CO-INJECTION OF POLYURETHANE RESINS

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INTRODUCTION

- Co-Injection Resin Transfer Molding (CIRTM) enables the manufacturing of multi-layer, hybrid composite parts in a single processing step.
- In CIRTM two or more resins are simultaneously injected into a mold filled with a stationary fiber bed and are co-cured.
- A variety of separation layers have been used to separate the flow of the resin.

GOAL

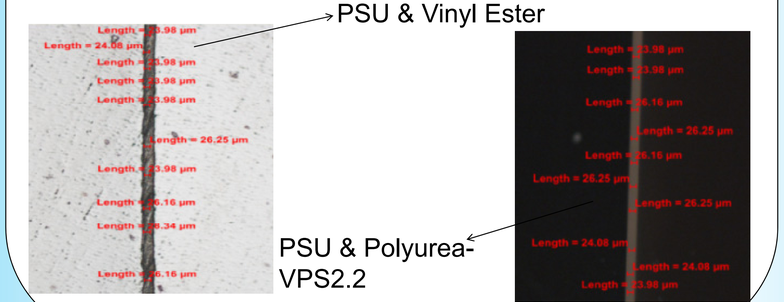
- Develop CIRTM process for Polyurethane (PU) resins.

APPROACH

- Evaluate Polysulfone compatibility as a barrier layer for PU resins.
- Fabricate CIRTM panels.
- Evaluate bond strength between PU and Vinyl Ester (VE) interface.

FILM TESTING

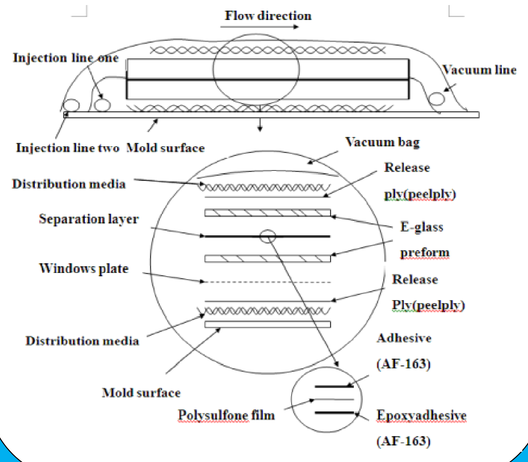
- Film being tested here as a separation layer is Polysulfone (1mil = 25.4μm)
- Resins used for testing include Vinyl Ester 8084, CCMFCS2 and polyurethane(Polyurea - VPS2.2)
- Film is dipped into the different resins and geometry and material changes are observed under the microscope.
- No major changes are observed.



CASE STUDY

- S2-glass 24oz (10 layers) plain weave infused with
  - Vinyl Ester Resin
  - Polyurethanes (Polyurea - VPS2.2) Resin
  - Polysulfone(PSU) film with 2 resins Polyurethanes(Polyurea -VPS2.2) and Vinyl Ester 8084
  - AF-163-2OST adhesive film together with Polysulfone(PSU) film with 2 resins Polyurethanes (Polyurea -VPS2.2) and Vinyl Ester 8084 – Co-infusion

CIRTM EXPERIMENTAL SETUP



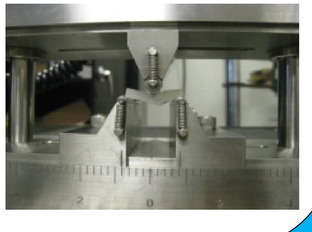
PART FABRICATION

- Infusion and postcure

- Problem encountered: bubble formation of the PU Resin during the curing cycle results in voids on PU infused preform.

MECHANICAL TESTING (SBS) IN PROGRESS

- **Experimental Setup**
  - Short Beam Shear (SBS) test
  - To evaluate the overall quality of the composite, as well as to compare shear strength



SUMMARY

- PSU film is compatible with VE and Polyurethanes(PU)resins.
- Initial CIRTM panels can be fabricated with PU and VE resins.
- Future work will mechanically evaluate CIRTM performances.

ACKNOWLEDGEMENTS

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