SIMULATION-BASED LIQUID INJECTION CONTROL (SLIC): FEATURES AND APPLICATIONS IN RTM AND VARTM

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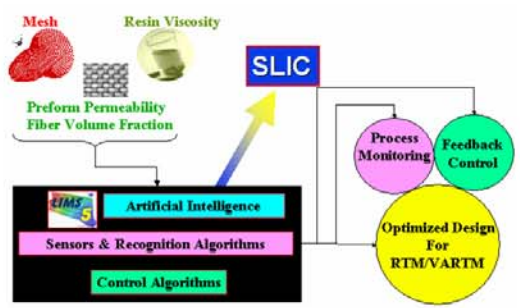
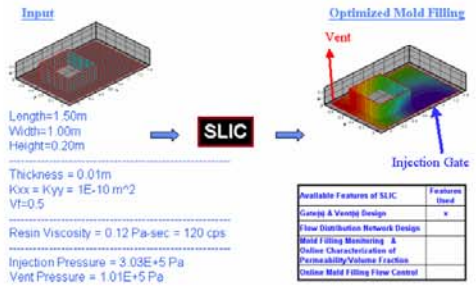
Simulation-Based Liquid Injection Control: Philosophy

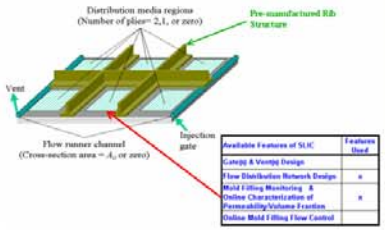


Features of SLIC

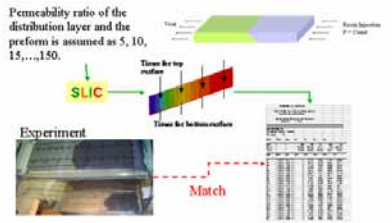
Case 1: Optimize Gate and Vent Locations



Case 2: A VARTM/Co-Cure Case Study

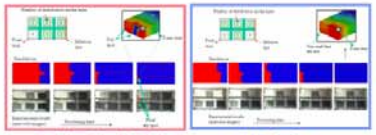


Case 2: Distribution Layer Permeability Measurement with SLIC



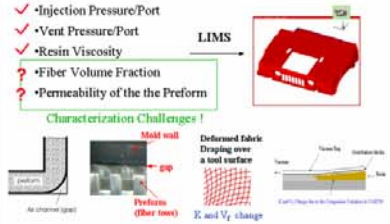
12 Experiments were conducted, the permeability ratio was obtained as 20-40.

Case 2: Intuitive (Trial-and-Error) Design vs. SLIC Design

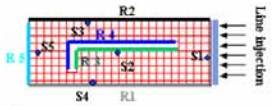


	Dry spot content	Fill time	Number of experiments
Trial-and-error intuitive design	0.851%	10.87 min	4
GA/simulation-based design (SLIC)	0.034%	13.05 min	1

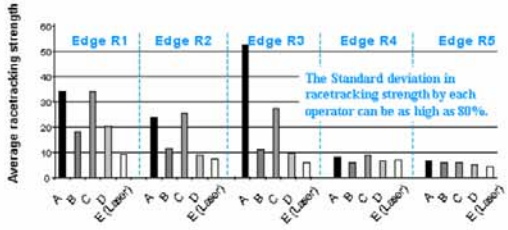
Permeability Variations



Case 3: Using SLIC to Characterize the Racetracking



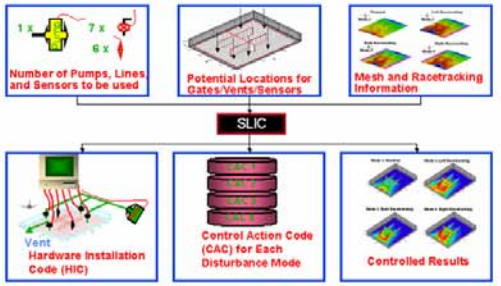
Five different operators A, B, C, D and E run 10 experiments each. A, B, C and D cut the fabrics by hands, E used a laser cutter.



The Standard deviation in racetracking strength by each operator can be as high as 80%.

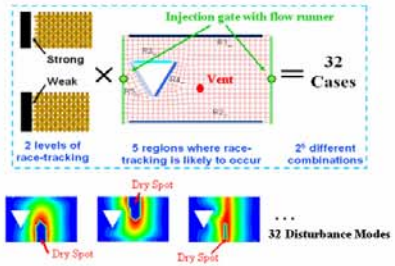
Streamlined Flow Monitoring & Control - From Design To Automation

Developing Flow Sensing/Control System with SLIC

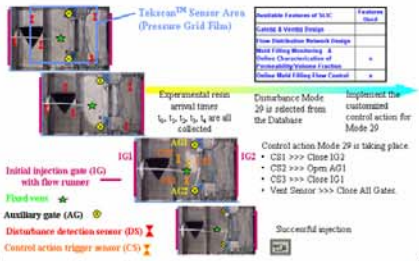


Flow of Automation

Case 4: Online Flow Monitoring/Control with SLIC



Case 4: Online Flow Monitoring & Control with SLIC (Experimental Results)



Summary

SLIC

AUTOMATED DESIGN

- Selection of Initial Gate and Vent Locations
- Optimization of the Flow Distribution Network
- Online Flow Sensing/Permeability Characterization System Design
- Creation of Online Flow Control Solution

Advantages of developing RTM/VARTM with SLIC

- Rapid design for RTM/VARTM.
- Less cost for process development.
- Reliable and comprehensive mold filling solution.
- Advanced flow monitoring/control technology provides the opportunity to elevate the part quality and reduce the cycle time.

ACKNOWLEDGEMENTS

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