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Overview

Objectives

- Evaluate and debug Intelligent Process Control system
- Evaluate mechanical properties of typical VARTM panels
 - Different resins (completed)
 - Different Distribution medias (to be completed)
 - Different fabric types (to be completed)

Approach

- Fabricated more than 80 parts with IPC
 - Debugged software
 - Checked sensor performance
 - Created leak tester for sensors
- Down-selected room-temperature infusible resin systems
- Evaluated flexural properties, void content and fiber volume fraction

Material Information and Process Setup

Process sequence with IPC

- Mold preparation
- Material lay-up
- Infusion
- Dwell
- Cure (including Post cure)

Resin types used

- Applied Poleramics SC 79 (Epoxy)
- Applied Poleramics SC79 (75%) + SC15 (25%) blend (Epoxy)
- Vantico Resinufusion 8605 (Epoxy)
- DOW Derakane Momentum 411-100 (Vinyl ester)
- Newport NBV 850 (Epoxy)

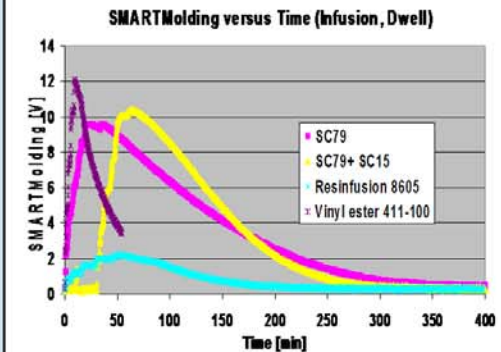
Distribution media used

- Roxford Fordell 50% Shading Material
- Polybeam 703
- Polybeam 730

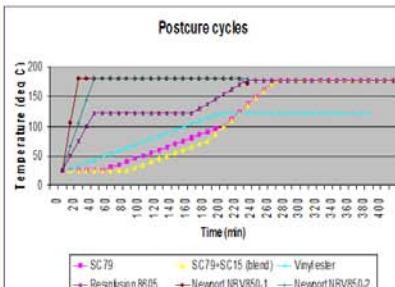
Fabric

- E-Glass 324-2407 Woven Roving (8 layers 24in by 24in)

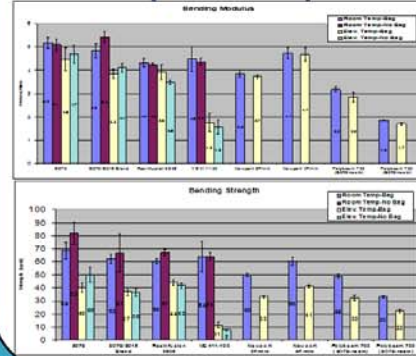
SMARTMolding (Gelation and Cure Information)



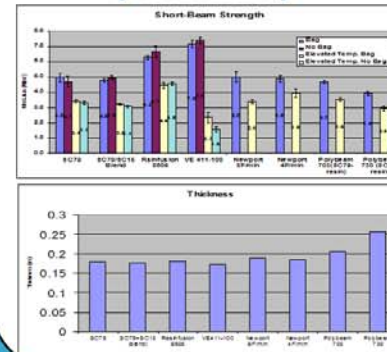
Postcure Cycle



Mechanical Properties I (ASTM D 790)



Mechanical Properties II (ASTM D2344)



Conclusions and Future Work

Conclusions

- Cost reduction and time saving for industrial purposes by avoiding vacuum bagging during post-cure.
- Vinyl Ester has competitive mechanical properties at room-temperature for 15% of the cost.
- Low T_g of VE reduces properties above $T > 200^\circ\text{F}$

Future Work

- Other fiber and distribution media architectures will be tested.
- Fiber volume fraction and void content will be determined

Acknowledgements

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