



Creative Cost-Effective Solutions for Small Wind



Has your tooling created this ?

Damn, I wish this mold fit together so I don't have to sand **EVERY** blade



Contents

- Company introduction
- **FOUR** Products for Wind Blades
- Andy's Guiding Philosophy
- Project examples

Who We Are

- **World's Largest Privately Owned Tooling Supplier**
- **Engineering & Manufacturing Company**
- **Composites & Metal Fabrication**
- **Large-Scale Facilities**
- **High-Precision 5-axis Mills**
- **Global Customers**



Markets

- Aerospace
- Marine
- Space
- Energy
- Infrastructure
- Transportation
- Defense



SPACE



AEROSPACE



Infrastructure



Defense



Transportation



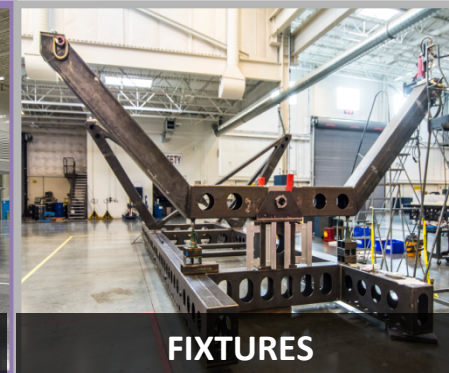
Energy



MARINE

Products *Composites & Metallics*

- Tooling
 - Patterns, Molds, Cauls
- Fixtures
 - Assembly, Transport
- Parts
 - Prototype, production
- Engineering Services
 - Concepts, CAD, FEA



1-Foam Patterns

Requirements: Single usage, Low cost, complex molding surface, no vacuum integrity, +/- 3 mm profile tolerance

Solution: Wood, spray PU foam. Single fast 5-axis machine step. Sealed surface.

Benefits:

- Durable to support walking
- Large scale capable
- 2-3 week availability
- Inexpensive- 1.0X



2- Putty Patterns

Requirements: 1-5 part usage to 70c, Low cost, complex molding surface, vacuum integrity, +/- 1.5 mm profile tolerance

Solution: Wood, spray PU foam, FG, Putty, Sealed surface.

Benefits:

- Infusion capable
- Scribes and detailed radii features incorporated into surface
- Large scale capable
- 3-4 week availability
- Inexpensive- 1.5X



Buck Fab.



Rough Mill



Apply
Chop



Apply putty



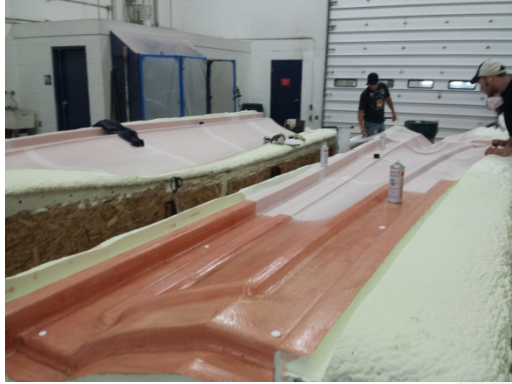
Final Mill



Finishing

3- FRP/Putty Molds

Foam Mold

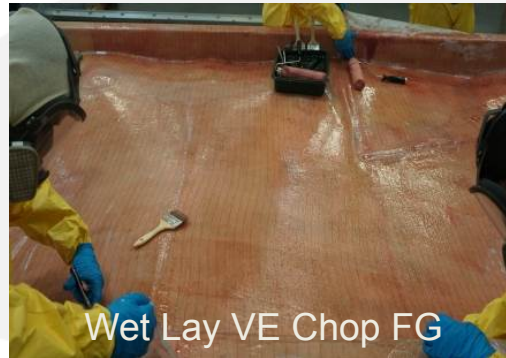


Requirements: 1-10 part usage to 70c, Durable, vacuum integrity, +/- .75 mm profile tolerance

Solution: Steel SS, FG, Putty, Sealed surface.

