SORG FOREHEARTH SYSTEMS

Presenters:

Mr. Joerg Kraus

SORG | VALUE BY DESIGN

Agenda

- The SORG Group

- The SORG 340S+® Forehearth System
  SORG 340S+®

- The SORG® Coloring Forehearth System
  SORG®

The Different SORG Forehearth Systems

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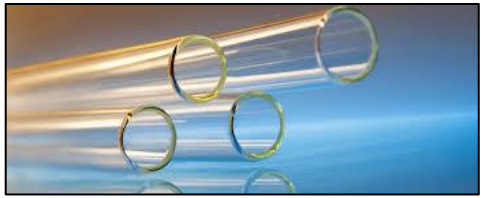
Glass types

- Soda lime glass
- Fluor opal glass
- Borosilicate glass
- Neutral glass
- C-Glass
- E-Glass
- Basalt (Wool, Fibre)
- Lead crystal glass
- Sodium silicate glass

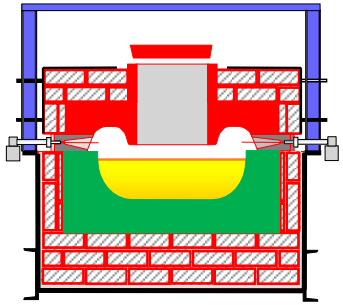
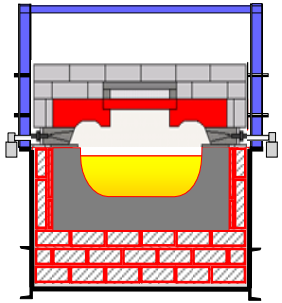
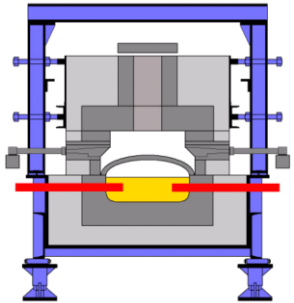
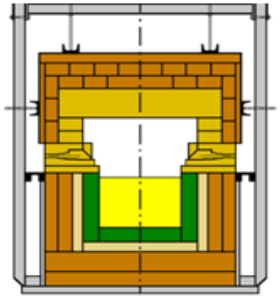
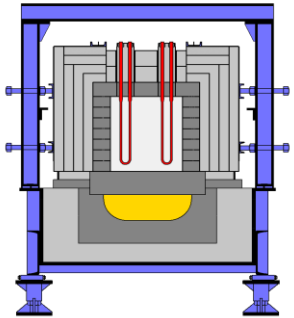
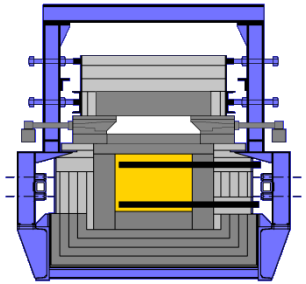
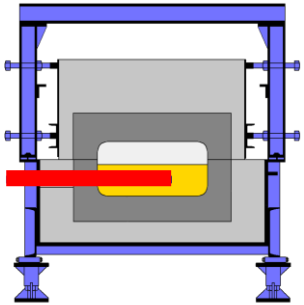






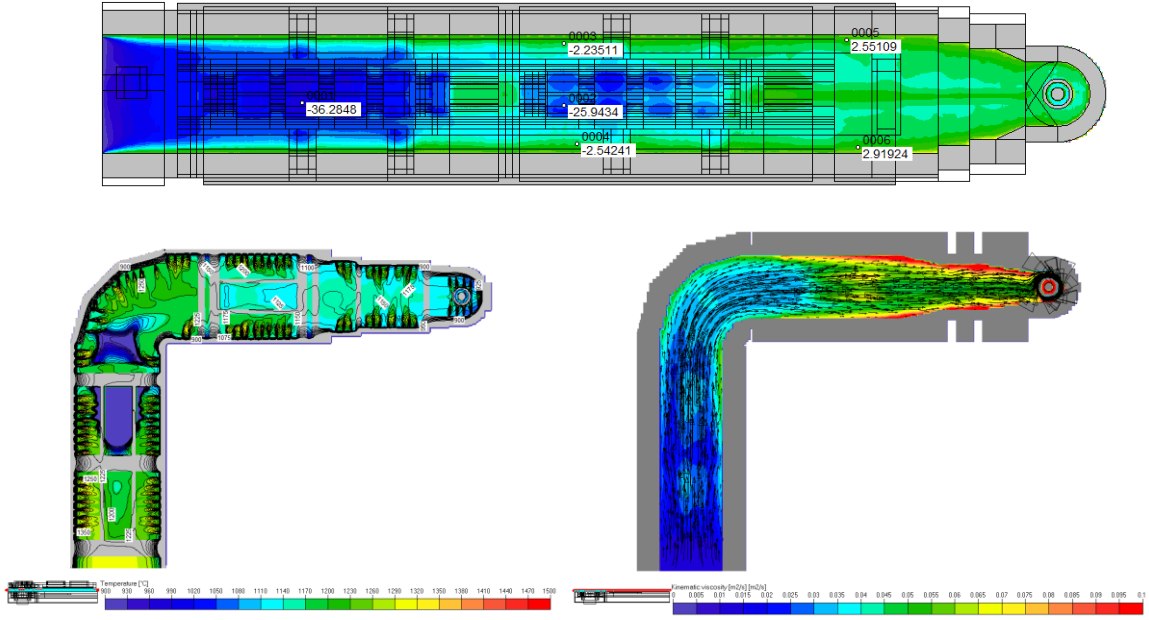


Different design for the customer

Collecting Information According to Customer's Requirements

- Glass type / product
- Glass color
- Energy medium (gas, electricity)
- Expected homogeneity
- Space limitations
- Existing building
- …….



