



# **The Advanced Materials Webinar Series: Advanced Composites**

*Southern Advanced Materials in  
Transportation Alliance (SAMTA)*



# Today's Objectives

- Assess the economic development potential of advanced composites.
- Explore research questions and their relevance for the South.
- Gauge further interest in pursuing this material as a working group.

The screenshot displays a meeting interface with several panels. On the left, the 'Attendees' panel shows a video feed for 'Linda Hoke' and a list of attendees. Below it is a 'Feedback' panel and a 'Chat' panel with 'Public' and 'Private' tabs. The main area on the right shows 'Session Details' and 'Audio Details'. Two orange arrows originate from a red-bordered box on the right and point to the 'Private' chat tab and the chat input area.

Attendees | 0 / 1

Start Content

**Session Details**  
Session Name: Linda Hoke's Room  
Leader: Linda Hoke

**Audio Details**  
Primary Dial-In: 1-800-371-9219  
Passcode: 4215367

Public Private

Double-click an attendee to chat privately.

# Asking Questions

# Today's Presenters

- **Les Goff, President & CEO,  
Noetic Technologies**
- **Bryan Brister, Director,  
MS Polymer Institute,  
University of Southern Mississippi**



# Noetic Technologies, Inc.

A Technology Commercialization Company

Advanced Composites: The Southern Advanced Materials in  
Transportation Alliance

## **Advanced Composites - Introduction**

February 16<sup>th</sup>, 2011

Les Goff, Ph.D.

President & CEO Noetic Technologies, Inc.

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# What is a Composite?

## **Definitions:**

**Composite is when two or more different materials are combined together to create a superior and unique material.**

**Definition of Composite (for our discussion) : A filled polymeric material. One filled with reinforcing fibers and fillers that are then processed i.e., extruded, injection molded, thermoformed etc.**

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# Why a Composite?

**Light Weight – Energy Efficiency**

**High Strength – Strength to weight ratio**

**High Modulus – Opportunity for thinner parts**

**Impact Performance – Systems to dissipate energy**

**Durability – Corrosion resistance vs. metals**

**Design Freedom- Angles/Curves relative to cost of metals**

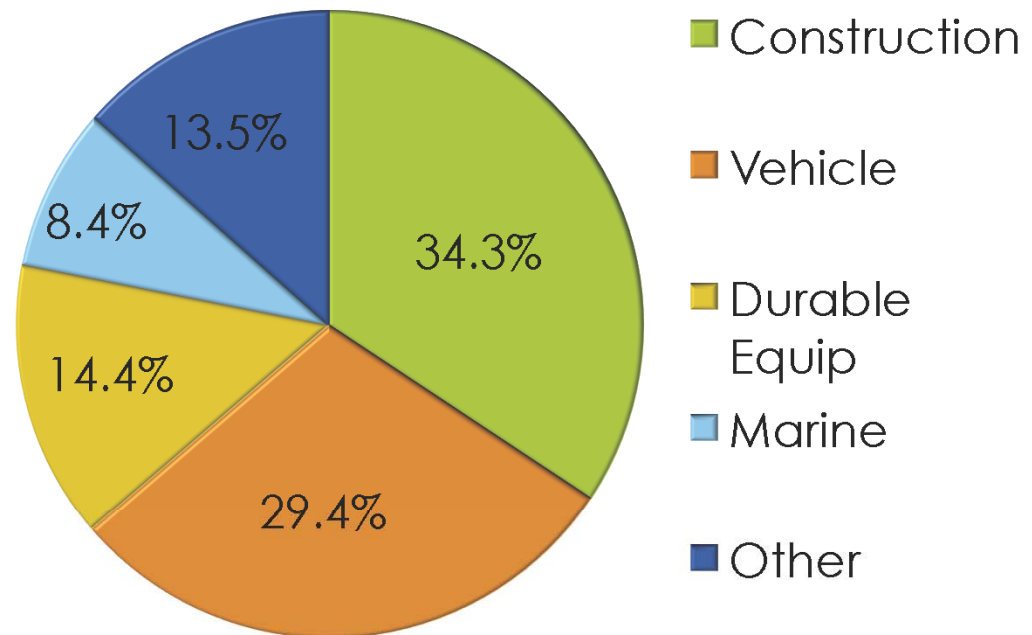
**Etc.....**



# Composite Demand

- Construction and Vehicle largest markets
- Advanced Composites are part of all these markets
- Vehicle and Aerospace applications drive innovation in composites

**Market Demand 2008 (%)**



Ref: Plastics News

# Demand for Composite Materials

Volume (M lbs)	2003	2008	2013	2018
Total resin Demand	3235	3100	3570	4000
<b>Resin Type</b>				
Thermoset	1950	1800	2070	2320
Thermoplastic	1285	1300	1500	1680
<b>Market</b>				
Construction	1050	963	1095	1244
Vehicle	942	885	1060	1191
Durable Equip	433	511	575	640
Marine	417	330	380	415
other	393	411	460	510

Ref: Reinforced Plastics, May1, 2009 Freedonia Group, Inc.

