TCM™ COMPOSITES
A Division of Kenway Corporation

TCM™ Composites…
…Providing Solutions

www.tcmcomposites.com

Manufacturing Temperature Controlled Molds & Tooling

Providing TCM™ Consulting, Training & Employee Development

Partnering with TCM™ Licensing, Contracting Manufacturing And Joint Venture R&D Programs

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What are Temperature Controlled Molds?

- NOT traditional electrically heated molds that can only raise temperature
- Allows precise *heating* and *cooling* of mold surface through efficient thermal transfer media
- TCM™ molds can *remove heat from the laminate* and prevent runaway exothermic reactions
- Required for successful integration of Arkema's IS300 BlocBuilder into the manufacturing process
- TCM™ mold control provides multiple benefits for polyesters, vinyl esters, epoxies and prepregs

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Suitable for a Wide Range of Composites Manufacturing Processes

- ✓ Closed Molding at Ambient Temperature
- ✓ Elevated Temperature Closed Molding
- ✓ Polyesters/Vinylesters with Inhibitor Packages
- ✓ Epoxy Closed Molding with Heat Activated Cure
- ✓ In-Mold Postcure of Epoxies and Prepregs with using an autoclave
- ✓ Resin Film Infusion (RFI)

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Combine the TCM™ Process with Controlled Radical Polymerization (CRP)

TCM™ process control and Arkema's IS300 CRP additive…

… Providing the ideal conditions for closed-molding.

- *Reduced viscosity for superior flow characteristics*
- *Faster production times*
- *Enhanced physical properties*
- *Extended gel times*
- *Managed exotherm temperatures*
- *Cure-on-demand control*

ARKEMA
The world is our inspiration

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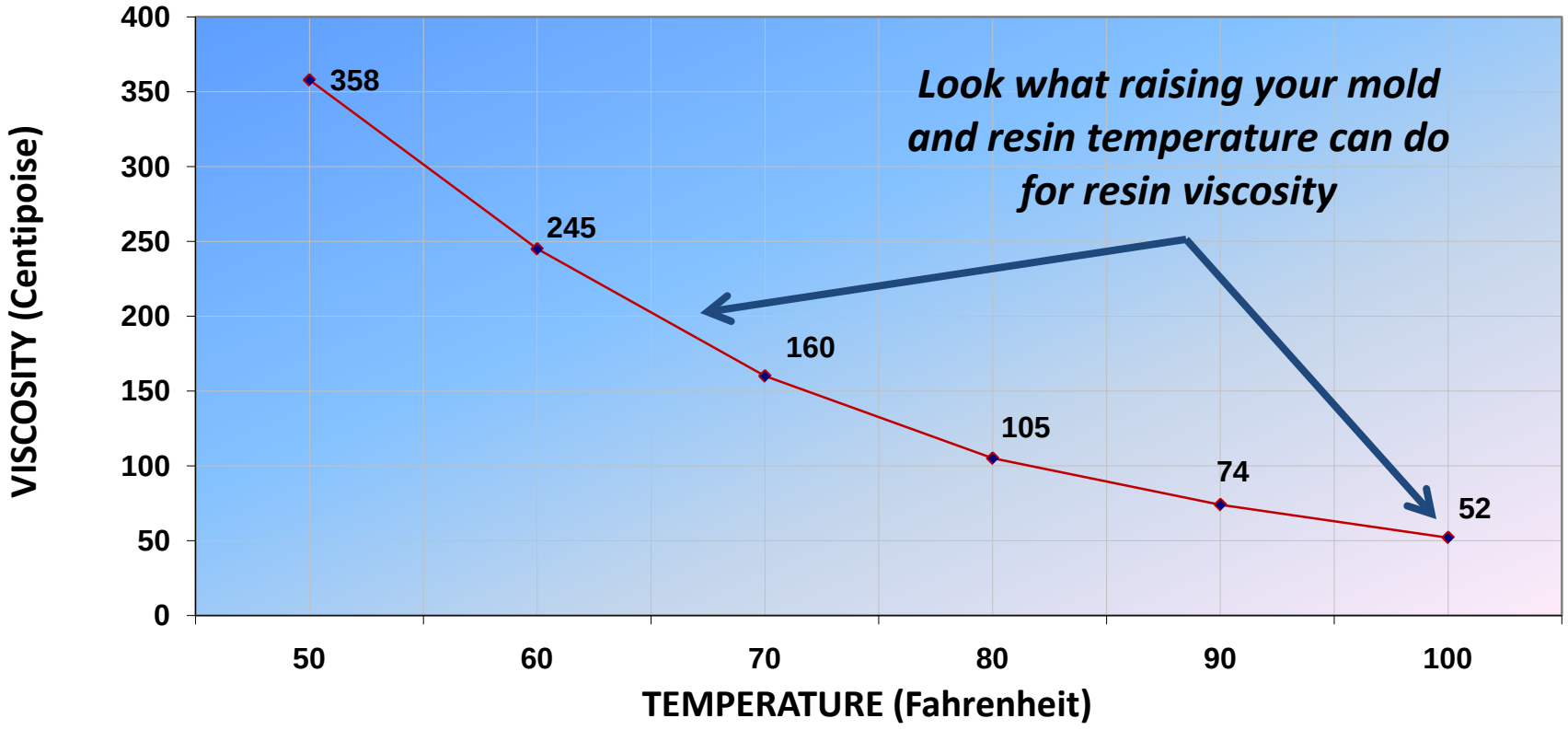
Effect of Temperature on Resin Viscosity

