

INDUSTRIAL WIND-UP BOBBINS

Design Summary

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Product:

Wind-up bobbins are frequently used in industry for transporting materials within production and transporting the final product to the customer. Bobbins can hold any "ribbon-like" material, for example: cable, wire, chain, textiles, rope, steel belts, etc. For compatibility with a wide range of industries, wind-up bobbins must meet the following requirements: maximum loads of 1 ton, temperatures not to exceed 220° F, chemical and UV resistance, impact resistance, and a minimal weight. It is also preferable that bobbins be adaptable to the customer's existing equipment. Large bobbins average 4.5 feet in diameter, 1.5 feet in spool diameter, and 1.5 feet of storing width.

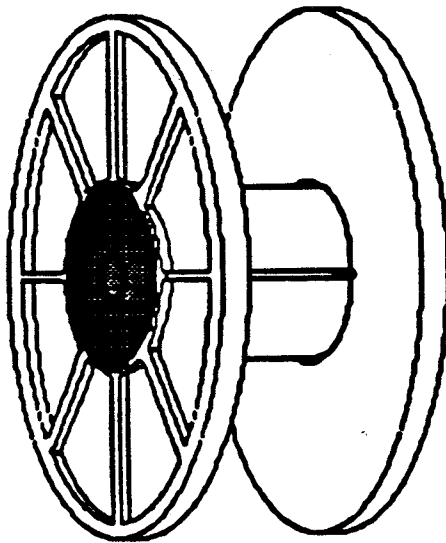
Materials:

A vinyl ester resin is reinforced with a Woven Roving fabric as the main construction material (55% E-Glass by volume). An inner sleeve and outer end caps are made of 4130 Steel for toughness and as a means of binding the three composite pieces.

Process:

The bobbin is made by Resin Transfer Molding in two molds. The first mold is a preform mold that forms Woven Roving into the wheel and spool preforms. The second mold injects resin into the preforms and cures the final product. The cycle time is 30 minutes at 350° F. The end caps and sleeve hold the assembled bobbin together and are welded by a robotic welder. Yearly output has been set at 7,000 units but may approach 10,000 units at 100% at design capacity.

Economics:



Costs are as follows:

Raw Materials	\$ 1,693,599 / year
Equipment	\$ 150,000
Tooling	\$ 225,000
Labor	\$ 94,900 / year
Utilities	\$ 34,446 / year
Total Product Cost	\$2,529,252 / year
Selling Price	\$711.31 / part
Profit (29%)	\$209.99 / part