# Advanced Composites - Auto

## **Advanced Composite Auto Applications**

- Ignition components
- Body panels
- Heat shields
- Hoods
- Radiators
- etc.....

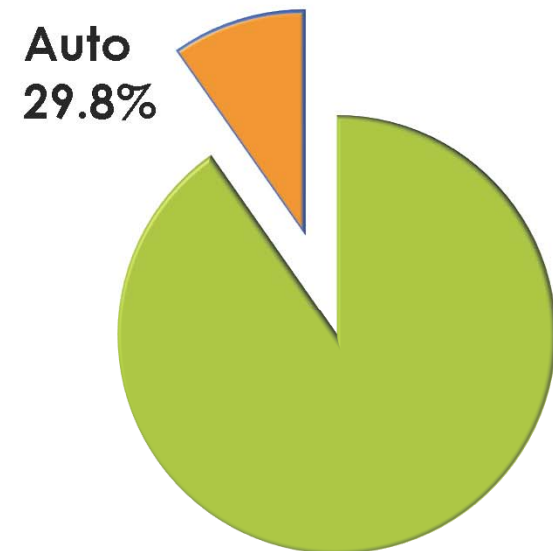
# Advanced Composites Demand

- Auto will grow 4% per year thru 2013

## Growth factors are:

- Fuel efficiency
- Reduce maintenance costs
- Primary growth in Thermosets

## Composite US Demand 2018 (%)



4 Billion lbs

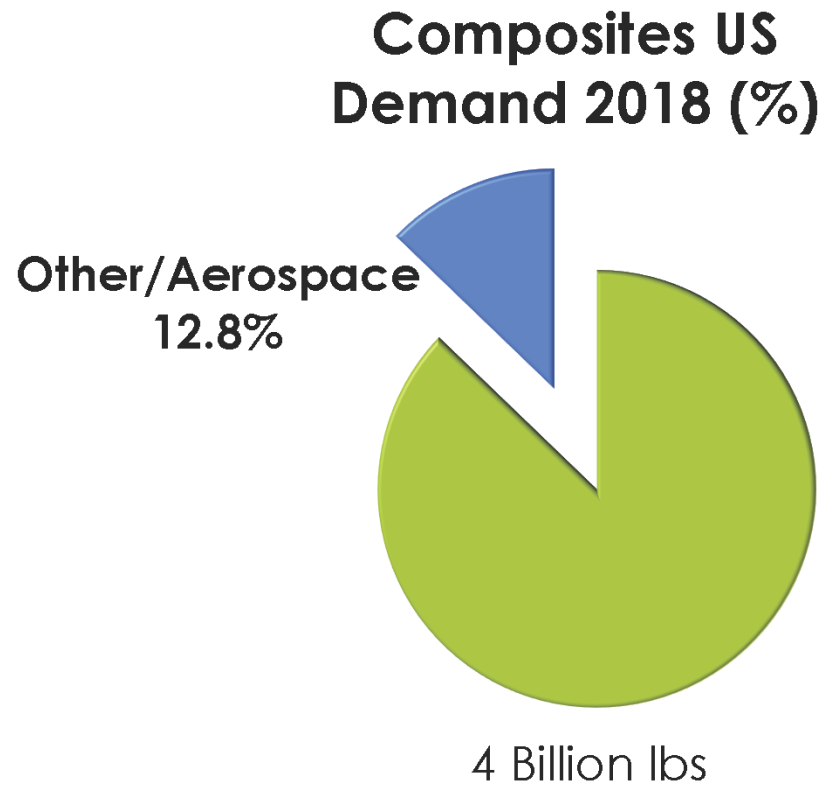
# Advanced Composites - Aerospace

## **Advanced Composite Aerospace Applications**

- Wing and tail parts
- Helicopter rotor blades
- Interior panels
- Aircraft Canopies
- Landing gear components
- Radar domes

# Advanced Composites Demand

- Aerospace will grow 7.3% per year thru 2013
- High modulus to density ratio
- Maximum stiffness at lightest weight
- Low thermal expansion
- Lower maintenance cost
- Challenges – cost/performance





**Composites is the next frontier for material science. There is a tremendous amount to be studied and understood.**

**One of the biggest challenges is to convert engineers and processes from metal to composite design and manufacturing.**



Questions? – At the end.....



