

Manufacturing Plant Heat Control

Problem Definition

Neocon's Burnside facility manufactures specialized composites for the automotive industry:

- Electric ovens used to heat polymer sheets for molding
- Heat is rejected to the plant floor
- 40°C + in the summer
- Reduces productivity by ~10 %

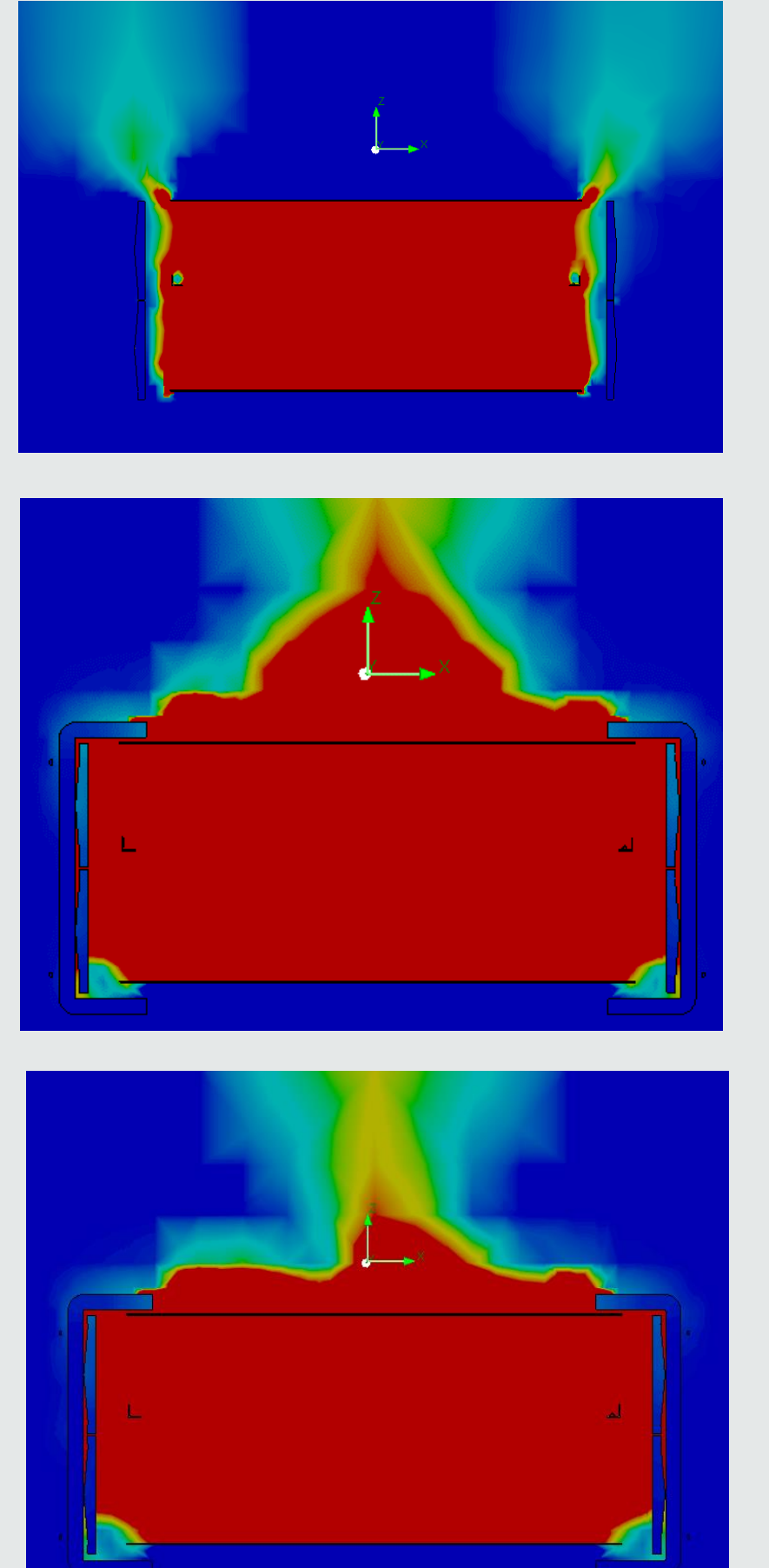
Requirements

- The solution shall be able to reduce the effective temperature experienced by the plant workers by 5 – 10°C in the summer
- The solution shall consume less energy than a traditional air-conditioning system (~3.5 MW)
- Any added obstructions to the thermoforming machines must be removable in under 10 minutes to provide access for maintenance
- The solution shall not obstruct normal operations.

