A&P Technology

# *Engineered Braided Fabrics Enable Significant Cost Savings*

# Overview

- Braided Fabric Applications
- Types of Braided Fabrics
  - Fabric forms
  - Benefits of each
- Design Flexibility
  - Raw material
  - Architecture
  - Hybrid
  - Contour
- Manufacture Processes
  - Prepreg
  - Thermoplastics
  - SMC
  - LCM

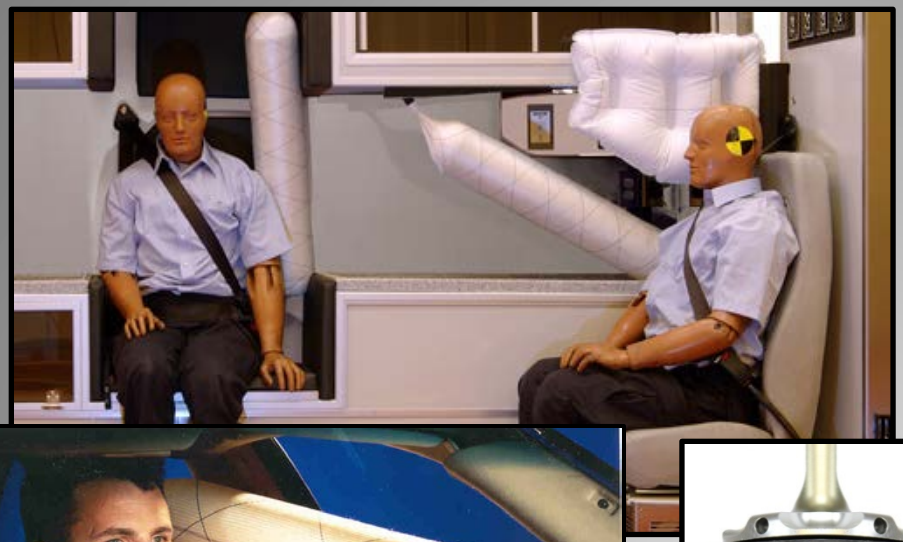
# Applications Of Braided Reinforcement

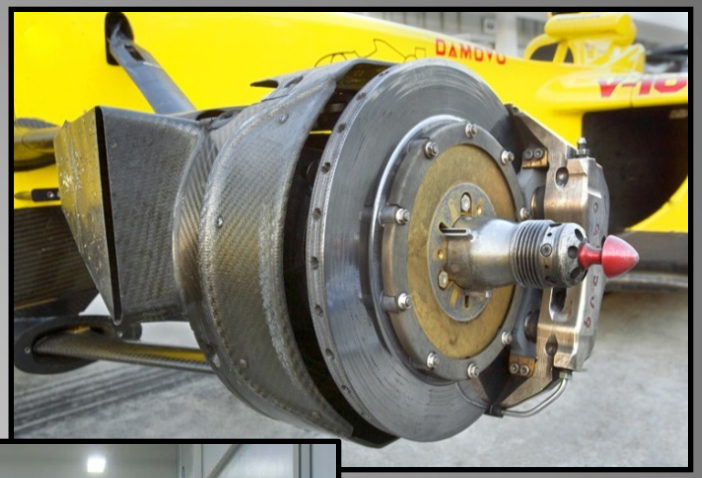
# Aerospace

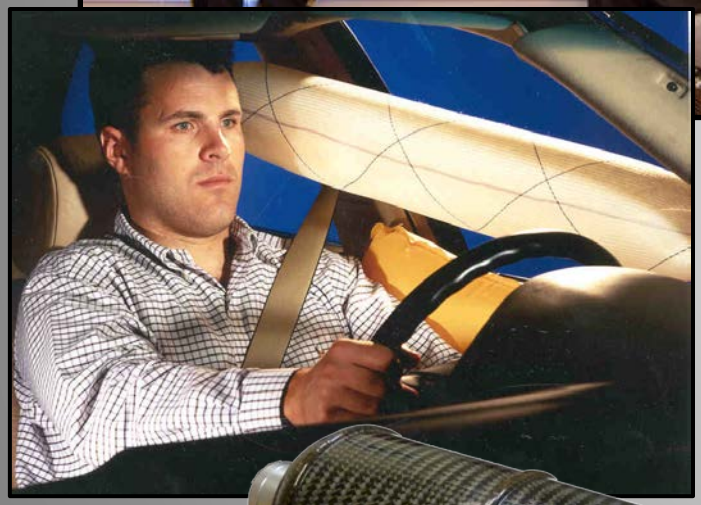
# Recreation

# Industrial

# Automotive







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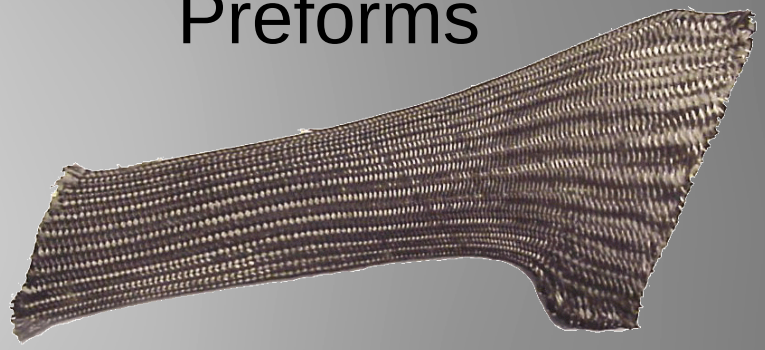
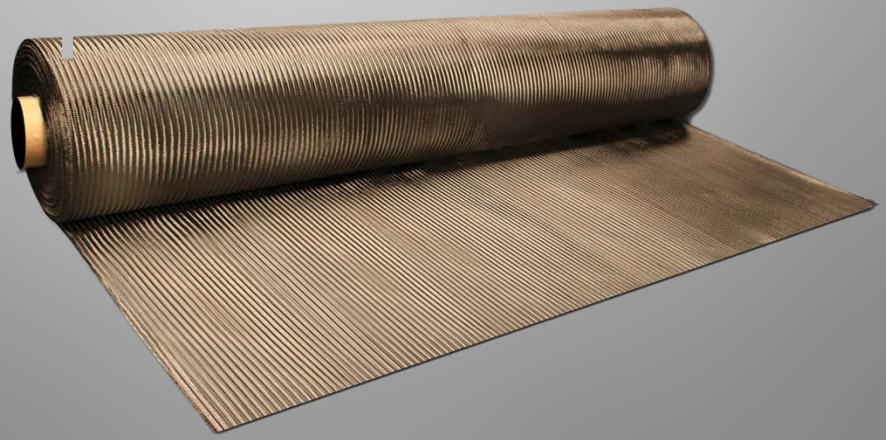
# Braided Products

