

Designers and Builders of
All Types of Furnaces and Kilns
Tundish and Ladle Preheaters and Driers
Control Panel and System Designs
Retrofits to Existing Plant
A Total Combustion Service for all Industries



NORTHERN COMBUSTION

Northern Combustion Systems was formed in 1984 by engineers with a wealth of experience in the design, supply, installation and commissioning of process heating plant, covering the steel, brick, refractories, glass, food and associated industries.

Capital turnkey contracts undertaken to date include the provision of conveyorised, forging, and heat treatment furnaces, batch type kilns, continuous kilns, ladle and tundish heating stations.

Many existing furnaces and plant have been totally upgraded to include the latest equipment for fuel saving and combustion technology.

N.C.S. also offer a comprehensive commissioning, service, breakdown and call out facility.

The Company have gained a vast reputation for technical competence and superior products, and as a result are now enjoying repeat orders from well established customers.



Lift-off-cover Furnaces

(see photo on front cover)

These furnaces are becoming ever more popular with our heat-treatment customers who have overhead cranes, as it obviates the need for expensive car bottom (bogie hearths) and attendant drive units.

The combustion fired hoods can serve one or more bases, and can work at temperatures in excess of 1250°C.

Northern Combustion Systems' innovative hearth flueing arrangement allows temperature uniformity to meet with Rolls Royce, aerospace, and petroleum industries tight specifications of $\pm 5^\circ\text{C}$.

Control varies from simple high/low to the most sophisticated P.L.C. and computer linked systems.

The photograph shows a large 7 metres square x 4 metres high unit, serving two bases. It is for the heat treatment of steel rolls and satisfies a total charge weight of 150 tons.

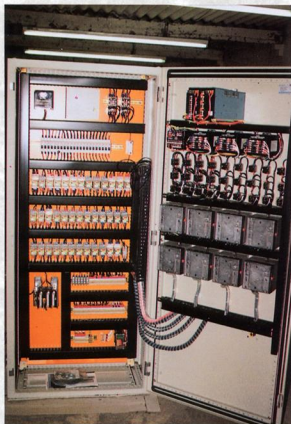


Fixed Hearth Furnaces

Many furnaces are of the fixed hearth style, whereby the hearths are constructed from castellated piers. This type of furnace is common when a number of furnaces are positioned side by side, thus enabling a single charging machine to load and unload any number of furnaces.

The furnace illustrated is for the Firth Rixson Group, who manufacture components for the automotive and aerospace industries.

Temperature uniformity is absolutely critical and, to achieve the desired results, flues are usually taken through the hearth and pierced structure.



Control Panels

Each combustion project would normally have its own control panel; designed and built to suit the actual application.

These panels can vary from the simple wall mounted type to the very sophisticated computer driven free-standing units, with mimic diagram fascia plates.

Great care and consideration is given to customers who wish to use a particular manufacturer's components in order to retain compatibility with existing systems.



Indirect Fired Kiln

This photograph shows an indirect rotary retort type kiln at Sutcliffe Speakman, and is for activating high grade carbon from superior quality coal.

The kiln is fired with seven nozzle mix burners in three zones. Each zone has modulating control, with each burner having individual flame control.

A custom designed control panel houses the temperature and flame control instrumentation.

Temperature range from 600°C to 950°C.



Tundish Driers/Preheaters

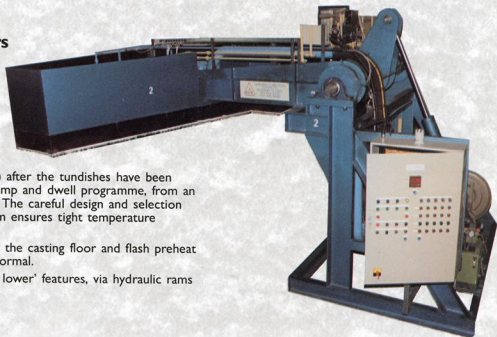
Many units have been 'custom designed and manufactured' for steelworks both in the U.K. and around the world.

The photo illustrates two units which were specifically designed for Antara Steel Mills in Malaysia.

The critical dry-out cycle (up to 600°C) after the tundishes have been lined, is achieved by selecting a multi ramp and dwell programme, from an instrument built into the control panel. The careful design and selection of multi-burner firing and control system ensures tight temperature tolerances throughout the tundish.

Preheating would, usually, take place on the casting floor and flash preheat temperatures in excess of 1100°C are normal.

Units shown have automated 'raise and lower' features, via hydraulic rams and pumping units.



Off-the-Press Heat Treatment Furnace

This twin conveyor furnace, the first production unit of its kind in Britain (possibly Europe) accepts hot pressings (950°C) direct from the presses and transfers them through thermal zones, discharging them as fully heat-treated components. This eliminates a costly, secondary, heat-treatment cycle, whilst giving a superior metallurgical product.

