

Session	Glass in The Digital Age
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Chair	Seçil Erman



INVITED SPEAKER

Celfos: Simulation-Assisted AI Modeling for Glass Quality Prediction

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Biography

Joining CelSian's predecessor TNO in 2011 as a CFD research engineer, Johan was one of the founding members of CelSian. Prior to joining TNO/CelSian, Johan finalized his master's in physics at the Twente University and has worked as a product engineer for Bosch.

After many years of being operationally responsible, he moved from the beginning of 2023 to the position of CTO. Making him responsible for new product developments, product improvements, the introduction/integration of new technologies like AI and GPU calculation, and the introduction of CelSian's products to other industries.

Abstract

The glass industry operates in an increasingly complex environment, with rising demands for quality, energy efficiency, and cost optimization. Furnace operators play a critical role in navigating these challenges, yet they face an overwhelming volume of process variables and data points to analyze in real time. This raises the following question: How can we provide operators with actionable insights, reducing guesswork and improving confidence?

Traditionally, furnace control systems have focused on stabilizing temperatures, yet temperature stability alone does not guarantee optimal glass quality. Aligning operational performance, reliability, and glass quality requires a deep understanding of the dynamic, time-transient behavior of glass furnaces. The challenge lies in the broad residence time distribution, influenced by multiple variables, and the difficulty of identifying key process parameters that impact glass quality. Moreover, conventional systems struggle to adapt to sensor deterioration or replacement, leading to data inconsistencies and reduced reliability.

This presentation introduces Celfos, an AI-powered system that enhances operational decision-making by linking process settings to glass quality. By combining advanced neural network models with time-transient CFD analysis (GTM-X), Celfos provides insights into complex furnace dynamics and delivers precise quality predictions.

Celfos combines historical furnace data and real-time process parameters with qualitative GTM-X models. It works for all common glass and furnace types and is control system independent. The neural network is trained to correlate these inputs with glass quality metrics, enabling predictive quality control and adaptive decision-making, even when sensors degrade or are replaced.

Celfos is a dynamic, adaptive system that brings the glass industry closer to a future of precision and efficiency designed to support operator expertise.

Co-Authors

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