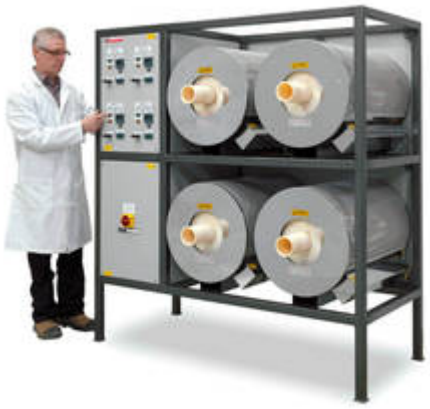
Examples of Customized Furnaces

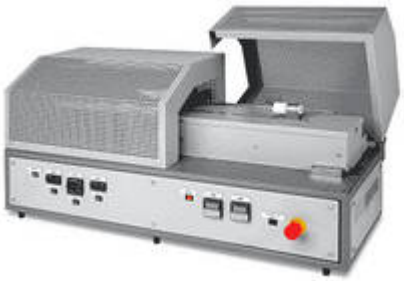
Following are a few examples of customized furnaces that Carbolite has realized in the past. More are available upon request:



A Thermal Cycling Rig Comprising Four GHA 12/450 Tube Furnaces
This thermal cycling rig comprises four 1200°C GHA 12/450 furnaces, each with a heated length of 450mm installed into and integrated frame

Each furnace has an independent 8 segment programmable controller and each has over-temperature protection and RS232 communications.

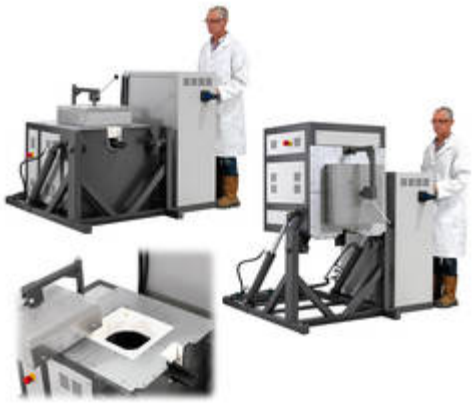
The operator manually transfers the sample between furnaces.



Thermal Cycling Test Furnace
One of five identical thermal cycling furnaces for accelerated aging tests on sensors that are used in aircraft engines.

In use test samples experience temperatures up to 1100°C. These 1200°C 3 zone furnaces have actuators that can insert up to 15 sensors each around 2mm in diameter into the furnace for around 30 minutes then return them to ambient temperature for up to 4000 cycles.

The design is derived from that of the standard TZF-12-38-400.

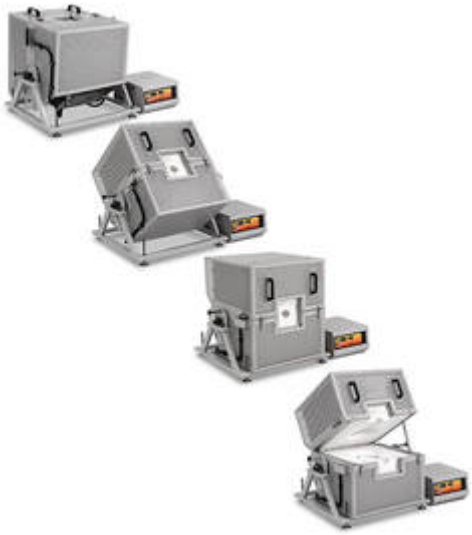


Thermal Cycling Test Furnace

This 900°C crucible furnace was produced for a university department researching in advanced material properties.

The furnace is designed to be able to heat 10 to 15kg of aluminium in an 8 litre crucible and is equipped with an 8 segment programmable controller and over-temperature protection.

A hydraulic tilting system raises and lowers the furnace, allowing the molten aluminum to be poured out.

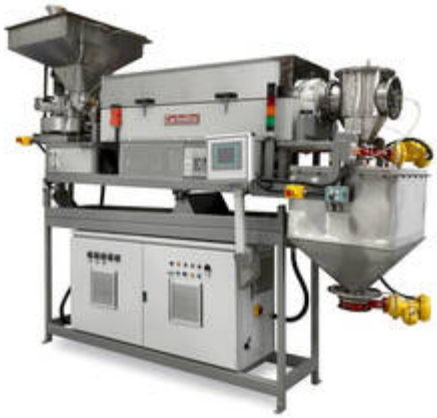


Split Spherical Tilting Furnace

This split spherical tilting furnace with a maximum operating temperature of 1100°C has been designed to heat a 250mm diameter reaction flask.

The furnace body can be tilted through a 45 degree angle and locked into position. The furnace body hinges open to insert or remove the spherical reaction flask. A safety switch turns off the power to the elements when the furnace is split.