SORG VALUE BY DESIGN

The SORG 340S+® Forehearth System
SORG 340S+®

SORG | VALUE BY DESIGN

Glass Conditioning – The most important process of making good products

Our approach:

- Forehearth design as simple as possible
- Easy operation, low maintenance
- Reliability through design, material and equipment
- Best control strategies (automatic control)
- Every development has to be seen under the viewpoint of the user resp. operator

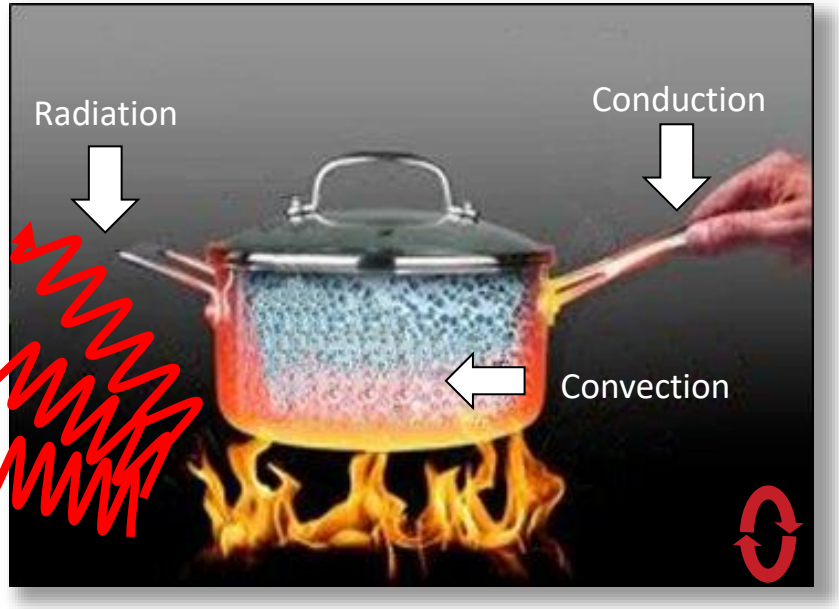
Glass Conditioning – Basics
Heat Transfer

The three methods of heat transfer

Conduction
- the passage of heat through a body

Convection
- the passage of heat by movement of a carrier (gas or liquid)

Radiation
- the passage of heat between bodies (transmitter and receiver) by electromagnetic waves

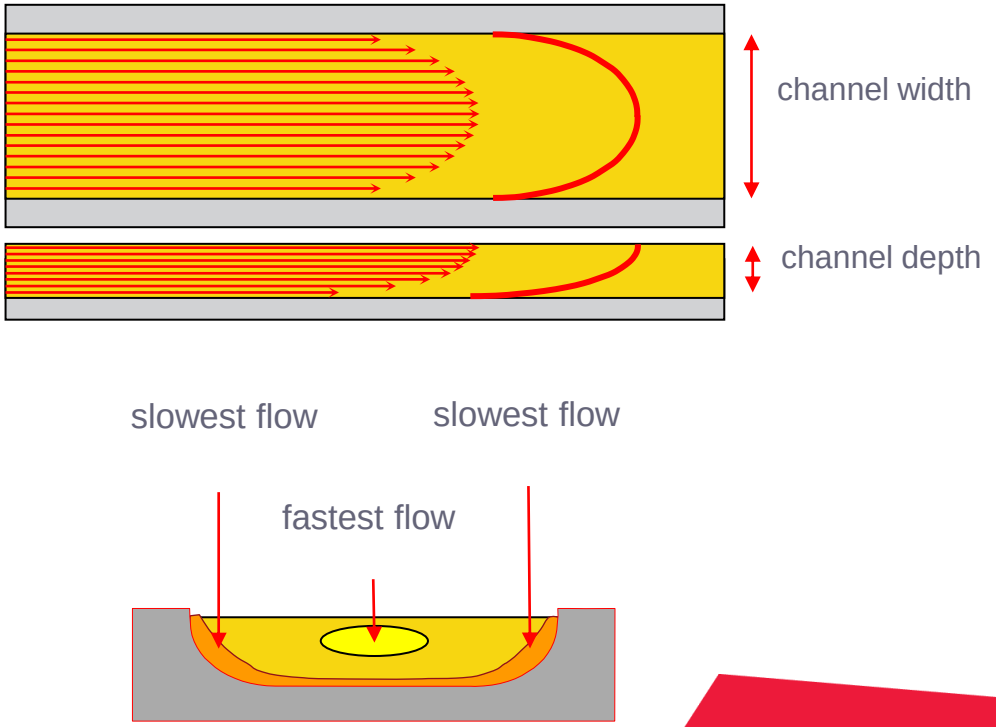


Glass Conditioning – Basics
Glass Flow

Flow Pattern

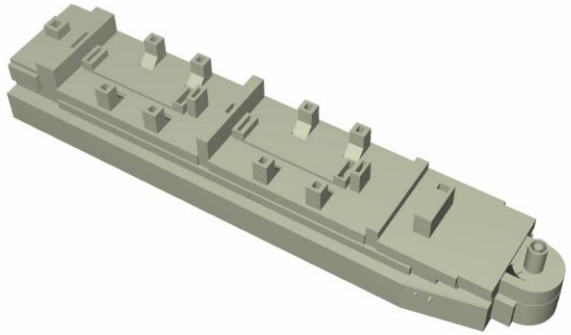
Glass near to sidewalls and bottom :

