

PRODUCTION PROCESS

- Scrap palm frond is collected by the University of West Florida team
- Palm fronds are shipped from the University of West Florida team to the Oregon State University team
- Exterior edges of fronds are cut by chop saw and bandsaw
- Prepared fronds are left to dry on drying racks until reaching a moisture content level below 15%
- Dried fronds are passed through a table saw to establish a box-like shape
- Fronds are passed through a planar to set a common thickness and are again passed through a table saw to set a common width
- Fronds are glued with wood glue into a plank
- The plank is compressed using clamps to ensure even adhesion and left to dry for 48-72 hours
- The clamps are removed and the plank is cut to shape, where it is then laid up with fiberglass and resin
- The shape is then sanded and polished to the desired final design



Natural Composite Team

Material Characterization and Usage of Palm Fronds as a Wood Composite Material



MATERIAL CHARACTERIZATION

The main goal of the project was to gather material characterization for the palm frond material, as this is data that has not been measured before. Three different layup types were used during testing: bare board, 4oz fiberglass, 6oz fiberglass. The three testing procedures conducted were a tensile test, a hardness test, and a three point bending test.

Tensile Strength				Dimension: 0.9 in x 6 in
Resin Type	Result #1 (lb/in ²)	Result #2 (lb/in ²)	Result #3 (lb/in ²)	Result Average lb/in ²
None	3695.9	4018.2	3744.1	3819.4
4oz Fiberglass	3387.2	4889.1	5732.8	4669.7
6oz Fiberglass	N/A	4300.1	5560.5	4930.3

Three Point Bending (Elastic Modulus)				Dimension: 3 in x 6 in
Resin Type	Result #1 (psi)	Result #2 (psi)	Result #3 (psi)	Result Average (psi)
None	1382400	1866240	2004480	1751040
4oz Fiberglass	3456000	4147200	2880576	3494592
6oz Fiberglass	2524608	3317760	2592000	2811456

PALM FROND SURFBOARD FIN

After changing the final product from a skimboard to a set of surfboard fins, the team received advice from Parker Conrad of Buni Boards LLC, a Corvallis-based surfboard shop, and decided to manufacture a set of three fins that would fit within a Futures brand fin box. Based on a design recommendation from Parker, the team chose to manufacture the fins with the palm fronds oriented at an

angle rather than parallel to the surface of the board to increase strength. The team used a CAD file provided by Parker to profile the shape of the board and manufactured a part that would interface with the Futures fin box. The final set of fins utilizes 6oz fiberglass and will be handed over to Buni Boards for installation on an actual surfboard.

THE TEAM

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