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CASE STUDY

Carbon Baking Kiln Upgrade

Magma Combustion Engineering completed a project for one of the main Carbon Cathode manufacturers and suppliers to the global aluminium industry to upgrade one of their existing plants in order to increase output and meet product demand. The project involved a 3-part upgrade on the Ring Furnace.

AIM

Overcome existing production constraints by increasing furnace output and efficiency.

SCOPE OF THE WORK

Design, supply, install and commission new baking furnace pre-heat, cooling and exhaust racks, which would allow more of the furnace to be in production at any time. This type of furnace is divided into sections, into which product to be baked is loaded, and which are arranged to form a 'ring'. Baking is achieved by heating and cooling a group of adjacent sections; at regular intervals one section is added to the group and one is removed from it, which requires that all the firing, waste gas handling and cooling equipment be mobile. To increase output, the number of sections in the group must be increased, resulting in a higher fuel input requirement. Therefore, not only must the quantity of combustion equipment in use be increased, requiring that the capacity of the waste gas handling system be increased, but also the post-baking cooling capacity must be augmented.

PRE-HEAT

Two classes of combustion equipment are used on this type of furnace, namely 'high heat' and 'pre-heat', this latter being used on those sections whose temperature is below 750°C. In order to achieve the required output increase, Magma Combustion Engineering supplied a new preheat rack. This is a portable steel structure equipped with main and pilot burners, together with a combustion air fan and flexible hose gas connection. A control panel, providing the required burner monitoring and control functions was also mounted on the rack. The design was also configured such that extra burners could be added at a later date if required.

EXHAUST

To cater for the increased fuel input and resultant increased flue gas production, it was necessary to uprate the rack used to connect the lead furnace section to the fixed waste gas system. Since production could not be interrupted for this, a new exhaust rack was supplied. This was a portable steel structure, equipped with connecting and collecting ducts, linked to a waste gas fan, also mounted on the rack. A control panel, containing a thyristor variable speed drive for the fan motor was also mounted on this portable structure.

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COOLING

Increased output requires increased furnace cooling capacity. Therefore, a new cooling rack was designed and manufactured. This comprised a portable steel structure, on which a cooling fan and the controls were mounted, together with a distribution header and distribution headers to connect to the furnace.

BENEFITS

The required increase in output capacity was achieved after the supplied equipment detailed above was commissioned. Since the racks were designed, manufactured and commissioned within 10 weeks of order placement, the customer was able to respond rapidly to increased demand from their customers, helping to maintain their position in a competitive market.

PHOTOS

A selection of photos from this case study.



Fig. 1 Preheat rig showing control panel.



Fig. 2 Preheat rig showing gas controls.



Fig. 3 Exhaust.



Fig. 4 Cooling rig.

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Fig. 5 Cooling rig.

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