



TC09 Energy Efficiency kick-off meeting 28.11.2013

Schott's status and wishes



SCHOTT is a globally active technology group

SCHOTT is an international technology group with more than 125 years of experience in the areas of specialty glasses, materials and advanced technologies.

We rank as number one in the world with many of our products.

We are committed to managing our business in a sustainable manner and supporting our employees, society and the environment.



Segments and Businesses



Home Appliances

Home Tech

Flat Glass



Precision Materials

Pharmaceutical Systems

Electronic Packaging



Optical Industries

Advanced Optics & Materials

Lighting and Imaging

We make SCHOTT part of everyone's life, for example...



SCHOTT in Mainz

SCHOTT Group headquarters and main plant since 1952

Largest industrial employer and provider of training positions in Mainz

- Approximately 2,500 employees
- Of which about 130 are apprentices

Otto Schott Research Center

- Ranks as one of the world's latest state-of-the-art glass research centers



R&D: Innovation Leadership the Key to Maintaining our Lead

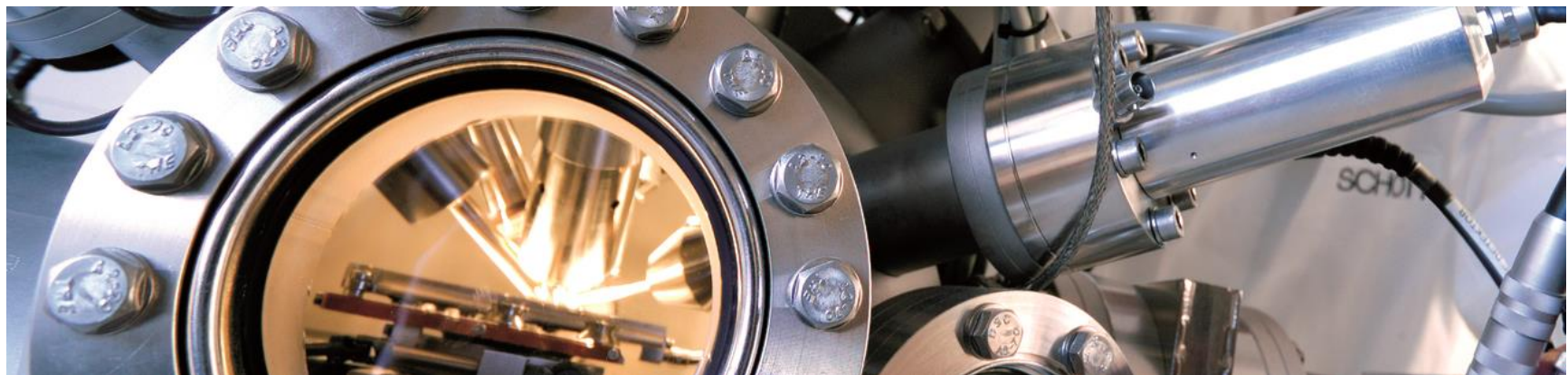
A global network with more than 600 R&D employees all over the world

- The Otto Schott Research Center in Mainz
- The Development Center in Duryea, Pennsylvania (USA)
- Technical Support Centers in Europe, North America and Asia

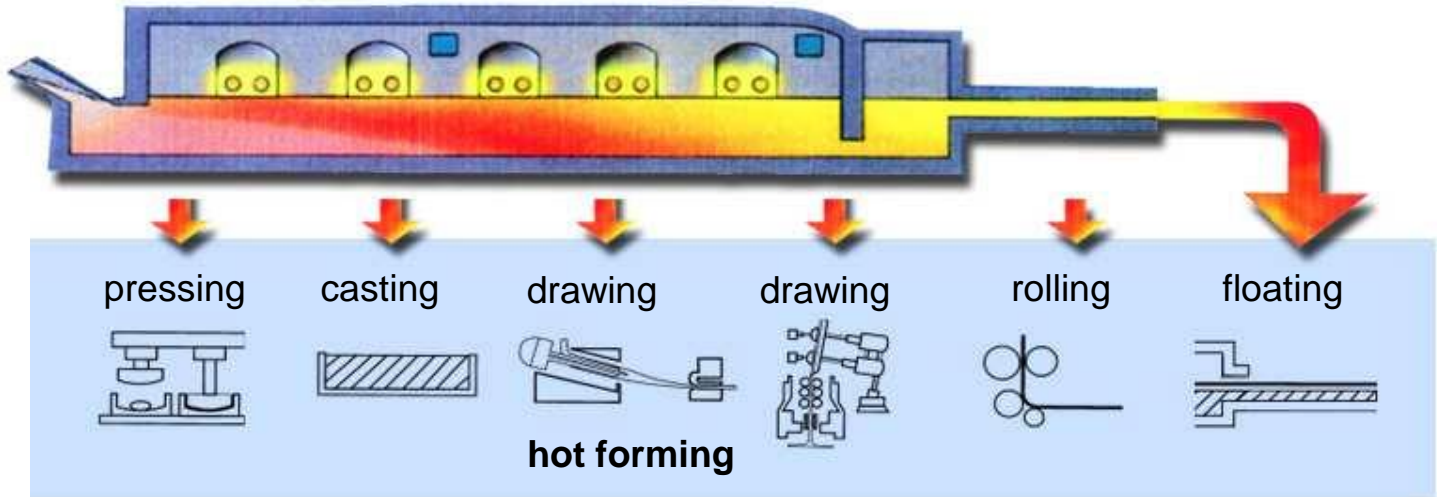
Main focuses of development work

- New and improved glasses and glass-ceramics
- Process development in the areas of melting and hot forming
- Coating technologies
- Application development