Thank You!

# Mississippi Polymer Institute

A University/Industrial Outreach Company of The University of Southern Mississippi

Advanced Composites: The Southern Advanced Materials in Transportation Alliance

**Advanced Composites - Introduction**

February 16<sup>th</sup>, 2011

# Composites Mfg Technology...

## Benefits

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Efficient Use of Materials & Design

Specific Strength and Stiffness

Fatigue Resistance

Insulation – sound/thermal

Damping

## Challenges

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**Mfg Technology – Labor Intensive**

Extremely Diverse Methodologies

Quality Control and Waste

Design Inexperience

Failure Mechanisms – Onset vs. Event

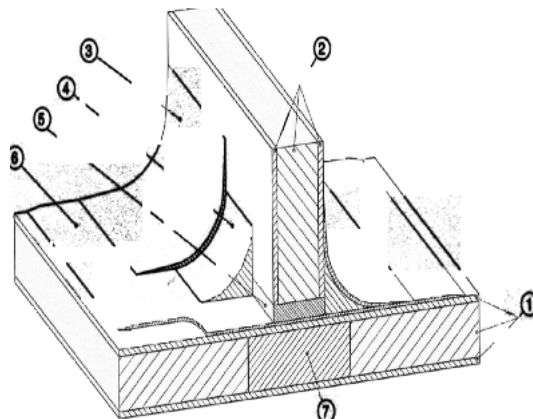
# Critical Manufacturing Technologies

## Hand Lay-up/ Pultrusion

Flat or Adjoining pieces

Emissions

Time-consuming



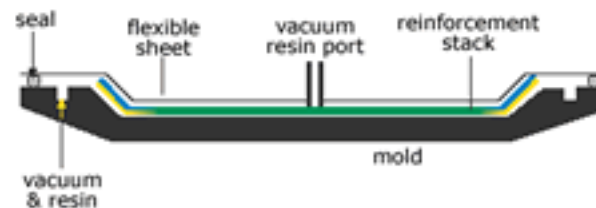
BTG Composites, '09

## VARTM

Vacuum Assisted Resin Transfer Molding

High waste production

Speeds throughput



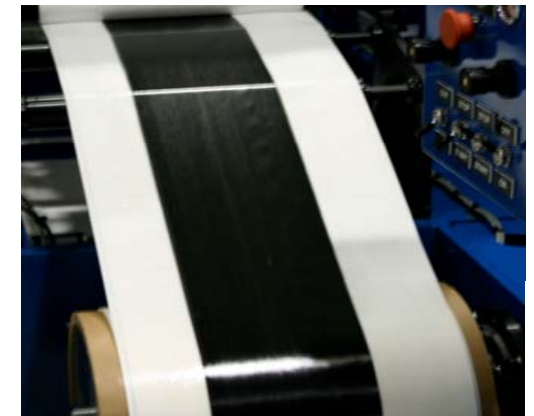
Owens Corning

## Pre-Preg

Speeds throughput

Continuous process

*Fiber densities ~60%*



Commercial scale utility across multiple industries...