- flows more slowly because of friction
- has a longer residence time
- loses temperature because of heat losses
- increases in viscosity because of lower temperatures
- flows more slowly and with higher viscosity

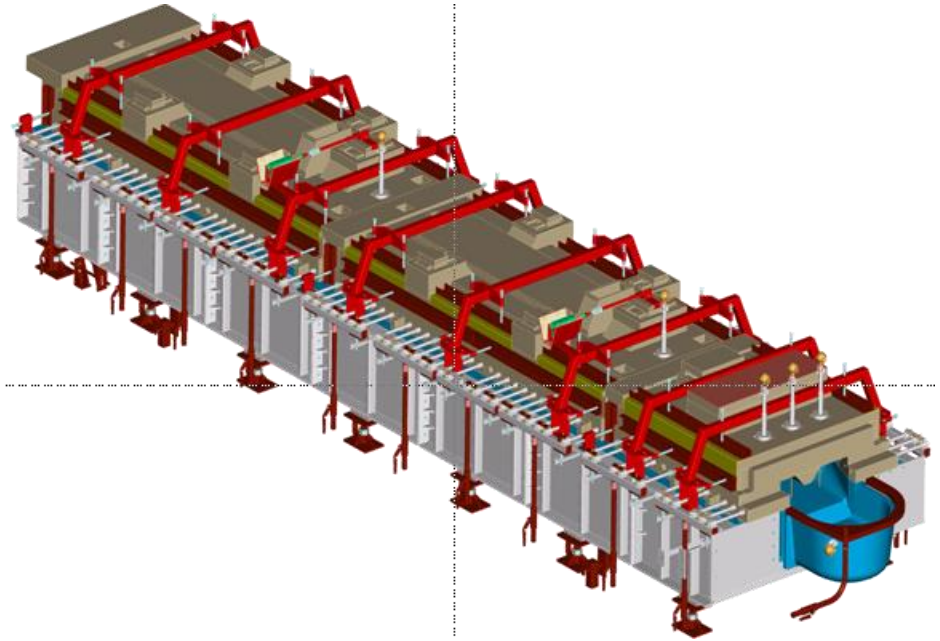


Glass Conditioning – Forehearth Superstructure Design

- Glass flow in the forehearth
- Hot middle glass
- Colder surface flow
- Intensive side heating



The SORG 340S+® Forehearth



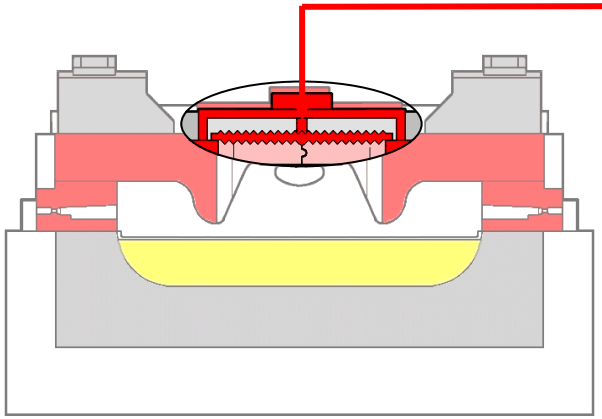
SORG VALUE BY DESIGN

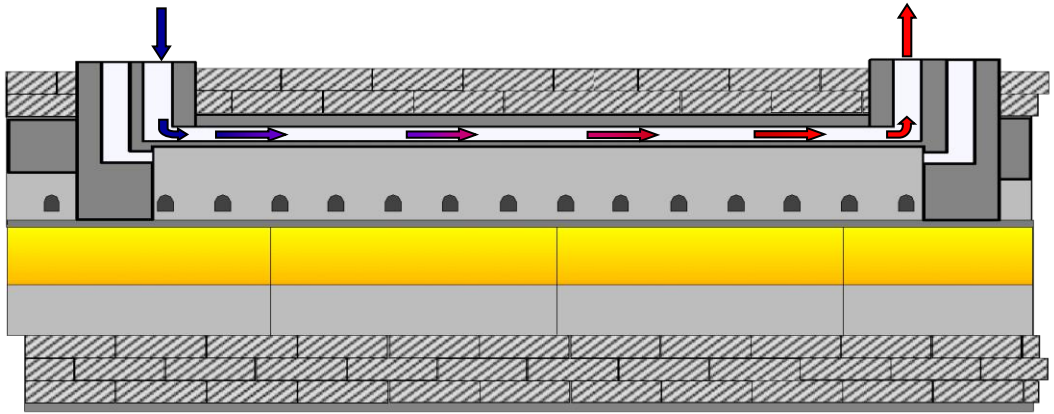
The SORG 340S+® Forehearth – Cooling System

