PRECISION QUINCY

CASE STUDY

Natural Gas Heated Walk-In Oven

for Industrial Repair and Heat Treat Processing

Natural-gas-heated walk-in batch oven engineered for a heavy industrial repair operation performing stress relieving, tempering, preheating, and related heat treating of large repaired industrial components—featuring a 60 in W × 72 in D × 72 in H work chamber, combination horizontal-vertical airflow, Maxon OvenPak 408 burner, 350°F–650°F operating range with ±10°F uniformity, and NFPA 86 Class A safety architecture.

OVERVIEW

A natural-gas-heated walk-in batch oven was engineered for the heat treatment of large repaired industrial components in a heavy-duty repair and refurbishment environment. The operation supported repair, refurbishment, fabrication, welding, and urgent turnaround work on large industrial equipment including gear drives, pumps, bearing assemblies, crushers, conveyors, hydraulic systems, shafts, and similar assets. This oven was developed to support repeatable thermal processing of repaired metal parts for stress relieving, tempering, preheating, and other repair-related heat treating steps prior to return to service.

The oven was built around a 60 in W × 72 in D × 72 in H work chamber and designed for an operating range of 350°F to 650°F, with a maximum temperature of 650°F and a required workroom uniformity of ±10°F. To deliver that performance, a back-mounted natural gas heat chamber was used with a Maxon OvenPak 408 burner and a New York Blower 15 PLR plug fan delivering 4,140 CFM at 4 in. w.c. through a combination horizontal-vertical airflow pattern. The burner and airflow were sized for a 2,200 ft design elevation.

The equipment was configured as an NFPA 86 Class A oven with a PQ1 exhauster rated for 430 CFM at 1 in. w.c. and a WATLOW F4T ramp/soak controller with Type J thermocouples. The shell uses 5-inch-thick insulated panel construction with structural steel reinforcement, an aluminized steel interior, and a painted RAL 7042 exterior. The oven was fully assembled and shipped in one piece, with an oven-mounted NEMA 1 control cabinet.

CUSTOMER PROCESS REQUIREMENTS

The equipment was developed for a heavy industrial repair operation requiring the batch heat treatment of repaired metal components before return to service.

Application requirement

- The equipment had to process repaired metal parts used in heavy industrial service, including gear drives, pumps, bearing assemblies, crushers, conveyors, hydraulic systems, shafts, and similar large industrial components.
- The oven supports stress relieving, tempering, preheating, and other repair-related thermal processing occurring after repair or refurbishment and before return to service.
- The equipment had to support repeatable batch processing for large repaired industrial components with varying shapes and mass rather than small packaged product.

Work chamber / load requirement

- Required internal work chamber: 60 in W × 72 in D × 72 in H.

- The oven had to accommodate substantial industrial repair components with varying geometry and mass.

Process requirement

- The system had to support batch heat treating and related repair-process thermal cycles.
- The equipment had to provide controlled thermal performance suitable for repaired industrial components requiring repeatable post-repair heat processing.

Safety requirement

- The oven was required to be designed as an NFPA 86 Class A unit.
- The oven required appropriate exhaust, combustion, and control architecture for safe natural-gas-fired operation.

Utility / site requirement

- Required electrical service: 575V / 3PH / 60Hz. Full load amperage: 7.8 A FLA.
- Required fuel: natural gas. Gas inlet pressure: 2 PSI. Gas flow basis: 660 CFH.
- Design elevation basis: 2,200 ft.

Installation / shipment requirement

- The oven was built fully assembled and shipped in one piece.

THERMAL PROCESS REQUIREMENTS

These thermal process requirements were established from the need to heat treat repaired industrial metal components in a controlled, high-temperature batch environment.

Temperature capability

- Operating range: 350°F to 650°F. Maximum operating temperature: 650°F.
- Required workroom temperature uniformity: ±10°F.

Process basis

- The thermal process basis is batch heat treating of repaired industrial metal components, including stress relieving, tempering, preheating, and related repair-related thermal cycles.
- The process occurs after repair or refurbishment and before return to service, requiring repeatable heat processing for large, heavy components with varying geometry and mass.

Heat input requirement

- Heat source: natural gas. Burner: Maxon OvenPak 408.
- Natural gas inlet pressure: 2 PSI. Gas flow basis: 660 CFH. Design elevation basis: 2,200 ft.

Airflow delivery requirements

- Required airflow style: combination horizontal-vertical airflow.
- Recirculation airflow basis: 4,140 CFM at 4 in. w.c.

Exhaust / ventilation basis

- Exhaust airflow basis: 430 CFM. Exhaust fan: PQ1 exhauster delivering 430 CFM at 1 in. w.c.; 0.75 HP motor.
- Maximum volatile load basis: 0.1 gallons per batch. Oven classification: NFPA 86 Class A.