Benefits:

- Infusion capable
- Large scale capable
- 4-6week availability
- Price- 2.5x



Putty- Machined Final

Structure Tabbed to Facesheet

4-Production Wind Blade Tooling

- Blades, webs, assembly fixtures 3m to 60m length
- Heated electrical, water, air
- Non-heated
- Machined surface $\pm .5 \text{ mm}$ local tolerance
- Cast surface $\pm 2 \text{ mm}$ local tolerance

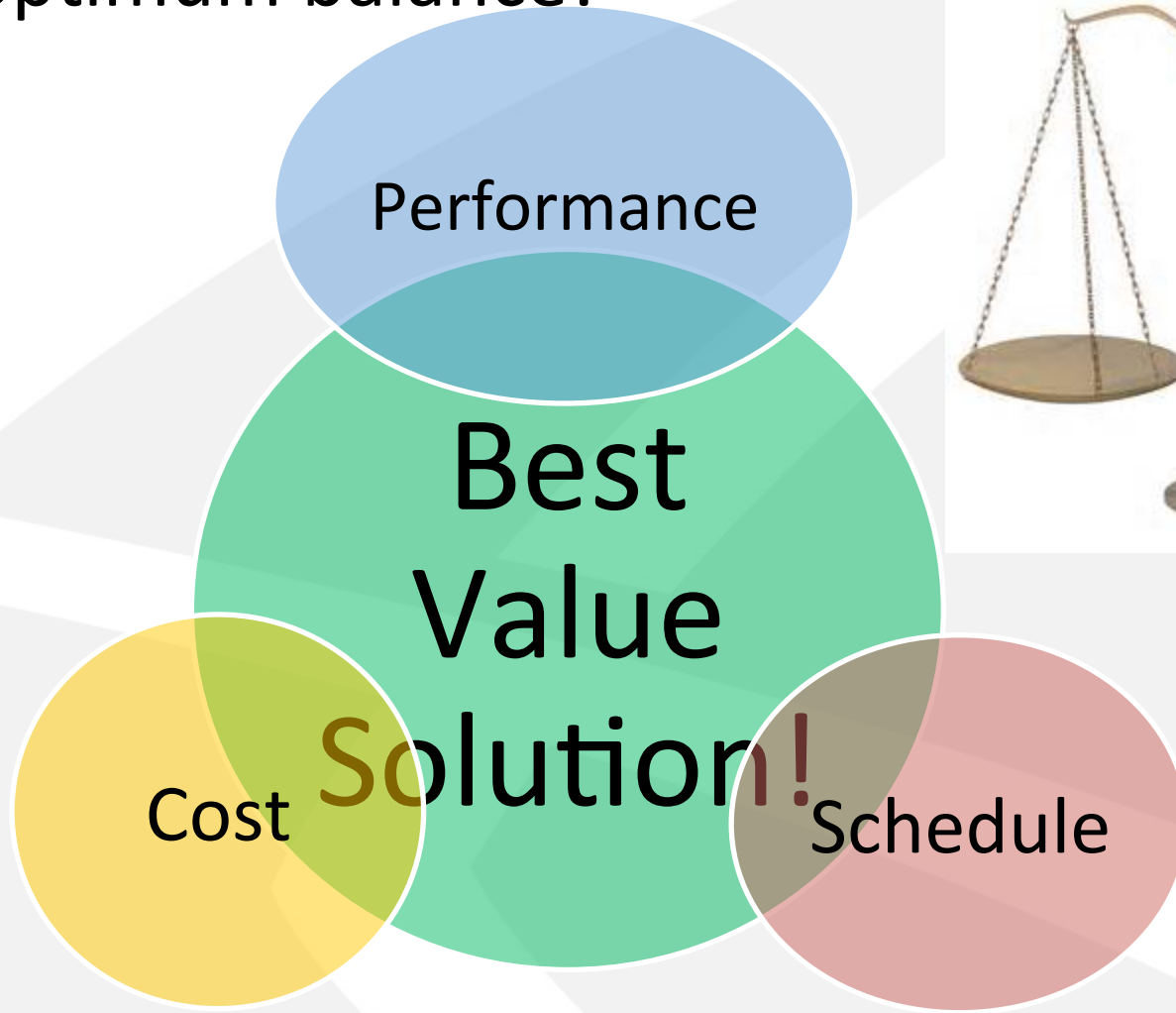


Machined Duratec Option



Andy's Guiding Philosophy

- Triad optimum balance!



