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MOTIVATION

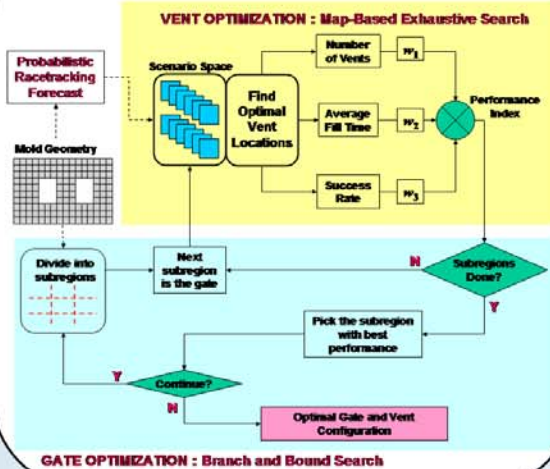
Gate and vent locations determine process outputs such as fill time, pressure requirements, and whether the fabrics will be saturated entirely, a requirement for the success of the mold filling operation. Disturbances such as racetracking, in which the resin flows faster along the edges of the mold, further complicate the gate and vent selection process.

OBJECTIVE

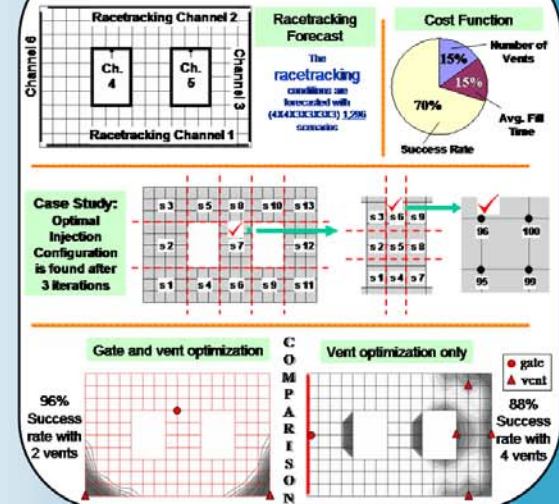
Develop a methodology to find the optimal single-gate multi-vent injection system that will minimize the fill time and the number of vents, and maximize the success rate of the mold filling operation in the existence of racetracking.

fill time: the time it takes to fill a mold
success rate: the ratio of the successful mold filling

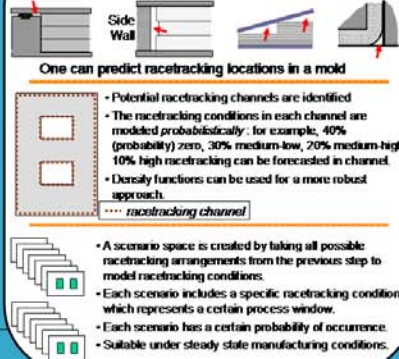
CASCADED OPTIMIZATION ALGORITHM



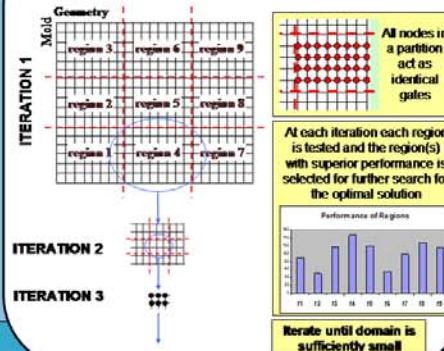
CASE STUDY



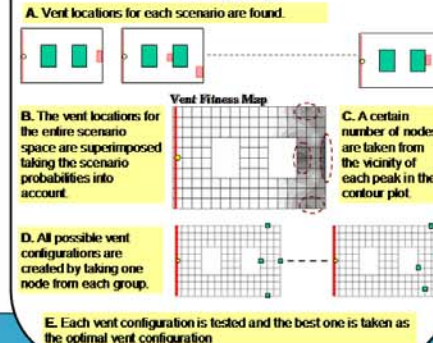
PROBABILISTIC RACETRACKING MODELING



BRANCH AND BOUND SEARCH



MAP-BASED EXHAUSTIVE SEARCH



CONCLUSIONS

Modeling racetracking in the computer environment is an effective way to develop injection systems that are insensitive to disturbances.

Simultaneous gate and vent optimization determines the optimal gate and vent locations efficiently.

Disturbance-based optimization methods are low-cost alternatives to feedback control in minimizing defects in the composite parts.

ACKNOWLEDGEMENTS

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