

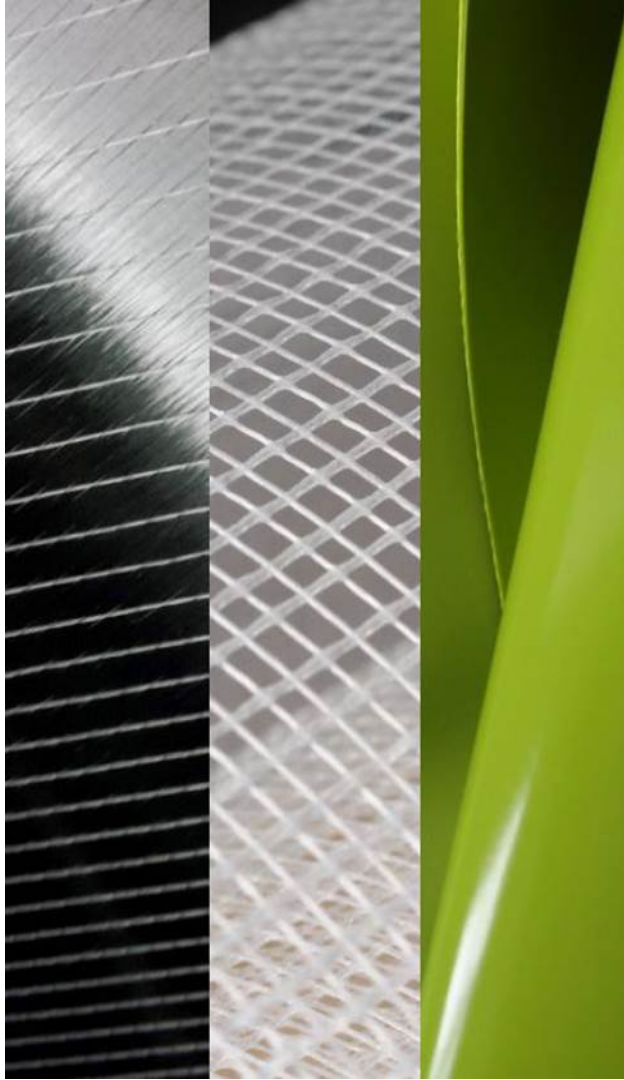


CHOMARAT

free to innovate



ORNL Textile Carbon Fiber C-PLY™
IACMI Members Meeting



CHOMARAT Group

Established in 1898

100% family owned

International textile group

Europe, USA, China, North
Africa

~900 employees

CHOMARAT Worldwide



CHOMARAT NORTH AMERICA AS9100

3 sites in Anderson (SC)

-  **Composites** Reinforcements (glass/carbon)
-  **Construction** Reinforcements

CHOMARAT FRANCE

3 sites in Ardèche

-  **Composites** Reinforcements (glass/carbon)
-  **Construction** Reinforcements
-  **Coatings & Films - Textiles**

CHOMARAT TUNISIA

2 sites in Grombalia (Tunis)

-  **Composites** Reinforcements (glass)
-  **Garment manufacturing**
-  **Automotive Textiles**

CHOMARAT CHINA

1 site in Taicang (Shanghai)

-  **Composites** Reinforcements (glass/carbon)

Businesses

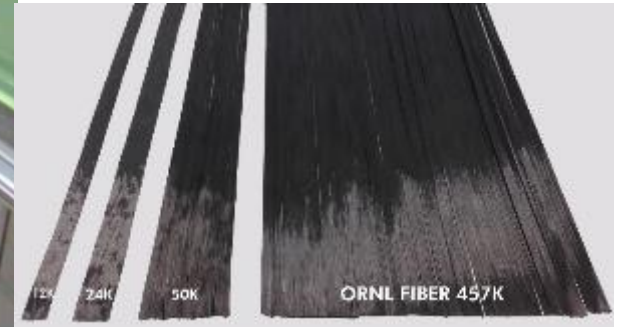


Composite Reinforcements: C-PLY™



Advanced Carbon NCF Technology

- Spreading Tows
- Thin Plies
- Shallow Angles



Why C-PLY™?

