Membrane design uses the latest technologies, providing options for different assembly processes to produce a finished product. Filament winding is a process used by many companies in the production of membranes.

Wound Around Membrane

Filament-wound fiberglass proves to be effective for membrane production

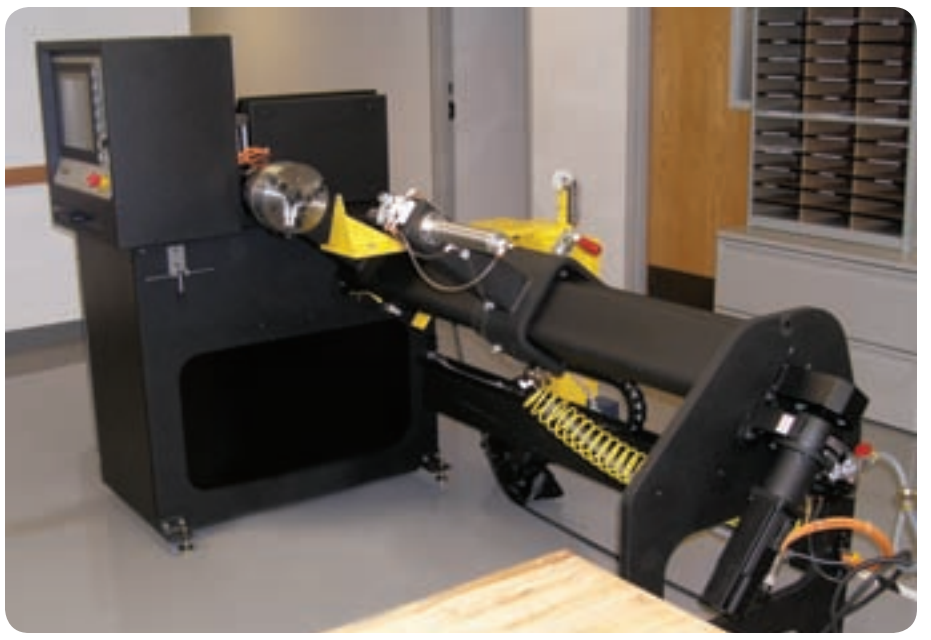
The outer casing of a membrane serves one main purpose: to hold everything together. The membrane has specific requirements regarding what materials can be used for this purpose. It needs to be strong enough to handle the pressures within the membrane and create a watertight seal with the end-caps. Filament-wound fiberglass has proven to be cost-effective in achieving these results.

Winding Filaments

The filament winding patterns used in membrane production are quite simple. Companies can build the strengths that they need by doing what the industry calls a "hoop" wind, or circumferential wind. This is a near-90-degree wind. For every revolution of the mandrel, the carriage advances along the mandrel axis by one bandwidth, essentially wrapping the mandrel. This wind allows for the customer to build up the membranes to both the strength and thicknesses they require.

When the winding is near completion, the customers can place their identification labels on the part and filament wind over them. The use of fiberglass in the filament winding process allows for the identification tag to be visible but sealed, preventing removal.

To optimize processes such as this, McClean Anderson has designed filament-winding equipment specific to its customers' unique needs. An example would be the Little Hornet, which can wind parts to the size of membranes. For membrane production, the Little Hornet, which comes standard with 150 rpm, is ramped up to a maximum of 300 rpm. This speed creates a high enough output to ensure the filament winder does not become the bottleneck of the manufacturing process.



Each membrane manufacturer has its own unique final design. The team at McClean Anderson works with its customers' design engineers to develop the filament-winding machine specific to their process.

The company has also developed the Composite Designer pattern-development software. Composite Designer is able to customize and combine various parts of different programs and develop a filament-winding pattern into one simple

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file that is transferred to the machine.

The added customization of the part programs is called chaining. In the chaining process, you can place statements and add the auto hold function to the file so that the employee is forced to follow the program set up by the engineer. Composite Designer is also designed with three-dimensional modeling, allowing you to see the filament-wound membrane before the file is transferred to the machine for production.

This filament-winding pattern file is then run by McClean Anderson's Flexwind machine control, which was developed in-house specifically for filament winding. The machine control allows operators and engineers that are new to filament winding to learn the process quickly and more efficiently. Flexwind is run on Windows XP, one of the most common operating systems. The Flexwind machine control allows you to monitor how much of the membrane has been wound and at what speed it is running. It has the capability to data log the process for each membrane, allowing you to monitor your consistency.

The Curing Process

During the filament winding process, resin control is very important in achieving consistency of results in the final products. McClean Anderson has designed a resin bath with a digital doctor blade. The doctor blade controls how much resin is applied to the fiber and onto the part. The blade is controlled by the Flexwind machine control or can be programmed into the membrane parameters with Composite Designer design software, providing consistent resin content every time the program runs.

After the membrane is filament-wound, it goes into an oven designed to cure the resin and give customers their final part. Membranes, unlike conventional wound parts, are a complete item when they go to be cured. Normal filament-wound parts are on a mandrel, which can withstand any temperature in which a resin might cure. With membranes, the manufacturer has to make sure all components in the membrane can handle the temperatures of the curing process.

Membranes, like many products, are a part that can utilize filament winding. Modern filament winding has adapted to products like membranes, advancing the manufacturing technology process. *wqp*

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