

# Support Wax Automated Removal Module (SWARM)



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## TEAM 8

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## PROJECT BACKGROUND & DESIGN GOAL:

RIA-JMTC operates two 3D Systems MJP 2500 IC wax printers for investment casting pattern production, but lacks a safe, automated means of removing wax support structures. SWARM automates post-processing through a heated solvent bath with submersed vortex cavitation agitation, sensor-based monitoring, and a touchscreen operator interface. The goal is a self-contained wax removal system capable of processing a standard build plate within 90 minutes for less than \$4,000.

## DESIGN SUMMARY:

Designed and developed an automated wax support removal system that integrates a heated solvent bath, fluid circulation, and sensor-based monitoring to control cleaning.

The resulting design provides a complete framework for automated wax removal, enabling controlled testing and optimization of temperature, flow, and process timing to improve consistency and operator safety.



CAD drawing of final SWARM system design

## DESIGN CONSTRAINTS:

- **Chemical Compatibility:**  
Must safely operate with wax-removal solvents without degrading parts
- **Temperature:**  
Must maintain solvent temperature between 70-130°F
- **Safety & Interlocks:**  
Must include fail-safe hardware and software interlocks
- **Size & Dimensions:**  
Working envelope must be at least 14"L x 14"W x 15"D
- **Budget:**  
Total system cost must not exceed \$4,000