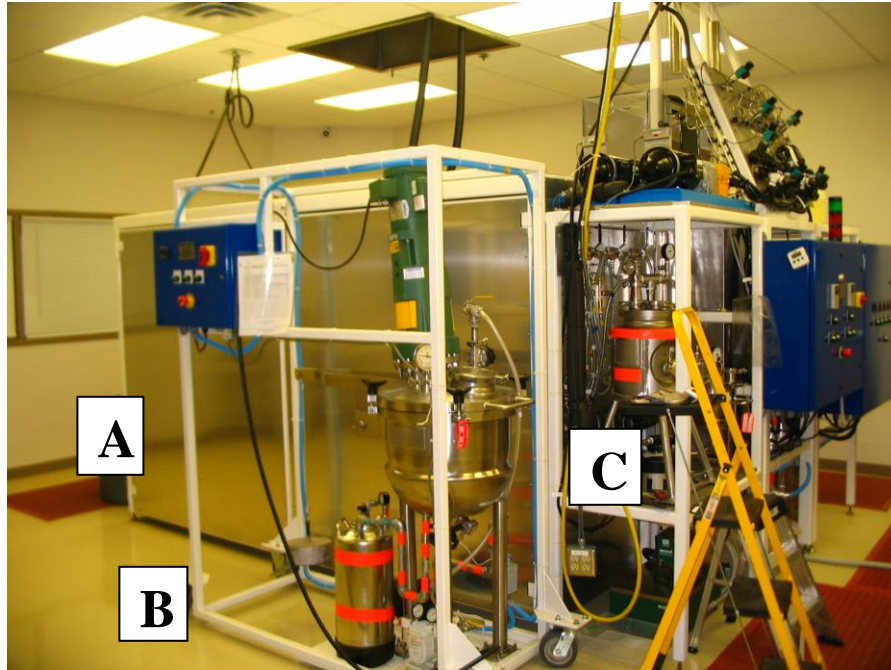


## Description of the Hollow Fiber Spinning Machine



The Hollow Fiber Spinning Machine is a modular design consisting of:

- The primary operational energy considerations are electrical and pneumatic.

### (A)

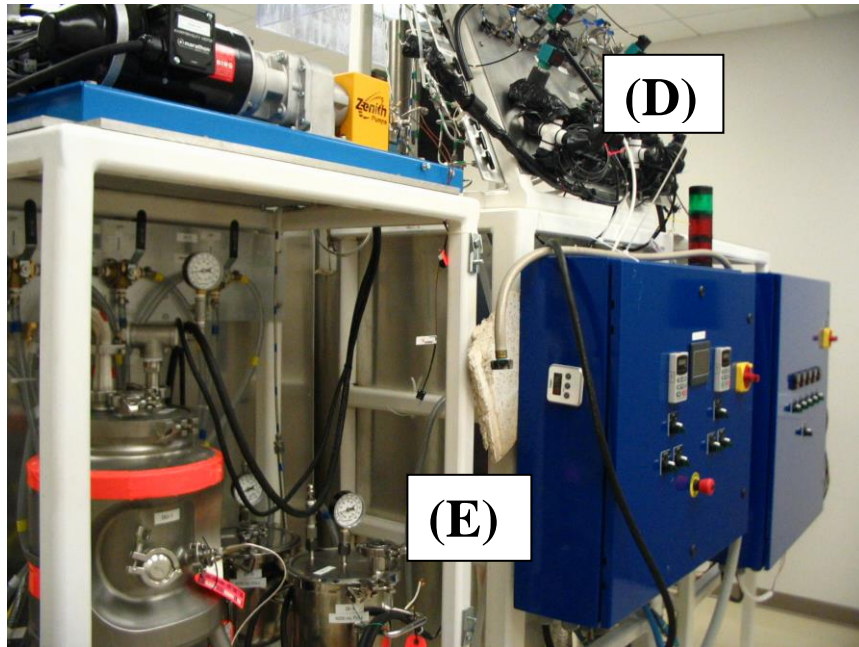
- The Drive Module houses four sealed bearing, belt driven axles. The purpose of these drive axles is to provide rotation to the four tensioning rollers which are positioned within the main rinse tank. See Figure 1 in Appendix 1.

### (B)

- Next to the Drive Module is the Portable Mixer which holds the particular chemistry for the hollow fiber to be spun. Multiple portable mixers can be fabricated in order to rapidly change out fiber chemistries, make a run, remove the empty mixer, purge the spinning system and mixer, change out the spinnerets, bring in the next chemistry to be spun and repeat the process.

