





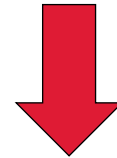
Water Soluble Mandrels for Hollow Structures



About

- Hollow parts with closed shape require mandrel technology
- Existing mandrel or bladder techniques show disadvantages
- New class of lost core / mandrel material
- Water soluble
- Environmentally friendly
- Processing Advantages
- Applications:
 - Air- and Cable Ducts
 - Stiffening Structures
 - Pressure Vessels

AQUA
MANDREL





Highlight Features

- Water soluble
- Lightweight 0.54 gcm^{-3}
- Low CTE 4.7 e^{-6}
- Temperature resistant 195°C
- Pressure resistant 8.5 bar
- Autoclave and RTM
- Non corrosive
- Smooth surface
- Automated manufacturing, machinable
- Fast wash-out
- Environmentally friendly – no wastewater treatment





Materials

- Aquacore™ wet paste
- Aquapour powder, castable
- Aquafill™ filler for repair
- Aquaseal™ water soluble sealant
- Fastcore for automated processing
- Rapidcore rapid prototypes

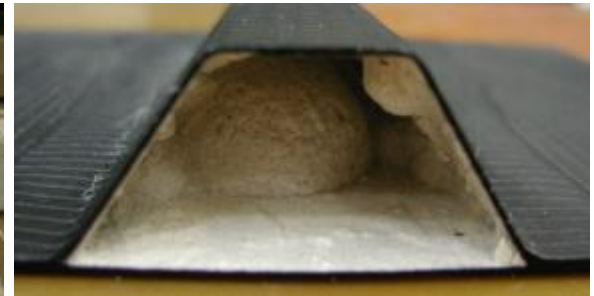
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Reasons for Mandrel Production



- Common problems with processing

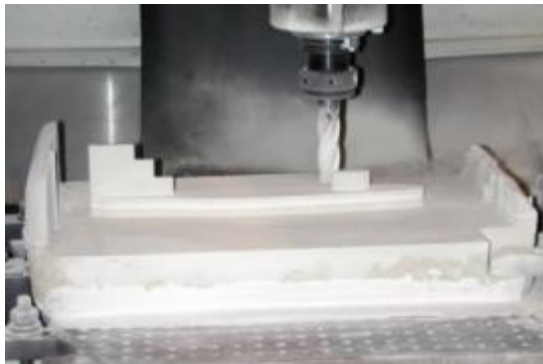


- ➔ Service to offer ready to use water soluble mandrels

Products

- **AquaBlock**

- Pressed & Sealed
- Machinable



- Machined surface must be sealed with tape or sealer

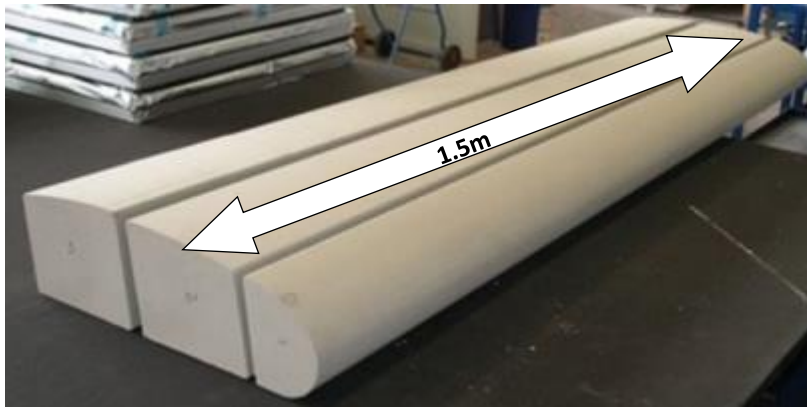


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Products

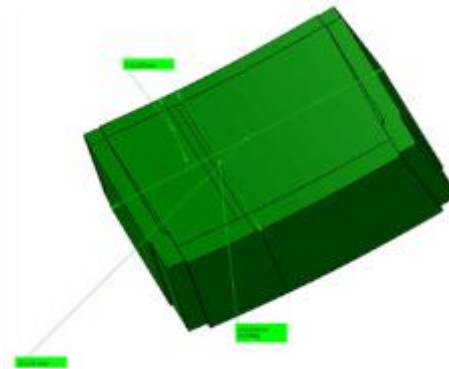
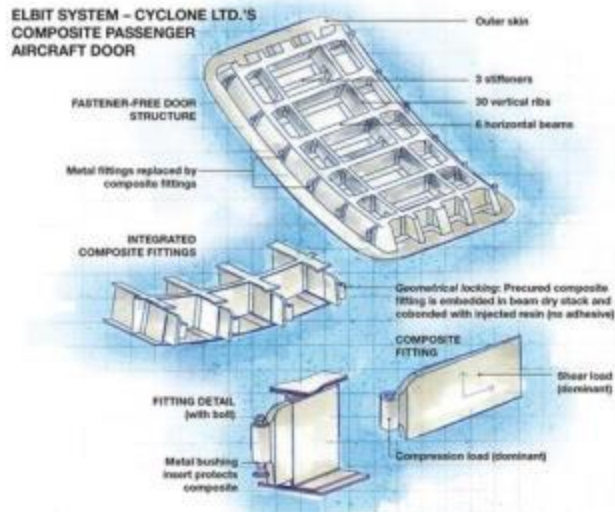
- **Manufactured Mandrels**



