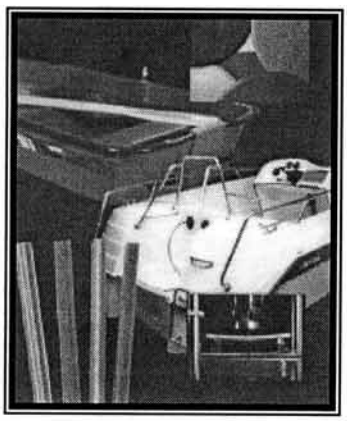

Economical Alternative to Conventional Cores: A Viable FRP Recyclate System

Overview

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Introduction

Four years ago, a joint project between Seawolf Industries and the Swedish Institute of Composites, with support from the Nordic Industrial Fund and the Swedish National Board for Industrial and Technical Development (NUTEK), proved the economic feasibility of using fiberglass waste created by the manufacturing process and post consumer fiberglass waste in the construction of new fiberglass boats.

The driving forces behind seeking effective methods to recover those previously wasted resources has been:

Decay susceptibility of natural based cores, high cost of "mat type" core materials.

Environmental concerns.

Legislative and regulative action concerning industrial waste containing styrene including producer responsibility for waste treatment.

The ever increasing cost of dumping expensive material into the landfill.

Increasing costs of raw materials.

This joint venture was established to overcome the obstacles present in the composites industry with regards to an efficient and viable FRP scrap recycling system. Some of those obstacles included:

Proper grinding method to maintain fiber integrity.

Prevention of premature catalyzation due to residual catalyst in scrap.

Maintaining proper viscosity in mixes after addition of recyclate.

Prevention of "recyclate" settling in mix resulting in resin richness.

The Solution

Seawolf developed an FRP scrap grinder that can quickly grind scrap to predetermined fiber lengths and keep the fibers intact. This solved one of the major obstructions to a viable recyclate system. Germany has been using powdered scrap in the automotive industry for some time, but it is not a cost-effective method, nor does the powder add strength to the product. Compound additives discovered by Seawolf, resolve the premature catalyzation, viscosity, and settling problems. Seawolf also developed equipment such as low/high sheer mixers and specialized spray systems for the Seacore.

This project resulted in the development of a syntactic core material and spray-up system—Seacore, which offers a production boat with as good or even better structural integrity as conventional boats—even after replacing up to one-half of the bottom lamination with Seacore.

Performance

In these boats, laminates are reduced by 50% and combined with the Seacore amalgamation containing 30-40% ground scrap. A specific scrap mixture also replaced all other core materials, such as Coremat™ and plywood. This resulted in a boat that had a total scrap content of more than 20% by weight.

Tests have shown that recyclate laminates using this process can handle the same loads as conventional laminates of the same or equivalent weight. In addition, there is increased durability as this material does not rot—and is not susceptible to becoming resin rich, which also improves fatigue performance by more than double.

Due to a lower density, the Seacore system will have about a 15% thicker laminate. Laminates of up to 50% recyclate are proven to have equal bending strength as compared to traditional laminates of equal weight. Tests have shown Seacore replacement of Coremat™ results in increased flexural strength, and is double the strength of plywood core. Screw hold capacities is increase by up to 60% with Seacore scrap-mix laminates. Seacore also shows relatively high shear strength due to the 3-dimensionality of the recyclate fibers.