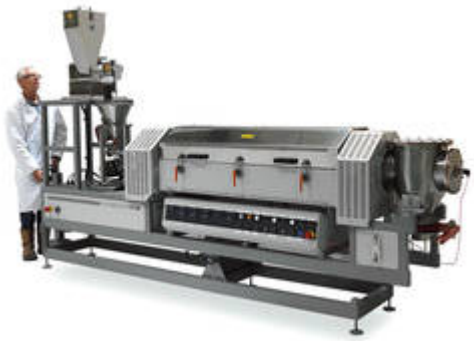
The separate control module houses a 301 set-point controller and an additional 2132 over-temperature protection control.



An 1100°C Rotating Tilting Tube Furnace
This 1100°C tilting rotating tube furnace is equipped to process precious metal based catalysts under an inert atmosphere.

Furnace control and data-logging is via a PLC (process logic control) touchscreen.

Sample feeding, processing and collection are all achieved under and inert atmosphere. The split tube design simplifies exchanging the work-tubes.



Rotating Tilting Tube Furnace With Dual Feed Mechanism
This 1100°C rotating tilting split tube furnace is equipped with a dual feed mechanism which incorporates both screw feed and a vibratory feeder.

The processed material is collected under an inert atmosphere. The furnace is used for the manufacture of hydroxyapatite based synthetic bone graft materials. These allografts provide many advantages over bone graft materials of natural origin.

The split tube design simplifies exchanging the work-tubes.

High Temperature Air Recirculation Furnace
One of an identical pair of air recirculation furnaces supplied for a 'centre of excellence'manufacturing process development site. The units are designed for use in Nadcap AMS 2750E heat treatment applications and operate in the range 300°C to 1100°C

Each has a vertically opening door and load handling accessories. Air recirculation fans provide rapid and uniform heating through the convection phase of the heating cycle

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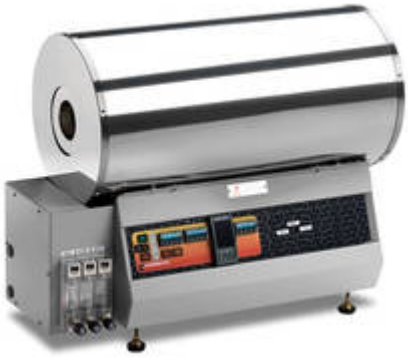
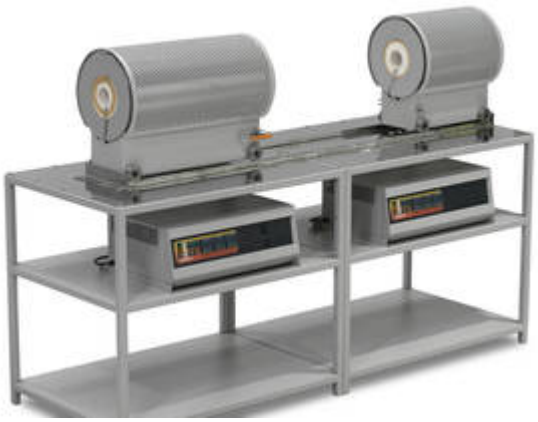


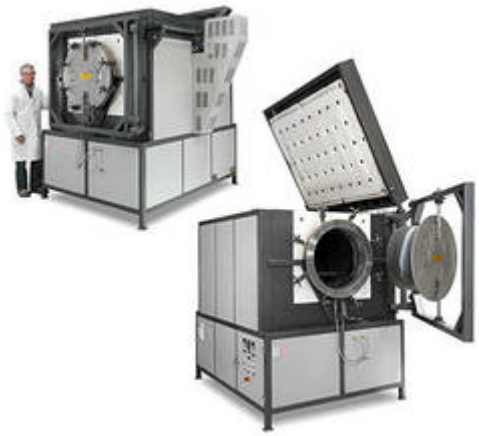
Water cooled TZF-12-65
Based on a TZF 12/65 this 1200°C three zone tube furnace has a water cooled jacket providing cooling circuits to each zone independently. These enable accelerated cooling of the furnace.

The 8 segment programmable controller is also equipped with RS232 communications.



