Sidewall overcoat extends float furnace campaign

This article describes a project to apply a sidewall overcoat to the entire furnace melter and refiner of a major float glass manufacturer, as well as to remove the existing glass level bowls from each side of the refiner. James M Uhlik* reports on the methods employed and the subsequent results of this work.

Achieving the maximum return on capital employed is one of every glass manufacturer's goals. The melting furnace campaign life is a key component of this.

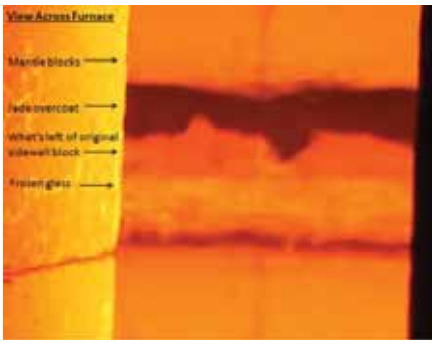
In order to accomplish its stated goal of accomplishing a 20-year furnace life, a major float glass manufacturer asked Dreicor, a plant and furnace constructor based in North Carolina, USA, to perform an overcoat of its entire furnace melter and refiner, and to remove the existing glass level bowls from each side of the refiner. This article describes the methods employed and results of this work.

Existing conditions

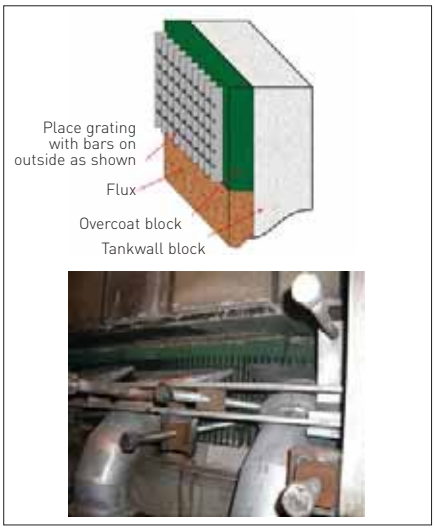
The furnace had been overcoated during its life prior to this work. The normal sidewall wear dictated that the present thin overcoat layer and precautionary back-up water coolers be removed, and a new overcoat layer be installed to replace it.

In addition, the customer asked Dreicor, with engineering and technical assistance from Toledo Engineering Co (TECO), to remove the glass level bowls and replace them with standard refiner sidewall construction. (Note that the glass level bowls could have been overcoated as well but were removed and replaced instead.)

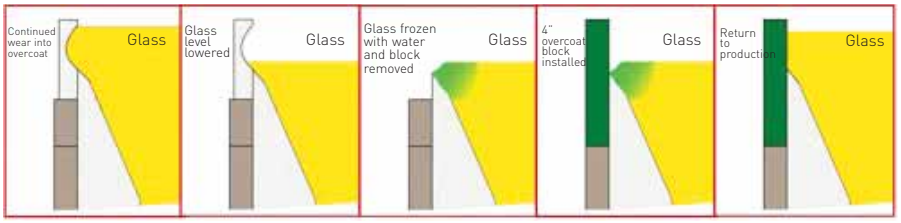
In order to complete this work, the glass level was lowered as much as possible by draining the glass via the canal through the tin bath. Work was then begun by Dreicor on both areas simultaneously.



▲ View inside the furnace showing worn, jagged tankwalls with overcoat in place.



▶ The new overcoat block was placed and then secured using steel grating and appropriate binding steel and jackbolts, similar to this illustration.



▲ Furnace sidewall wear and overcoat maintenance sequence.

Sidewall overcoat

Firstly, the existing worn overcoat block had to be taken down and removed. As work progressed with the removal of this existing overcoat, the areas of higher wear revealed nothing behind this block but an open hole with total exposure to the furnace melting environment, as well as some level of molten glass still directly contacting the existing overcoat. Dreicor personnel were able to use water to first freeze the molten glass behind each existing block before carefully removing it. Frozen glass had to be chipped away to allow for the new block placement.

Several different materials are successfully used for furnace overcoating, but this customer's analysis of its product mix and high-quality demands resulted in the selection of North American Refractories' Jade 52 XL block. This block performed very well

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Left side GLB before


Note very thin sidewalls


Right side completed

during installation due to its excellent thermal shock resistance.

The new overcoat block was placed and then secured using steel grating and appropriate binding steel and jackbolts, similar to what is illustrated on the previous page. The sidewall cooling air nozzles were then replaced and the tuckline sealed to complete this portion of the work.

At the conclusion of the furnace campaign, North American Refractories offers a reuse programme for Jade 52 XL materials that were used in this overcoat work. In its literature, it states: "If you are interested in reuse of spent chrome-alumina refractories from your glass furnaces, please let your NARCO sales person know and we would be glad to supply you with a proposal and answer any questions you have."

Glass level bowl removal

The removal of the glass level bowls presented Dreicor with another interesting challenge – complete removal of the sidewall of the refiner while the furnace was kept at near operating temperatures, essentially exposing the molten glass to a deep hole in its side. Working with technical assistance from TECO, a procedure was developed, reviewed and implemented to freeze the molten glass to allow for the safe, secure sidewall removal and replacement.

Water lances were placed into the glass in the area to be replaced, freezing the glass such that the solid glass formed a barrier or dam. This held back the remaining many hundreds of tons of molten glass for the duration of the bowl removal, and subsequent new sidewall block placement.

The binding steel, sidewall cooling nozzles and other refractory was then replaced as per the re-engineered design and work successfully completed.

This project was performed in early 2009, and the factory continues to report successful operations and excellent results. ■

***James M Uhlik, Director of Technical Services, Toledo Engineering Co, USA.**
Website: www.teco.com