The furnace, 15 metres long, fired with Tempest high velocity gas burners, has full computer control of all temperature bands, belt feed, and speeds.

Full automatic flame control is fitted.





Heat Treatment Furnaces

Forged Rolls (UK) gave Northern Combustion Systems the contract to design and build a roll hardening and preheat furnace.

N.C.S. engineers came up with a unique design; consisting of two vertical, circular, tower furnace chambers measuring approximately 6.4 metres high x 1.5 metres diameter. Each chamber will accept a single roll loaded in the vertical plane, with each roll weighing up to 15 tons.

One tower was designed as the heating (hardening) unit, and tangentially fired with fifteen Tempest high velocity burners in five zones. Northern Combustion Systems' unique design then allowed the preheat furnace to be unfired, with the exhaust products from the heating furnace being utilised to preheat the roll in the preheat chamber. Motorised flue dampers were integrated into the system, to ensure correct temperatures in each of the chambers. Final flueing from the preheat chamber was then taken out of the building.

Great fuel savings were made, due to having preheat facility in an unfired furnace chamber.

Temperatures are in the range of 400°C for the preheat unit and 1000°C for the hardening furnace. Uniformity of $\pm 5^\circ\text{C}$ was achieved.

Fully programmed modulating temperature control, temperature recording, and flame control was provided and housed in a free-standing panel.



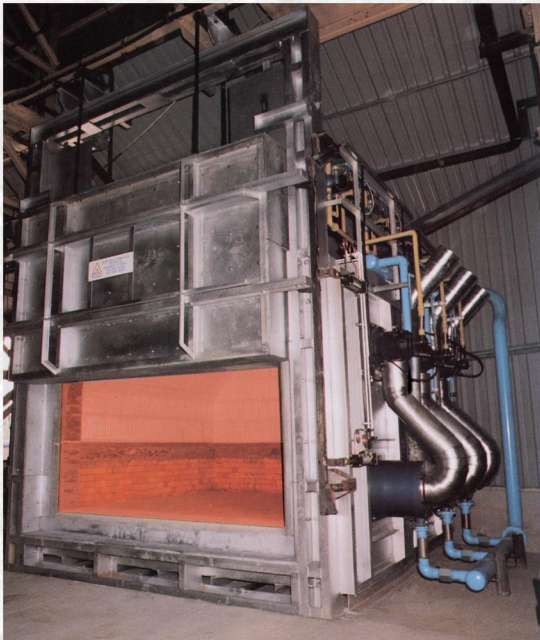
Ladle Stations

This station preheats a ladle, which is used in conjunction with a Plasma heating furnace, which extracts valuable nickel particles from the fume dust.

The main column supports the burner heat shield, which raises/lowers prior to slewing into position above the ladle.

Gas, air, and electrical controls were pre-manufactured onto a skid frame, and then connected up to the burner rig on site.

The above unit was designed and manufactured for British Steel, and a similar unit was designed and manufactured for Terni Steel in Italy.



Forge Furnaces

Illustrated is one large forging furnace, of which two were designed and built for Firth Rixson Rings at Rotherham.

Furnace operating range is 500°C to 1250°C with a choice of stoichiometric or oxidising atmospheres. Temperature uniformity is to Rolls Royce specification RPS953.

Each furnace is fitted with three 20-therm, hot air, energy saving burners and Nu-way separate recuperators. These systems can result in fuel savings of up to 35% over conventional, cold air, burner systems.

Fully modulating temperature control is fitted, along with continuous temperature monitoring.



Ladle Stations

One of a batch of eleven ladle and tundish stations provided for Usiminas Steelworks of Brazil.

Photo illustrates a 200 tonne ladle preheater being tested at our works in Dewsbury.

The 12 million BTU/hr (3500 kW) burner which is fitted to the stations is from the North American HiRAM High Velocity range.

The unit lifts and lowers via an hydraulic ram and self contained hydraulic powerpack.





Heat Treatment Furnaces

Smaller of 2 off "CLAM SHELL" furnaces designed and built for a large Sheffield industrial group.

The furnaces are mainly for annealing and heat treatment of steel ingots.

High velocity burners fire the furnaces which are capable of temperatures upto 1180°C and are on a pulse fired control system. Temperature uniformity conforms to Rolls Royce Specification.





Kilns

A large kiln designed and built for a clay pipe manufacturer in the South Yorkshire area. The pipes which are mainly for drainage can be up to 800mm diameter. A full kiln area door opening is provided for drive in fork truck loading. The door itself is of the garage type 'up and over'.

