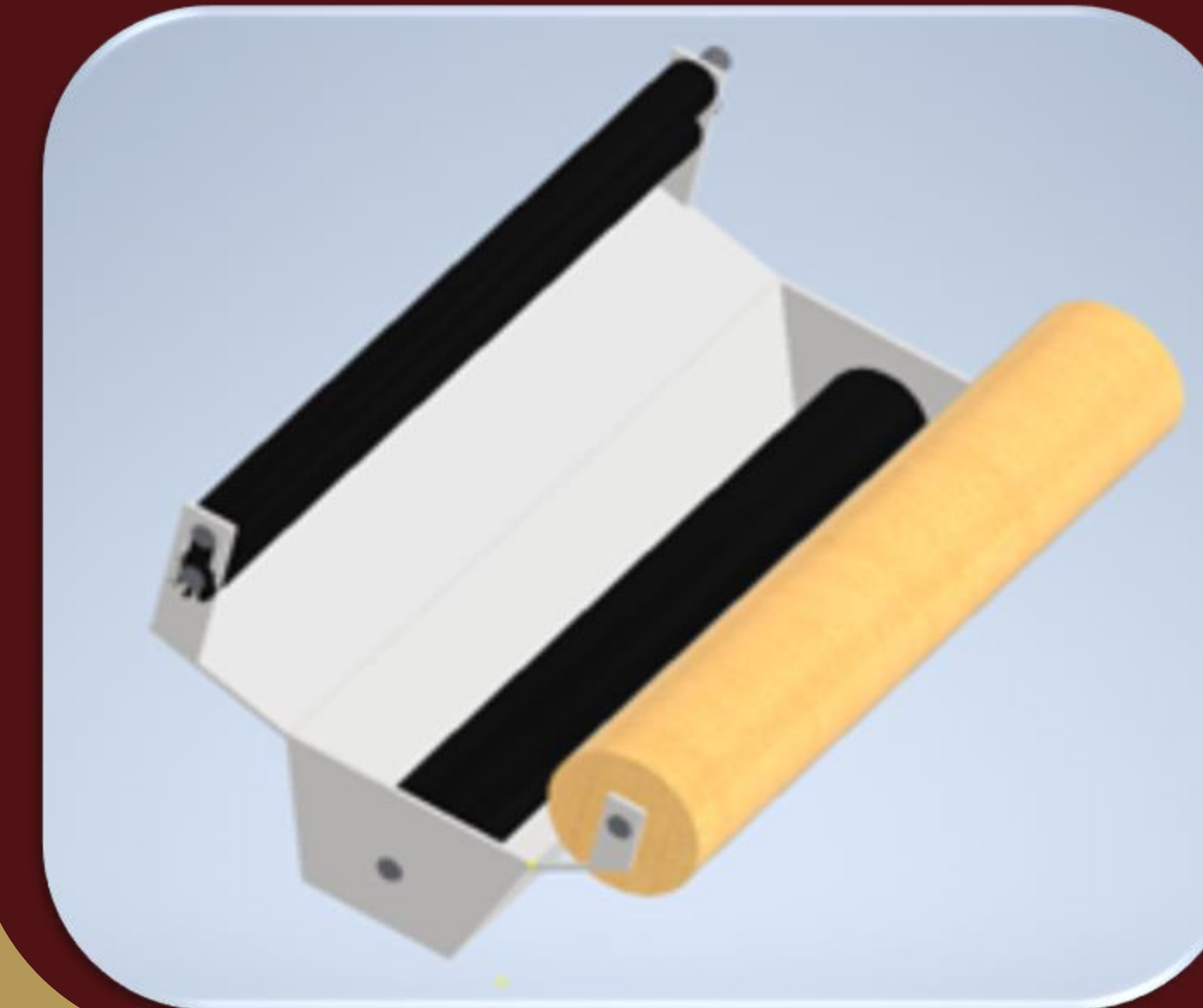
#### Full Assembly



#### Resin Bath



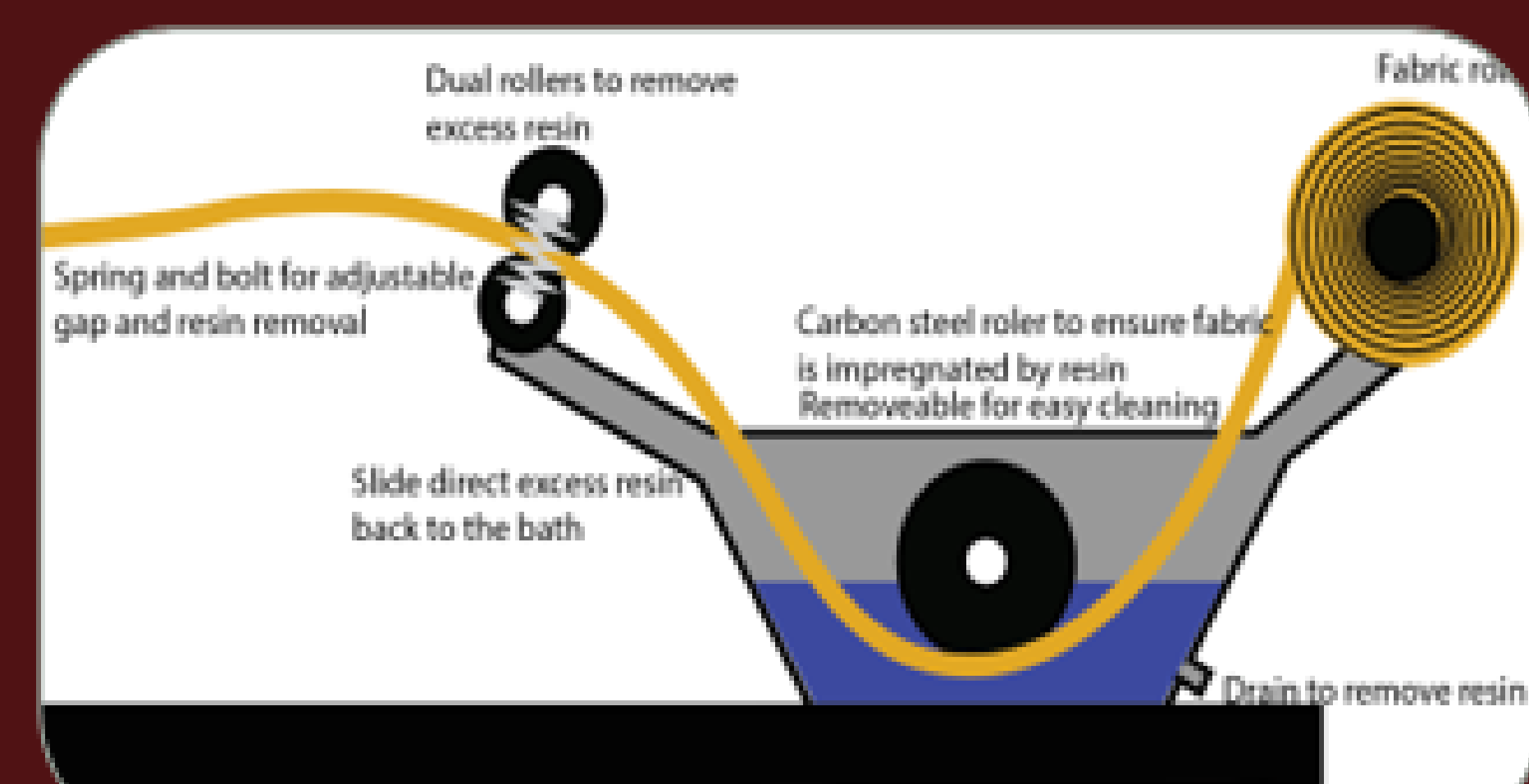
#### Resin Bath/Roller Assembly



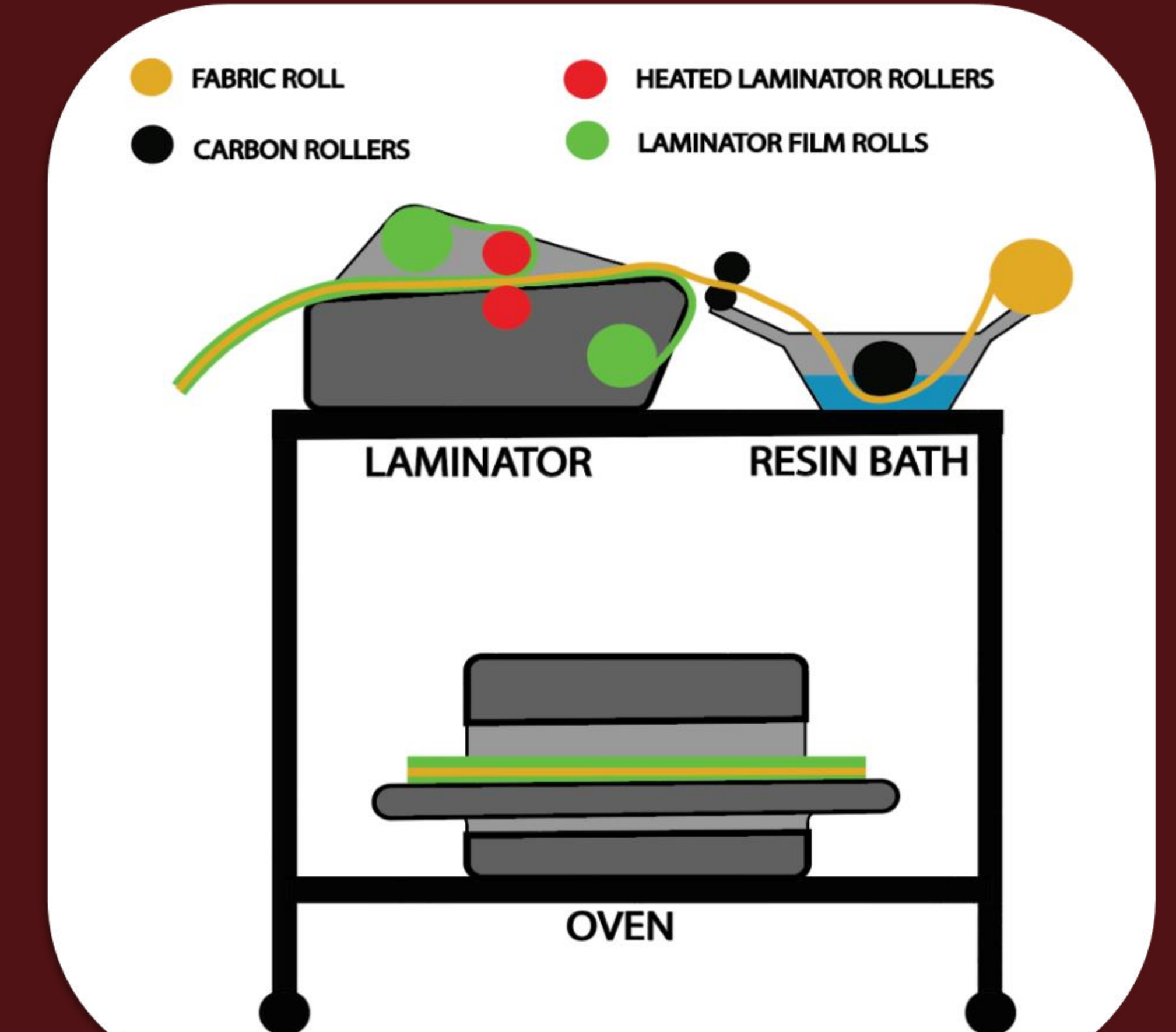
#### Sketch of Calendaring Process

- Resin curing has three stages: A-stage, where the resin is applied without curing; B-stage, where curing starts after applying heat; and C-stage, where the resin is fully cured through heat treatment in an oven.

#### Resin Bath Detail



#### Side View of Calendaring Assembly



## System Breakdown

### GMP Excelam 685 Laminator

- Dual adjustable heated rollers
- Range of speed of 0 – 10 ft / min
- Ability to handle fiber material

### Resin Impregnation System

- Resin bath with the ability to hold 1 liter of either epoxy resin 828 or derakane 411-350 resin
- High density polyethylene chosen for its chemical resistivity and low cost

### Roller Guide System

- The final design includes four carbon steel rollers
- Set of rollers to guide fibers to and through resin bath
- Another set of rollers to remove excess resin off fibers and into bath

## Goal

The objective of this project is to develop a reliable and cost-effective machine that can consistently manufacture high-quality composite pre-preg material to be used in future research projects at Texas State University.