The SORG 340S+® Forehearth – Cooling System

A unique combination of indirect and direct air cooling

indirect air cooling



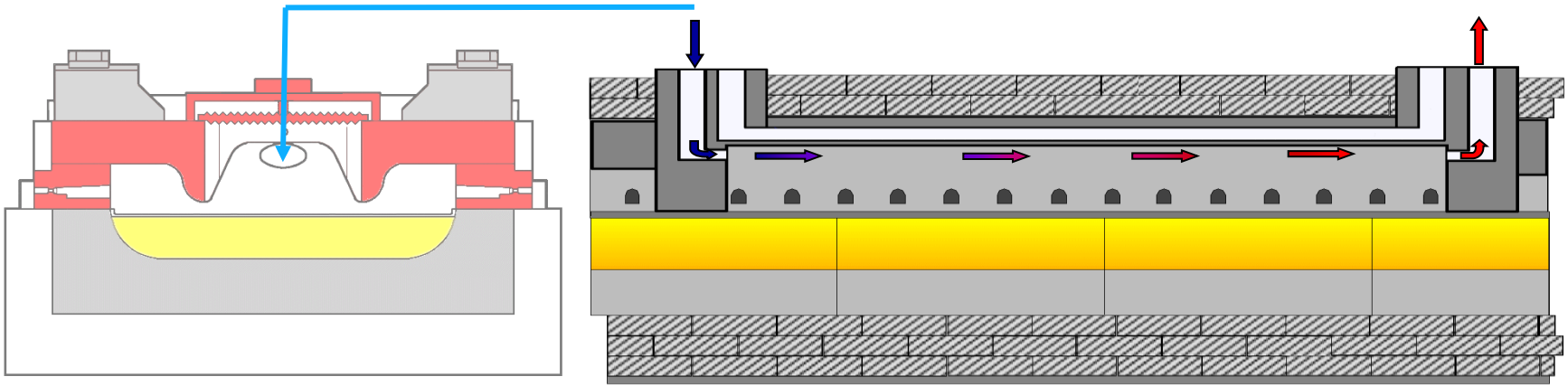


SORG VALUE BY DESIGN

The SORG 340S+® Forehearth – Cooling System

A unique combination of indirect and direct air cooling

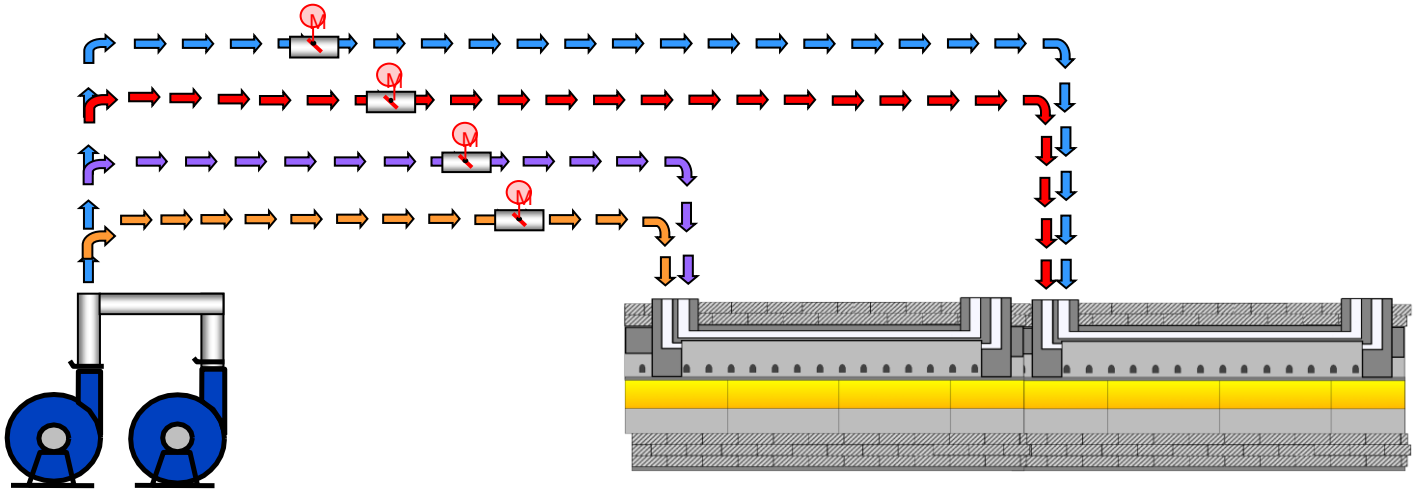
direct air cooling



SORG VALUE BY DESIGN

The SORG 340S+® Forehearth – Cooling System

NEW: Central cooling air supply



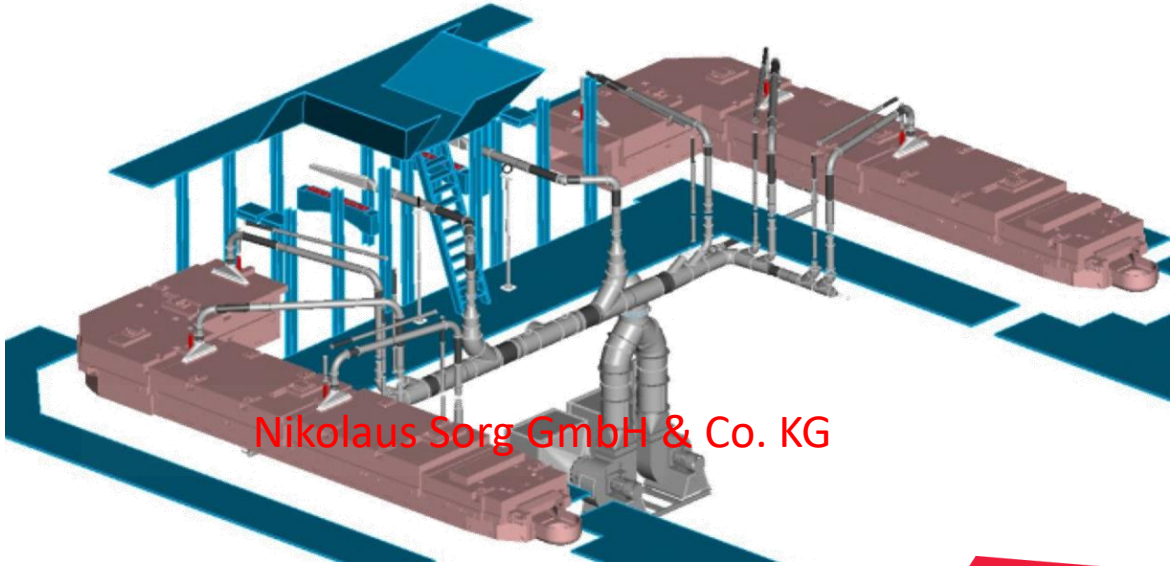
ONE fan with one standby

With frequency inverter

The SORG 340S+® Forehearth – Cooling System

NEW: Central cooling air supply

- Less investment
- Less maintenance
- Less operational costs



The SORG 340S+® Forehearth – Cooling System

NEW: Central cooling air supply

Only with ONE fan
Instead of multi-fans

The SORG 340S+® Forehearth – Cooling System

NEW: One-piece instead of two-piece cover plate