# Hand Lay-up...

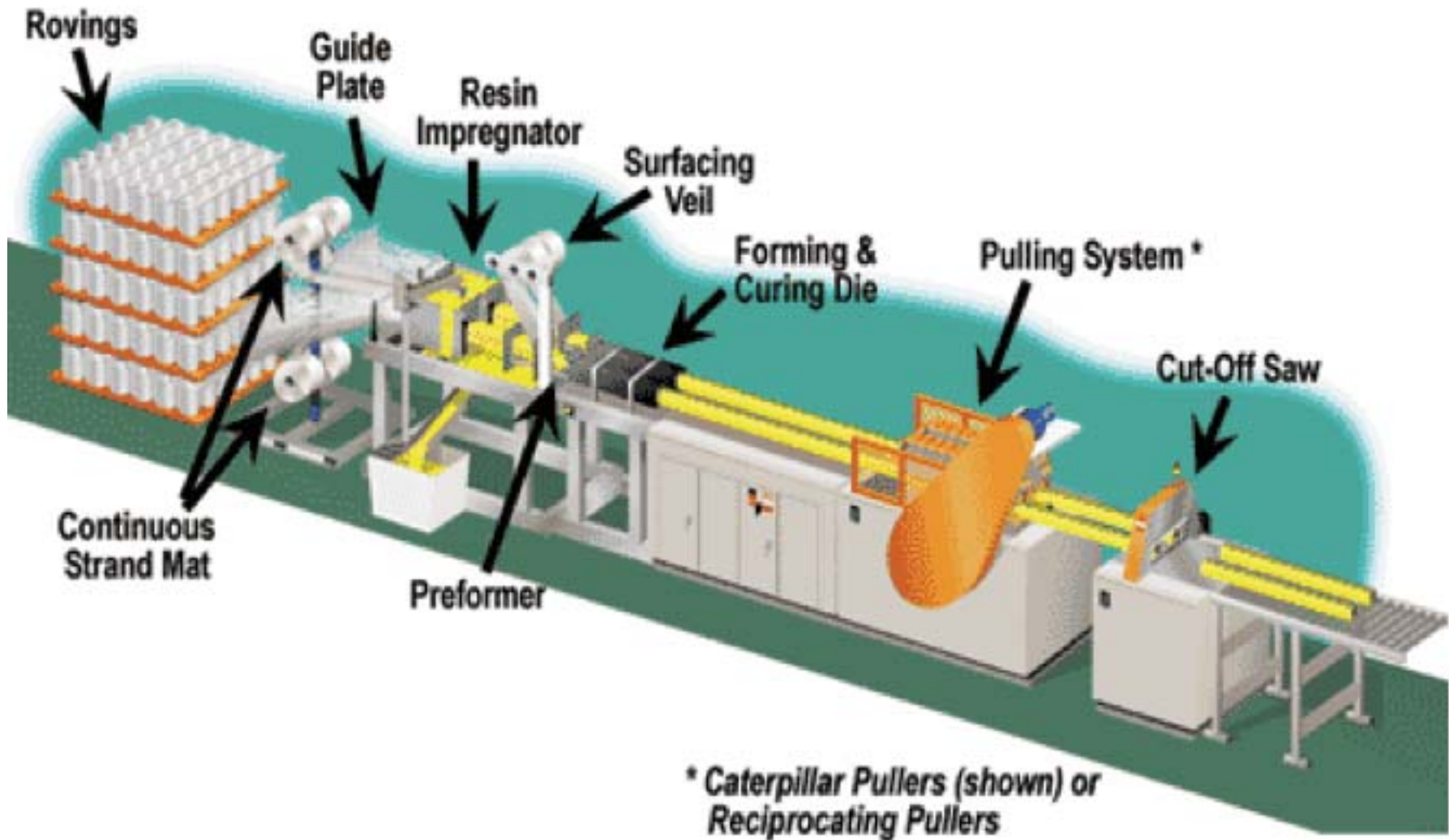


BTG Composites, '09

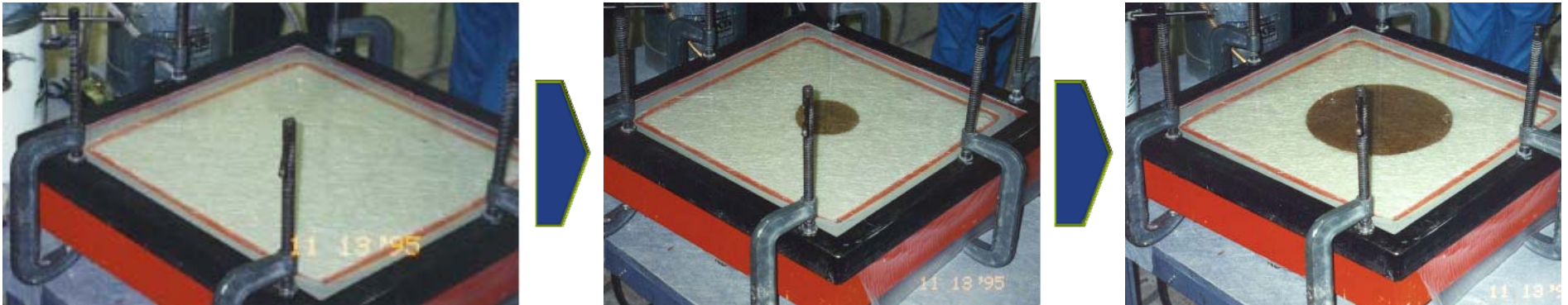


