Assignment

What is Filament Winding:-

- o 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.

Process:-

- Precision high-speed positioning of continuous fiber in a pre-determined pattern is the basis of the filament winding process .
- There is a mandrel that the fiber and resin wound upon, is cured in room temp or in oven. After cure mandrel is removed leaving a hallow composite structure.

Tension:-

- fibre tension is critical to the operation of a filament winding machine,
- tension required depends on type of fibre a part diameter D winding pattern
- fibre tension directly affects:
- a fibre volume fraction,
- void content,
- o strength and stiffness of the composite part.

Materials :-

fiber (in roving form):

- E-glass. S-glass,
- Carbon / Graphite,
- Aramid,
- Borons

Materials :-

Resins:

- Epoxy
- Vinylester
- Polyester,
- Polyurethane,
- Phenolics,
- Furans,
- Polymidies

Factors Affecting Properties:-

- Fabrication variables
- Processing variables
- Winding variables
- Material's variables
- Environmental variables

Advantage of winding :-

- highly reproducible nature of the process
- continuous fiber over the entire part
- high fiber volume is obtainable
- ability to orient fibers in the load direction (1 00 minimum winding angle)
- fiber and resin used in lowest cost form
- size of component not restricted by oven or autoclave size
- process automation (particularly with high volume) results in cost savings

Disadvantage of winding :-

- part configuration must facilitate mandrel extraction
- mandrel could be complex and expensive
- inability to wind reverse curvature □ inability to easily change fiber path within one layer
- wound external surface may not be satisfactory for some applications

Application:-

- Storage tank o
- Railway tank car
- Pipe

- Aerospace Parts
- Sporting Goods
- Gas Tanks

Refference:-

- Filament Winding Compositions forFiber/Resin Composites, P. Klemarczyk,1996
- Thermoplastic Filament Winding, Composites Manufacturing, J.Romagna, 1995