



Hollow Fiber
Manufacturing Machine



Flat Sheet Membrane
Manufacturing Machine

The PMI Advanced
**Membrane Manufacturing
Apparatus**

MMA-1500A-HF-FS

Not just products...solutions!

PRINCIPLE

Solutions for making membranes are thoroughly mixed at desired temperature and pressure. The chemicals are shaped in to flat sheets or hollow fibers and allowed to coagulate at the desired temperature.

THE MACHINES

Layout of the hollow fiber making machine is shown in Figure 1. One hundred PSI pressure tanks hold chemicals at the desired temperature and pressure. The chemicals are constantly stirred and pumped to the spinnerette. Flow regulators control the flow rates of the chemicals. The hollow fibers coming out of the spinnerette pass through a temperature controller coagulation tank and are washed. Figure 2 shows the layout of the flat sheet membrane making machine.

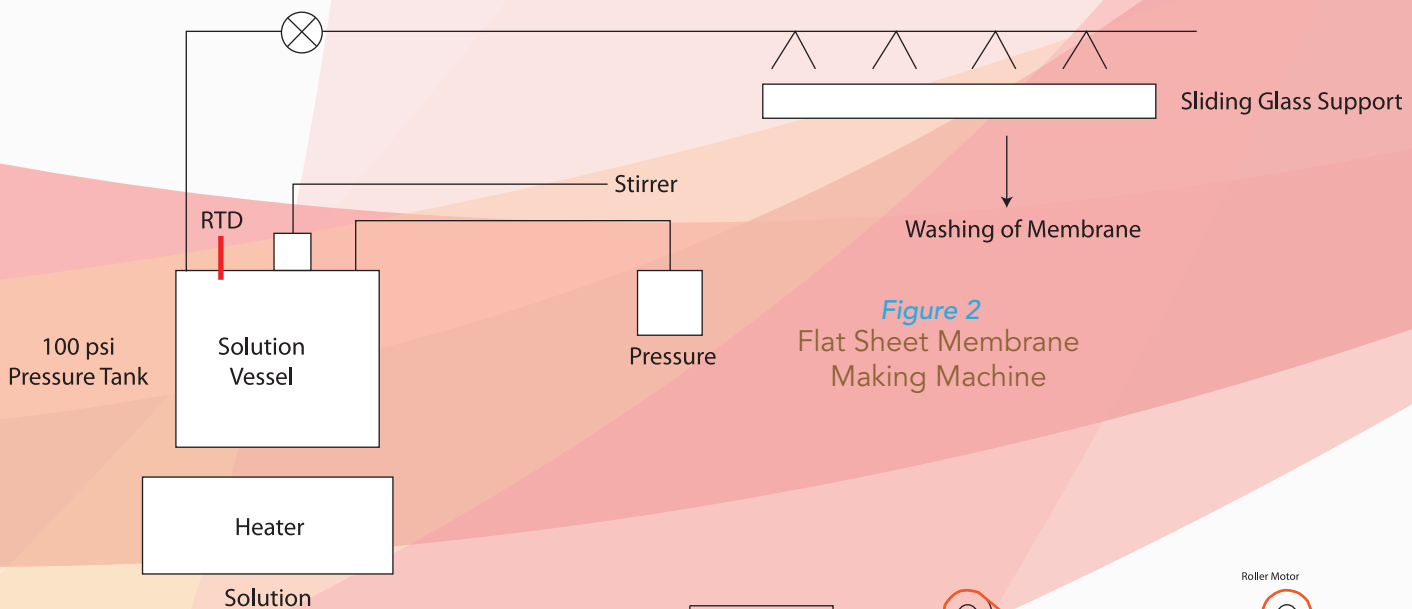


Figure 2
Flat Sheet Membrane Making Machine

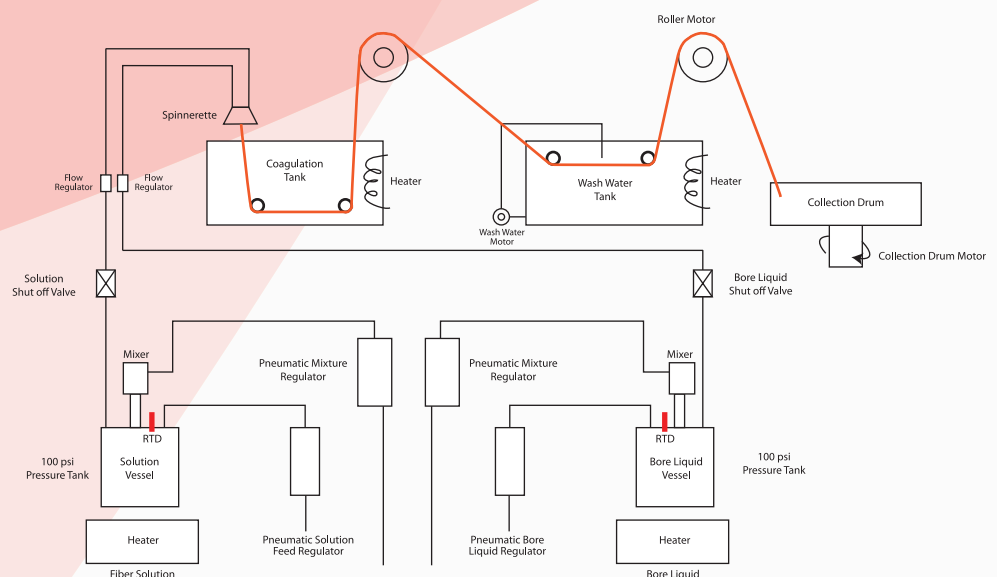


Figure 1
Hollow Fiber Making Machine

APPLICATIONS

PMI Membrane Manufacturing Machines can be used to create cast Flat Sheet Membranes and Hollow Fiber Membranes. The machine permits adjustment of fabrication parameters so that membranes with different characteristics could be made for development, research, and many wide varieties of application and filtration.

TYPICAL PRODUCTS

A variety of Hollow Fiber membranes and flat sheet membranes have been manufactured. Figure 3 shows typical hollow Fiber membranes.

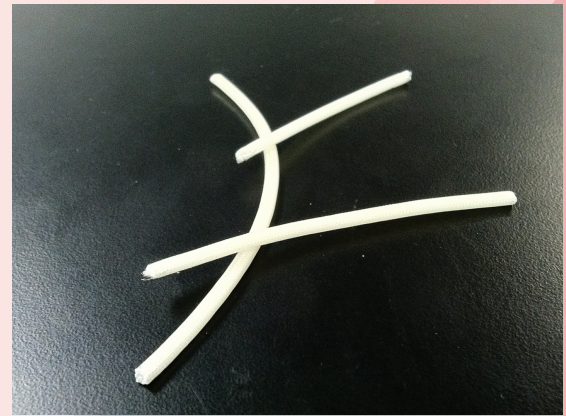


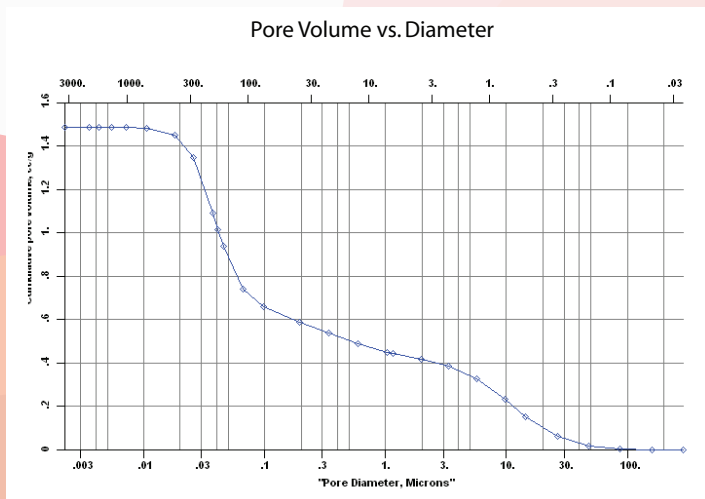
Figure 3
Hollow Fiber Membranes

