



FOR ALL YOUR THERMAL PROCESS REQUIREMENTS

## CASE STUDY

# Heat Treatment Furnace Combustion System Upgrade – Clam Upgrade

Magma Combustion Engineering completed a project for a leading metal components manufacturer in the UK which included the upgrading of the combustion and control systems for one clam type hardening furnace and one clam type tempering furnace.

## AIM

After forming, long alloy steel products require heat treating, i.e. hardening and tempering, to produce the required metallurgical and physical properties. Although the clam furnaces in question were being used to produce commercial quality material, this was not of sufficiently high standard to meet the requirements of the aerospace industry. To ensure the high quality required for this application, the temperature distribution within any furnace used for this process has to be extremely uniform, and compliant with the requirements of any certifying authority. Therefore, the combustion and control systems for both clam furnaces required upgrading.

Additionally, it was required that both furnaces should be used for both hardening and tempering operations, something which could not be done at that time. Using the concept of a working envelope within the furnace, the required temperature uniformity for both furnaces was required to be  $\pm 6^{\circ}\text{C}$  at operating temperatures below  $750^{\circ}\text{C}$ , and  $\pm 10^{\circ}\text{C}$  at operating temperatures above this; the operating temperature range for the furnace was specified to be  $550\text{--}1100^{\circ}\text{C}$ . Fuel efficiency was also considered important, in order to minimise operation costs. Consequently, minimisation of energy wastage by employing excess combustion air to maintain temperature uniformity was to be eliminated.

## SCOPE OF THE WORK

Design, supply, install and commission an upgraded combustion and control system to comply with the specified requirements with regards to temperature uniformity, hardening and tempering operations and reduced operational costs.

A combustion and control system upgrading package was provided, namely:

- Combustion system, electrical and control design
- Manufacture and procurement of system elements, including control panel
- Project management
- Site installation
- Commissioning and temperature uniformity trials

## CONTACT US

Want to know more about how Magma can help you?

- [magmacombustion.com](http://magmacombustion.com) / [info@magmacombustion.com](mailto:info@magmacombustion.com)
- 01709 521144 / Magma House, Rotherham, S60 1SG



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## BENEFITS

Both clam furnaces can now be used as either a hardening or a tempering unit, with temperature uniformity certified to meet aerospace standards, on stock up to 7m in length. Fuel usage has been reduced by the elimination of excess combustion air use. Consequently, the customer has been able to enter successfully, at economic prices, a market sector previously closed to them, as well as optimising costs for their existing commercial products.

## PHOTOS

A selection of photos from this case study.



Fig. 1 Clam furnace for heat treatment.



Fig. 2 Clam furnace for heat treatment.

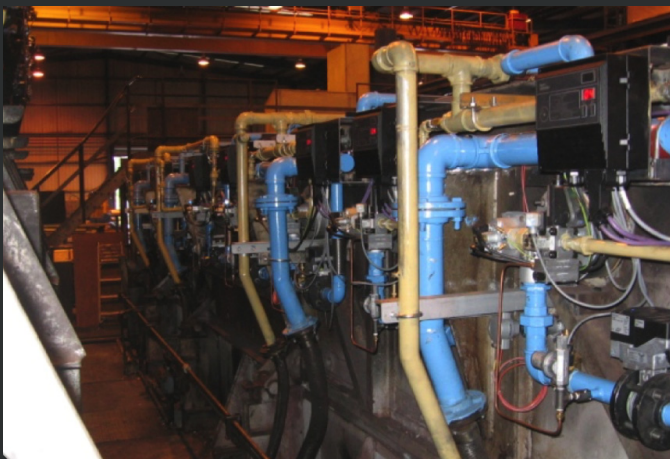


Fig. 3 Clam furnace for heat treatment.

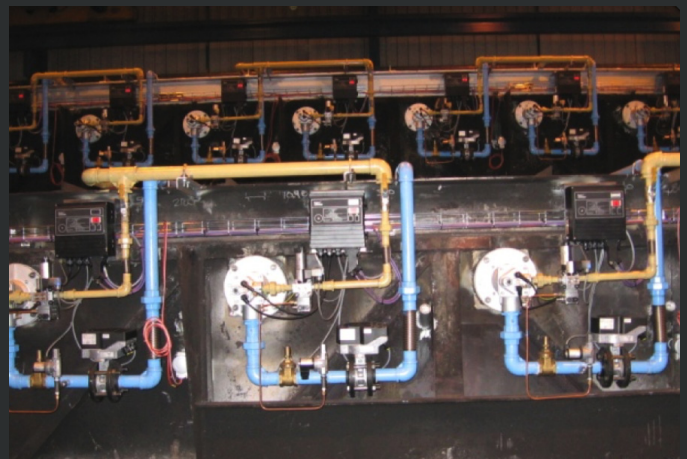


Fig. 4 Clam furnace for heat treatment.

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