The SORG 340S+® Forehearth – Heating System

The SORG 340S+® Forehearth – Heating System

SORG® combi burner nozzles

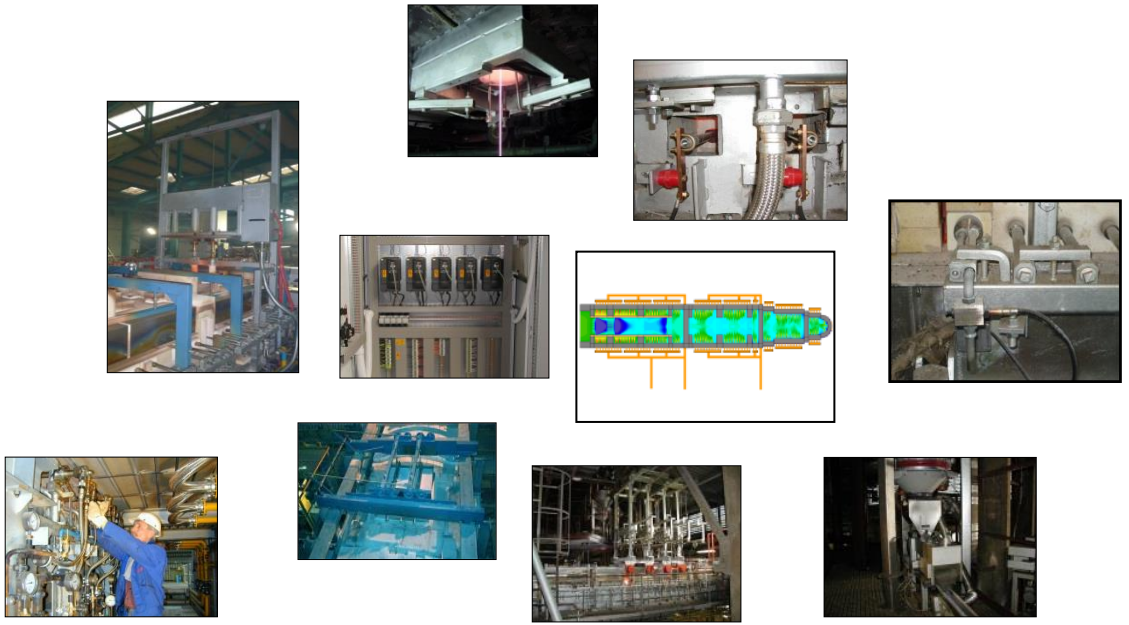
- Increased heat resistance
- Less susceptible to dirtying and blockage
- Supplied more than **75 000 times**

Add-on Systems for SORG Foreheharths

Options = Flexibility

Available Options / Add-On Systems

- Forehearth CONTI-DRAIN®
- Equalizing section electric boosting system
- The OMT (Oxygen Metering Trim) system OMT
- Equalizing Stirrer units
- **Colouring Forehearth**
- SORG Service Contracts



SORG sub-systems are also available for SORG forehearths

Forehearth CONTI-DRAIN®

Used to drain contaminated glass from the channel bottom and reduce or eliminate zircon cord.

Equalising section electrical booster

Electrodes installed to provide additional heating and improve thermal homogeneity.