### (C)

- Next to the portable mixer is the Feed Module. From the portable mixer, the feed module will pump the chemical formulation into the Spinneret Distribution Circuit. The chemistry is drawn from the portable mixer, using two Zenith 1/2hp pumps mounted on top of the feed module.

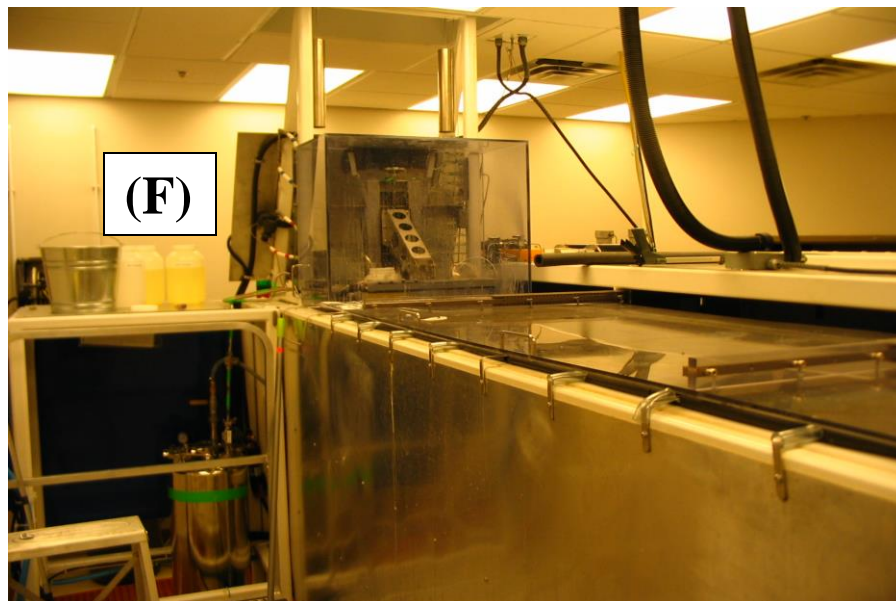


(D)

- The spinneret distribution circuit will receive the chemistry from the feed module and distribute the chemistry to one of ten (10) spinnerets or to all (10) spinnerets, which is the maximum capacity of this particular system. The system could be modified to increase capacity.

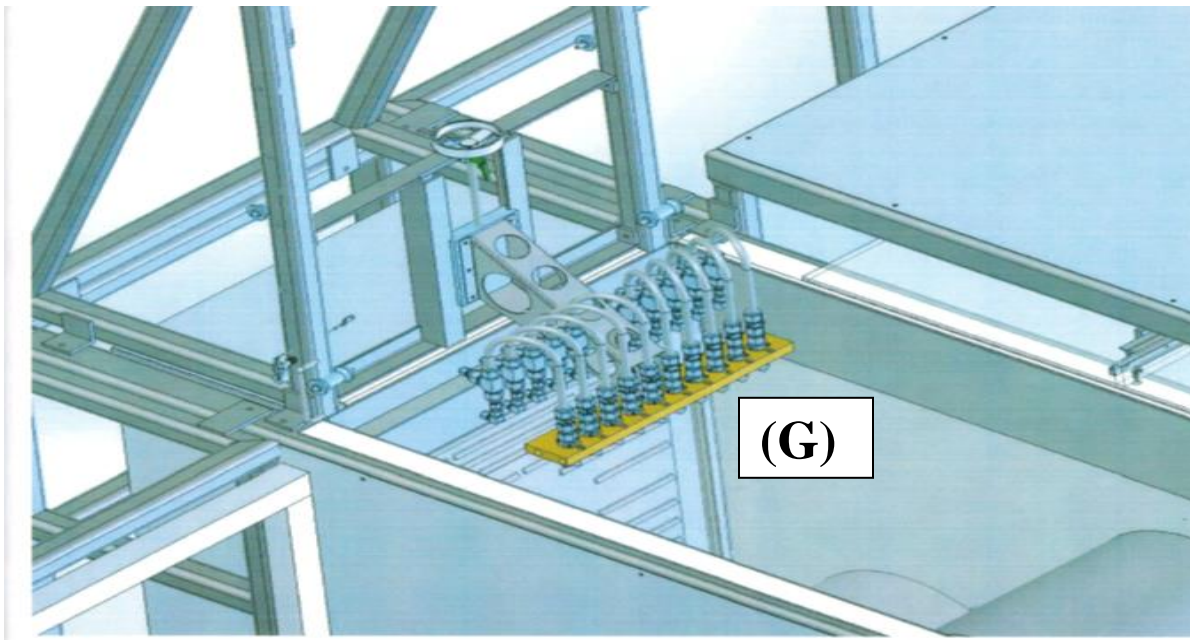
(E)

- Positioned below the distribution circuit are two (2) of three controllers, which manage the electromechanical action, heaters, vacuum pumps and other aspects of the spinning machine.