Applications

- Hollow Door Structures
- Door Hinges
- Airducts
- Stringers

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Example: compositesworld.com 201307

Aircraft Passenger Door Hinge

- Different mandrel shapes



- Wash-out station



Door assembly

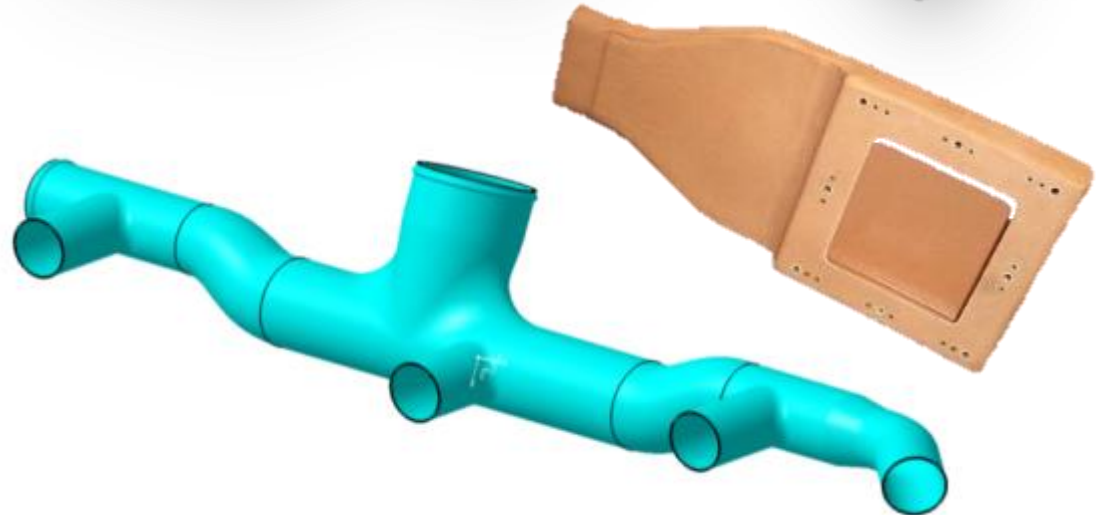
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Air-/Cableducts



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Air ducts

- Different Air ducts



Missile Air duct



Landing Flap

- 1.5m length



- RTM Processing

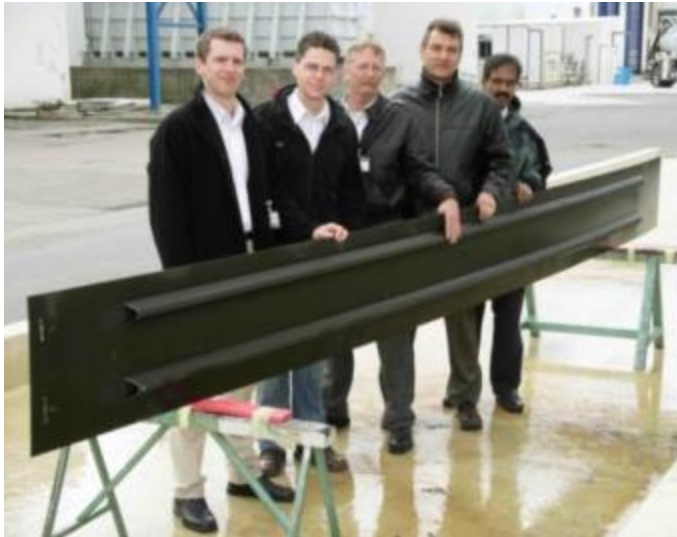


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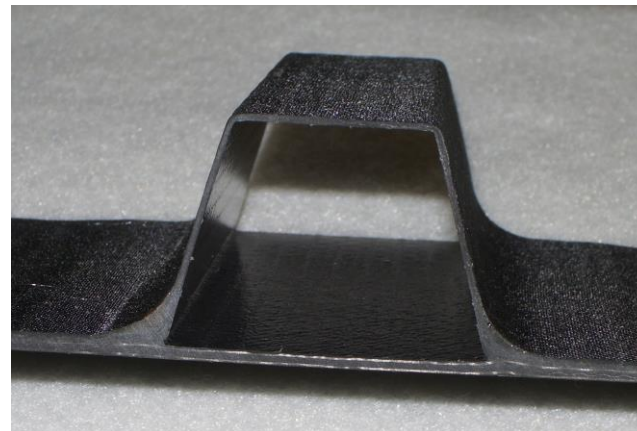


