The Leader...

C. I. HAYES INC.

PRODUCT BULLETIN

Bulletin No. 971

Hayes Continuous Vacuum Carburizing

The **Hayes Series VBQ Vacuum / Air Heat Treating Furnace** is a modular design system that permits the user to thermally process parts in a variety of controlled atmospheres including vacuum and air. **Continuous** operation is provided with a heating / loading chamber and an in-line integral oil quench module or optional gas pressure quench module.

The **Hayes Series VBQ** is designed for **carburizing** applications that require tighter case depth, microhardness profile control and reproducibility than is possible with conventional atmosphere carburizing furnaces. The furnace also has applications with difficult to carburize geometries such as blind holes, roots of fine pitched gears or where the presence of intergranular oxidation is detrimental as in highly loaded gears and bearings.

Routine maintenance is simplified and reduced during air processing as the furnace performs a **self-cleaning** operation.

PULSE / PUMP CARBURIZING SYSTEM

The carburizing chamber is equipped with a Pulse / Pump Carburizing System. This system ensures maximum carburizing uniformity with minimum gas consumption. The system also permits blending of process gases for optimum composition for special requirements such as carbonitriding of ferritic nitrocarburizing.

LOAD / EVACUATION CHAMBER

The chamber is mounted on a structural steel frame, which is on wheels to provide easy access to the furnace internals for maintenance. On multi-chamber designs, this chamber, in addition to preheating capabilities, can be equipped with partial pressure/ vacuum de-oiling to eliminate prewashing.

MODULAR COMPONENT DESIGN

Precise present and future customer requirements are met by our modular design to suit the soak time, carburizing cycle, quench and throughput requirements for carburizing applications.

HEATING CHAMBER

The heating chamber consists of up to three (3) zones of heating. High purity ceramic fiberboard forms the heating chamber. The number of heating chambers can be varied to suit the soak time, carburizing cycle and throughput requirements for each application. Each chamber is mounted on a structural steel frame which is on wheels to provide easy access to the furnace internals.

HEATING ELEMENTS

The furnace is heated with silicon carbide tubular type heating elements. The elements are designed for efficient and uniform heat transfer which is critical to obtaining tight case depth and microhardness profile control and reproducibility.

PUMPING SYSTEM

The modular design and ability to isolate and vary the partial pressure in each chamber ensures the number of vacuum pumps is kept to a minimum.

WORK TRANSPORT SYSTEM

Work is transported through the chambers on high strength rollers and rails. The robust pusher and puller mechanisms automatically transfer work through the furnace.

QUENCH MODULE

The furnace can be equipped with atmosphere oil quench, vacuum oil quench or high pressure gas quench modules to suit the hardenability and cleanliness requirements of virtually any steel.

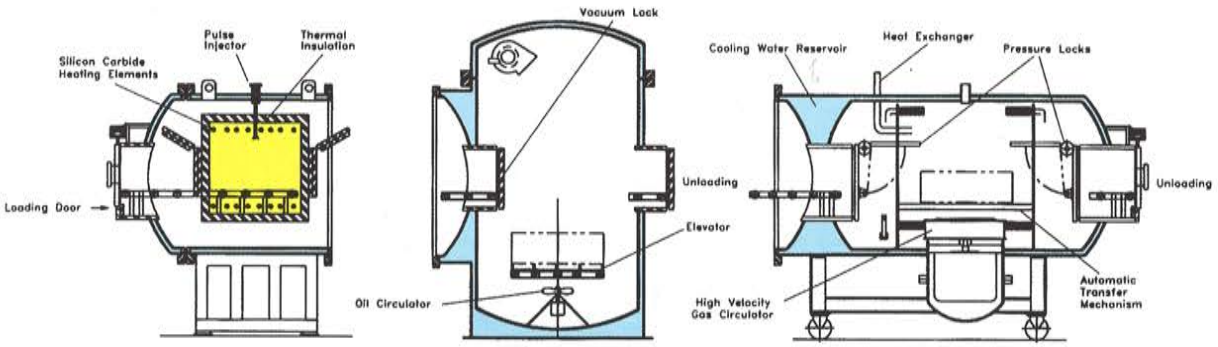
GRAPHICAL COMPUTER INTERFACE (GCI)

Mechanical and electrical components are integrated with computer software to provide control and diagnostics of equipment, monitoring process variables, displaying real time trending and storing and retrieving historical data.