Sleevings

Preforms

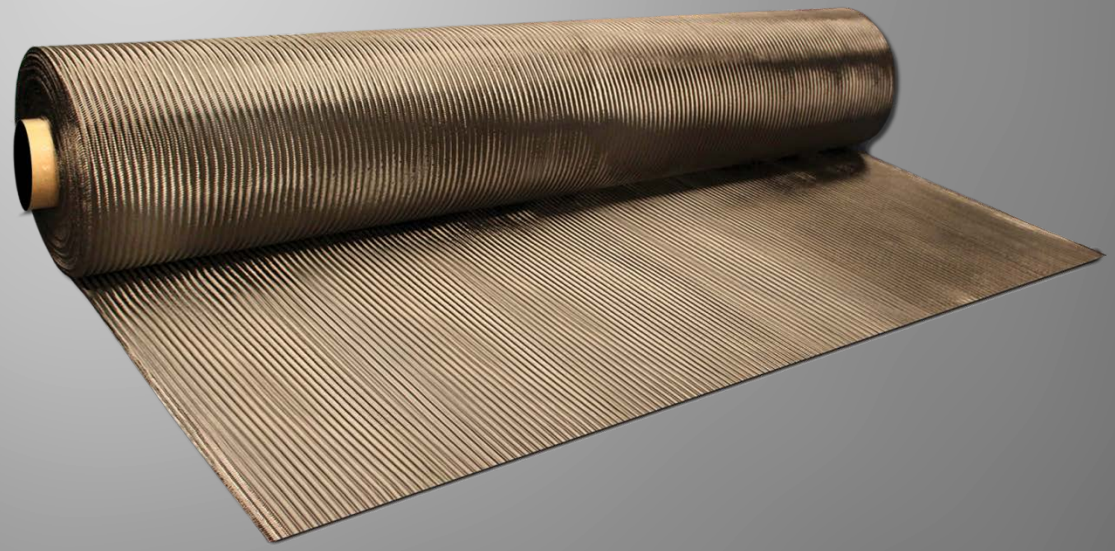


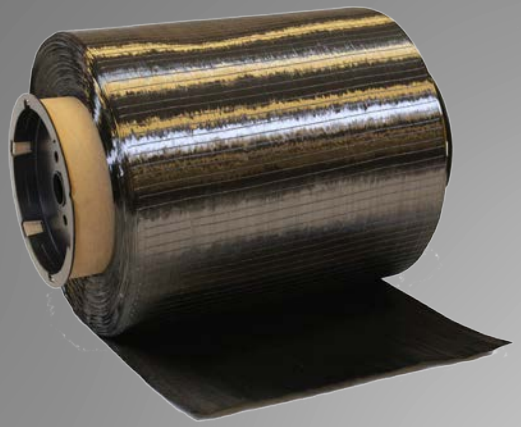
Fabrics



# Fabrics

- Unidirectional
- Biaxial
- Multiaxial
- Custom



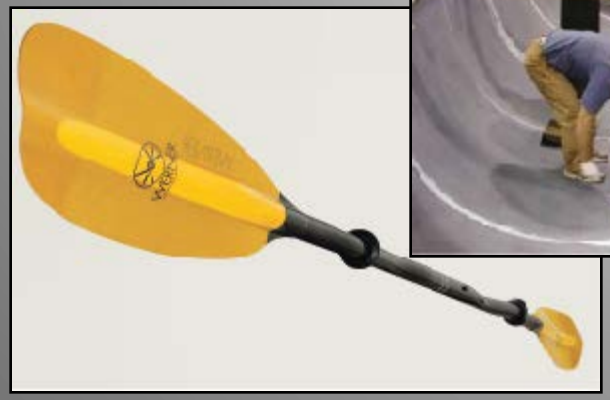


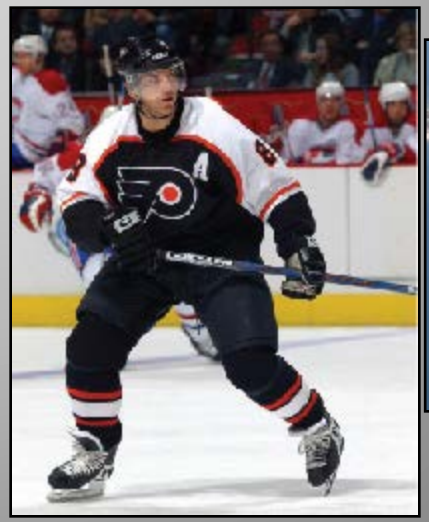
# Unidirectional

No Crimp Unidirectional Fabrics –
Highly Efficient and Very Affordable

Only small percentage of binder (less than 3%) on one side – no crimp offers direct translation of properties

Offered in 4 oz., 9 oz., and 22 oz. fabric weights in standard and intermediate Modulus.





