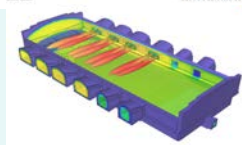


Chair: Aaron Huber, Johns Manville, USA  
 T: +1 303 978 2403; E-mail: Hubera@jm.com  
 Core group members: Erik Muijsenberg, Czech Republic  
 Adnan Karadag Sisecam, Turkey  
 Wolfgang Muschick, Private (ex Schott), Germany



## Mission

- Improve glass furnace design and operation with sophisticated tools such as furnace modeling, new sensors and intelligent controls
- Develop the “self driving melting process” and the most efficient glass melting furnace approaching 3 GJ/Ton with lowest possible emissions.

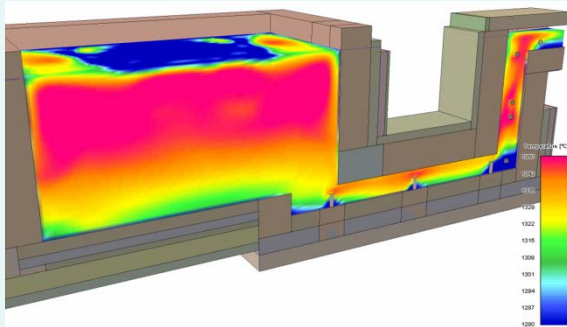
## Recent Activities & Meetings

- GlassTrend meeting on Sensors and Process control, October 2015, Eindhoven NL.
- Int. Seminar on Glass Furnace Design & Operation, June 2017 Velke Karlovice, CZ
- 2018 Kick-off of Electric Melter Round Robin Test (RRT6) with about 8 companies participating.
- Int. Seminar on Glass Furnace Design & Operation, May 2019 Velke Karlovice, CZ
- ICG Congress June 2019 Boston MA USA

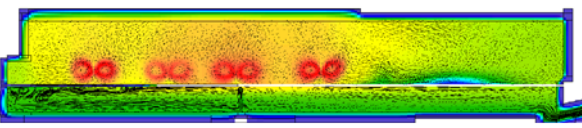
## Projects

- RRT5 - Past comparison of modeling results on a 220 TPD cross fired regenerative furnace.
- RRT6 comparison of modeling results for a small cold top electric melter. Phase I basic design and modeling approach, Phase II design variations

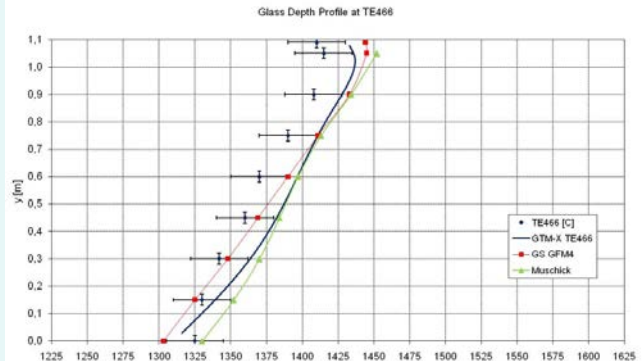
## RRT6 Cold Top Electric Furnace



## RRT5 Cross Fired Regenerative Furnace



Center slice in furnace showing temperatures 800-1800 C



Vertical temperature comparison, calculated and measured in refiner part

## Co-operation with other ICG Technical Committees (current topics)

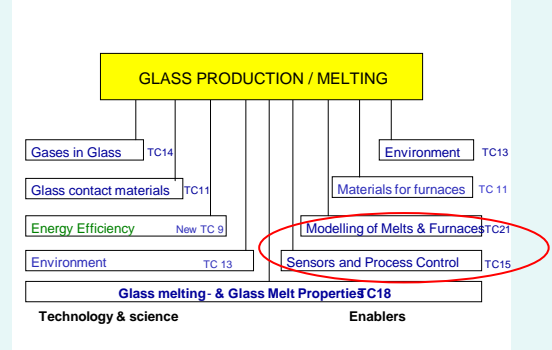
TC21 & TC15 (Sensors and Advanced Control) merged

To form TC15+TC21 1 TC:

“Glass Furnace Design and Operation”

## Future Topics

- Modeling in detail of the batch melting process
- Better understanding of temperature dependent material properties (cooperation with other TC's)



TC 15&21's position and co-operation with other TC's glass production

## Future Plans

Future meeting planned at ICG/ESG in Krakow Poland 2020  
 Phase II of RRT6 – Electric Melter Modeling.

## Publications

Muschick, W.; Muysenberg, E.; *Round robin for glass tank models. Report of the International Commission on Glass (ICG) Technical Committee 21 'Modeling of Glass Melts'* Glass Tech.: Eur. J. Glass Sci. Technol. A, 2008

## Members

Members of TC 21 and frequent visitors:

- Industry**
- Adnan Karadag, Sisecam
  - Fabrice Fasilow, AGC
  - Christoph Berndhäuser, Christian Muller, Schott
  - Wolfgang Muschick, private
  - Aaron Huber, Johns Manville
  - Bruno Purnode, Owens Corning
  - Kosuke Aiuchi, NEG
  - William Johnson, Corning

## Cooperating TC chair persons

- Jaroslav Klouzeck (TC 18)
- Detlef Koepsel (TC 14)

## University & R&D institutes

- Lubomir Nemecek, VSCHT
- Adriaan Lankhorst, Mathi Rongen, Celsian
- Menno Eisenga, Myra Trochta, Petr Schill, Glass Service