OMT System

The patented SORG OMT forehearth oxygen trim system offers continuous metering of the air /gas ratio of each zone on a distributor or forehearth,

Forehearth Stirrer units

For equalising sections. These stirrer units are very effective for improving the thermal homogeneity and also in eliminating cords.

Forehearth colouring systems

The glass colour can be changed in the forehearth, thus increasing production flexibility in specialist markets.

The SORG® Forehearth Colouring System

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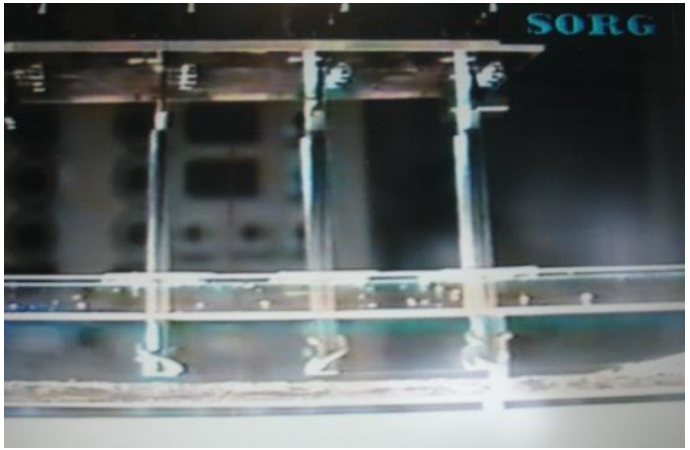
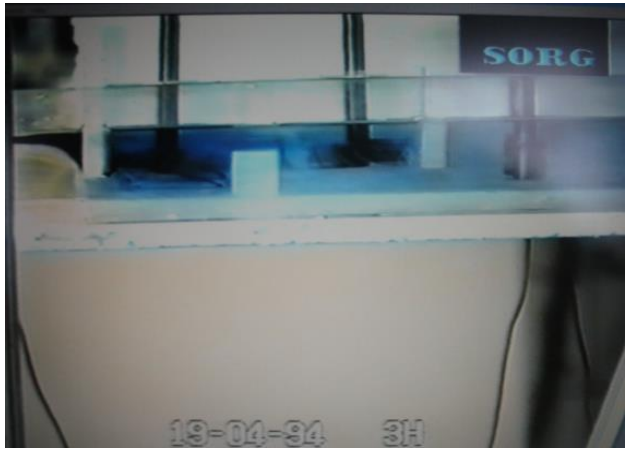
In-house physical modelling in use since 1974