Norwegian Navy's Skjold-class vessels – All Composite Structures

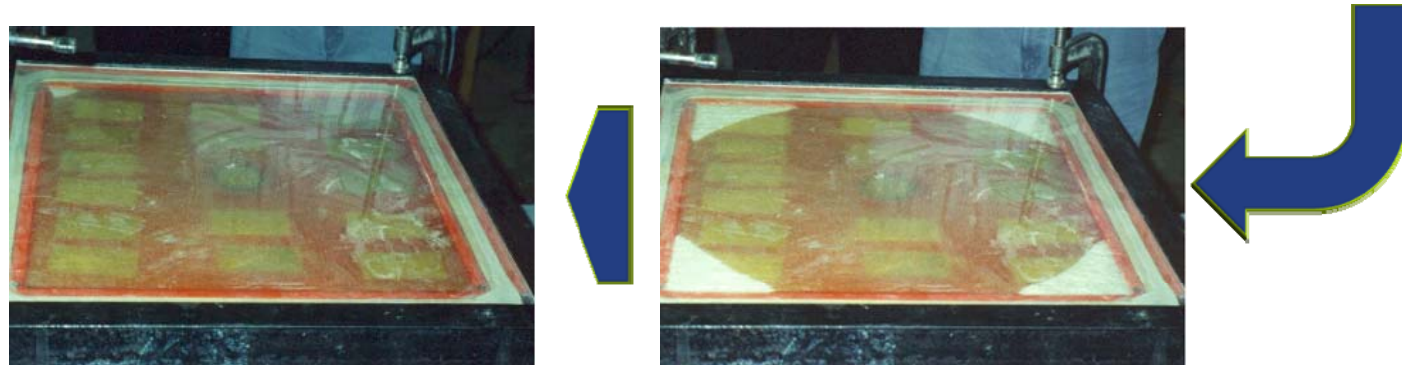
# Pultrusion...