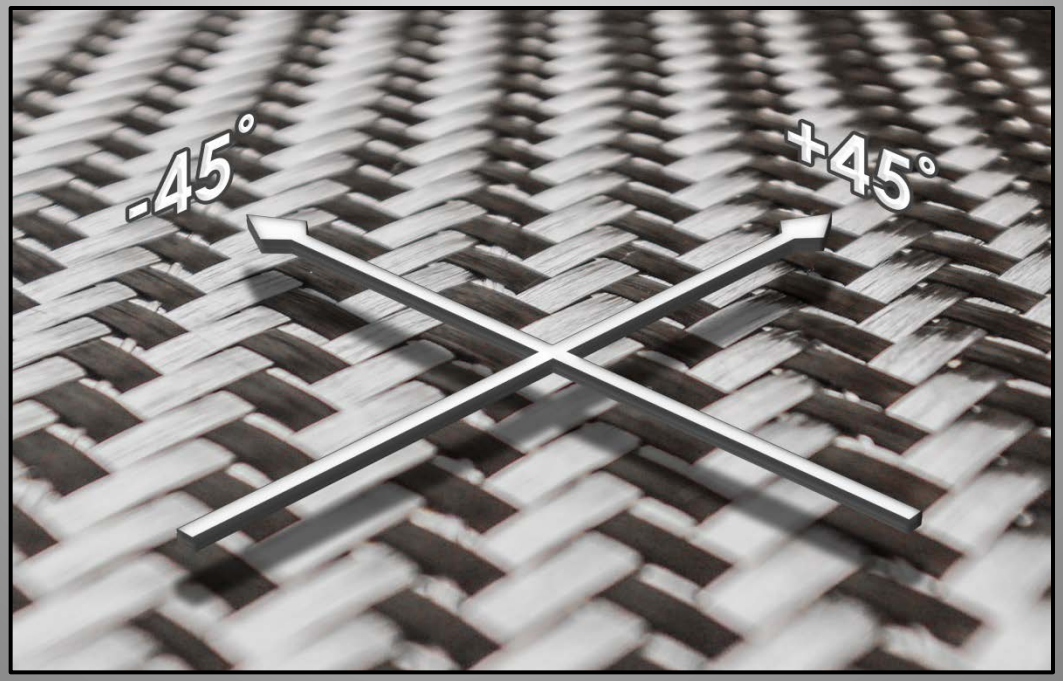
# Biaxial

+/-45° fabric without cutting, stitching or manipulation

Highly drapable and conformable

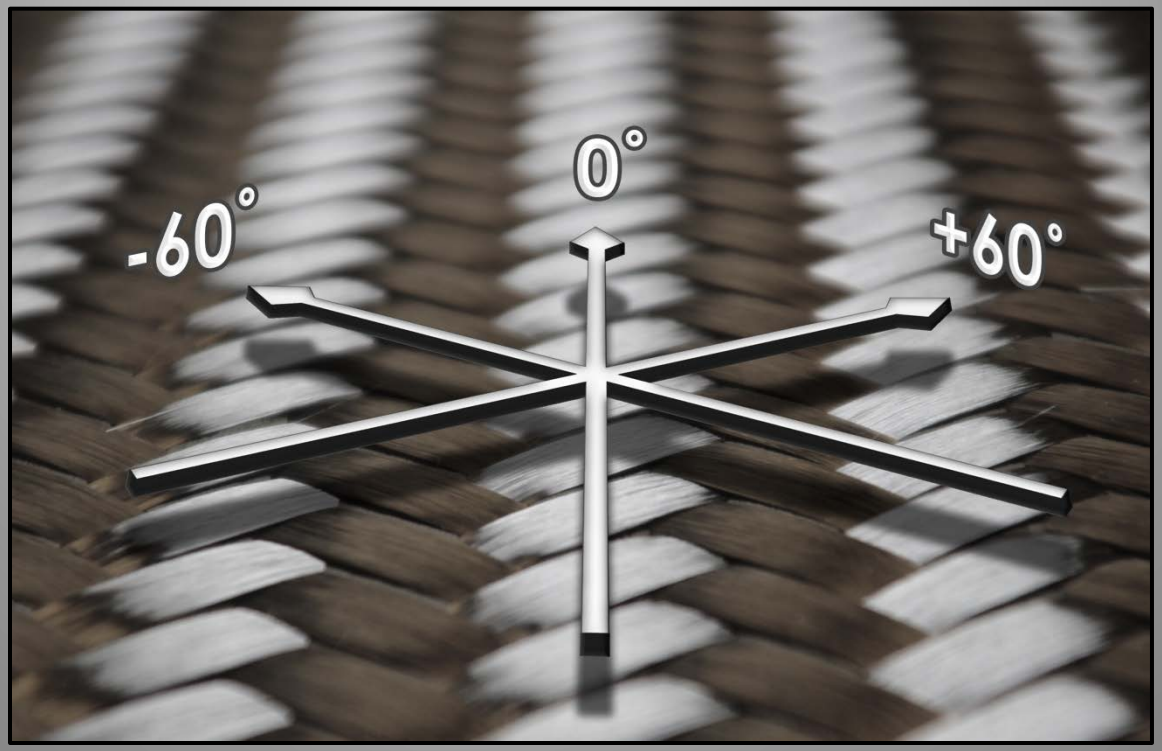
Off the roll +/-45° reduces manufacture time and results in less waste

Widths from 20” – 52” and fabric weights from 5.8 oz/yd² to 21 oz/yd²



QISO®

- Braided, triaxial fabric reinforcement
- Each ply is balanced and symmetric; inherently Quasi-ISOtropic