CCP Epovia RF1001 Vinyl Ester Infusion Resin



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Maximizing Process Control & Quality Assurance

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TCM™/IS300 infusion of this variable thickness laminate produces results….

(graph next page)

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TCM™/IS300 Exotherm Control for 12mm to 150mm Variable Thickness VE Laminate

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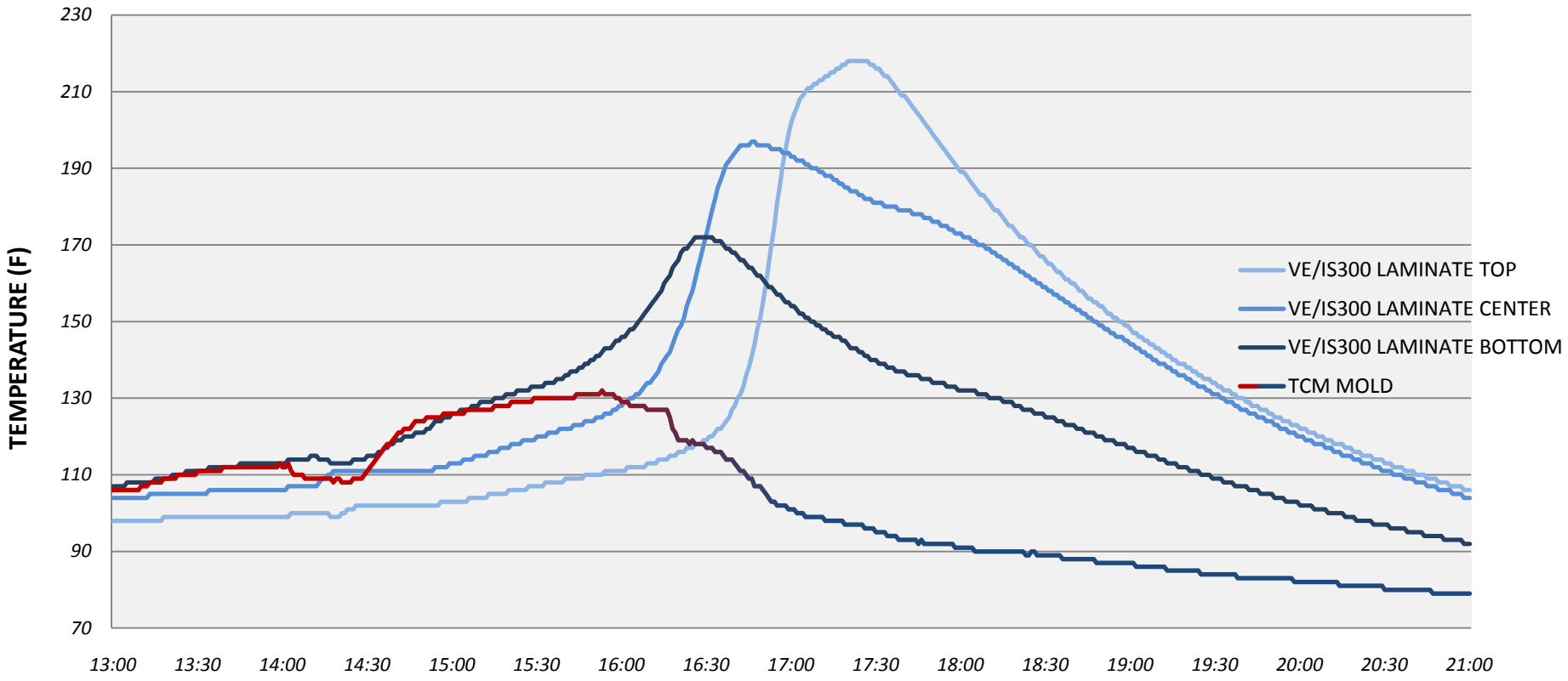

