

Filament Winding Overview

Filament winding is the process of winding fiber material and resin around a shape, known as a mandrel, to create composite product. The process of filament winding is typically used to create circular composite products with a hollow core. The filament winding process can utilize many different fibers and resins to achieve desired characteristics for the finished component. The end result is an extremely efficient process to create low cost, lightweight, and strong composite materials. This continuous Filament Winding process is also known as & commonly referred to as the “Drostholm Process”

Examples of products created using the process of filament winding include:

- Golf clubs
- Bicycle components and tubes
- Transmission poles
- Sail boat masts
- Aircraft fuselages
- Gas, water, or tanks
- Heavy duty construction products
- Pipes

Advantages of Filament Winding

Filament winding has many advantages in the process of creating hollow composite products. Advantages include:

- **Weight** – A key advantage to the filament winding process is that since all products are hollow and can be made without a permanent internal system, they are extremely light without sacrificing strength. Light products translate to lower costs to produce, transport, and ship.
- **Design** – Changes in the design and engineering process using different techniques in winding, curing, and material options allow for variations in flexibility, strength, and pressure holding capacities (hoop strength).
- **Automation** – Filament winding can be done in a high speed process using machines to quickly and accurately reproduce identical components. This process can include sophisticated machinery and software to create complex engineered non-circular composite materials. Since the process can be automated to a high degree, it is scalable and can allow for the precise mass production of highly complex components.
- **Cost Effective** – By using low cost materials and automation the cost to produce components is substantially reduced. The process involves less material, less labor, and less transportation costs than many other forms of component manufacturing methods.

The process of filament winding is widely used in composite manufacturing to create highly customized hollow core structures that have unique flexibility and strength characteristics. The process allows for the creation of these structures in a scalable, automated, and cost effective format.

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Basic Machine Overview Examples

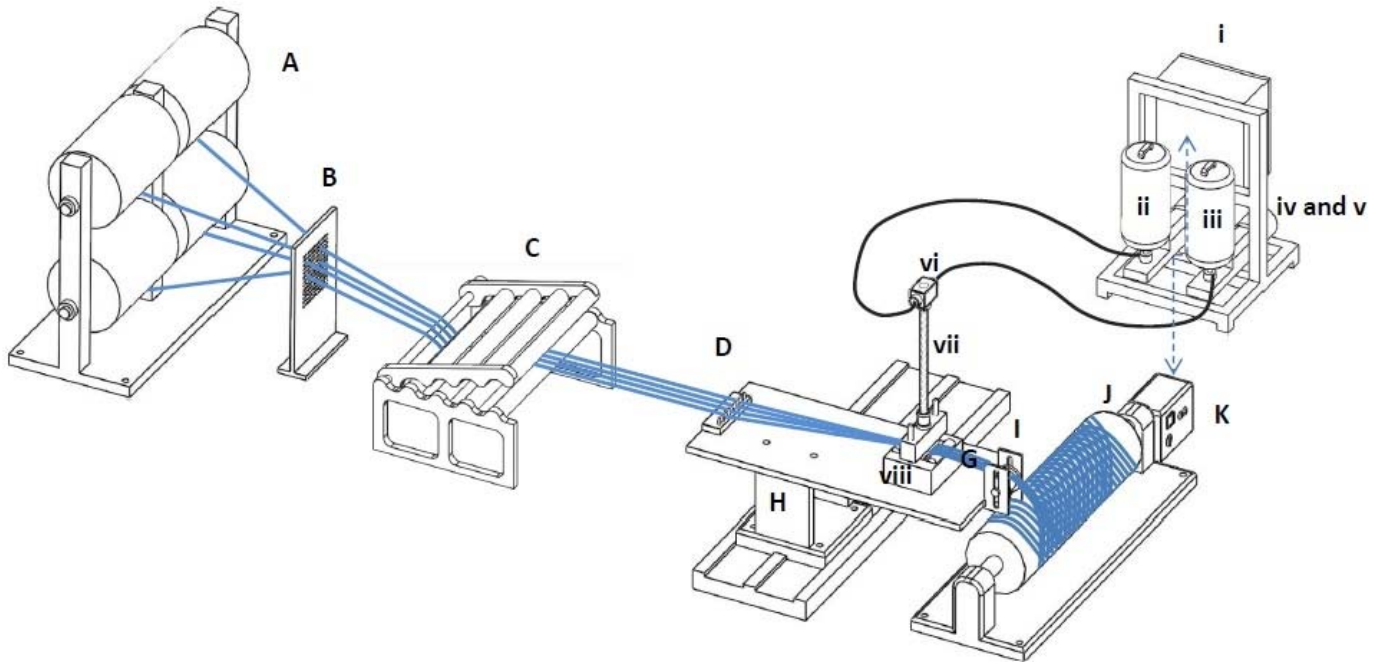
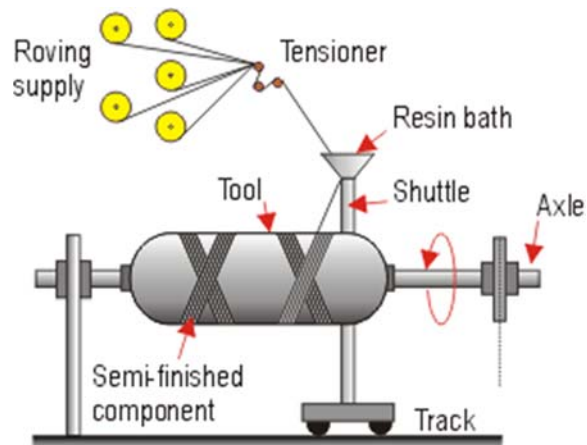


Figure 2: Schematic illustration of the clean filament winding process. The key components are coded as follows. (A) Fibre creels. (B) Fibre guide. (C) Tensioning system. (D) Guide pins. (G) Resin-impregnated fibre bundles. (H) Traversing carriage with a platform/adaptor to house the impregnator (viii). (I) "Collector" roller or D-Ring; (J) Rotating mandrel. (K) feedback control unit. Refer to Figure 1 for a description of (i-viii).



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