# Why?

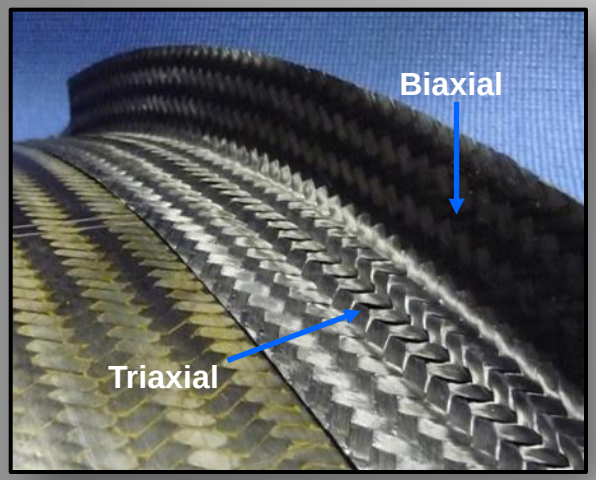
## Better. Faster. Cheaper.

- Superior performance
- Simple and efficient processing
- Reduction in scrap waste

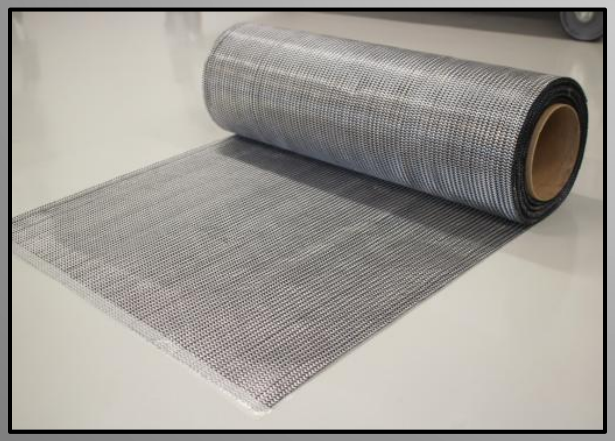
# Link to QISO video

# Custom Fabrics

- Hybrid Architectures – Biaxial/Triaxial
- Hybridized Material Systems
- Customized Widths for Waste Reduction
- Customized Architectures for Optimized Properties