Physical modelling

- 1984 till 1999
- More than 900 physical model tests

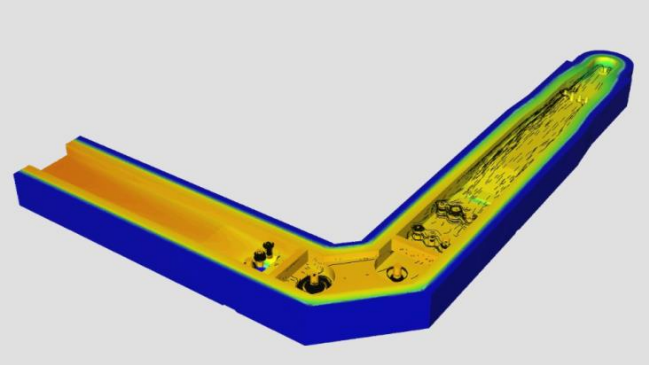


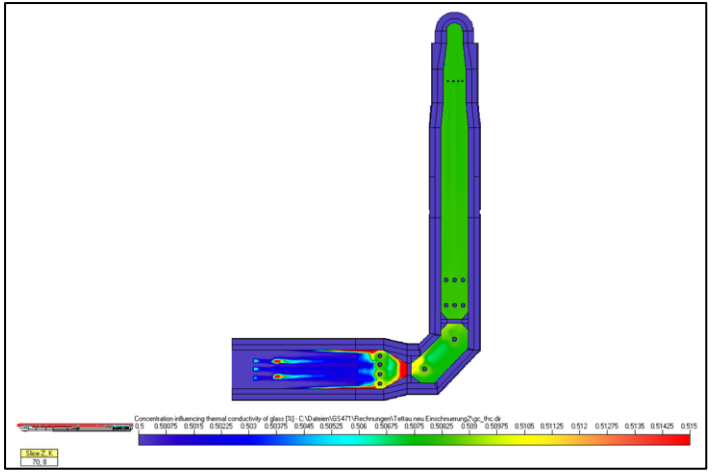


In-house mathematical modelling in use since 1994

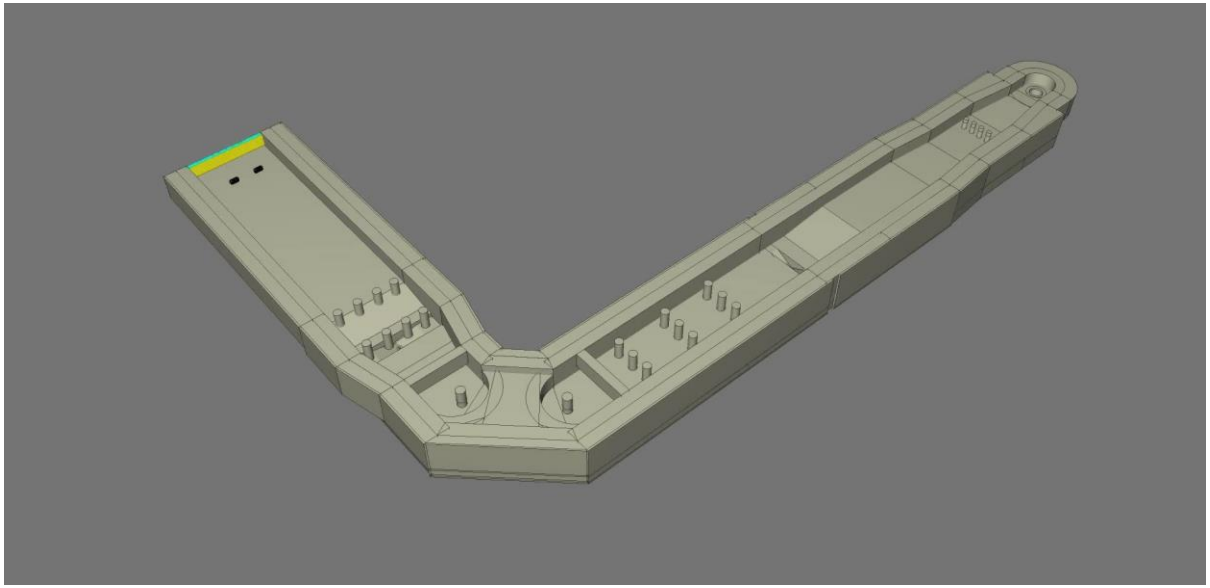
Mathematical modelling

- Used every day
- GTM (Glass Tank Model) three dimension model
  - Since 1994
  - 120 - 150 mathematical models per year