C. I. Hayes Inc. • 800 Wellington Ave. • Cranston, RI 02910 • 401-467-5200 • FAX 401-467-2108

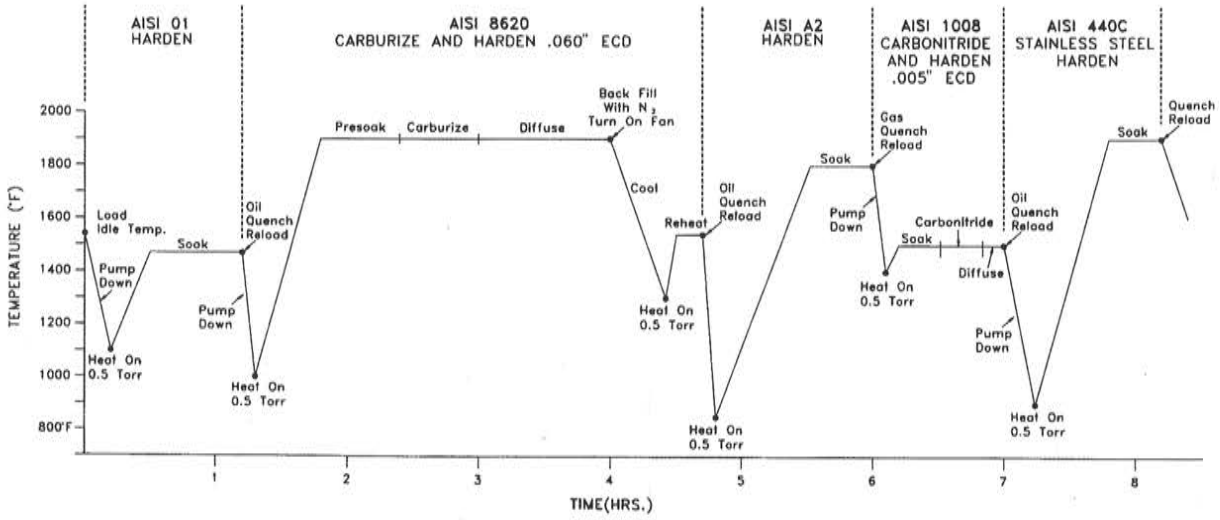
SPECIFICATIONS

CROSS SECTION OF VBQ CONTINUOUS HEAT TREATING VACUUM FURNACE



CARBURIZING CHAMBER | OIL QUENCH MODULE | PRESSURE QUENCH MODULE

TYPICAL VBQ 8 HR. DAY



Models:	VBQ-091824	VBQ-202436
Heat Chamber Work Size (H x W x L)	9" x 18" x 24"	20" x 24" x 36"
Heating Elements	18 Silicon Carbide Tubes	30 Silicon Carbide Tubes
Maximum Operating Temperature	2000°F	2000°F
Temperature Uniformity Total Spread @ Carburizing Temperature	25°F	25°F
Backfill Gas Requirement: Heat Chamber Oil Quench Module Pressure Quench Module (@ 1 Atmosphere)	 68 cu. ft./cycle 90 cu. ft./cycle 90 cu. ft./cycle	 350 cu. ft./cycle 300 cu. ft./cycle 200 cu. ft./cycle
Carburizing and Carbonitriding Gas	Dependent on Cycle	Dependent on Cycle
Hearth Loading (Gross)	300 Lbs.	670 Lbs.
Quench Transfer Time	Less Than 10 Seconds	Less Than 10 Seconds
Quench Oil Volume	600 Gallons	1700 Gallons
Hearth Level	54"	54"
Heating Power	60 kVA	150 kVA
Total Power	76.5 kVA	210 kVA
Cooling Water (with a rise of 20°F)	20 GPM	50 GPM
Example of Production Rate: 0.040 Case at 1900°F (Cycle Time)	106 pounds/hour 2.83 hours	237 pounds/hour 2.83 hours

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