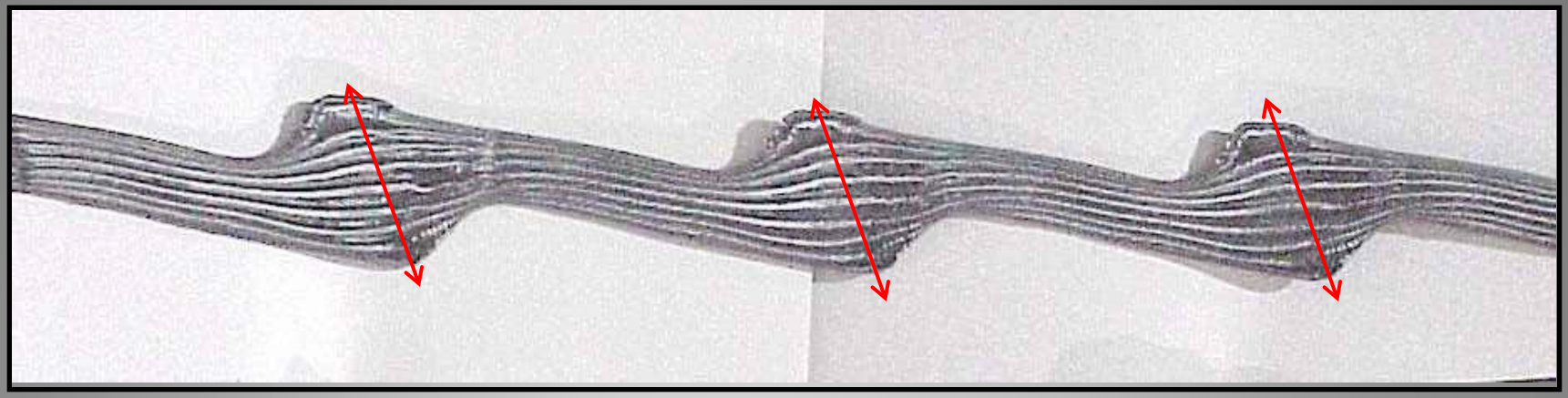

Tailored Fabrics

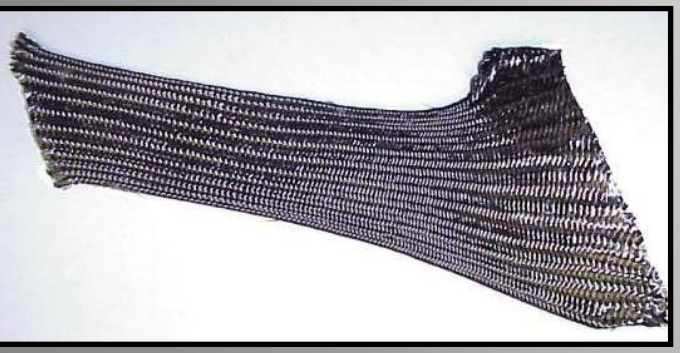


Hybrid Fabrics

Contoured Fabrics

# Braided Preforms

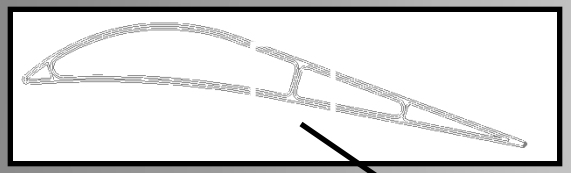


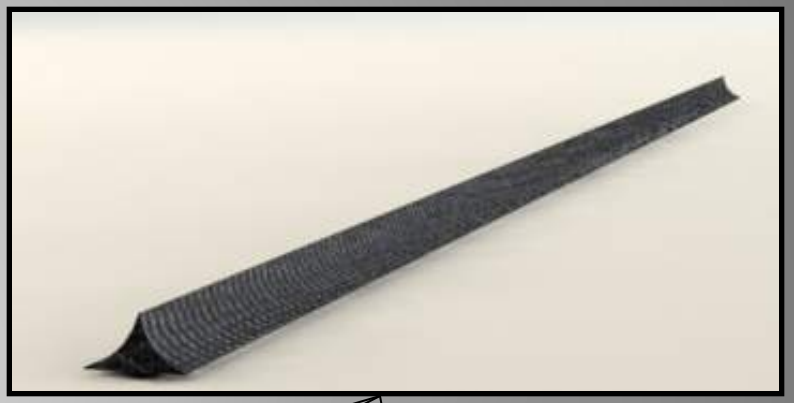


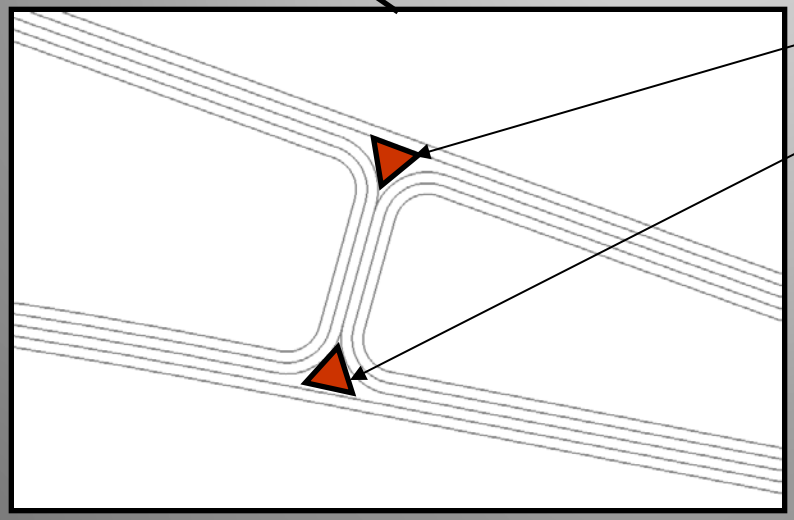
- Tailored to the shape of the mold
- “Drop and shoot” dramatically reduces manufacture costs

