PVT

An Inductotherm Group Company

Vacuum Heat Treatment Furnaces

PVT
An Inductotherm Group Company

Vacuum Heat Treatment Furnaces

Vacuum Heat Treatment is now a well established practice in the aerospace (OEM and repair), land based turbines, automotive and tool industries.

The main advantages of this process are specialized:

- Bright oxide-free finishes
- No carbonization or decarburization
- Fluxless brazing
- Controlled heating
- Repeatability
- No hazardous fumes or toxic waste

PVT Vacuum Furnaces are utilized in many applications such as:

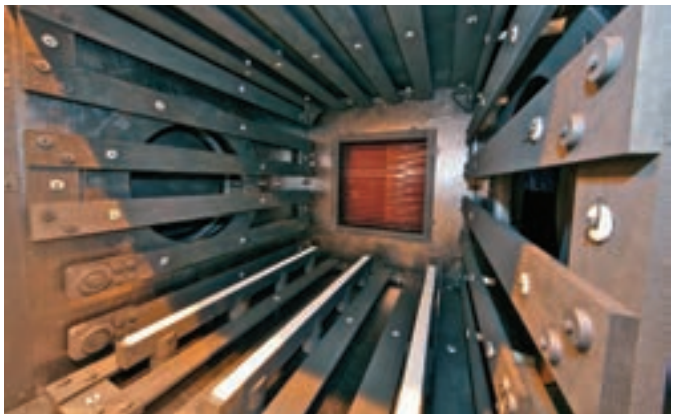
- Solution heat treatment and ageing of nickel based alloys
- High temperature brazing
- Sintering of powdered metals

PVT Vacuum Furnaces are also widely found in more general heat treatment applications such as bright annealing & stress relieving. We manufacture a wide range of horizontal, bottom loading and top loading Vacuum Heat Treatment Furnaces. A unique Clamshell split chamber furnace design with its inherent advantages of easy access for loading and maintenance. All furnaces can be engineered to meet a variety of customer requirements with working capacity up to 4000 pounds.

PVT
An Inductotherm Group Company

Horizontal Furnace

The horizontal vacuum furnace is the workhorse configuration for the thermal process industry. PVT offers systems with a wide range of qualified work zones to satisfy most customers requirements.



Model No.	Work Size		
	Width	Height	Length
FH 60-45-60	24" (600mm)	18" (450mm)	24" (600mm)
FH 60-60-90	24" (600mm)	24" (600mm)	36" (900mm)
FH 76-60-90	30" (760mm)	24" (600mm)	36" (900mm)
FH 76-76-90	30" (760mm)	30" (760mm)	36" (900mm)
FH 90-76-122	36" (900mm)	30" (760mm)	48" (1220mm)
FH 90-90-122	36" (900mm)	36" (900mm)	48" (1220mm)
FH 100-100-100	39" (1000mm)	39" (1000mm)	39" (1000mm)
FH 100-100-150	39" (1000mm)	39" (1000mm)	59" (1500mm)

Standard Unit

- T_{max} 1300°C
- Rectangular graphite hot zone
- Single zone four sided heating
- Over temperature controller
- Emergency stop on control panel
- PC based supervisory controls with PLC/ Wonderware SCADA and Touchscreen HMI
- Water-jacketed chamber and door
- 1000 lb capacity
- $1x10^{-3}$ torr

Options

- $T_{max} \geq$ 1800°C
- $1x10^{-5}$ torr
- Rear chamber door for maintenance access
- Metallic hot zone and heaters
- Inert gas cooling – internal or external
- Partial pressure inert gas operation
- Loading device
- Closed loop water cooling subsystem

PVT
An Inductotherm Group Company

Clamshell Furnace

The Clamshell is a vacuum furnace solution that offers the desireable features of a bottom loading furnace with the easy loading access, low height requirements, and similar footprint to a horizontal furnace.

These models are ideal for heat treatment, high temperature brazing, or graphitization.