SPECIFICATION

- The unit is compatible to fabricate different membrane models, including hollow fiber and flat sheet modules.
- The unit is capable to process different types of polymeric materials.
- Mean Pore Siz: 0.01-50 microns
- ID, OD and Wall Thickness: Dependant on Spinnerette Polymer before OD, Needle OD, Needle ID
- Length: 50 ft. plus
- Mean Pore Siz: 0.01-50 microns
- Thickness: 0.001" - 0.02"
- Length: 3-4 ft.
- Width: 6" max

Pore Structure of Membranes

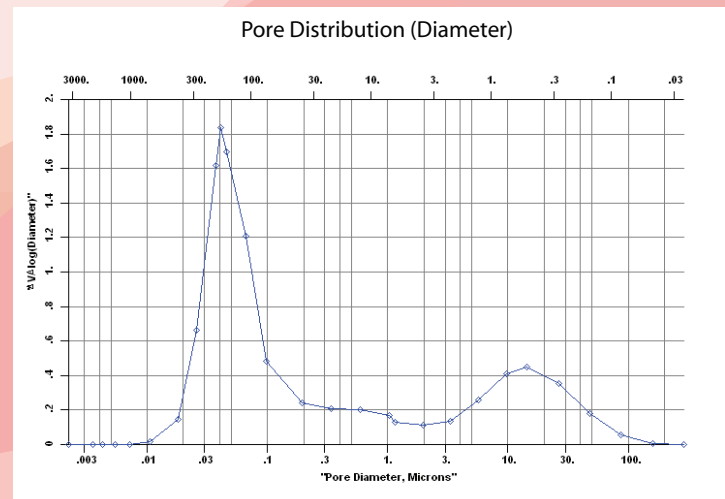
The pore structures of the membranes made in the PMI membrane making machines were determined by various pore structure characterization techniques. The pore structures of hydrophobic Flat sheet membranes were measured by water intrusion porosimetry. Figure 4 shows variation of hydrophobic pore volume with pore diameter. Pores have diameter from about, 50 to 0.01 microns. The pore distribution in Figure 5 shows that pores making maximum contribution to the pore volume are about - 0.04 microns in diameter. The pore volume at 20 micron is probably due to pore mouths. The pore structures of the membranes made in the PMI membrane making machines were determined by various pore structure characterization techniques. The pore structures of hydrophobic Flat sheet membranes were measured by water intrusion porosimetry. Figure 4 shows variation of hydrophobic pore volume with pore diameter. Pores have diameter from about, 50 to 0.01 microns. The pore distribution in Figure 5 shows that pores making maximum contribution to the pore volume are about - 0.04 microns in diameter. The pore volume at 20 micron is probably due to pore mouths.