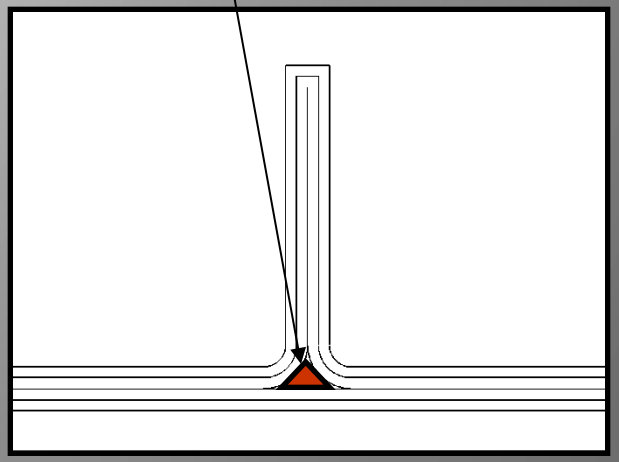
# Fillet Preforms

- Tailored, Axially Loaded Net Shape Radius Fillers
- Minimize Resin Rich Regions





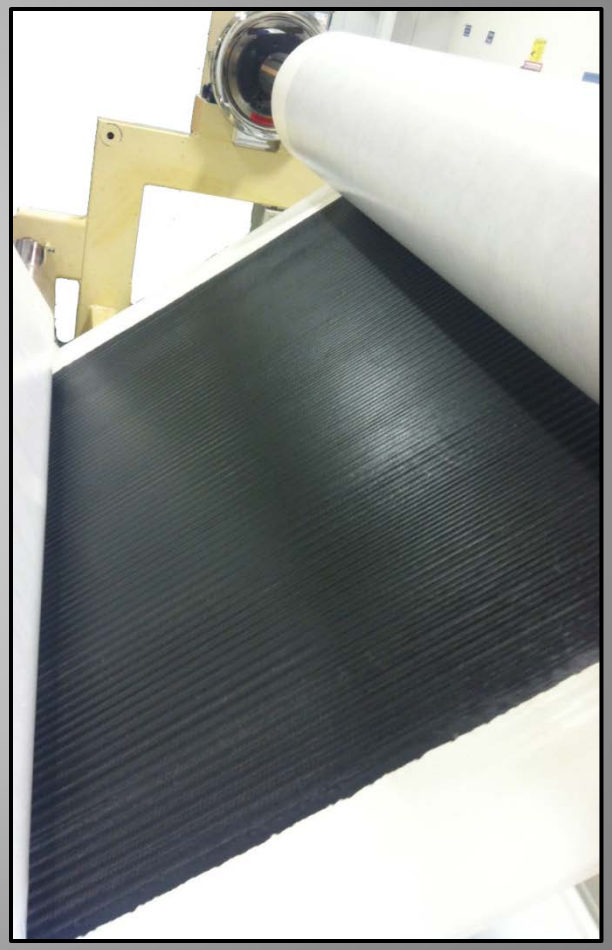




# Manufacture Processes

# Prepreg

- A&P fabrics are impregnated by all major prepreg suppliers:
  - TCA
  - Hexcel
  - Solvay
  - Tencate
  - MCCFC