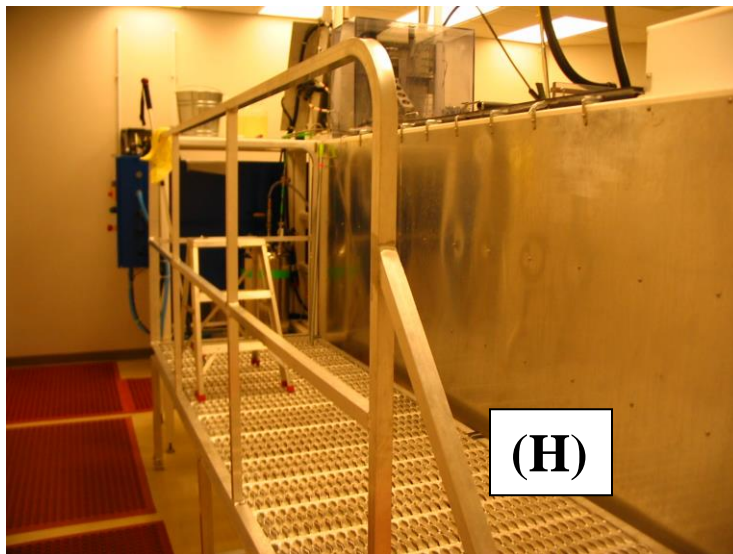
(F)

- Behind the distribution circuit is the (10) spinneret manifold with the protective lexan cover lowered over the spinneret manifold. The image on the following page (G) is a solid model of the spinneret array, with heat control to the spinneret heads.



(G)

- The spinneret manifold can support up to (10) spinnerets or as few as (1). The nozzle design will determine the ID/OD of the base fiber, followed by being drawn through the tensioning rollers within the tank.



(H)

- On the opposite side of the central spinning tank is the operator's gantry, allowing the operator to be able to access the interior of the spinning tank to set and monitor fibers coming from the spinnerets.



### **Fiber Capability:**

- This spinning machine is capable of producing fiber in the Ultrafiltration to the Nanofiltration range. These ranges would service :
  - Water filtration
  - Food & Beverage
  - Pharma
  - Extracorporeal (Blood Filtration), aside from Dialysis

### **History:**

- This spinning machine was designed and constructed in 2013. The majority of the unit was fabricated and integrated in Minneapolis, MN. Since the acquisition of the former company, which had contracted to have the machine built, the unit has been in climate controlled storage.
- The former company did spin hollow fiber on the machine in this narrative at a “First Article” level. Although the quality of the fiber produced was very good quality, the company was unable to raise the capital to move to the pre-production or production phases.