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TCM™ Process & IS300 BlocBuilder®
Increased Barcol Hardness without Postcure

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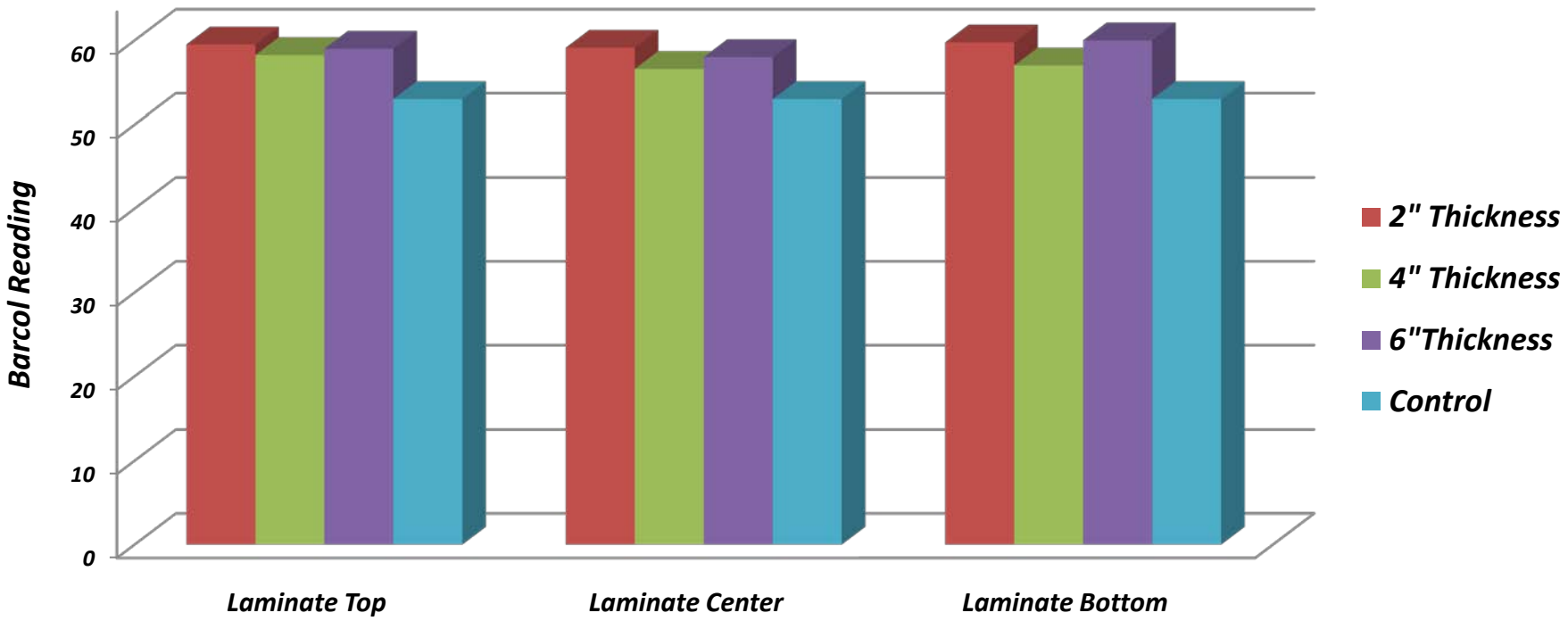