# Thermoplastics

Available in biaxial and multi-axial fabrics and sleevings

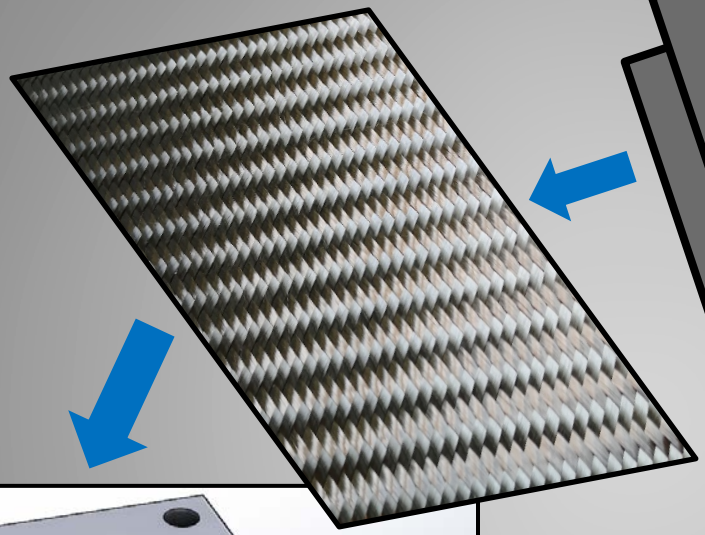
Braiding narrow slit thermoplastic tapes

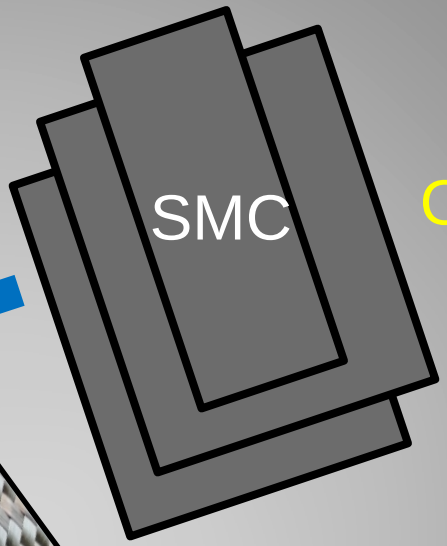
- Expliseat's TiSeat made from preforms comprised of multi-layered thermoplastic tape sleevings

Thermoplastic semipreg

- A&P's QISO fabric, post-treated and coated with Tencate's Cetex resin

# Braid/SMC



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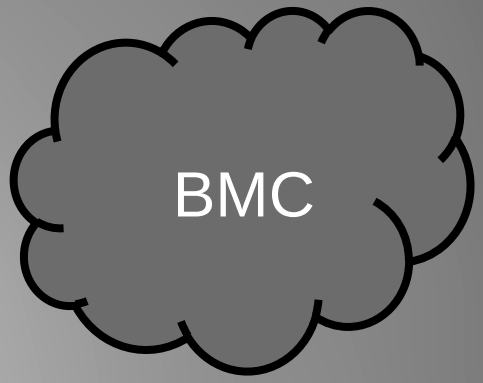
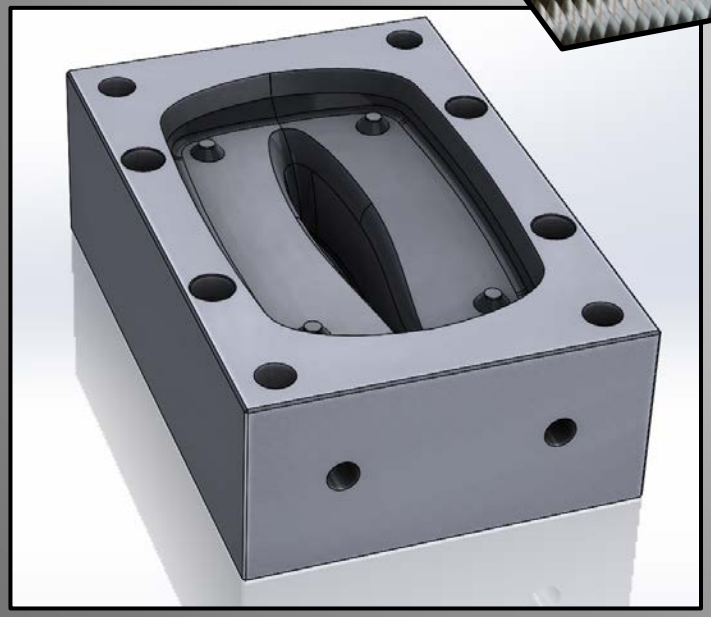
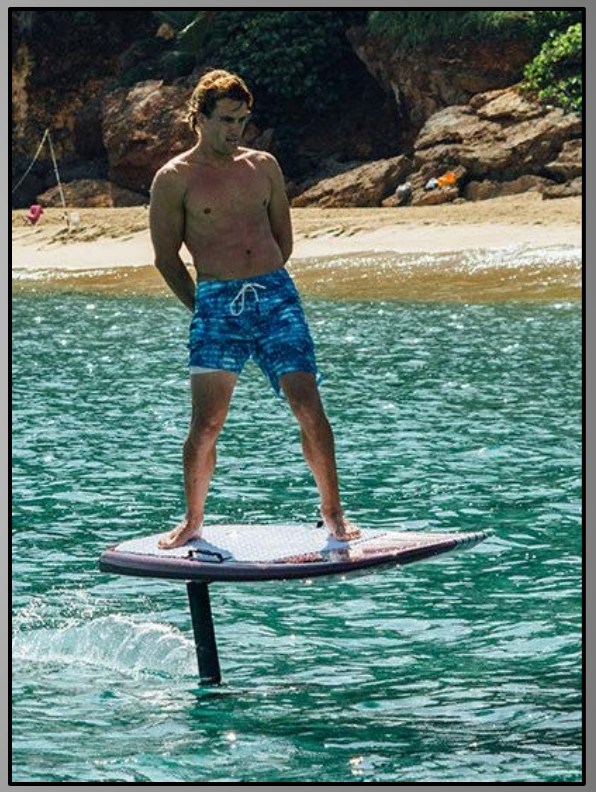


