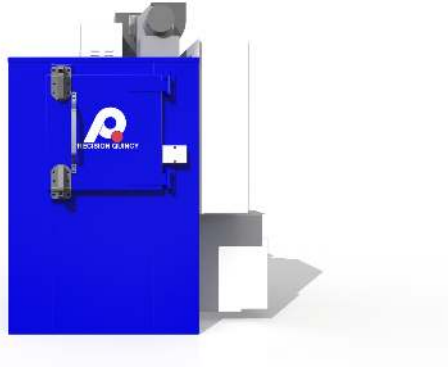
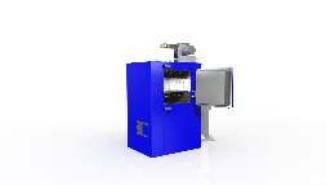
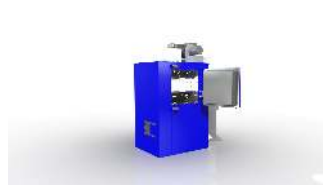
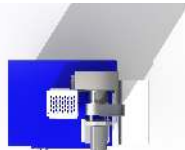
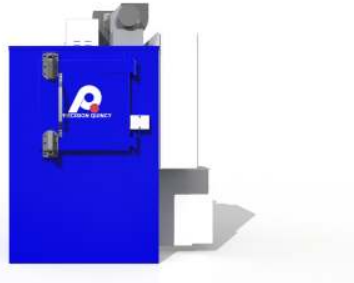




CASE STUDY

Electric Class B Cabinet Oven for High-Temperature Batch Processing of Precision Metal Components

Precision Quincy engineered this oven as a high-temperature electric cabinet oven for controlled batch heating of precision metal components in an industrial manufacturing environment. The delivered machine combined 800°F to 850°F operation, full horizontal airflow, programmable ramp/soak control, and heavy insulated construction in a compact cabinet format suited for repeatable shelf-loaded processing.



OVERVIEW

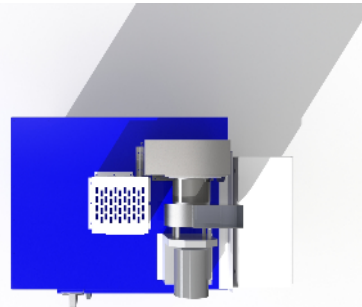
The project was developed as a C8-202020-B electric Class B cabinet oven for the customer. The equipment was built around a 20 in W × 20 in D × 20 in H work chamber and was designed for 800°F to 850°F operating temperature, 850°F maximum temperature, $\pm 10^\circ\text{F}$ uniformity, and full horizontal airflow.

The final design package used an 18 kW electric heating element array, a Jan-Air recirculation fan rated 2,000 CFM at 2 in. W.c. With a 1 HP motor, a Watlow F4T ramp/soak controller, Type J thermocouples, and a NEMA 1 control enclosure built as a UL 508A open industrial control panel. The oven used a 7-inch insulated wall system with 6 inches of 6 lb mineral wool and 1 inch of 8 lb Superwool, an unpainted aluminized interior, and a PQ gray exterior.

Front loading was provided through double swing doors, and the chamber was equipped with three 100 lb shelves and one 250 lb shelf for flexible batch loading. The final configuration used a non-powered exhaust outlet and a compact cabinet layout that concentrated the heating, airflow, controls, and insulated work chamber into a self-contained high-temperature batch platform. The control enclosure was arranged for front-face access, which supported serviceability from the front side of the unit and made side-by-side oven placement more practical where floor space was limited.

[GA overall view]

[Front / side rendering]



CUSTOMER PROCESS REQUIREMENTS

The project required a compact, high-temperature batch oven for controlled thermal processing of smaller precision metal components in a shelf-loaded cabinet format. The required chamber size and shelf package indicate a process built around repeatable loading of smaller parts, subassemblies, tooling, or fixtures rather than large walk-in batches.

Application requirement

- The customer required a batch oven for controlled high-temperature processing of precision metal work.
- The oven needed to support flexible batch loading across multiple shelf elevations.

- The chamber size and loading arrangement had to suit smaller components and variable load patterns within a compact cabinet footprint.

Loading requirement

- Required work chamber: 20 in W × 20 in D × 20 in H.
- The oven needed to include a shelf package with three 100 lb capacity shelves and one 250 lb capacity shelf.
- Shelf loads had to be evenly distributed.
- Product and fixture positioning had to be arranged so airflow through the chamber remained open and effective during use.