### **Output:**

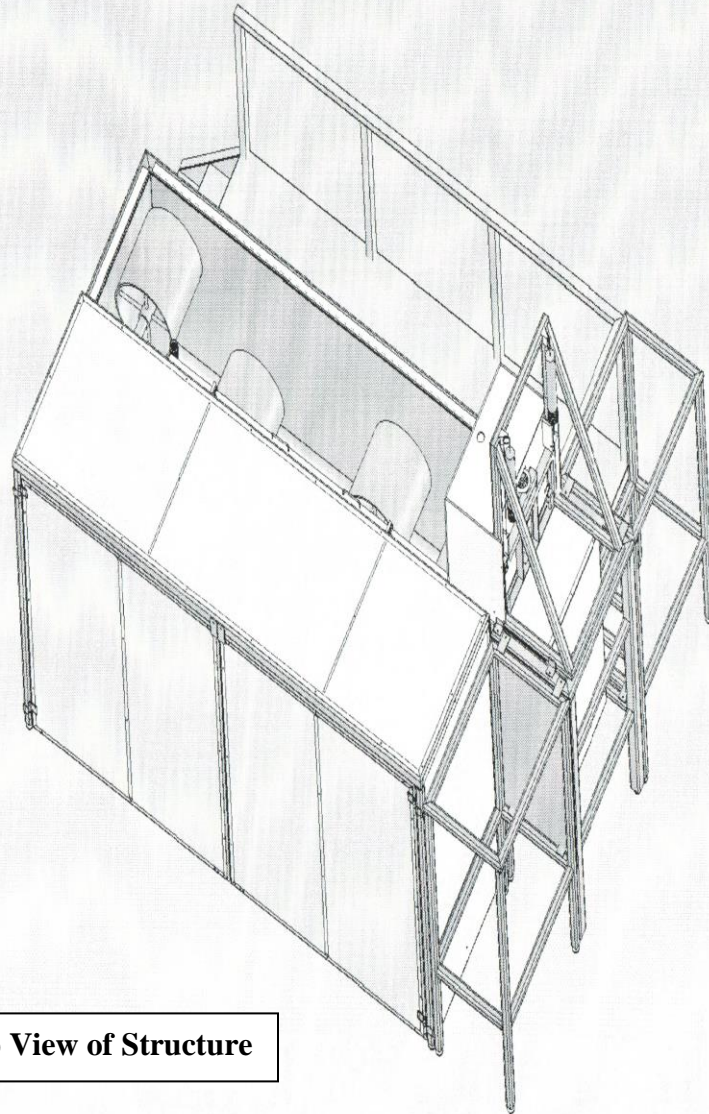


Output from the Machine  
Polyethersulfone, NMP  
solvent.

Samples available for  
evaluation, upon request.

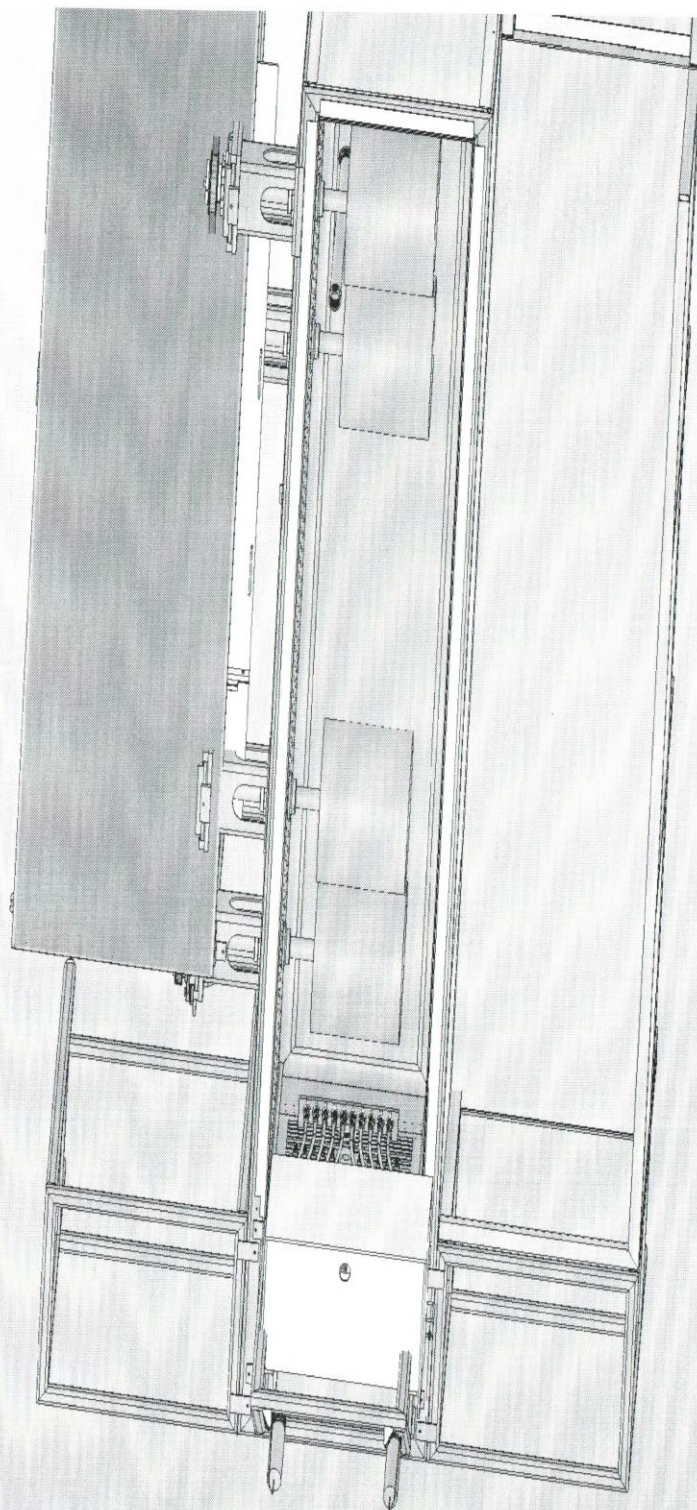
## **Appendix 1**





**Top View of Structure**





Top View of Structure with Spinnerets  
and Distribution Module Frame