Pore Diameter (microns)

Figure 4

Pore Volume and Diameter of Flat Sheet Membrane
PVDF Polymer



Pore Diameter (microns)

Figure 5

Pore Distribution of Flat Sheet Membrane
PVDF Polymer

Pore Structure of Membranes

Some of the Hollow Fiber membranes made in the PMI membrane manufacturing machines were tested by Liquid-Liquid Porometry. The presence of small pores in the membrane are demonstrated by the plot of flow rate with pressure (Figure 6). The mean flow pore diameter was 0.015 microns. Most of the pores are present over a narrow size range as demonstrated by the pore distribution in Figure 7.

Typical Properties for Hollow Fiber based on Polymer Type:

Typical Properties for Cast membrane based on Polymer Type:

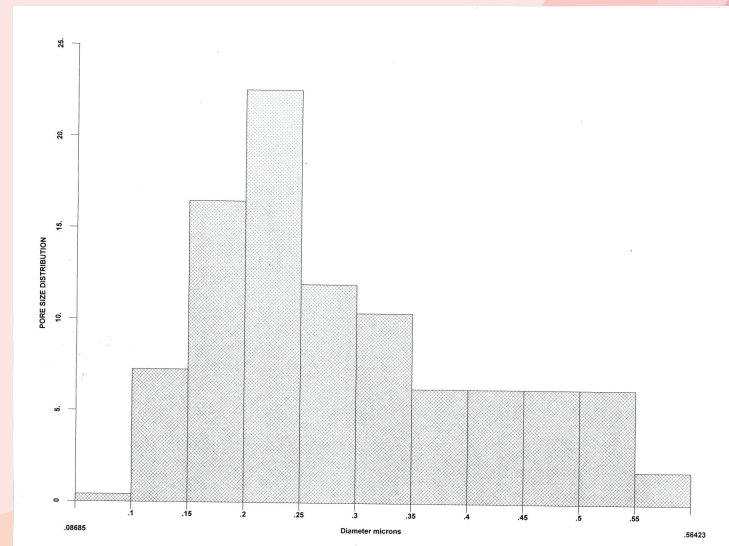
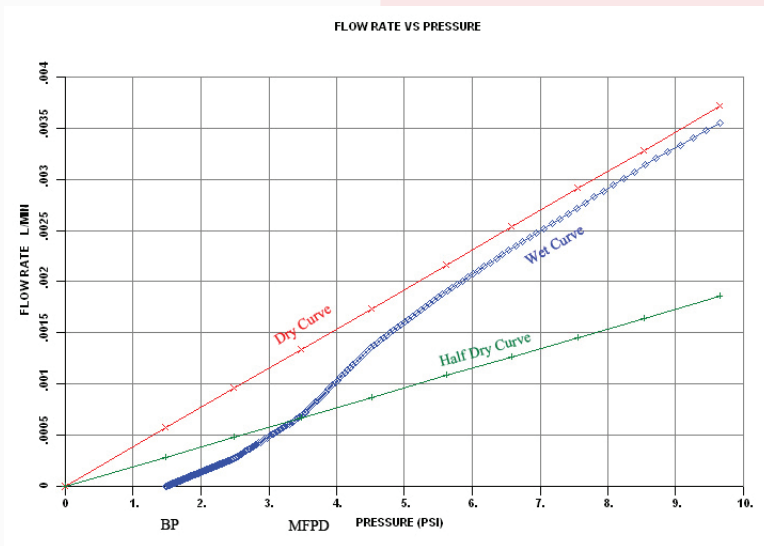


Figure 6

low rates through dry and wet hollow fiber samples

Figure 7

Pore distribution of hollow fiber membranes (Histogram)

SALES & SERVICES

Our sales team is dedicated to helping our customers find which machine is right for their situation. We also offer custom machines for customers with unique needs. To find out what we can do for you, contact us.

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