Custom designed tube furnace solution for a research institute

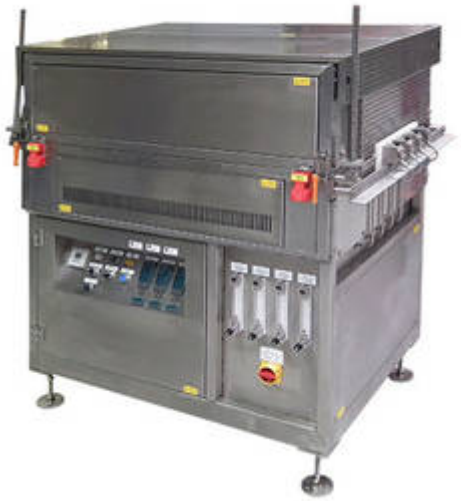
- 2 x 3-zone tube furnaces mounted on rails which allows the furnaces to be linked together to create a temperature gradient, or used independently
- 1 furnace has a heated length of 600 mm and the second one a heated length of 400 mm
- Used with quartz tube of 45 mm diameter



Retort furnace (illustrated with and without the cooling lid in the case top open)
This large capacity 1150°C furnace was designed to sinter 100kg of graphite matrix containing ceramic powder inclusions, used in the manufacture of abrasive discs.

The large Inconel retort holds a nitrogen/hydrogen reducing gas mixture and uniformity is assured through the use of a 3 zone control system and radiation shields.

This particular model features an opening roof to increase cooling for sintering ceramic abrasive discs under an inert atmosphere. Other versions of this design have been built to incorporate exhaust afterburners for use in ceramic binder burn-off.



Four Lane Stand Line Furnace
Normally operated between 500°C and 1250°C, this four lane strand furnace is being used to anneal platinum wire.

The furnace has three zone temperature controls, each zone with independent over-temperature protection.

Independent flow controllers supply inert gas to each lane.

Multiple 4 lane strip furnaces.
Four parallel, 4 lane strip line furnace sets each comprising an 1100°C hardening furnace and a 600°C tempering furnace.

Used as part of the production line for the manufacture of surgical steel scalpel blades

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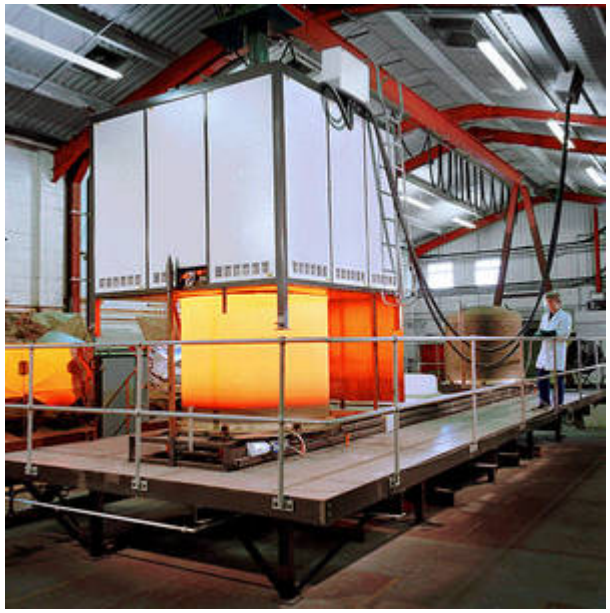
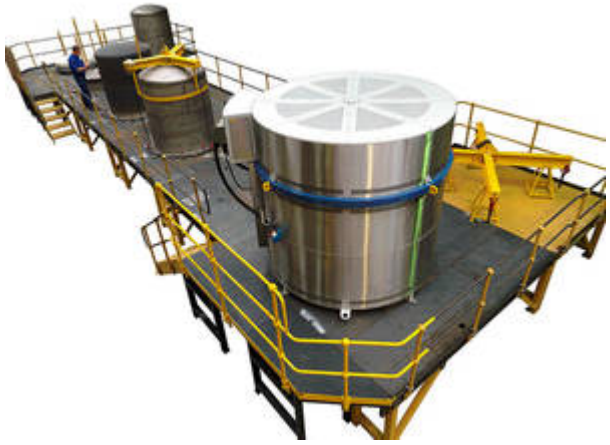


Custom Top Hat Furnace

A custom built top hat furnace system that is used for the surface treatment or jet turbine blades under an argon atmosphere.

Advanced single crystal nickel based superalloy turbine blades used in the construction of the latest generation of high efficiency high pressure gas turbine jet engines are loaded into jigs within the furnace retorts and then heat treated under an inert gas atmosphere.



Multiple retort top hat furnace system

A top hat furnace system with a maximum temperature of 1050°C used for the surface treatment of gas turbine blades used within jet engines.