Vinyl Ester / E-Glass / IS300 BlocBuilder®/ TCM™Process
High Fiber Volume Fraction (70%)

TCM™ COMPOSITES
A Division of Kenway Corporation

TCM™ Process & IS300 BlocBuilder®
28% Improvement in ASTM D2344
Short Beam Shear Test

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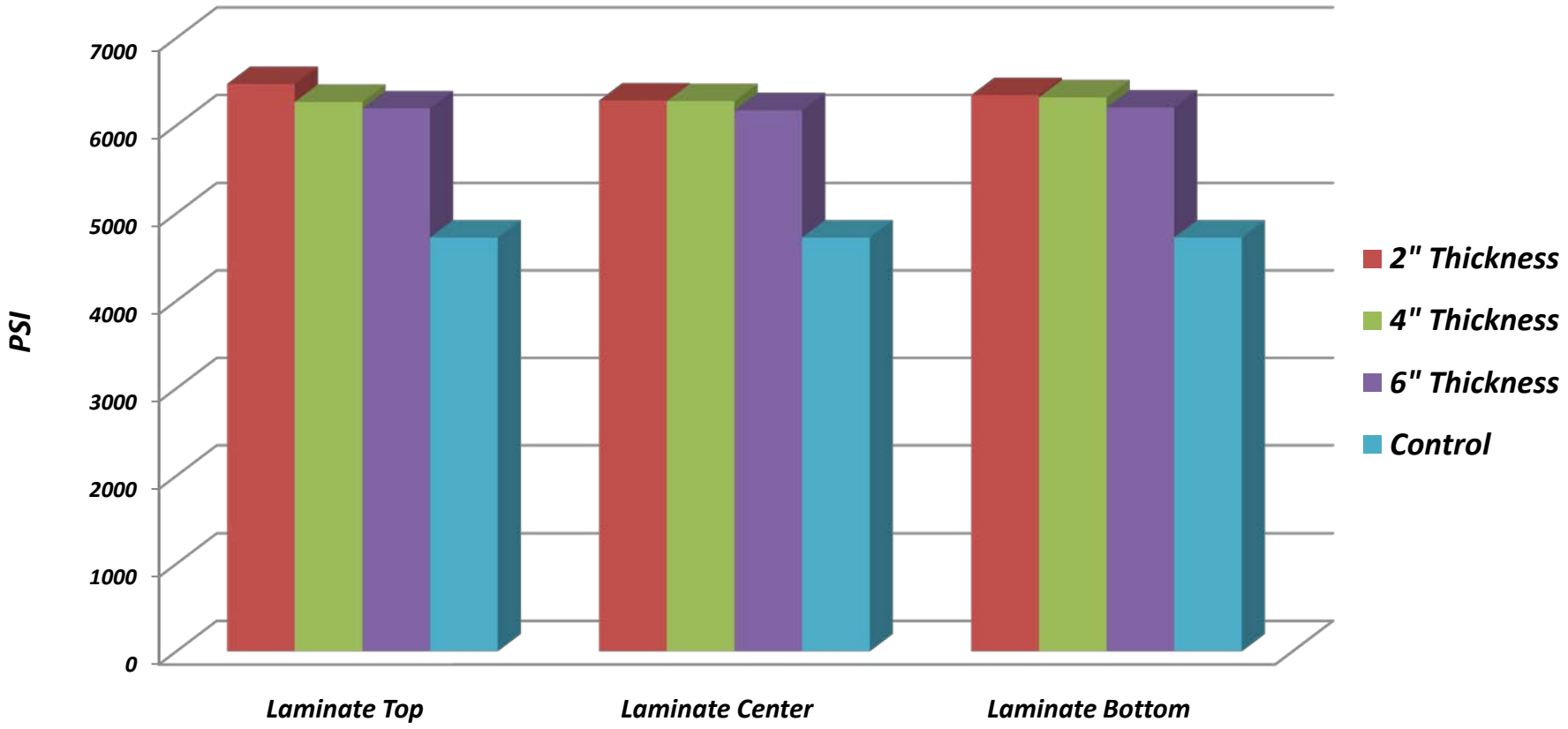