Omega Stringer

- Up to 7m length



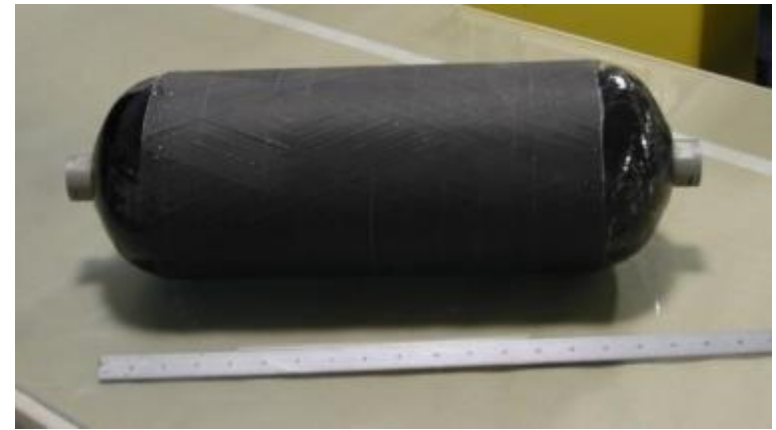
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Pressure Vessels



- Mandrel made from block or with mould



- Composite processing by winding or tapelaying



Automotive Parts

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Maintenance Door



- Dimension 600x690mm (24"x 27")
- Volume 8.0 litre
- OEM in Germany
- Lay-up of the SMC material
- Temperature 140°C / 284°F
- Pressure 40bar / 580psi
- Cycle time each part 8 – 11min
- SMC Part
- Very accurate in wall thickness
- Weight reduction 51% (16.5kg => 8.0kg)
- Better acoustic insulation



Manufacturing



Production Equipment

- Hot Air Ovens



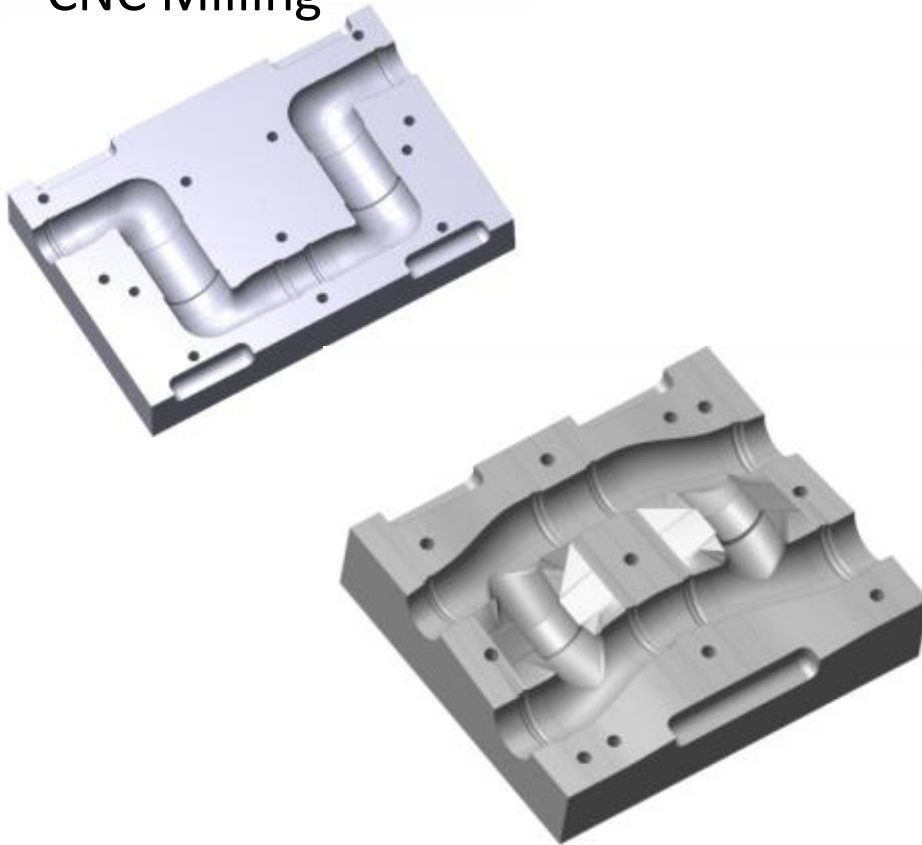
- Microwave Heating





Production Equipment

- CAD/CAM Design
- CNC Milling



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Logistics / Serial Production





Customers



GE Global Research



Aero Consultants

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Your Partner in the Aerospace Composites Industry



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