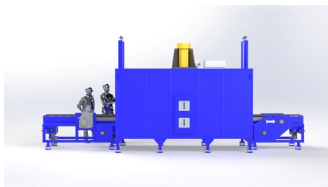
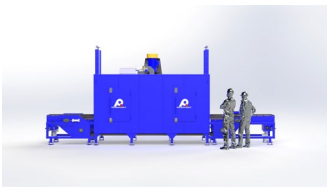


CASE STUDY

## Polyurethane Reheat Oven for Automated Polyurethane Forklift Wheel Manufacturing

*Electric-heated indexed conveyor reheat oven engineered as the intermediate thermal transition stage between primary cure and final post-cure in an automated forklift wheel manufacturing line — combining 108 kW electric resistance heat, 8,500 CFM forced-convection recirculation, 265°F–275°F operating temperature, servo-driven indexing on two lines of C2082H K-1 steel roller chain, lift-and-transfer conveyors on both inlet and outlet, vertical lift doors on both ends, and Allen-Bradley Kinetix 5700 servo control in a structural-steel-reinforced pan-style shell.*

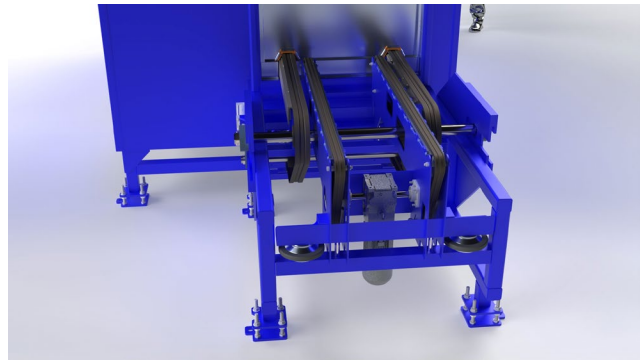
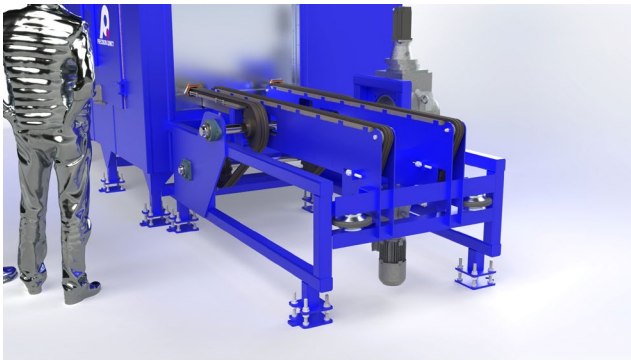


## OVERVIEW

This project was developed as the intermediate polyurethane reheat stage within an automated forklift wheel production line. Positioned after the primary cure oven and before the final post-cure system, this machine serves as a focused thermal transition module inside the broader manufacturing sequence.

The role of the equipment is distinct from both the earlier cure stage and the longer final post-cure stage. Rather than delivering the primary cure or the final long-duration thermal cycle, this machine restores or maintains the required thermal condition between major polyurethane operations so product can continue through the line under controlled conditions.

The machine is packaged as a compact but highly integrated process module. The oven combines electric heat, forced convection, indexed conveying, servo-driven motion, lift-and-transfer interfaces, and vertical lift doors on both ends. Those features allow the equipment to function cleanly inside an automated line where product handoff and sequencing are tightly controlled. The result is a highly integrated reheat module built around compact packaging, repeatable servo-driven handling, and tight production-line coordination.



## CUSTOMER PROCESS REQUIREMENTS

The process requirement was to provide an intermediate reheat stage between the primary cure and final post-cure portions of the polyurethane wheel manufacturing sequence. The machine had to preserve production-line timing while restoring or maintaining product thermal condition before the next major operation.

### Application Requirement

- The equipment serves as the intermediate reheat stage between the primary cure oven and the final post-cure system in an automated forklift wheel manufacturing line.
- The machine restores or maintains the required thermal condition in molded wheel assemblies before they advance to the final post-cure stage.
- The oven functions as a thermal transition module — not a primary cure or long-duration post-cure system — within a coordinated manufacturing sequence.

### Line Integration Requirement

- Because the oven sits at a transition point inside the line, the machine integrates cleanly with upstream and downstream automated handling.
- That required indexed conveyor movement, dependable lift-and-transfer hardware at both ends, predictable door operation, and repeatable product positioning during every cycle.

- The control architecture is compatible with the Allen-Bradley platform used across the broader production line.

**Packaging / Footprint Requirement**

- A compact machine architecture capable of fitting into a tightly coordinated automated process path was required.
- The oven packages its heat, airflow, motion control, and transfer interfaces efficiently while still maintaining serviceability and process control.

**Safety / Classification Requirement**

- The oven was classified as NFPA 86 Class B, consistent with its cure-related thermal duty.

**Utility Requirement**

- Required electrical service: 480V / 3PH / 60Hz.

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**THERMAL PROCESS REQUIREMENTS**

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The thermal process requirements were established from the need to restore or maintain polyurethane thermal condition in molded forklift wheel assemblies at the intermediate reheat stage of an automated manufacturing line.

**Temperature Capability**

- Operating temperature: 265°F to 275°F.
- Maximum design temperature: 300°F.

**Process Basis**

- The thermal process basis is intermediate polyurethane reheat, positioned between the primary cure oven and the final post-cure system.
- The machine delivers a stable forced-convection environment sufficient to restore or maintain product thermal condition within the available dwell time at the specified index interval.
- The shorter dwell time of approximately 10.2 minutes reflects the machine's specific role as an intermediate reheat stage rather than a full primary cure or long-duration post-cure system.