Stratolauncher- World's largest airplane!

Wingspan 117 meters



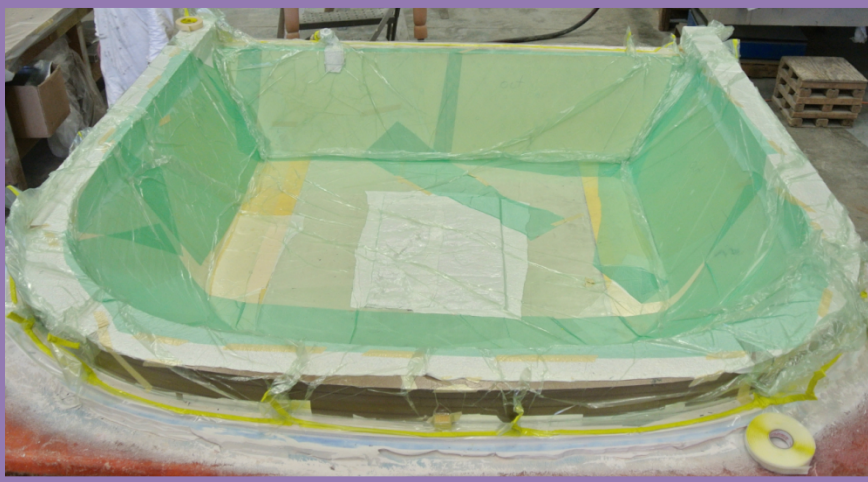
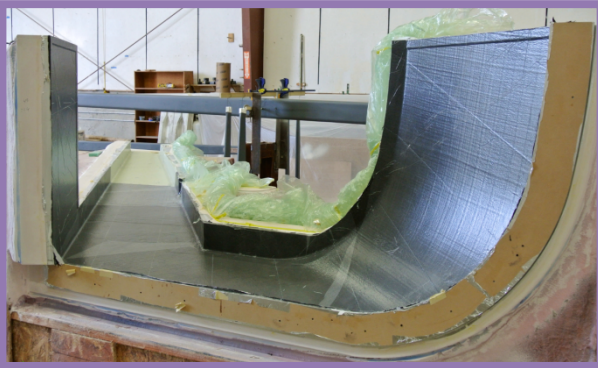
BMW Oracle Racing Yacht



Betts Boats

"Boat building and composite parts manufacturing is all about tooling. The precision we can achieve with tooling provided by Janicki Industries is unparalleled, and critical for the success of our manufacturing operations."

Kellen Betts



AgriMarine sustainable aquaculture

- Janicki designed and fabricated tooling and parts for serial production of 24m 3,000 meter³ salmon farming tanks
- Recirculating design
- Fiberglass/vinylester infusion

“We chose Janicki based on their reputation for very high quality control and solid engineering capacity. Also, their operation is highly professional, with well trained staff”

*Rob Walker
President*



Accurate tooling drives finish cost down!

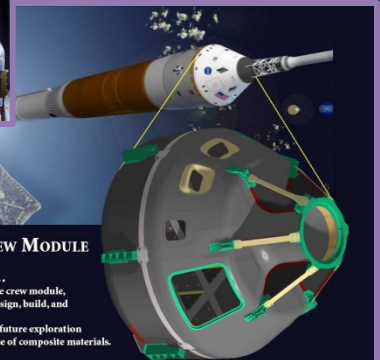
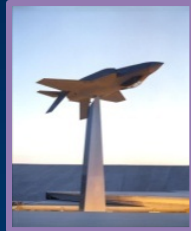
Quality wind blade molds can produce 1,000+ blades





Thank You

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COMPOSITE CREW MODULE

- What's going on...
- building a composite crew module,
 - gaining hands on design, build, and test experience,
 - in anticipation that future exploration systems may be made of composite materials.

