

Partnership achieves improved operations at Korean plant

With increasing pressure on glass manufacturers to reduce energy consumption and emissions, it seems that all-electric forehearths are providing a viable solution. UK supplier Electroglass explains how an installation of its latest all-electric forehearths at Hite Industries' container plant in South Korea is improving operations in more ways than one.

The instability in the worldwide energy supply market, tougher environmental regulation and increased quality requirements have led to an ever-increasing number of glass manufacturers seeking alternatives to conventional gas-fired forehearths for the conditioning of their glasses.

Quality issues

In conventional gas-fired forehearth design, attempts have been made to overcome issues that can affect quality, such as uneven temperature profiles across the channel leading to poor thermal and chemical homogeneity and unstable gob weight control.

Many designers have added features aimed at combating these problems, including gas firing systems intended to provide preferential heating along the channel sides and forced air cooling along the centre line to cool the glass where it is hottest. However, both gas heating and forced air cooling are, by their nature, imprecise and lack the ability to be contained or restricted to specific zones across the channel width.

Electroglass has addressed such problems with its Electroflex all-electric forehearths. The result of more than 30 years of continually evolving forehearth design, the current generation of Electroflex forehearths incorporate a range of design features to improve side-to-side and top-to-bottom temperature profiles, provide tighter and more responsive temperature control and reduce gob weight variations and ware rejections, while maintaining Electroglass' goal of high energy efficiency.

Design features include special profile heating elements capable of inputting heat energy accurately in key areas across the width of the forehearth. Independent side-to-side power control can be included to help overcome incoming temperature differences often present in the rear section of some wide forehearths. Specially designed sub- and superstructure insulation is used to promote cooling where it is required. Centre-line radiation cooling by means of manually adjustable damper openings allow for further cooling if required, particularly at high pulls.

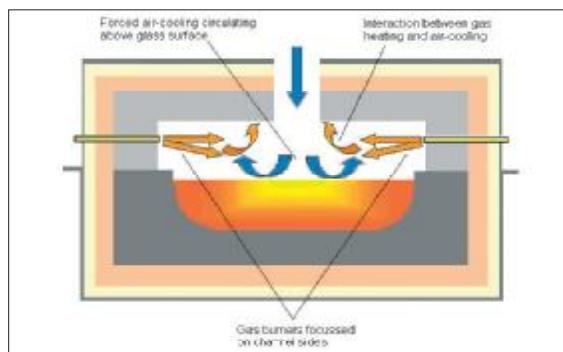
Successful installation

One company that is experiencing the benefits of Electroflex forehearths is Hite Industries of South Korea. Based in Jinju in the South of the country, the manufacturer of beer and soju bottles approached Electroglass to provide a solution that would reduce energy and maintenance costs and help decrease ware rejections.

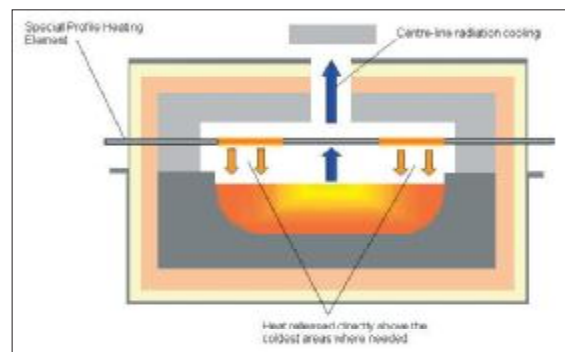
Melting primarily emerald green and amber glass for double gob IS forming, Hite had long experienced large variations in gob weight and rejections due to 'cat scratch' and other forehearth-related defects. During a previous campaign, Electroglass supplied and installed continuous controlled drain systems to its existing gas forehearths to help eliminate cat scratch and these were an instant and lasting solution.

The new electric forehearths were supplied for Hite's 2008 furnace rebuild and commissioned by Electroglass engineers in December. The customer's existing layout and drop points were

continued >>



▲ The interaction between gas heating and forced air-cooling.



▲ The heating and cooling abilities of an Electroflex forehearth.

Forehearth design and operation

retained to minimise costs and disruption. In addition to the standard Electroflex features, the Hite forehearths included two additional Electroglass systems designed to further ensure both thermal and chemical homogeneity.

Additional systems

The first of the two systems is the Temp Trim electrode heating system. Installed in the conditioning section of each forehearth, the system includes a number of electrodes installed through both sides of the channel and connected to a number of independent power control zones. It is designed to ensure the highest possible thermal homogeneity and to optimise gob stability with a very low power input. The system is especially useful when producing coloured glass.

The second system is the Continuous Controlled Drain. Installed just before the spout in a specially designed channel block, it can be started and stopped easily by the application or removal of a small amount of power.

Electroglass reports that Hite Industries has benefitted in many ways from the



installation of its Electroflex forehearths. The plant's two previous gas-fired forehearths had a combined gas consumption of around 1050m³/day. The two Electroflex forehearths supplied by Electroglass have a combined energy consumption of 1535 KWh/day.

Relating this to the respective energy costs, the operating cost savings can be seen.

Original gas-fired forehearths:

1050m³ × US\$0.464/m³ = US\$382/day

Electroflex all-electric forehearths:

1535 KWh × US\$0.051/KWh = US\$78.29/day

Electroglass reports that Hite Industries in South Korea has benefitted from the installation of its Electroflex forehearths.

More precise heat distribution and quicker temperature responsiveness combined with the simple interface of the control system have streamlined operations and allowed for improvements in gob characteristics. These include a weight variation of no more than 3g when operating at a target gob weight of 295g, as well as improved overall glass quality.

Further time and cost savings can be realised as the campaign progresses, due to the reduced frequency and intensity of maintenance required on the all-electric forehearth.

With more and more manufacturers looking to a future with less carbon emissions and greater productivity, installations of all-electric conditioning systems such as the developments by Electroglass looks set to increase. ■

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