
Electric melters: Principle, design and limitations

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Abstract

The glass industry has been undergoing a paradigm shift towards sustainable and energy-efficient practices. One significant advancement in this direction is the adoption of full electric glass melters for large-scale production.

The principle of full-electric glass melters revolves around the utilization of electrical energy as the primary heat source for the melting process. This departure from conventional fuel-based melters not only reduces direct CO₂ emissions but also enhances process controllability and efficiency. This presentation brings to light the fundamental mechanisms at play in full electric glass melters, shedding light on the dynamic interactions between electrical heating, heat transfer mechanisms and the fluid flow within the melter.

This understanding of the melting process can help answer questions such as: Will the throughput meet the production demands for high-volume glass types? How adaptable are electric melters to changes in production requirements and variations in raw material inputs for different glass types? What are the challenges and limitations associated with specific glass compositions?

These different topics pertaining to energy, quality, melting and costs can best be answered with the help of CFD modeling, specifically using CelSian's GTM-X software that is devoted to the modeling of glass furnaces and processes. Together with an illustration of the capabilities of using GTMX to model electric melters, the presentation also aims to elucidate the dedicated batch model that GTM-X utilizes for the accurate prediction of the batch blanket and its associated impact on the glass melt.

Keywords: Electric melting, batch model, modeling

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