Operator / access requirement

- The process required front loading and unloading through a swing-door cabinet arrangement.
- The oven had to allow practical access to shelf-loaded work in a compact floor-mounted format.
- The control arrangement needed to keep operator interface and service access on the front face of the enclosure, reducing the need for side-access clearance.
- That front-access approach made it more practical to place ovens directly beside adjacent equipment or neighboring ovens when the installation layout required a tighter footprint.

Quality requirement

- The customer needed repeatable batch processing for shelf-loaded metal work.
- The thermal cycle needed to be programmable so the oven could run controlled recipes rather than only simple fixed-temperature operation.
- The chamber needed to maintain the required process conditions across the usable work area.

Safety / process classification requirement

- The process basis required Class B oven operation.
- No VOCs were allowed in the process load.
- The project therefore required a high-temperature thermal process without solvent-handling architecture.

Site / utility requirement

- Required electrical service: 460V / 3PH / 60Hz.
- Design elevation basis: less than 1,000 ft.
- [Front elevation]
- [Door and chamber section]

THERMAL / PHYSICAL PROCESS REQUIREMENTS

The project required a high-temperature forced-convection batch process for shelf-loaded metal work in a compact cabinet chamber.

Temperature requirement

- Operating temperature basis: 800°F to 850°F.
- Maximum temperature basis: 850°F.
- Required work-zone uniformity: $\pm 10^{\circ}\text{F}$.

Airflow / heat-transfer requirement

- Airflow direction basis: full horizontal airflow.
- The thermal process required forced convection across the work chamber to drive repeatable heat transfer through shelf-loaded parts.
- The airflow pattern had to support even heating across the usable chamber volume while maintaining the required temperature performance.

Heat-input requirement

- Heat source: electric resistance heat.
- Installed heat basis: 18 kW total.
- The thermal system had to support rapid heat-up to the operating range and stable control through the full process band.

Control requirement

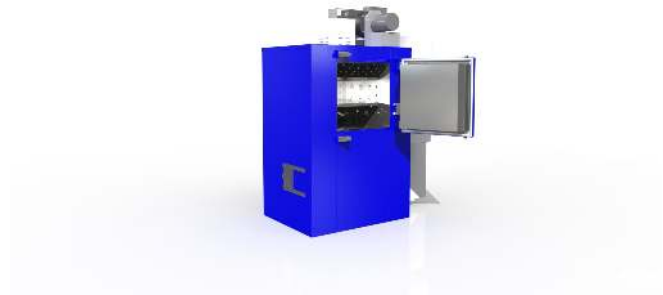
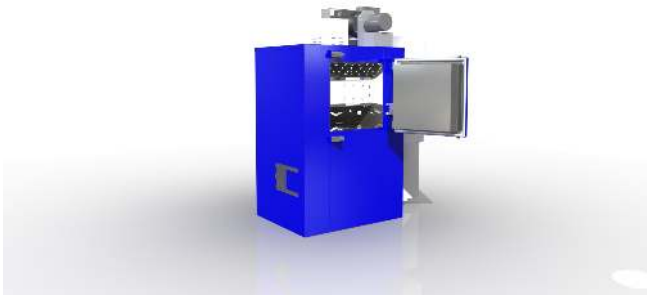
- Primary temperature control basis: programmable ramp/soak control.
- The process required controlled temperature profiling rather than simple manual heat input only.
- Work-area temperature sensing and excess-temperature protection were both required.

Process classification requirement

- The thermal process basis was Class B.
- No VOC loading was allowed, so the process did not require powered solvent-handling exhaust architecture.

Shutdown / cooldown requirement

- Heat had to be turned off before final shutdown.
- Recirculation airflow needed to remain in operation during cooldown.
- The documented operating sequence required the oven to cool to below 250°F before shutting off fans.
- [GA airflow view]
- [Wiring diagram sequence area]



EQUIPMENT CONCEPT & ARCHITECTURE

To satisfy those requirements, Precision Quincy configured the project as a C8-202020-B electric Class B cabinet oven with a compact insulated shell, horizontal airflow, side-mounted controls, and programmable high-temperature electric heat.

Pages 6–8 — Technical Specifications

Overall concept

- One electric Class B cabinet oven.
- Compact floor-mounted batch configuration.
- Shelf-loaded chamber sized for smaller high-temperature batch work.

Heating architecture

- Heat source: electric resistance heat.
- Heating system: 3 kW heating element array delivering 18 kW total.
- Heat output was controlled through the temperature-control system using solid-state relays and backup contactor protection.

Airflow architecture

- Airflow pattern: full horizontal airflow.
- Recirculation fan: Jan-Air 12.19 × 4 RB fan.
- Recirculation performance: 2,000 CFM at 2 in. W.c.
- Recirculation fan motor: 1 HP.