MATERIAL COMPARISON:

Mechanical Property:	Method:	Unit:	C-PLY™ ¹	3K Plain Weave ²	C-PLY™ Comp.	12K Uni-Directional ³	C-PLY™ Comp.
Un-notched Tensile Strength	ASTM D3039 Type I	MPa	885	665	133%	677	131%
Un-notched Tensile Modulus	ASTM D3039 Type I	GPa	46.7	44.5	105%	47.7	98%
Un-notched Compression Strength	ASTM D6641	MPa	572	511	112%	549	104%
Un-notched Compression Modulus	ASTM D6641	GPa	42.9	41.0	105%	44.3	97%
Open Hole Tension	ASTM D5766	MPa	434	360	121%	348	125%
Open Hole Compression	ASTM D6484	MPa	303	288	105%	276	110%

1. C-PLY BX0/-45 150 CT3.4 12K HS x 125 cm (Toray T700S Fiber)

2. Toho HTS40 3K Plain Weave

3. Toray T700G-12k UD-Quasi

- Improved handleability over UD with similar performance and an increase in performance over woven.
- Can provide a wide range of fabric areal weights & fiber orientations with a single input.
- Provides continuous fiber format for Textile Carbon Fiber that can be processed with all standard manufacturing methods.

500

400

300

200

100

0

GSM/Ply

Heavy Tow
110 to 500

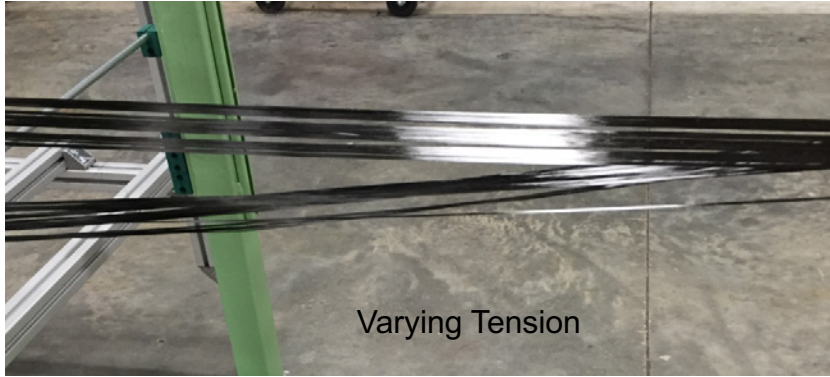
24K IM
50 to 150

12K HS
50 to 150

24K HS
80 to 250

CARBON Spreading

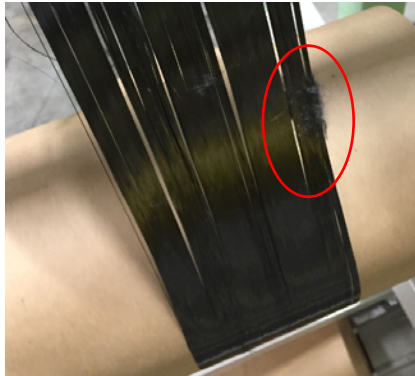
Challenges with Textile Carbon Fiber



Varying Tension



Broken Filaments



Fuzz



Inconsistent Package Size

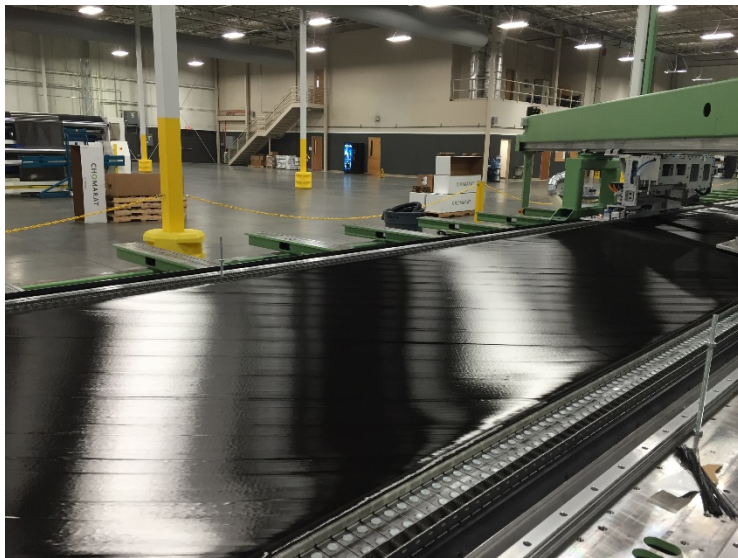


Cannot Make Good Product
with Bad Input

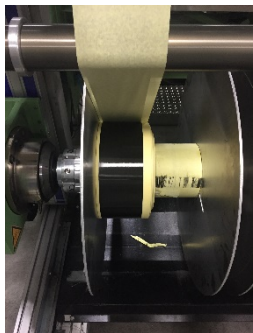
C-PLY™ with Textile Carbon Fiber



457K Input



Assembling



Winding



Stitching



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