



THE COMPOSITE APP CHALLENGE

Transforming the Fuel Efficiency World With Composite Pallet Boxes



DURABLE

NEED

- A pallet box that is light, strong and recyclable



FUEL EFFICIENT

SOLUTION

- Lightweight collapsible composite pallet box



PROTECTION

BENEFITS

- New standards in mechanical-performance-to-weight in a collapsible pallet box weighing less than 30 kg
- Ship 2 percent more product per pallet box load
- Up to four times more boxes per return trip
- Fully recyclable



RENEWABLE

POTENTIAL

- Global shipping container market estimated at USD 5 billion (15 mil units)
- Pallet boxes = \pm 5-6 million units



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THE COMPOSITE APP CHALLENGE

Transforming the Renewable Energy World with Composite Fuel Cells



DURABLE

NEED

- Fuel cells that weigh and cost less



FUEL EFFICIENT

SOLUTION

- Integrated structural composite fuel cells



PROTECTION

BENEFITS

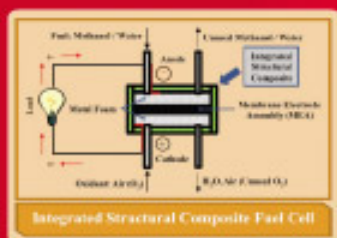
- Composites allow integration of most components into the structure
- Sandwich assembly provides orders of magnitude of improved stiffness versus monocoque construction
- Lower weight provides higher specific power output
- Significantly reduced cost of manufacturing and assembly



RENEWABLE

POTENTIAL

- The market for fuel cells is thought to be large and essentially untapped



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THE COMPOSITE APP CHALLENGE

Transforming the Fuel Efficiency World With Lighter Containers



DURABLE

NEED

- Lighter containers for lower shipping costs



FUEL EFFICIENT

SOLUTION

- Intermodal containers with composite panels



PROTECTION

BENEFITS

- A container weight reduction of 12% could result in USD 4.6 billion savings from ocean-liner transportation
- Savings also possible during land journey



RENEWABLE

POTENTIAL

- Container trade accounts for 70% of total trade value
- In 2008, the global dry container TEU¹ fleet stood at 23.6 million; 3.45 million TEUs were added in 2008²



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1. Twenty-foot Equivalent Unit (TEU), a measurement of cargo based on a standard ocean shipping container, which is 20 feet in length
2. http://www.unctad.org/indicators/2009_en.pdf & http://www.worldshipping.org/pdf/Line_Industry_Visionary_Survey.pdf



THE COMPOSITE APP CHALLENGE

Transforming the Infrastructure World with Long-Fiber-Reinforced PVC



DURABLE



FUEL EFFICIENT



PROTECTION



RENEWABLE

NEED

- Reinforced polyvinylchloride (PVC) for increased strength in low-cost products used in construction



SOLUTION

- Long-glass-fiber PVC pellet concentrate (LF-PVC)

BENEFITS

- Provides impact resistance three times higher than rigid PVC
- Allows reduction of fiber loading in end-use products
- Competes with rigid PVC—with better performance

POTENTIAL

- PVC is the third-most-consumed thermoplastic globally
- Use of 39 million tons forecast for 2011
- 60% used in construction
- Growth of 10.5% annually estimated for Brazil



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