multi-dimenison-hull-weaving-loom

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Electric Ship

Hull Multi Dimension Weaving Loom

This webpage QR code

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HDPE high density polyethylene thermoplastic used for boat building and has become a new trend. Known for its high strength-to-density ratio, the density of HDPE can range from 930 to 970 kg m3. Being lighter than water has an enormous advantage in the marine field. The HDPE is resistant to many solvents making it a perfect choice for the boat building industry.

PDF Version of the webpage (first pages)

Large Scale Hull Multi Dimension Weaving Loom

The key features of a multi-hull design for this concept:

1. Unsinkable and Durable:

2. Utilities: Energy storage (flow battery, ultra capacitor, or traditional battery), motive power, water storage, zeolite storage (heating cooling), and heat pump.

3. Low Maintenance:

4. Cost Competitive: Hull wrap versus bottom paint versus no cost.

5. Weight:

6. Hull Form:

7. Recyclable Materials:

8. Buildability: Anywhere. Using shipping containers as modular factories.

9. Scalable:

10. Ease of Build:

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Hull Build Flow Concept

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Traditional Hull Building

Traditional hull building fall into a few categories, including a frame and skin (both metal, wood, and vacuum bagging a mix via composites), rotomolding, and vacuum bagging composites in a mold.

Most processes involve a great deal of manual labor, whether it's for the framing and skin of the hull, or building the mold for a hull, and then laying out layers of materials to be epoxied.

Molds can be very expensive, with large runs needed to recapture the large cost in developing the plug and mold. And then if changes are needed, it becomes problamatic.

The holy grail of hull building would be a semi-automated layup design using materials specific to purpose (i.e. floatation versus structural).

Modern day cruise ships have a modular approach building in sections and then attaching together, with heavier metals on the bottom (steel) while using lighter aluminum on the upper decks.

Multi Hull Fabrication using Semi Automated Process Loom

The goal of our hull fabrication approach is to combine the best of all technologies into a semi-automated spindle.

Working from the inside out allows the incorporation of multiple strength and floatation options, and then a outter skin designed for optimizing cost and durability.

Working off a longitudinal spline which is rotated, a tube of extruded materials is wound in a helical format for strength. The extruded tube is as simple as a web of netting combined with recycled sealed plastic bottles (for flotation and strength) with a wrap of carbon fiber tow impregnated with expoxy that is wound around the spindle (spline).

Protruding from the spline are dowels (any material) which will hold in place the windings and also support any top side deck platform or bottom keel section.

As the spindle is wound with material the mechanism is changed from a longitudinal wrap, to a robot carriage that winds on the vertical axis near the top side deck platform and the keel bottom platform. This not only provides strength, but also a more rectangular form.

The entire structure can be vacuum bagged for final strength.

Kept on the spindle, the final application of the hull skin can be made. This may be stainless steel, glass or carbon fiber, or a more interesting material, HDPE (virgin or recycled plastic). HDPE can be melted and formed on surface and does not need to be painted for anti-fouling.

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HDPE Iron On Plywood

We are also experimenting with iron-on HDPE to plywood.

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Miniature Factory in a Shipping Container

The basic spindal loom for a 4 or 8 foot high hull section could be built into a 40 foot shipping container with half of the section for the spindle, and other half for the extruded tow materials which the carriage uses to weave the hull.

Two 20 foot containers could also be used. I prefer shipping containers due to their availability, ease of modification, and access.

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Using Popcorn as Aggregate

Pine resin UV set.

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