The kiln chamber measures approximately 18m x 6m x 3.5m high and is fired with 32 Eclipse Thermjet burners in dike firing formation.

For thermal efficiency the kiln is of low thermal mass insulation with variable speed motor combustion air fans. Normal kiln working temperature is around 1100°C





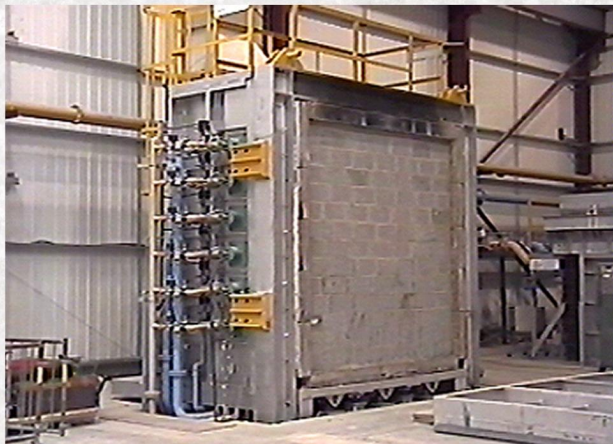
Clam Shell Furnace

This furnace is used for heat treatment and homogenisation of steel ingots with a total charge weight of up to 40 tonnes.

The furnace operates in the range 400°C to 1250°C and temperature uniformity meets Rolls Royce Aerospace Specification RPS 953.

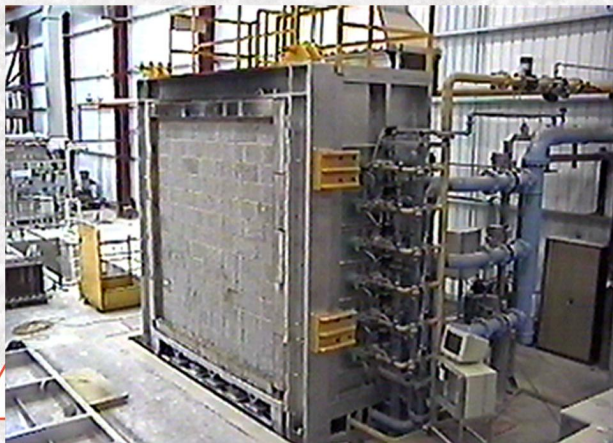
The furnace is equipped with high velocity hot air burners and recuperators which deliver preheated air at up to 550°C. The resulting fuel saving is 40% compared to a cold air system. The cover is raised through 90° using hydraulic cylinders, to enable the ingots to be removed using the overhead crane.





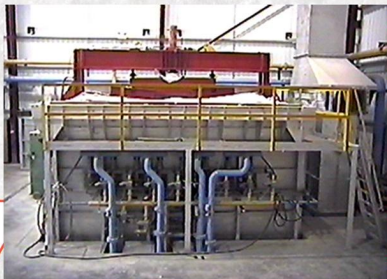
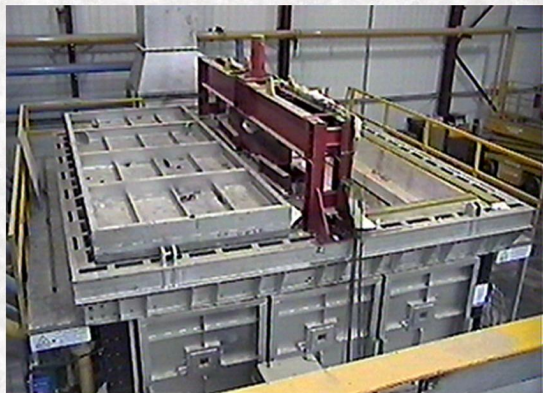
Vertical Fire Test Furnace

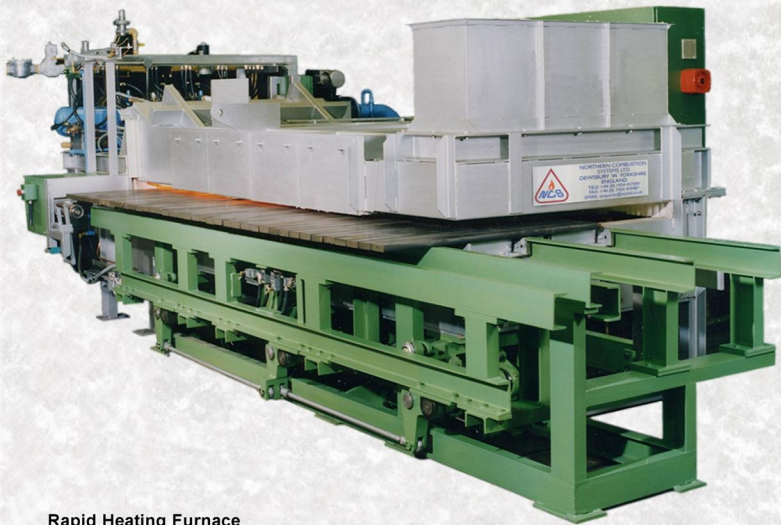
- Customer: Building Research Establishment - Garston
Sample Sizes: 3050mm x 3050mm
Fire Tests: Standard curves and hydrocarbon curves in accordance with BS476 and EN1363.
Sample Loading: Up to 50 Tons hydraulic loading.



