

# Composites for Wind Energy Applications

**NATIONAL CONFERENCE ON RECENT ADVANCES IN COMPOSITES**

***M.SURENDER NATH***

**INNOVATIVE FRP SYSTEMS PVT LTD**

**PANNAMGADU, TADA**

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# Composites For Wind Energy Applications

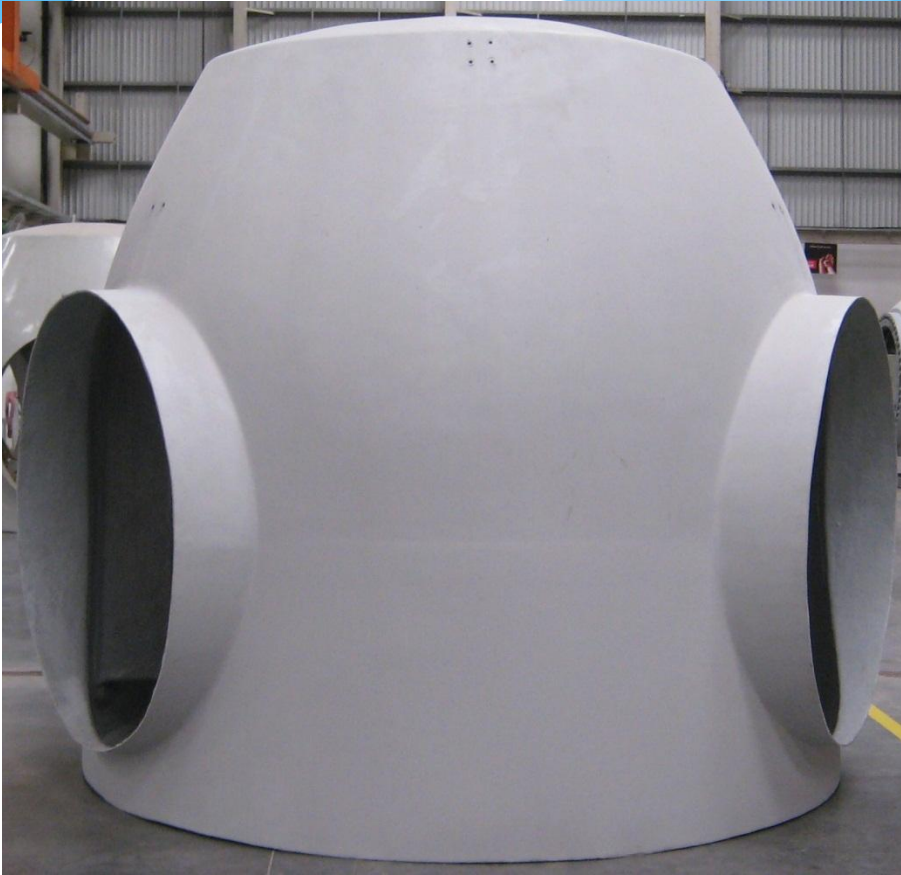


# Composites For Wind Energy Applications

The following composites are used in Wind Energy.

- \* Blades
- \* Nacelle Cover
- \* Nose Cone or Spinner
- \* Generator Top Covers.

# Composites For Wind Energy Applications



- \* Housing for all electrical, mechanical and electronics components
- \* Integrates with metal structure internally
- \* Having ventilation
- \* With excellent surface finish

# Composites For Wind Energy Applications



Spinner segment  
with spinner cap

# Composites For Wind Energy Applications

## Nacelle Cover and Nose Cone – Importance

- \* The forces acting from the front side of the Nose cone develop stress. The poor strength in laminates, frequent changes in wind pattern can damage the Nose cone severely. It is also a dynamic part like Blade.
- \* The nacelle cover has also felt the similar forces. The surface should be well protected for UV rays. It should have good thermal and noise insulation. Now a days, the need is raised to have flame retardant covers also.
- \* Any out side repair during its life is practically impossible or cause lot of efforts to rectify. So these products needs a stringent quality norms.
- \* Both should be more stable and durable product with less weight and higher mechanical strength.
- \* Both should have an excellent surface finish, since it is the first impression about the turbine.



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Nacelle Covers are manufactured in two methods.

- \* Hand Layup method

Glass to Resin ratio is 45 : 55

- \* Infusion method.

Glass to Resin ratio is 65 : 35

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The following materials are used in the manufacturing of Nacelle covers in hand layup method.

- \* Chopped Stand Mat.
- \* Woven Roving
- \* Combi
- \* Bi-directional Chopped Stand Mat(BDCSM)



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Advanced materials are used in the manufacturing of Nacelle covers in infusion method for better mechanical properties. They are

- \* Biax mat( $\pm 45^\circ, \pm 60^\circ, \pm 90^\circ$ )
- \* Combi Biax
- \* Triax
- \* UD mat

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## **Nacelle Cover and Nose Cone – Advances in Technology**

- \* The concept of using technical fabrics instead of CSM / WR.
- \* Hand lay up is still being used. Infusion are also being used to enhance the product quality
- \* Both Epoxy and Polyester system are used for light weight construction.
- \* High quality PU paint system is getting used for better surface protection.
- \* In order to have a very good mechanical strength, PVC foam become a core material to have a sandwich construction.
- \* To avoid misalignment between the segments, the CNC cut patterns are getting introduced. The cover assembly is having very close tolerances.
- \* To ensure the profile / outer contour, CMM is getting used along with metal templates.
- \* Metal frames used for Turbine assembly are integrated with cover.
- \* ISO system implementation is made mandatory for the manufacturing shop.

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**Thank you**