Validation

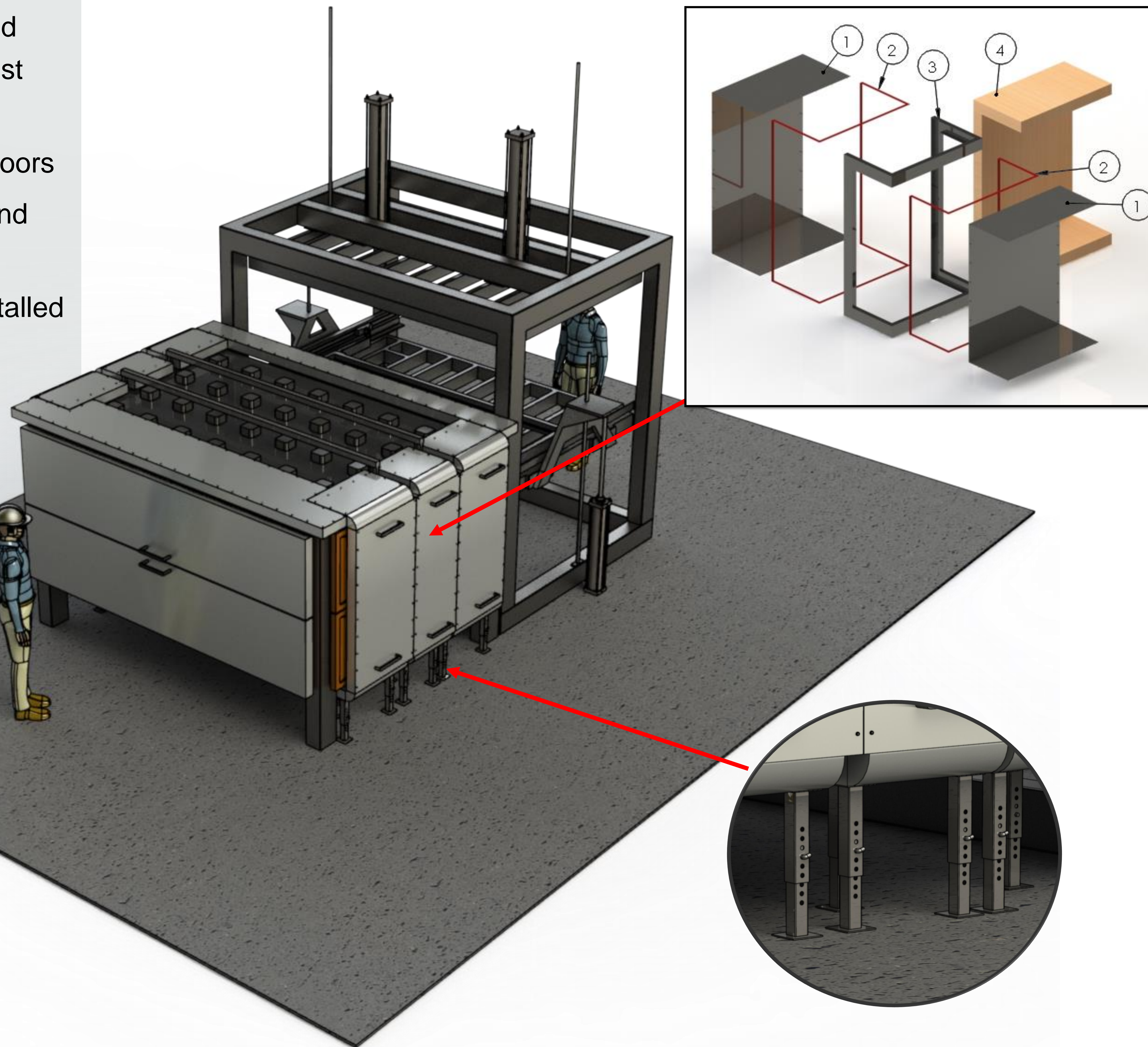
Heat Transfer Simulation on SolidWorks

- Thermoforming machine at a current state
- Thermoforming machine with insulating panels at current energy input
- Thermoforming machine with insulating panels at reduced energy input



Insulating Panel Design

- Insulating panels installed over the sides where most heat loss occurs
- Installed over the back doors
- Installed over the front and back gaps
- The support legs are installed under the panels, for additional support



Design Features

Insulating Panel Components:

- 1) Galvanized Steel Sheet 26 gauge - reduce radiation, provide rigidity
- 2) High Temperature Caulking - reduce convection inside panel
- 3) Custom Bent Steel Track 26 gauge – hold components together
- 4) Rockwool Comfortbatt R14 Insulation 3.5 in. THK - reduce conduction
- 5) #10 Self-Drilling Screws – fastening steel sheets to track perimeter

Recommendations

- Additional testing and heat loss analysis required
- Quantify the energy savings using wattmeter
- Further analysis on temperature distribution around the plant after the panel installation.

References

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