Model No.	Work Size	
	Diameter	Height
FVS 32-45-51	18" (450mm)	20" (510mm)
FVS 42-61-76	24" (600mm)	30" (760mm)
FVS 51-76-76	30" (760mm)	30" (760mm)
FVS 56-100-100	39" (1000mm)	39" (1000mm)
FVS 56-122-137	48" (1220mm)	54" (1370mm)
FVS 56-160-120	63" (1600mm)	47" (1200mm)
FVS 56-160-150	63" (1600mm)	59" (1500mm)

Features & Benefits

- Hot zone is ideal for cylindrical and tall assemblies.
- Single zone heating including top an bottom coverage.
- Excellent temperature uniformity.
- Chamber can be closed immediately after unloading.
- Easy and quick change of thermocouples.
- Low facility ceiling height requirements.
- No moving parts, working at heights, or confined spaces.

Standard Unit

- T_{max} 1300°C
- Over temperature controller
- Emergency stop on control panel
- PC based supervisory controls with PLC/Wonderware SCADA and Touchscreen HMI
- 1000 lb capacity
- $1x10^{-3}$ torr

Options

- T_{max} 1600°C
- $1x10^{-5}$ torr
- Metallic hot zone and heaters
- Inert gas cooling
- Partial pressure operation
- Loading device
- Closed loop water cooling subsystem

Controls

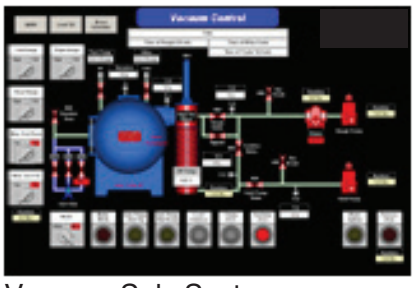
Three levels of operator security allow thermal processing to be carried out under fully automatic or manual control. The system is interlocked with safety devices for fail-safe operation in the automatic mode. Control and monitoring equipment is contained within a single free standing totally enclosed NEMA 12 rated cabinet located adjacent to the furnace.

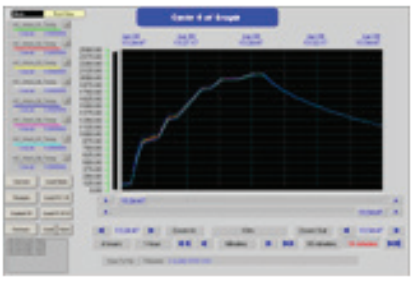
PVT's standard controls are configured to meet AMS 2750 E Type B Instrumentation requirements. Thermocouple, System Accuracy Test, and Temperature Uniformity Survey management along with secure data recording are also included in PVT's standard control package.

Control Instrument:	PLC with software Proportional- Integral-Derivative Control
Control Sensor:	[1] thermocouple for each control zone
Temperature Display:	Touch screen HMI via Wonderware In Touch software
Recording Instrument:	Local PC via Wonderware In Touch software
Load Sensor:	[12] sensor receptacle for load and TUS thermocouples
Over Temperature Protection:	Independent Honeywell over-temperature controller

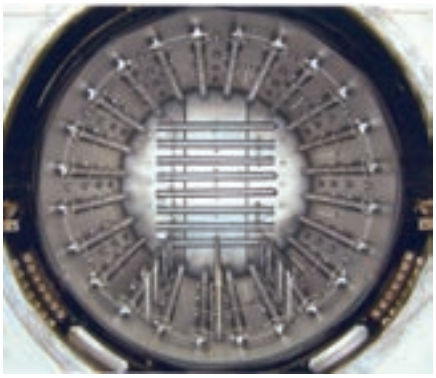
The HMI menus are programmed to facilitate input, provide instant process feedback, and to recall archived data so that the operator can run the system with full confidence. Status and alarm screens are used to display the logical status of the furnace. Some sample screens are as follows:


Recipe Input


Vacuum Sub-System


Temperature Trend

PVT
An Inductotherm Group Company

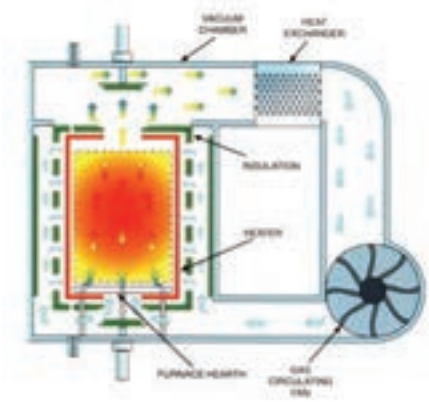


Hot Zone Design

PVT offers graphite and metallic hot zones, with graphite being the heat treaters' preferred option for most processes due to its longer life, lower replacement cost and reduced power consumption. Composite hot zone constructions utilizing metallic, graphite and/or ceramic fibre materials, are also available to meet specific customer requirements.