**New product rate:
over 30 % of sales**



Overview of glass production processes @ Schott



gobs



large pieces



glass tubing



flat glass



cooktops



thin glass

Specific situation @ Schott

high variety of glass types

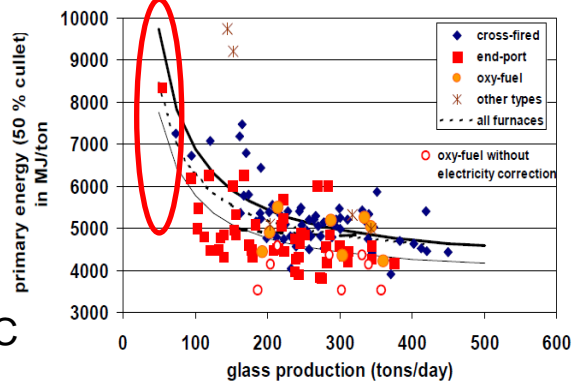
- aluminosilicate glass
- non-alkaline-earth borosilicate g
- borosilicate glass (containing alkaline-earth)
- high-boron-containing glasses
- LAS-Glass ceramics

High viscosity glass

High melting temperatures >1650°C

High quality << 1bbl/kg (10my)

Primary energy consumption container glass furnaces (123) versus production rate and furnace type in 1999



ICG 2010 Bahia-Brazil Glass - Environment and Sustainability

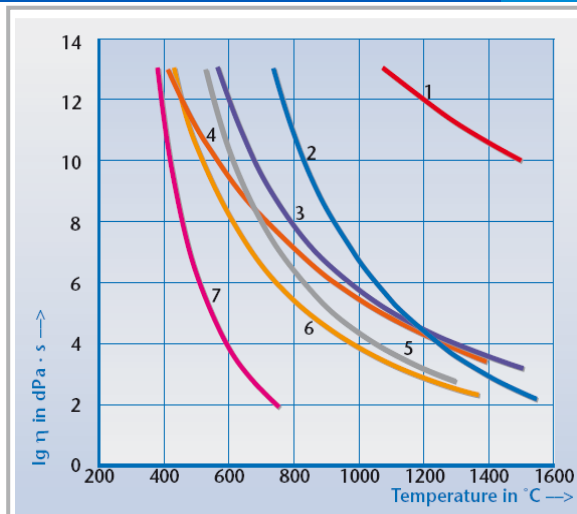


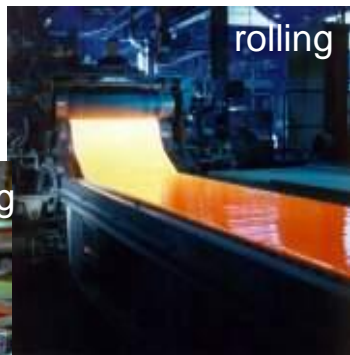
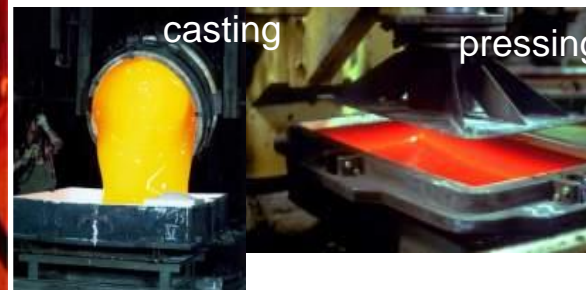
Fig. 10. Viscosity-temperature curves for some important technical glasses. 1: fused silica, 2: 8409, 3: 8330, 4: 8248, 5: 8350, 6: 8095, 7: 8465.

high melting and refining temperatures

small to medium tank sizes:

0,5 – 80 t/d

continuous/batch



Activities concerning energy efficiency improvements:

By Technology:

conversion of air-fuel to oxy-fuel burners

By process:

adaption energy – quality – throughput on existing lines

adaption energy – quality – throughput – tank geometry on new / rebuild lines

Continuous process improvements, e.g. heat leakages, enclosure / insulation of tank, pressure control

Combustion optimization

Raw material optimization

By recovery or second use of energy:

recuperation

economizer

Studies:

e.g.

Raw material preheating

Thermo - electric devices

ORCent process:

heat pump / adsorb cooling / hpc

Personal expectations of TC09

Technology monitoring and first evaluation of new options for all kind of energy saving / cost reduction available on the market

Input from other industries (e.g. steel, cement, power stations....) for energy savings, expert discussions of TC09 about learning or impact for glass industry

Invited talks: technology suppliers, best practice overview

Informations, hints and good discussions all about energy efficiency and saving

Add's from todays discussion:

Reviews and assessments concerning energy efficiency regulations

Roadmap to energy efficiency

Reviews to state of the art technologies