Vinyl Ester / E-Glass / IS300 BlocBuilder®/ TCM™Process
High Fiber Volume Fraction (70%)

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TCM™ Process & IS300 BlocBuilder®
Double Fatigue Resistance of Vinyl Ester Laminate

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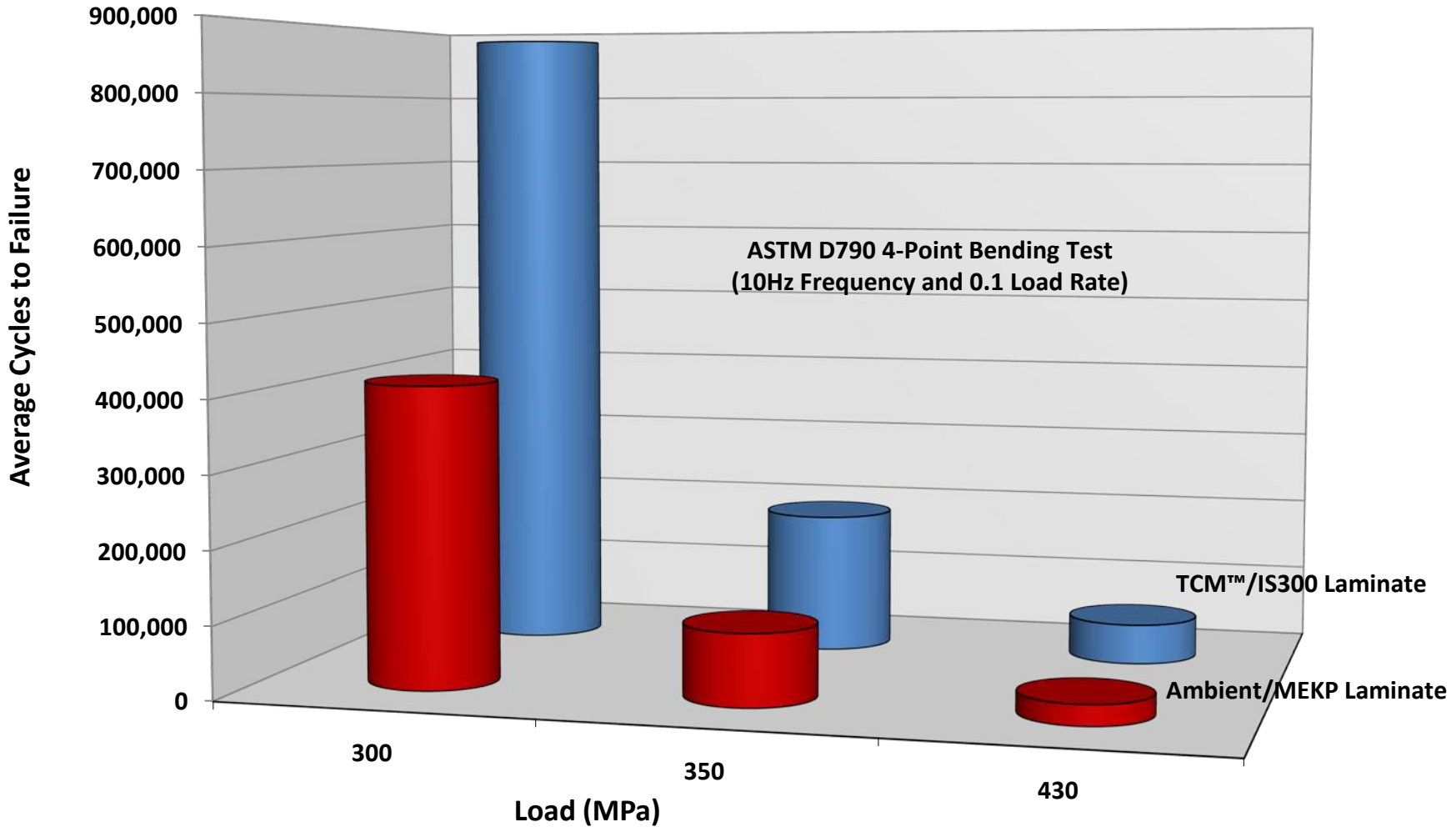

