Fiber-reinforced polymer (FRP) composite materials: Revolution in effective structural solutions

A new material legacy with FRP Composites is springing up

Composite materials have revolutionized our outlook toward obtaining effective structural solutions. Coextensive and diametric to steel, in terms of exhibiting strength and finesse, composites hold the key to the engineering quest of obtaining lightweight yet stronger and environmentally efficient materials.

The backbone of developed economies for many years was laid on the strength and inherent uses of steel. With a paradigm shift in material science and technology, there came a growing demand for Fiber-reinforced polymer (FRP) composite materials, which are made up of a polymer matrix reinforced with fibres, including carbon, glass, aramid, basalt, and others. FRP composites require almost no maintenance and are far more durable when exposed and extreme environments, beyond the durability of steel. It can withstand extreme temperature fluctuations without warping and is also extremely resistant to rusting. Their properties can be manipulated and tailored as per requirement, and hence used as a structural material for a wide application ranging from deep-sea structures to outer space exploration.

Fig 1. FRP composite quarantine unit made in India (NMB TATA Steel ltd.)

Fig 2. FRP composite gazebo

Fig 3. Left: conventional steel bridge; Right: FRP composite bridge

Keeping up with the scientific trend and moving towards achieving engineering excellence is NIT Rourkela's FRP composite lab at the heart of the Department of Metallurgical and Materials Engineering. Research and development of a wide class of composites, nanomaterials and technology modelling are carried out by an enthusiastic group of young researchers to bolster our understanding of composites and their applications.

References

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