

DISADVANTAGES AND BENEFITS OF ADHESION DURING SG PRODUCTION PROCESSES

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IFPRI workshop 2026

Our solutions provide answers to the greatest challenges of our time.

global
megatrends



Climate change



Scarcity of natural resources



Urbanization and population growth



Energy-efficient renovation



Lightweight construction



Decarbonation of industry

our
responses

Gypsum
plaster board



Ceramics



Concrete additive
Mortar

Abrasive



Insulating materials



Abrasive Particles

Bond



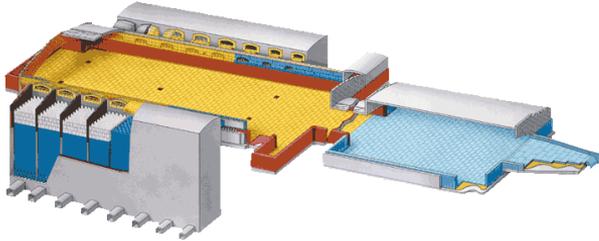
Ductile cast iron pipes



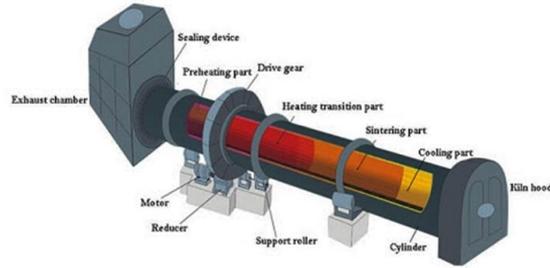
VARIOUS PROCESSES

Involving granular raw materials

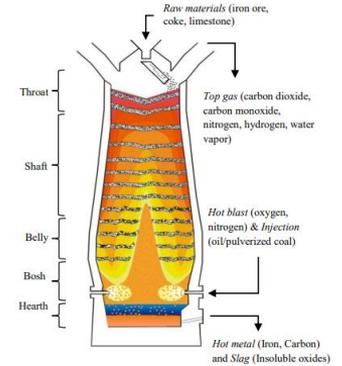
LARGE SCALE PROCESSES WITH FEW CONTROL PARAMETERS



Glass production from raw materials



Sintering of ceramic beads in rotary kiln



Ductile cast iron in blast furnace

MANUFACTURING OF HIGH-PERFORMANCE PRODUCTS



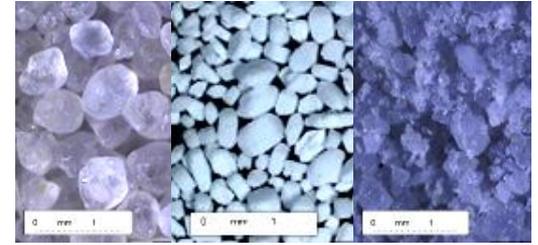
Ceramics



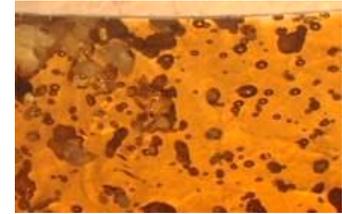
Abrasives

FLOAT GLASS

SiO₂ (65%) CaCO₃ Na₂CO₃



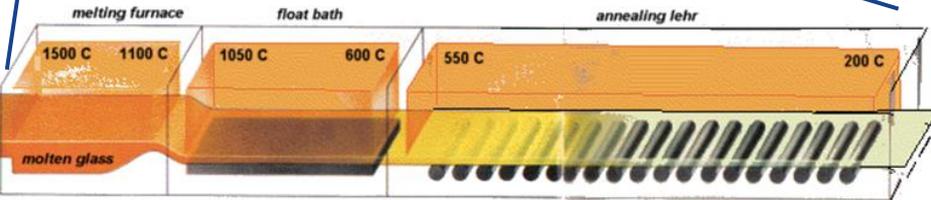
↓ 100 - 600 μm



↓

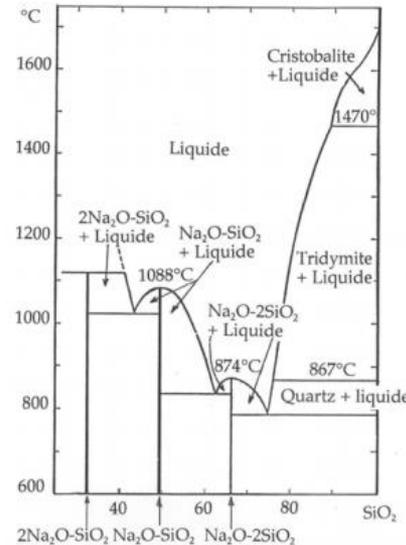


SiO₂ + Na₂O + CaO



30 000 m² per day (300 t)