The system comprises a single furnace with multiple hearths, retorts and a cooling station

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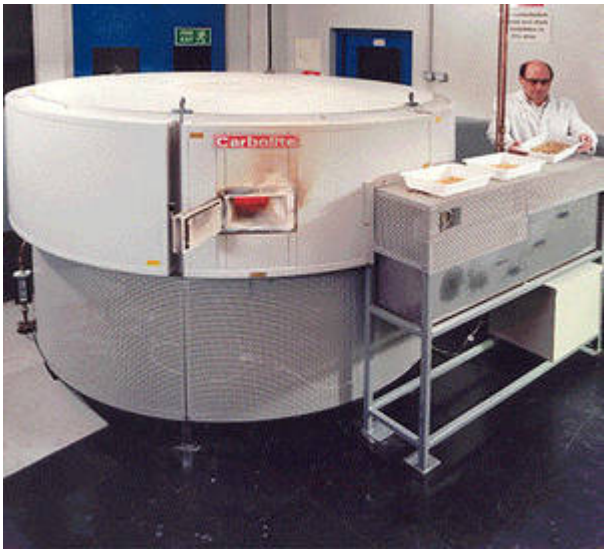
Dual-hearth Top Hat Furnace System

A top hat furnace system comprising two hearths a single furnace and retort and a cooling station.

Used for sintering ceramics used in battery manufacture under an inert gas atmosphere.

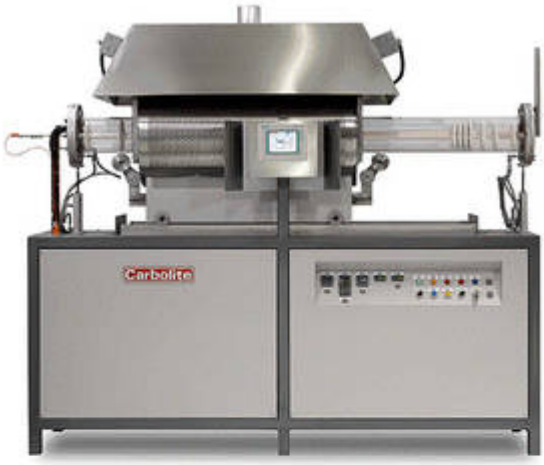


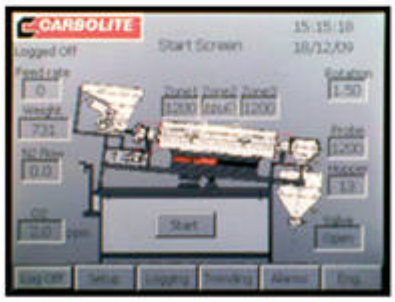
Rotary Hearth Furnace

This rotary hearth furnace is used in the production of wedding rings. Gold 'compacts' are sintered so as to improve the workability of the precious metal.

Powdered gold is packed into a die and pressed to form a ring with a rectangular cross section. These are known as compacts.

These are heated under a 95:5 nitrogen:hydrogen atmosphere to around 750°C to 800°C for up to 24 hours. Uniformity is provided as a result of 3 control zones being employed.



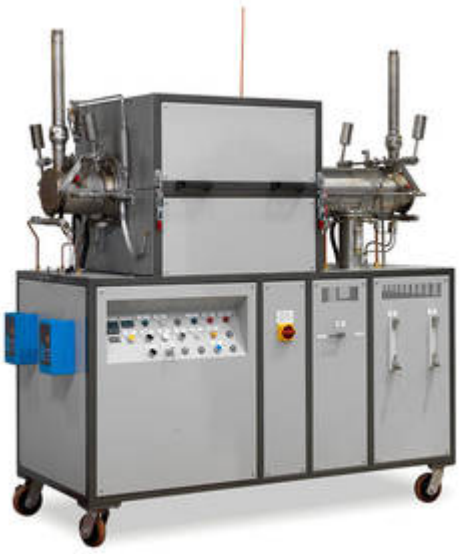


Tube furnace for CVD (Chemical Vapour Deposition)

With a maximum temperature of 1300°C and an operating temperature of 1200°C this tube furnace was developed for research into CVP chemical vapour deposition under hydrogen and corrosive atmospheres. The gas management system in the furnace base controls the supply of carbon dioxide, carbon monoxide, nitrogen, hydrogen and sulphur dioxide using mass flow controllers. An integral hood is designed to provide ventilation into an extraction system.

The furnace's 500mm heated length has 3 control zones so as to increase uniformity and a cascade control system via a Eurtherm 3508P1. Gas and temperature data is displayed on a Siemens TP 1778 colour HMI touch screen panel which includes smart server software for internet explorer access.

The furnace is on rails and so is able to travel along the 150mm diameter quartz glass tube applying the 500mm heated length to locations.



Manual Pusher Furnace

This brazing furnace with a maximum operating temperature of 1150°C is designed to allow an operator to manually push product into the furnace which can be purged with either 100% nitrogen or 100% hydrogen.

The entrance and exit to the furnace have a gas curtain burner that activates when the door is opened and sophisticated gas control system with a series of safety interlocks

Construction is based upon a tube furnace design in which the product is heated in the ‘hot’ zone and after a determined time it is pushed into a water cooled, cooling zone.