Transfer / Loading Systems

PVT can supply a fully integrated loading system to manipulate the charge from its dedicated storage area to a position inside the furnace for processing and from the furnace to its dedicated storage after processing. These systems are designed in a range of standard sizes to accommodate a wide variety of working load weights and geometries. The load systems can be fully automated, semi-automated or manual depending on the user preferences. PVT can provide either a dedicated transfer system on fixed guide rails or a flexible transfer system for manoeuvring the load to other areas of a factory.



Gas Quenching

Gas Quench systems are available to meet process requirements ranging from fan assisted cooling to rapid, uniformly controlled "Multiflow" high pressure quench operations. Quench rate in a vacuum furnace is directly related to both the pressure and the velocity of the cooling gas. PVT exploits both these factors by using high velocity "Multiflow" gas at pressures of up to 10 bar. The latest design technology in compact copper heat exchangers are used in combination with a high capacity gas quench turbine blower, utilizing a water cooled motor designed for use in vacuum/pressure environments. Rapid quenching at high pressure to meet specified metallurgical properties ensures that superior cooling rates are achieved when heat treating material such as tool steels, die steels and high alloy steels. This high speed cooling also produces reduced cycle times with a consequent increase in furnace production levels.

PVT
An Inductotherm Group Company

Vacuum Induction Heating Systems

Vacuum Induction Heating Systems are ideally suited to high temperature (≥2200°C) processes requiring large work zones (36" diameter). These systems are used in sintering, graphitizing, and many other thermal processing applications. They are especially suitable for hard materials. Top and bottom loading configurations are available.

Standard Unit

Vessel: Water cooled double wall
Controls: PLC, Wonderware Intouch SCADA, and Touch Screen HMI
Power Supply: Inductotherm VIP Power Trak
Coil: High purity copper designed to couple to graphite susceptor
Gas Cooling: Inert gas circulation with external heat exchanger

Options

Single power supply, double vessel configuration

Features

- Stable solid graphite susceptor
- No ceramic insulators
- No internal connections
- Low maintenance
- High power to charge ratio

Model No.	Work Size	
	Diameter	Height
FVB 86-122-150	48" (1220mm)	59" (1500mm)
FVB 96-150-150	59" (1500mm)	59" (1500mm)
FVB 96-150-180	59" (1500mm)	70" (1800mm)
FVB 96-180-180	70" (1800mm)	70" (1800mm)
FVB 106-200-200	79" (2000mm)	79" (2000mm)

PVT INCORPORATED
100 Indel Avenue
P.O. Box 156
Rancocas, New Jersey 08073
Phone: +1 (609) 267-3933
Fax: +1 (609) 267-1366
E-mail: sales@pvt-vf.com
www.pvt-vf.com

CONSARC ENGINEERING LIMITED
9 Woodside Eurocentral
Holytown, North Lanarkshire ML14XL
Scotland, United Kingdom
Phone: +44 (0)1698 730430
Fax: +44 (0)1698 730431
E-mail: sales@consarceng.com
www.consarceng.com

The Company

PVT, an Inductotherm Group Company a manufacturer of vacuum melting, heat treatment, and brazing systems, was established in 1965 and became part of the Consarc Group in 2003. Our advanced vacuum and controlled atmosphere furnace systems are widely used by customers throughout the world for the processing of metals, special alloys, and engineered materials.

PVT
An Inductotherm Group Company

For more information visit www.pvt-vf.com

INDUCTOTHERM GROUP
Leading Manufacturers of Melting, Thermal Processing and Production Systems for the Metals and Materials Industry Worldwic