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TCM™ Process Control Leads to Improved Cosmetics

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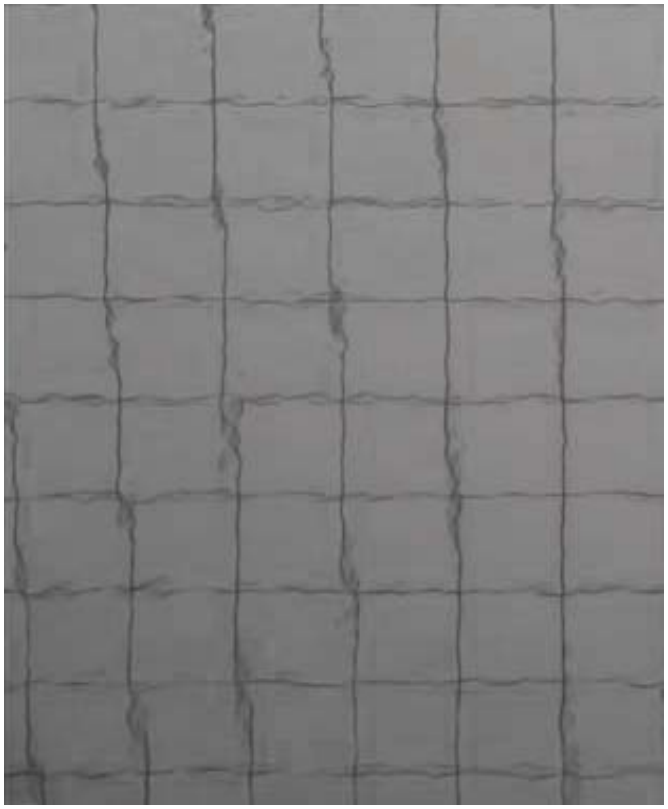
Identical Epoxy/Glass Laminates



Ambient Cure ***vs.*** ***TCM™ Cure***

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The TCM™ Mold Technology

www.tcmcomposites.com

- High Temperature Epoxy Mold Surface (450°F)
- Interstitial Space Creates High Thermal Capacity at Mold Surface
- Precise Control within 3°-5°F
- Programmable Integrated Control Unit (PID)
- Allows for Heating, Cooling, Ramping, Soak or Dwell, and Cool Down as Required
- Unlimited Zone Flexibility

Small Scale Prototype Windblade Mold

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