Membrane Manufacturing Apparatus

Hollow Fiber Manufacturing Machine

Flat Sheet Membrane Manufacturing Machine

PMI
Porous Materials, Inc.

Not just products...*solutions!*

Applications

PMI membrane manufacturing machines can be used to create cast flat sheet membranes and hollow fiber membranes. The machines permit adjustment of fabrication parameters so that membranes with different characteristics could be made for development, research, and many wide varieties of applications and filtration.

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.

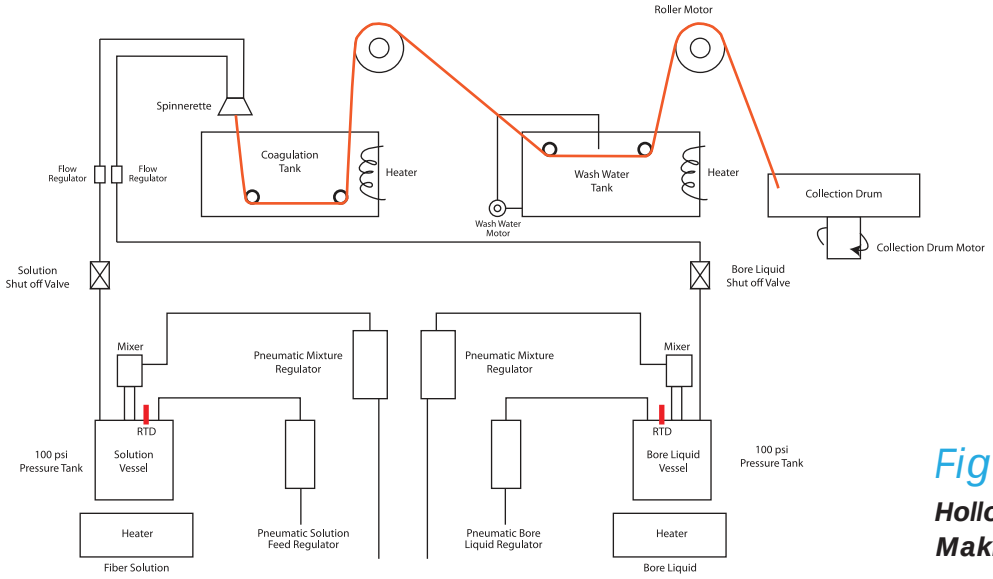


Figure 1

Hollow Fiber Making Machine