# Braid/SMC

## Compression Molding Example



Liftfoils.com

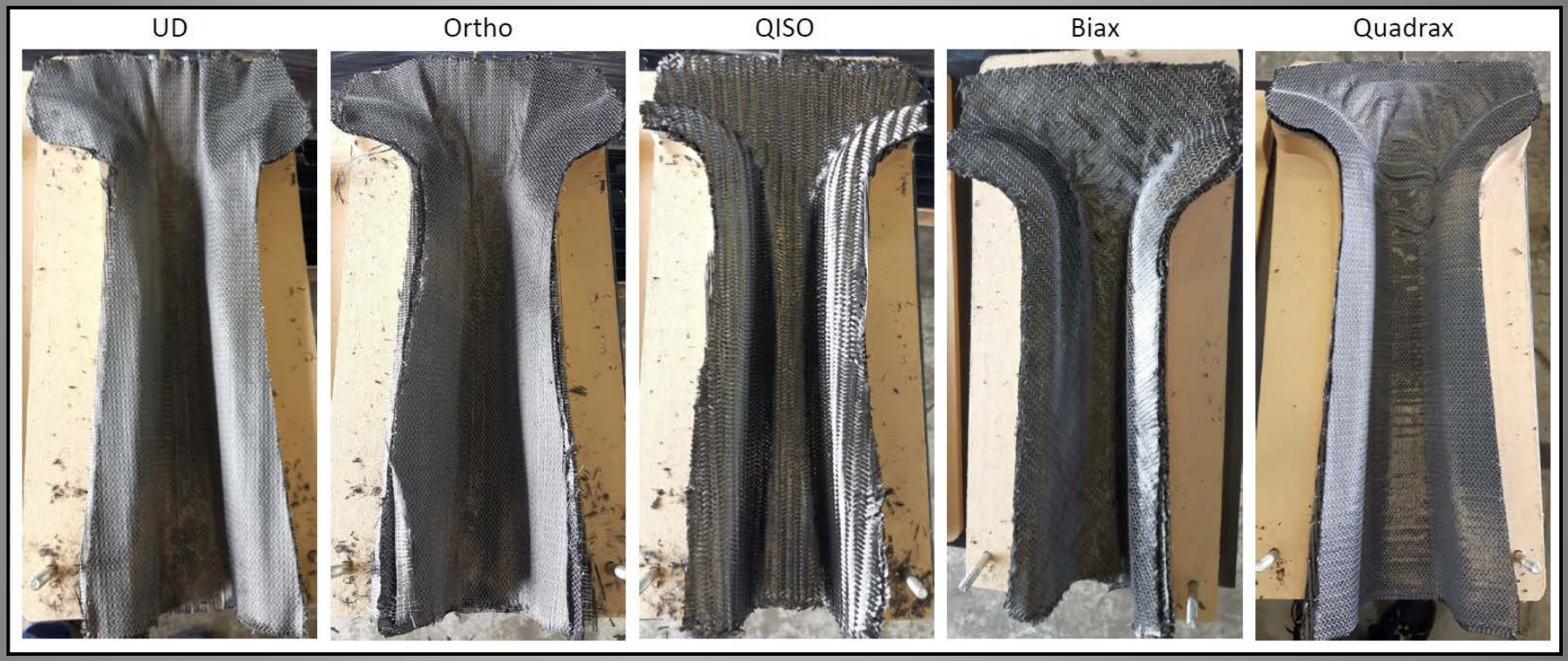
# Braid/SMC (cont.)

# Braid/LCM

LCM Composite B-Pillar Demonstrator

# Braid/LCM (cont.)

B-Pillar Drape Trials



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