

Oxy-gas fired glass forehearth burner developed

Optimising and reducing the energy consumption of glass processing is the main research and development objective of glassmaker Arc International. One of the projects it has investigated is the development of an oxy-gas fired burner for the common glass forehearth.

The aim of the project was to reduce the consumption of natural gas by up to 45% with an oxy-gas burner capable of retrofit into existing, common forehearth refractory upper structures (KW-26" wide). These were previously heated with traditional premix air-gas burner technology.

The challenge was the development of a reliable, low-cost oxy-gas burner capable of resisting the high temperature environment with low heat input firing conditions. Moreover, the energy saving gained had to compensate for the high costs of both the oxygen used and the upgraded control system (which was essential for the new firing technology).

Energy saving solutions

Arc International has been involved in oxy-firing technology for many years, with developments being made in the late 1980s with respect to furnace operations. Successful industrial applications have encouraged the company to rethink the combustion requirements for its forehearth systems. Its energy requirement is high and there are therefore substantial savings to be made from the use of oxy-gas firing technology (which is described as being advantageous in glass industry literature).

In-house development

There is little record in the public domain of industrial experiences of oxy-gas firing with glass forehearths. It is emphasised that it was not easy to view full-scale industrial applications and to obtain necessary feedback on, for example, the reliability, longevity and maintenance of the equipment.



Forehearth heating and temperature control systems are critical for a glass industrialist. It was therefore necessary for Arc International to validate the progress of its developed technology with continuous on-site monitoring.

Arc Glass Melting Solutions (AGMS) is a business division of Arc International. As a glass melting specialist, AGMS supplies tailor made solutions to the wider industry from the batch through to glass gob delivery. The availability of the Arc International glass furnace facilities was extremely valuable to the AGMS research and development team in helping it to achieve its technical goals. Practical experience in burner forehearth setup and operator process training helped to build a large amount of knowledge and provided important feedback.

Considering the price volatility of natural gas and oxygen, this knowledge is necessary for successfully implementing the new technology with its associated control system. This can be a traditional temperature loop control or an advanced predictive control. One of the considerations that

must be taken into account is whether to opt for a greenfield installation or a retrofit conversion. Beyond technical capabilities, an optimised running cost with a fast payback from the overall system still remains the key objective to be considered for a rational investment in oxy-gas firing technology.

Secondary developments of the project were:

- Key trials with various refractory materials
- Glass quality impact on clear glass
- Glass quality impact on special glass and coloured glass
- Predictive control using oxy-gas firing

AGMS further developments

The next step is to investigate the current technology for smaller forehearths (KU-16" wide). This is a more challenging task. The materials used with existing burner technology have to be reviewed in order to preserve the advantages and performance of the first development. This depends on the primary design of the forehearth for a straight-firing system retrofit or the design of the new forehearth, which can be optimised for maximum thermal efficiency.

Energy requirements for smaller forehearths are usually higher compared with those for the common forehearth (glass distributor). It also means a higher energy saving if the whole oxy-gas firing technology is correctly implemented. ■

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