Exhaust architecture

- Exhaust style: non-powered exhaust.
- Exhaust outlet size: 7 in × 7 in.
- Roof exhaust location and chamber circulation path were arranged around the compact cabinet shell.

Chamber / shell architecture

- Internal work chamber: 20 in W × 20 in D × 20 in H.
- Wall system thickness: 7 in.
- Insulation package: 6 in of 6 lb mineral wool plus 1 in of 8 lb Superwool.
- Interior material: unpainted aluminized steel.
- Exterior finish: PQ gray (RAL 7042).
- Control enclosure finish: PQ gray (RAL 7042).

Loading architecture

- Front access through double swing doors.
- Shelf package included three 100 lb shelves and one 250 lb shelf.
- The loading arrangement supported flexible shelf placement and evenly distributed loads.

Controls architecture

- Primary temperature controller: Watlow F4T ramp/soak controller.
- Excess-temperature controller: Gefran 650L.
- Thermocouple type: Type J.
- Control enclosure: NEMA 1.
- Enclosure listing basis: UL 508A open industrial control panel.
- Panel hardware included a disconnect, operator switches, indicators, enclosure cooling fan, and panel-mount USB port.
- The control cabinet arrangement kept operator and service access on the front face of the unit, which improved accessibility while reducing the side-clearance requirement for installation.
- That layout made side-by-side placement of multiple ovens more achievable in space-constrained production areas.

Safety architecture

- Applicable standards basis: NFPA 79, NFPA 86, and UL 508A.
- Safety logic included recirculation airflow proving, excess-temperature protection, and heat shutdown if safe operating conditions were not met.
- Documented operating sequence required fan operation before heat enable and continued airflow during cooldown.
- [Enclosure layout]
- [Front / side GA]
- [Chamber / airflow section]

TECHNICAL SPECIFICATIONS

Oven Configuration

Model	C8-202020-B
Type	Electric Class B cabinet oven
Quantity	1 oven
Work Chamber	20 in W × 20 in D × 20 in H
Airflow Pattern	Full horizontal
Door Style	Double swing doors
Loading Basis	Shelf-loaded batch operation

Thermal Process Basis

Operating Temperature	800°F to 850°F
Maximum Temperature	850°F
Uniformity	±10°F
Process Classification	Class B
Maximum VOC Load	No VOCs allowed
Design Elevation	<1,000 ft

Electrical / Heating System

Power Supply	460V / 3PH / 60Hz
Full Load Amps	25.5 A
Heat Source	Electric resistance heat
Installed Heat	18 kW total
Heating Arrangement	3 kW heating element array delivering 18 kW total
Heater Control	Solid-state relay with backup contactor protection

Recirculation / Airflow System

Recirculation Fan	Jan-Air 12.19 × 4 RB
Recirculation Airflow	2,000 CFM
Recirculation Static Pressure	2 in. W.c.
Recirculation Fan Motor	1 HP
Airflow Direction	Full horizontal across the work chamber

Exhaust System

Exhaust Style	Non-powered exhaust
Exhaust Outlet	7 in × 7 in
Exhaust Centerline from Face of Oven	19.07 in
Exhaust Centerline from Side of Oven	21.11 in

Construction

Wall Thickness	7 in
Insulation	6 in of 6 lb mineral wool + 1 in of 8 lb Superwool
Interior Material	Unpainted aluminized steel
Exterior Finish	PQ gray (RAL 7042)
Control Enclosure Finish	PQ gray (RAL 7042)

Loading Package

Shelf Package	3 × 100 lb shelves + 1 × 250 lb shelf
Shelf Loading Note	Load to be evenly distributed on shelf

Controls & Safety

Main Temperature Controller	Watlow F4T ramp/soak
Excess Temperature Controller	Gefran 650L

Thermocouple Type	Type J
Control Enclosure	NEMA 1
Enclosure Listing Basis	UL 508A Open Industrial Control Panel
SCCR	5,000 amps
Safety Logic Basis	Recirculation airflow proving and excess-temperature shutdown
Shutdown Requirement	Do not shut down fans above 250°F
Panel Features	Disconnect, operator switches, indicators, enclosure cooling fan, USB port
Control Access Basis	Front-face operator and service access
Installation Benefit	Supports tighter side-by-side oven placement

Equipment Dimensions

Overall Width	63.14 in
Overall Depth	44.83 in
Overall Height	67.06 in
Oven Body Width	63.14 in
Oven Body Depth	39.12 in
Oven Body Height	62.07 in
Work Area Width	20.00 in
Work Area Depth	20.00 in
Work Area Height	20.00 in
Height to Work Area	35.00 in
Control Enclosure Clearance	38.00 in
Door Swing	20.33 in
Lifting Points	4



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