Thermal instrumentation / control basis

- Primary temperature controller: WATLOW F4T ramp/soak controller. Thermocouple type: Type J.

EQUIPMENT CONCEPT & ARCHITECTURE

To deliver the customer and thermal process requirements for this industrial repair heat treating application, the following equipment concept and architecture was developed.

Overall concept

- One natural-gas-heated walk-in batch oven designed for general heat treating of repaired industrial metal components, including stress relieving, tempering, preheating, and related repair-related thermal processing.
- The design uses a back-mounted heat chamber. The oven was fully assembled and shipped in one piece.

Heating architecture

- Heat source: natural gas. Burner: Maxon OvenPak 408.
- Gas inlet pressure: 2 PSI. Gas flow basis: 660 CFH. Design elevation basis: 2,200 ft.

Airflow / recirculation architecture

- Airflow pattern: combination horizontal-vertical airflow.
- Recirculation fan: New York Blower 15 PLR plug fan—4,140 CFM at 4 in. w.c.; 3 HP motor.
- Exhaust fan: PQ1 exhauster—430 CFM at 1 in. w.c.; 0.75 HP motor.

Chamber / construction architecture

- Internal work chamber: 60 in W × 72 in D × 72 in H.
- Construction style: insulated panel construction with structural steel reinforcement.
- Wall system thickness: 5 in. Insulation: 5-inch, 6 lb density mineral wool.
- Interior material: aluminized steel. Exterior finish: painted RAL 7042.
- Insulated floor with cart guide tracks.

Door / access architecture

- Door style: bi-parting swing doors.
- The insulated floor and door arrangement support loading and unloading of heavy repair components.

Controls architecture

- Primary temperature controller: WATLOW F4T ramp/soak controller. Thermocouple type: Type J.
- Control enclosure: oven-mounted NEMA 1 cabinet, painted ANSI 61 gray. No PLC used.

- The controller-based architecture matched the repeatable batch heat treating duty of the repair environment.

Safety / compliance architecture

- Oven classification: NFPA 86 Class A. Maximum volatile load basis: 0.1 gallons per batch.
- Exhaust and combustion architecture sized to support the stated volatile load basis.

Shipping / installation architecture

- The oven was fully assembled and shipped in one piece.

TECHNICAL SPECIFICATIONS

Oven Configuration	
Type	Natural-gas-heated walk-in batch oven
Quantity	1 oven
Application	General heat treating of repaired industrial metal components
Internal Work Chamber	60 in W × 72 in D × 72 in H
Heat Chamber Arrangement	Back-mounted heat chamber
Shipment Style	One-piece shipment; fully assembled

Thermal Heat Power System	
Operating Temperature Range	350°F to 650°F
Maximum Operating Temperature	650°F
Temperature Uniformity	±10°F
Heat Source	Natural gas
Burner	Maxon OvenPak 408
Natural Gas Inlet Pressure	2 PSI
Natural Gas Flow Basis	660 CFH
Design Elevation	2,200 ft

Recirculation / Airflow System	
Airflow Pattern	Combination horizontal-vertical airflow
Recirculation Fan	New York Blower 15 PLR plug fan
Recirculation Airflow	4,140 CFM
Recirculation Static Pressure	4 in. w.c.
Recirculation Fan Motor	3 HP

Exhaust System	
Exhaust Fan	PQ1 exhauster
Exhaust Airflow	430 CFM
Exhaust Static Pressure	1 in. w.c.
Exhaust Fan Motor	0.75 HP

Construction Materials / Shell System	
Shell Style	Insulated panel construction with structural steel reinforcement
Wall Thickness	5 in
Insulation	5-inch, 6 lb density mineral wool
Interior Material	Aluminized steel
Exterior Finish	Painted RAL 7042
Floor Feature	Insulated floor with cart guide tracks
Door Style	Bi-parting swing doors

Safety & Compliance	
Classification	NFPA 86 Class A
Maximum Volatile Load	0.1 gallons per batch
Applicable Standards	NFPA 79, NFPA 86, UL 508A

Controls & Electrical	
Temperature Controller	WATLOW F4T ramp/soak controller
Thermocouples	Type J
Control Cabinet	Oven-mounted NEMA 1; painted ANSI 61 gray
PLC	Not used
Primary Power	575V / 3PH / 60Hz
Full Load Amperage	7.8 A FLA

Process Summary	
Product	Repaired industrial metal components
Market / Application	Industrial repair and general heat treat
Process Type	Batch heat treating after repair — stress relieving, tempering, preheating, and related thermal processing before return to service
Customer Context	Repair, refurbishment, fabrication, welding, and urgent turnaround support for heavy industrial equipment including gear drives, pumps, shafts, crushers, conveyors, and hydraulic systems
Key Verification	Repeatable control of temperature, airflow, combustion, and safe operating limits across the 350°F–650°F operating range for varied large repair components

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