Horizontal Fire Test Furnace

Customer: Building Research
Establishment - Garston
Sample Size: 4000mm x 4000mm Floors
Fire Tests: Standard curves hydrocarbon
curves. Loaded beam tests in
accordance with BS476 and
EN1363.
Sample Loading: Up to 125 Tons
Hydraulic Loading.





Rapid Heating Furnace

Gas Fired Rapid End Heating Furnace with Walking Beam and Roller Conveyor discharge designed specifically for the end heating of plates prior to parabolic rolling for commercial vehicle leaf springs.

The significant benefits from rapid heating are:

- a) Considerable Energy Saving
- b) High Thermal Efficiency
- c) Quick start up - minutes from cold to working temperature
- d) Improved operator comfort
- e) Improved product quality
- f) Consistent stock temperature
- g) Low maintenance.



Heat Treatment Lines

Complete Heat Treatment Line for hardening and tempering of steel bars.
Supplied to Abbey Group, Sheffield, England.

Comprising of: Two Heat Treatment Furnaces, Water Quench, Adiabatic Cooler
Charging Machine and Loading Tables.



Furnace Specification:

Capacity:	4 tonnes of stainless steel bars
Temperature Range:	550°C to 1200°C
Temperature Uniformity:	±5°C upto 750°C ±10°C from 750°C to 1200°C
Control System:	Pulse fired high velocity hot air burners with flue gas recuperation

Water Quench Specification:

30,000 litre capacity
Hydraulic lift
Multi-jet pumped agitation and recirculation

Charging Machine:

4 tonne capacity complete with 3 split forks
12 metre lateral travel
4 metre hydraulically operated fork travel

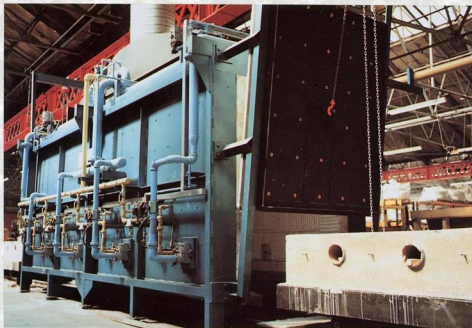


Rotary Furnaces

Rotary Furnaces have been supplied with throughput rates from 0.5 tonnes/hour to 5 tonnes/hour. This unit was supplied to a client in Sheffield, England for the heating of steel billets.

Operating Temperature:	1280°C
Throughput:	5 tonnes/hour
Maximum Load on Hearth:	15 tonnes
Temperature Uniformity:	Better than $\pm 10^{\circ}\text{C}$ at 1280°C
Burner System:	Self Recuperative





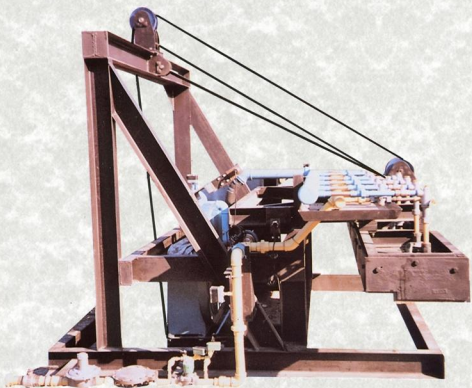
Direct Fired Kilns

Northern Combustion Systems provide a wide range of services to all industries, not just those in steel and metal processing.

This photograph shows a twin bogie kiln, for the drying and curing of ceramic shapes.

Northern Combustion Systems designed and built this kiln for Magneco Metrel U.K. Ltd., based in Sildon, County Durham.

Temperatures vary, up to 1100°C and the kiln is constantly being praised for it's reliability.



Launder Heating

This purpose built launder heating rig was built for Special Melted Products in Sheffield.

The launder accepts molten metal from a vacuum furnace, and the launders have to be virtually dust free, as well as uniformly heated.

Two units were custom designed and built by Northern Combustion Systems and employed a series of premix burners and controls fixed to the lid/laundry cover.

The lid, itself, raised and lowered via an electric winching system.

NORTHERN COMBUSTION

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