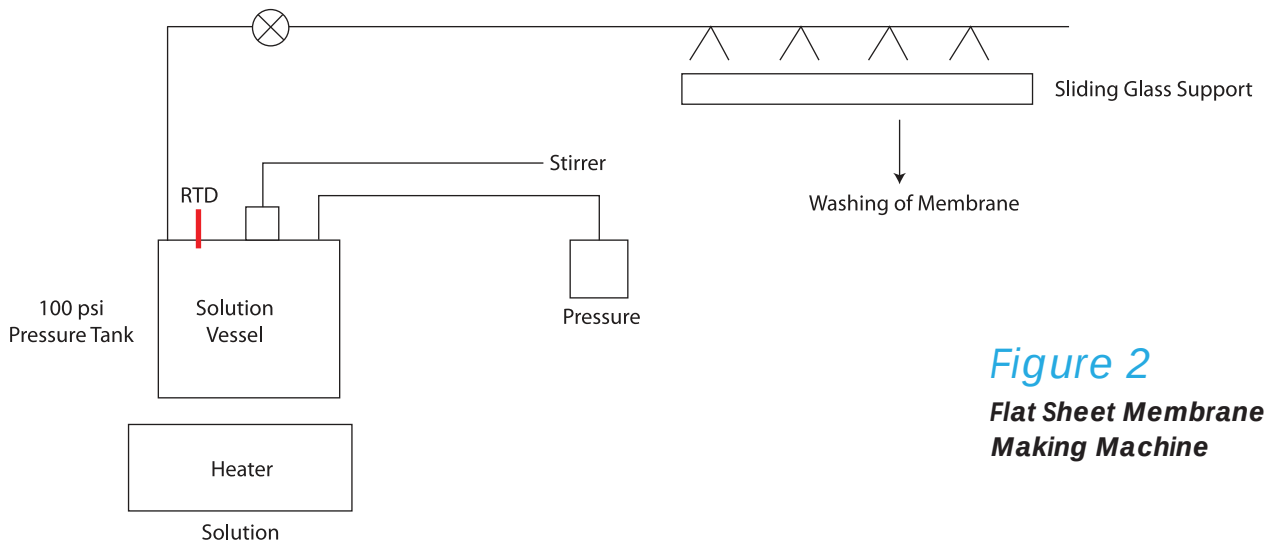


Figure 2

Flat Sheet Membrane Making Machine

Typical Product

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

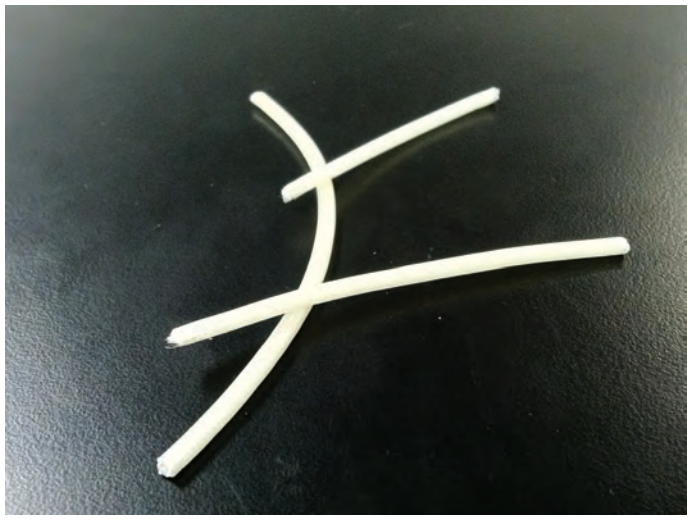


Figure 3

Hollow Fiber Membranes

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.

Figure 4

Pore Volume and Diameter of Flat Sheet Membrane

PVDF Polymer

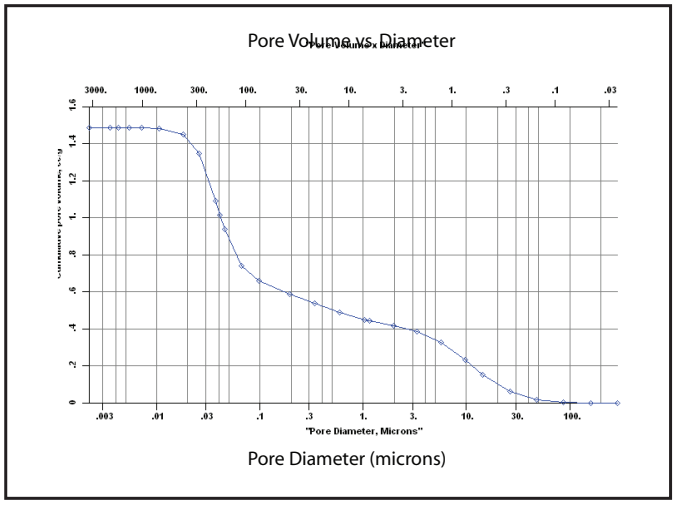
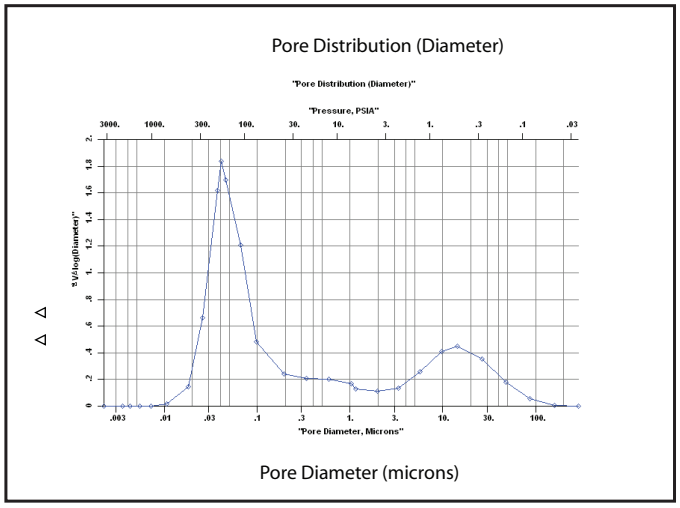


Figure 5

Pore Distribution of Flat Sheet Membrane

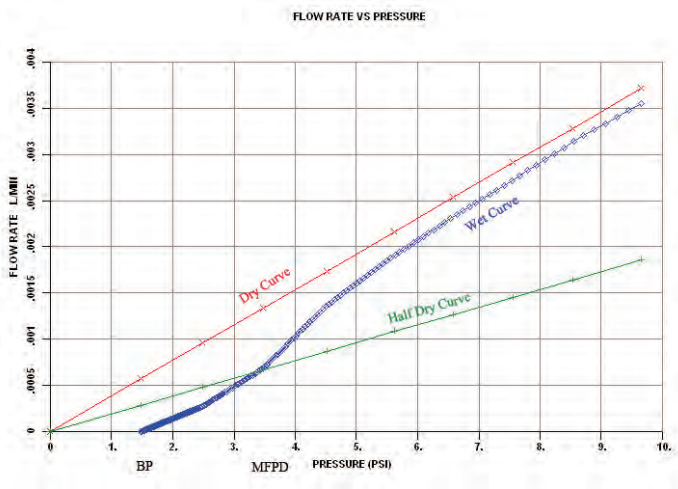
PVDF Polymer



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.

