FLOW CONTROL METHOLODOGIES FOR VACUUM INFUSION MOLDING PROCESSES

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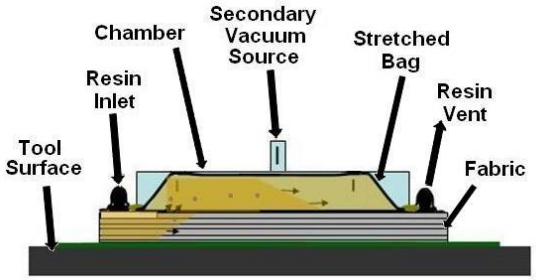
INTRODUCTION

- Vacuum Assisted Resin Transfer Molding (VARTM) and Seemann's Composite Resin Infusion Molding Process (SCRIMP) are vacuum infusion processes which are commonly used in low rate production of large structures.
- These processes are extremely labor intensive involving many technicians.
- Preform and lay-up variability often result in unpredictable resin flow during infusion.
- Project Objectives
  - Study Flow Control Mechanisms for these inexpensive processes.
  - Increase the level of automation for VARTM and SCRIMP.
  - Increase process reliability.

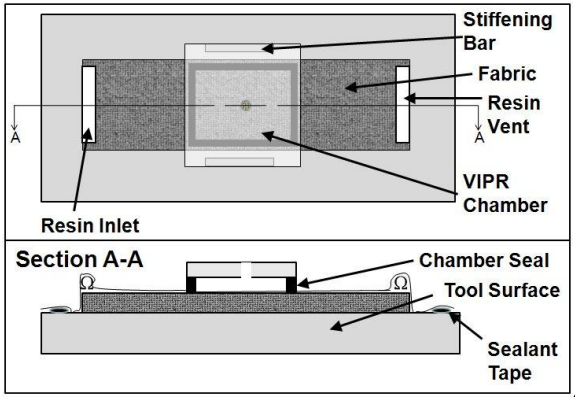
THE FFC PROCESS

- The VIPR Process draws on the invention of the Flow Flooding Chamber (FFC) method of resin delivery.
- The FFC Process uses a rigid vacuum chamber and a secondary vacuum source to create a resin flow gap between the fabric and the bag.



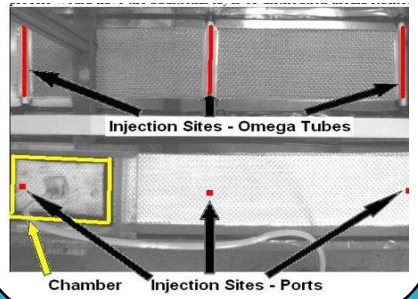
THE VIPR PROCESS

- Apply the chamber to a region of the mold to spatially control resin flow behavior.



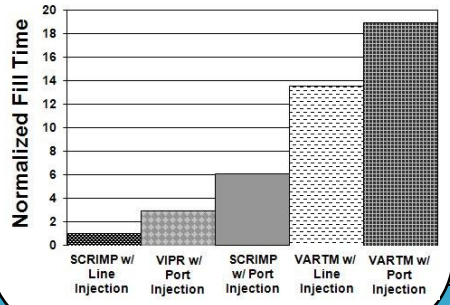
ADDITIONAL BENEFITS

- Intensity of the VIPR chamber effect on permeability can be controlled.
- Injection Ports can be used to further enhance spatial flow control.



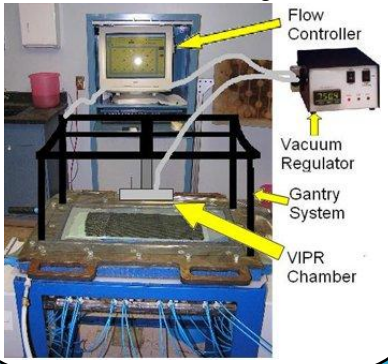
EXPERIMENTAL VALIDATION

Results of several experiments show the VIPR Process is faster than VARTM and has more control than SCRIMP



VIPR WORKSTATION

The VIPR Process is being integrated into an automated molding environment.



FUTURE WORK

- Construct VARTM automation test platform.
- Develop and Test VARTM Control Methodologies

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