# Vacuum Assisted Resin Transfer Molding...

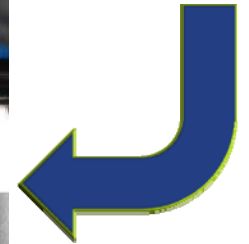
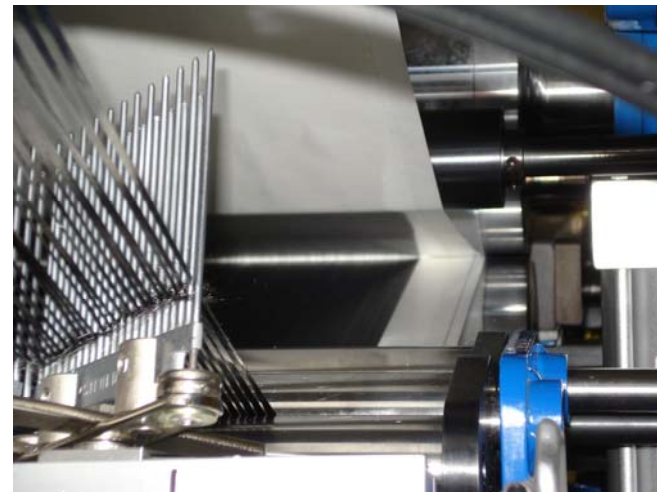
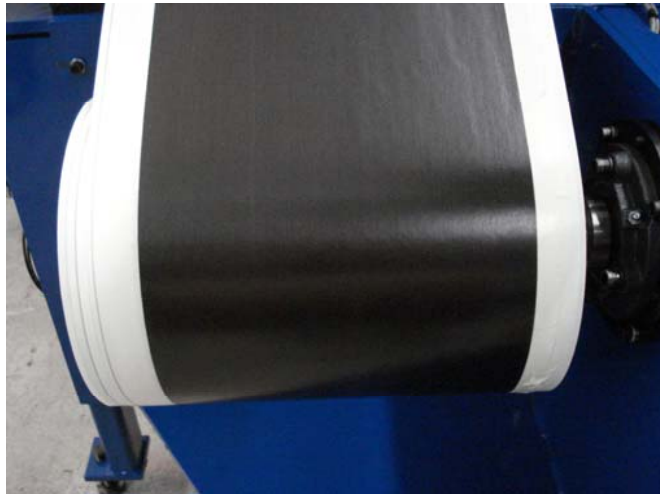
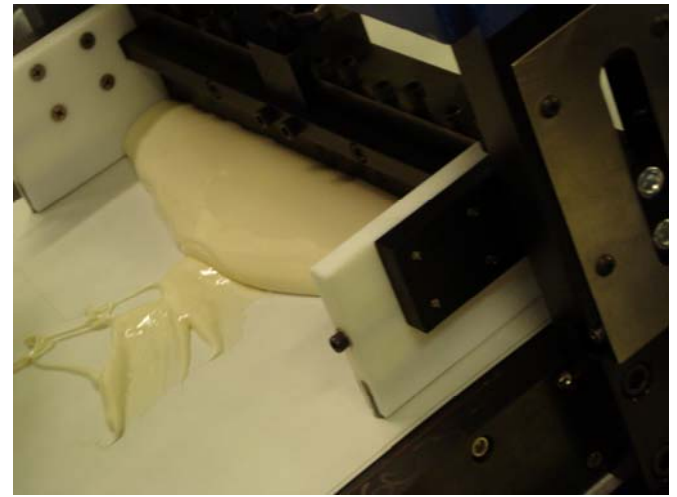
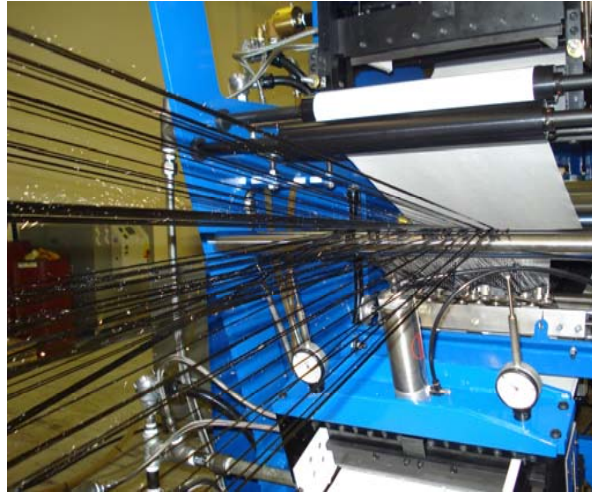


Finished parts  
in a fraction  
of the time!



Significant improvement in processing speeds...

# Pre-Preg...



Affords highest fiber density in finished parts...

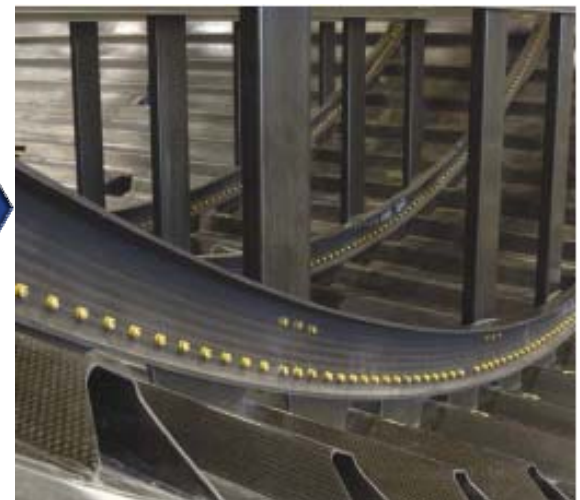
# Advanced Applications...



BTG Composites, 2009



Boeing's 787 Fuselage Interior



BTG Composites, 2009

# Q&A



# Next Steps: Working Group on Advanced Composites

- Email asking your opinion.
- Opportunity to join this working group.
- Contact me at [sdoron@southern.org](mailto:sdoron@southern.org).

# Next Advanced Materials Webinar: **Magnesium**

**March 16, 11:00 EST**

**Paul T. Wang,**

Deputy Director for Program Development,  
Center for Advanced Vehicular Systems,  
Mississippi State University

The logo features a stylized, elongated, teardrop shape pointing downwards, colored in a gradient from light tan to dark brown. A small red letter 'S' is positioned at the top point of the shape. To the right of the shape, the text 'outhern growth policies board' is written in a dark brown, sans-serif font. The letter 's' at the beginning of the word 'southern' is white and partially overlaps the bottom of the logo shape.

southern growth policies board

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