Figure 6

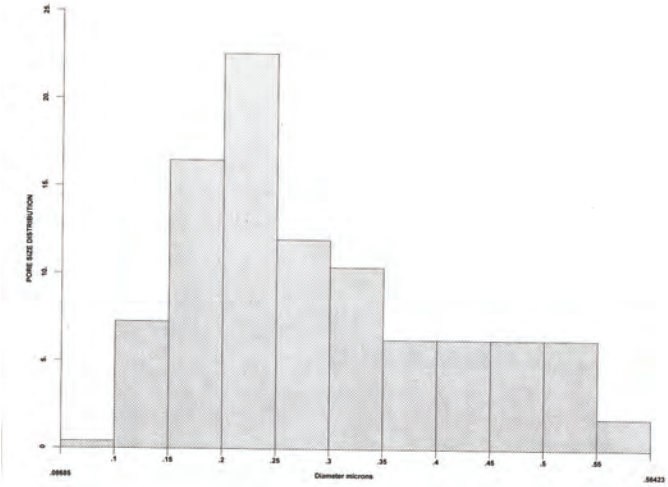
Flow rates through dry and wet hollow fiber samples



Typical Properties for Hollow Fiber based on Polymer Type:

Figure 7

Pore distribution of hollow fiber membranes (Hystogram)



Typical Properties for Cast membrane based on Polymer Type:

Specifications*

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

Other specifications for this machine are available. Specifications are subject to change without notice.

Sales & Services

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

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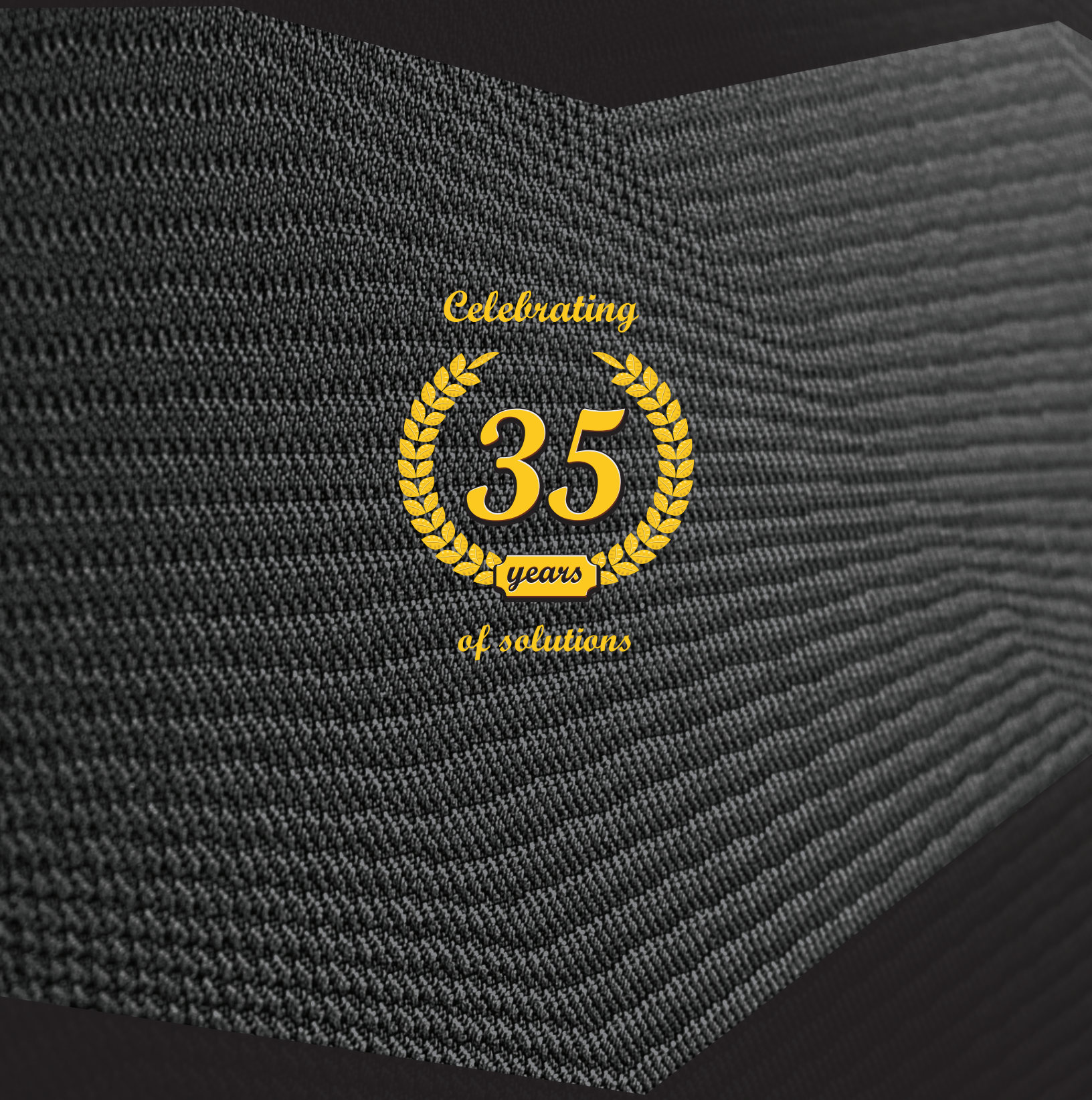

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