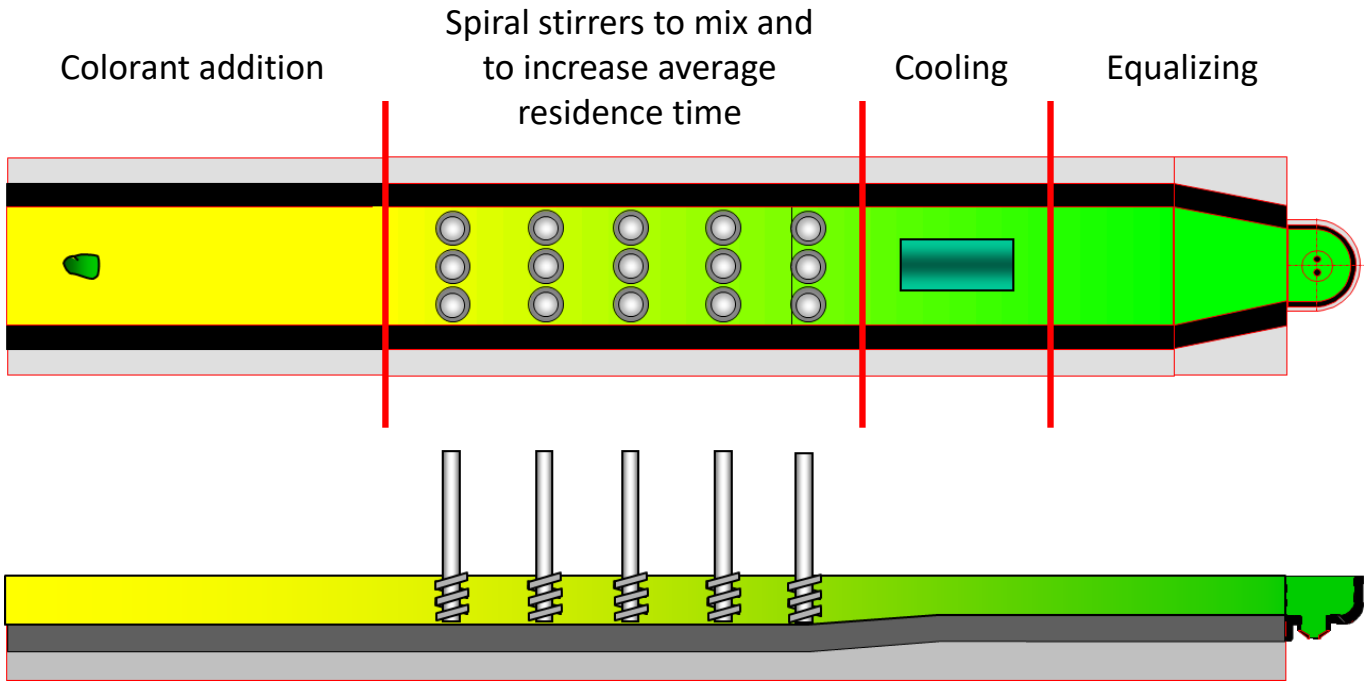




SORG Forehearth Mathematical modelling

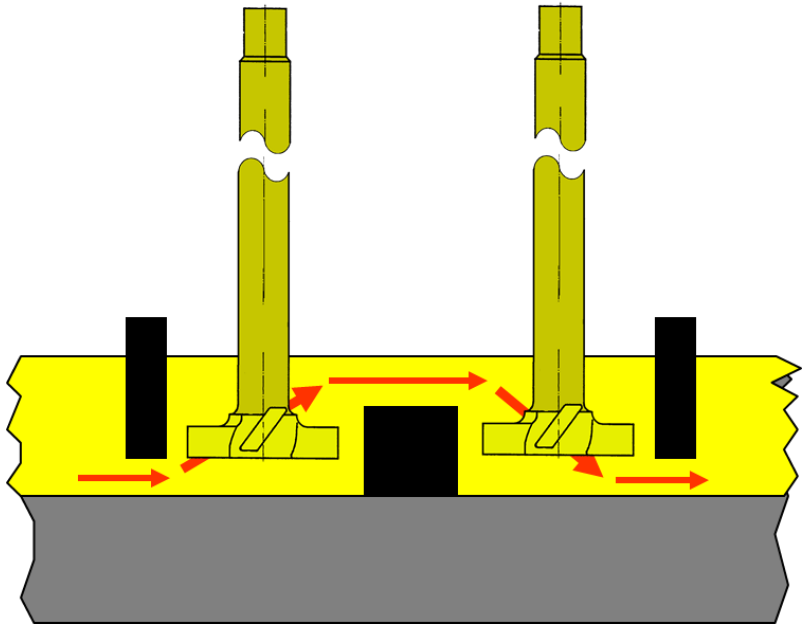


The SORG® Coloring Forehearth System – The Basic Principle of the “Normal” System



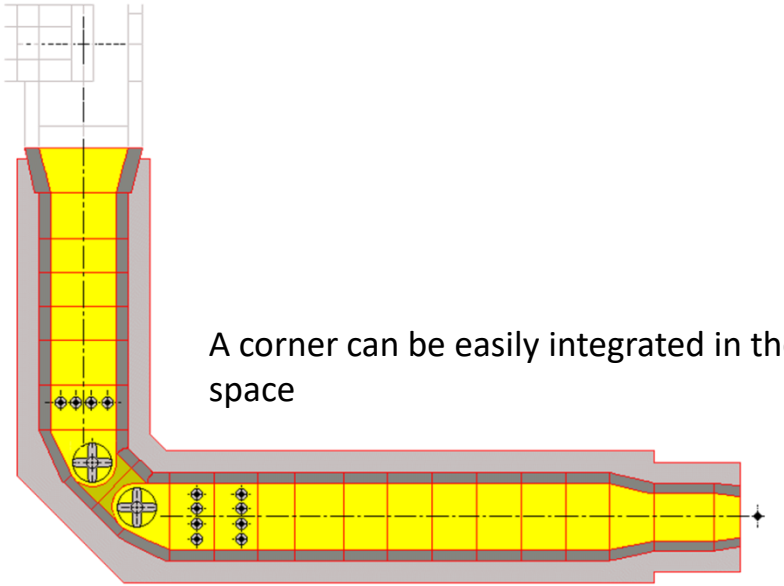
SORG VALUE BY DESIGN

The SORG® Colouring Forehearth System – The Basic Principle of the “Normal” System



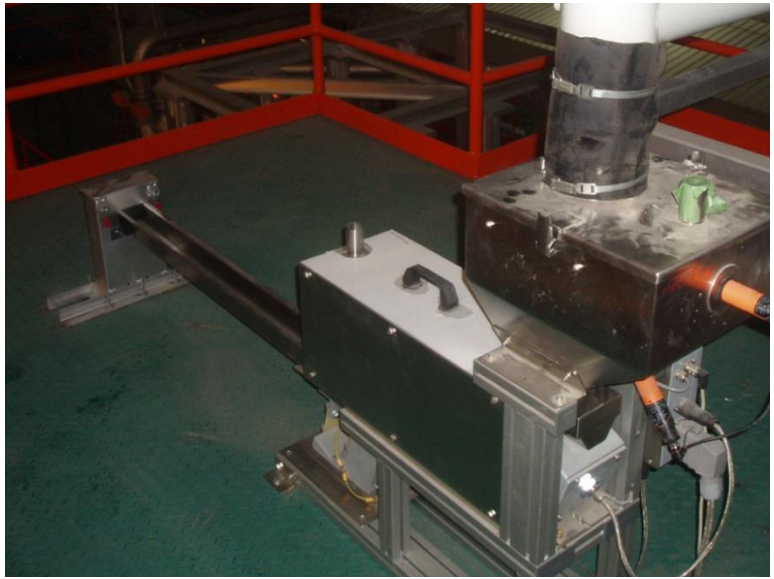
A combination of skimmers and a barrier wall create a vertical flow component in the mixing area

The SORG® Coloring Forehearth System – The Basic Principle



A corner can be easily integrated in the coloring area to save space

The SORG® Coloring Forehearth System – Stirrer Units and Feeder System



The SORG® Coloring Forehearth System – Stirrer Units and Feeder System

The SORG® modular stirrer units make refractory stirrer changing easy

The SORG® Coloring Forehearth System

- HALF WHITE
- LIGHT GREEN
- DARK GREEN
- LIGHT BLUE
- DARK BLUE
- BLUE/GREEN
- GREY
- PINK
- PURPLE - AMETHYST
- BLACK

All available coloring granulates/frits/pellets can be used!

- Containers
- Cosmetic
- Stemware
- Tableware
- Lighting ware
- Glass bricks
- Rolled plate

Thank you very much

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