**Heat Input Requirement**

- Heat source: electric resistance heat.
- Total installed heat input: approximately 108 kW.

**Airflow Delivery Requirements**

- Recirculation fan: one New York Blower 208 PLR plug fan.
- Recirculation airflow: approximately 8,500 CFM.
- The recirculation airflow package supports the required thermal recovery or maintenance duty within a relatively compact process envelope.

**Exhaust / Ventilation Basis**

- Exhaust fan: PQ1 exhauster rated at approximately 550 CFM; 0.75 HP motor.
- Oven classification: NFPA 86 Class B.

**Dwell / Cycle Basis**

- Index rate: 49 in. every 179.5 seconds at approximately 10 ft/min.
- Dwell in heat: approximately 10.2 minutes.

**EQUIPMENT CONCEPT & ARCHITECTURE**

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To deliver the process requirements for the intermediate polyurethane reheat stage, the following equipment concept and architecture was developed.

**Overall Concept**

- One compact electric-heated indexed conveyor reheat oven serving as the intermediate thermal transition module between the primary cure and final post-cure stages in an automated forklift wheel manufacturing line.
- The machine is built on structural steel reinforced pan-style construction, supporting repeated indexed movement, dual-end transfer interfaces, vertical lift doors, and line-level automation integration while maintaining thermal containment.

**Heating Architecture**

- Heat source: electric resistance heating.
- Total installed heat input: approximately 108 kW.

**Airflow / Recirculation Architecture**

- Recirculation fan: one New York Blower 208 PLR plug fan delivering approximately 8,500 CFM.
- Exhaust: PQ1 exhauster at approximately 550 CFM; 0.75 HP motor.

**Conveyor / Handling Architecture**

- Main conveyor: two lines of C2082H K-1 steel roller chain with a servo-driven indexing arrangement.
- Main conveyor capacity: approximately 18,350 lb maximum product load.
- Indexing motion: 49 in. every 179.5 seconds at approximately 10 ft/min, coordinated with the broader automation sequence.
- Transfer conveyors: lift-and-transfer conveyors on both the inlet and outlet, bridging the reheat oven to adjacent production operations.

**Shell / Construction Architecture**

- Shell construction: structural steel reinforced pan-style oven construction.
- Overall approximate dimensions: 318.43 in. deep × 102.73 in. wide × 164.69 in. high.
- Special features: vertical lift doors on both ends; roof and floor port openings reflecting the specialized interface conditions at this point in the line.

**Controls Architecture**

- Control platform: Allen-Bradley line-integrated controls architecture consistent with the broader production line.
- Servo platform: Allen-Bradley Kinetix 5700 on the main conveyor axis, providing precise indexed motion control for this transition-stage module.
- Control enclosure: remote-mounted NEMA 12 enclosure.
- The controls package includes distributed field integration, motion coordination, machine interlocks, and machine-to-machine communication with adjacent equipment.

## TECHNICAL SPECIFICATIONS

Oven Configuration	
<b>Type</b>	Electric-heated indexed conveyor reheat oven
<b>Application</b>	Intermediate polyurethane reheat stage between primary cure and final post-cure
<b>Safety Class</b>	NFPA 86 Class B
<b>Shell Construction</b>	Structural steel reinforced pan-style oven construction
<b>Approx. Overall Size</b>	318.43 in. deep × 102.73 in. wide × 164.69 in. high
<b>Special Features</b>	Vertical lift doors on both ends; roof and floor port openings

Thermal System	
<b>Operating Temperature</b>	265°F–275°F
<b>Maximum Temperature</b>	300°F
<b>Heat Source</b>	Electric resistance heat
<b>Heat Input</b>	108 kW
<b>Recirculation Fan</b>	One NYB 208 PLR plug fan
<b>Recirculation Airflow</b>	8,500 CFM
<b>Exhaust Fan</b>	PQ1 exhauster
<b>Exhaust Airflow</b>	Approx. 550 CFM
<b>Exhaust Motor</b>	0.75 HP
<b>Dwell in Heat</b>	Approx. 10.2 minutes

Conveyor / Handling System	
<b>Main Conveyor Type</b>	Two lines of C2082H K-1 steel roller chain
<b>Main Conveyor Capacity</b>	18,350 lb max product load
<b>Main Conveyor Drive</b>	Servo-driven main axis
<b>Index Rate</b>	49 in. every 179.5 sec at approx. 10 ft/min
<b>Transfer Conveyors</b>	Lift-and-transfer conveyors on inlet and outlet
<b>Process Style</b>	Compact servo-indexed reheat module integrated into automated production line

Controls & Electrical	
Electrical Service	480V / 3PH / 60Hz
Control Cabinet	Remote-mounted NEMA 12 enclosure
Control Architecture	Allen-Bradley line-integrated controls platform with distributed field integration
Servo Platform	Allen-Bradley Kinetix 5700 on main conveyor axis
Safety Features	Interlocks, motion coordination, and Class B thermal safety architecture

Process Summary	
Product	Molded polyurethane forklift wheel assemblies
Market / Application	Automated forklift wheel manufacturing
Process Role	Intermediate reheat stage between primary cure and final post-cure operations
Integration Role	Servo-indexed transition module with dual-end lift-and-transfer interfaces
Key Verification Concept	Repeatable thermal recovery, precise servo-driven index timing, and controlled product handoff between line stages



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