Mean residence time ~ 3 days



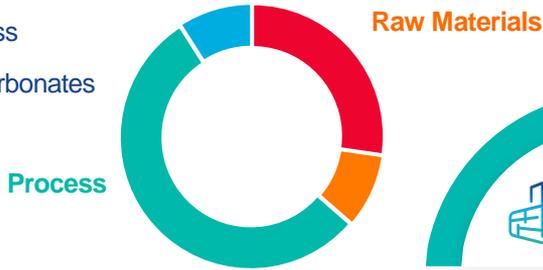
WHY DO WE CARE ABOUT GRAINS NOW?

Impact of granular raw materials on CO2 emission in glass production

CO2 EMISSION

0.6 t CO₂ / t glass

Impact of the carbonates

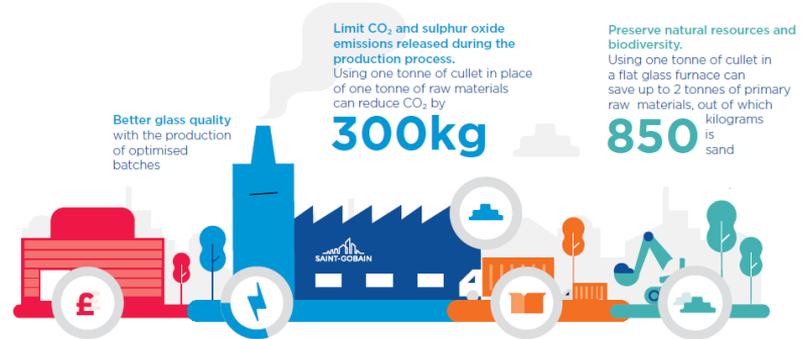


Pilot scale experiment

ENERGY / RECYCLING

Difficulties to go beyond 30% of glass cullet in the batch

Potential of energy saving too

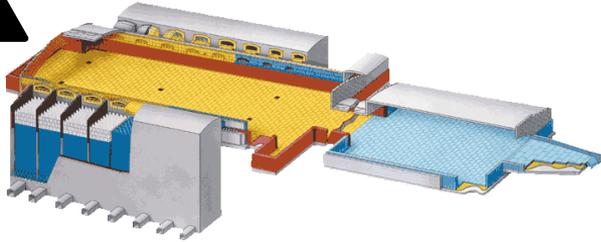


Increased competitiveness by meeting the market demand for recycled products

30% less energy is required in the furnace when melting cullet than raw materials

Less requirement for raw materials. Due to the demand and scarcity of raw materials, the price of raw materials is likely to rise.

FEEDING NEW RAW MATERIALS



(Re)ACTIVE MATERIAL

Sensitivity to environment

SCALE UP ISSUE lab to plant

Residence time in silos

Stresses supported

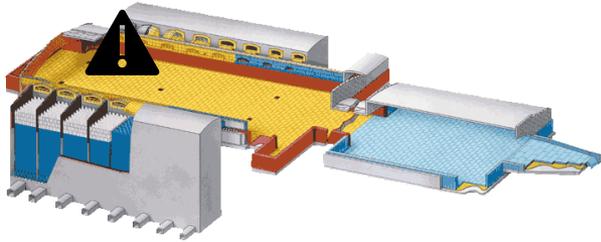
Clogging of silos ...

THIS
OF



Potential issue AI illustration

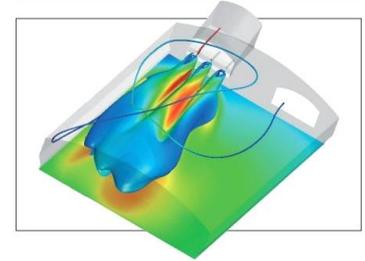
COHESION IS REQUIRED: ADDING WATER



AVOID AIRBORNE PARTICULES

Loss of raw materials

Aggressive reactions with the refractories of the furnace



AVOID SEGREGATION DURING TRANSPORT

Preserve local composition after mixing

Future better reactions



BUT CONSEQUENCES

Energy: batch mix should be hold above 45°C (carbonate)

Energy: Introducing water in the furnace reduces the efficiency

May result in a poor transport or clogging issue

May result in fluctuations of feeding rate.

PROMOTE OTHER COHESION?



www.koepfern-international.com



Test from competitor AGC - communication ICG School 2024



SPECIFIC COHESION

Only between grains at small scale

No flow issue

UNKNOWN INTERESTS FOR THE PROCESS

Mechanics?

Quality of production?

Energy consumption of the compaction?

Chemical contamination?

€, CAPEX!

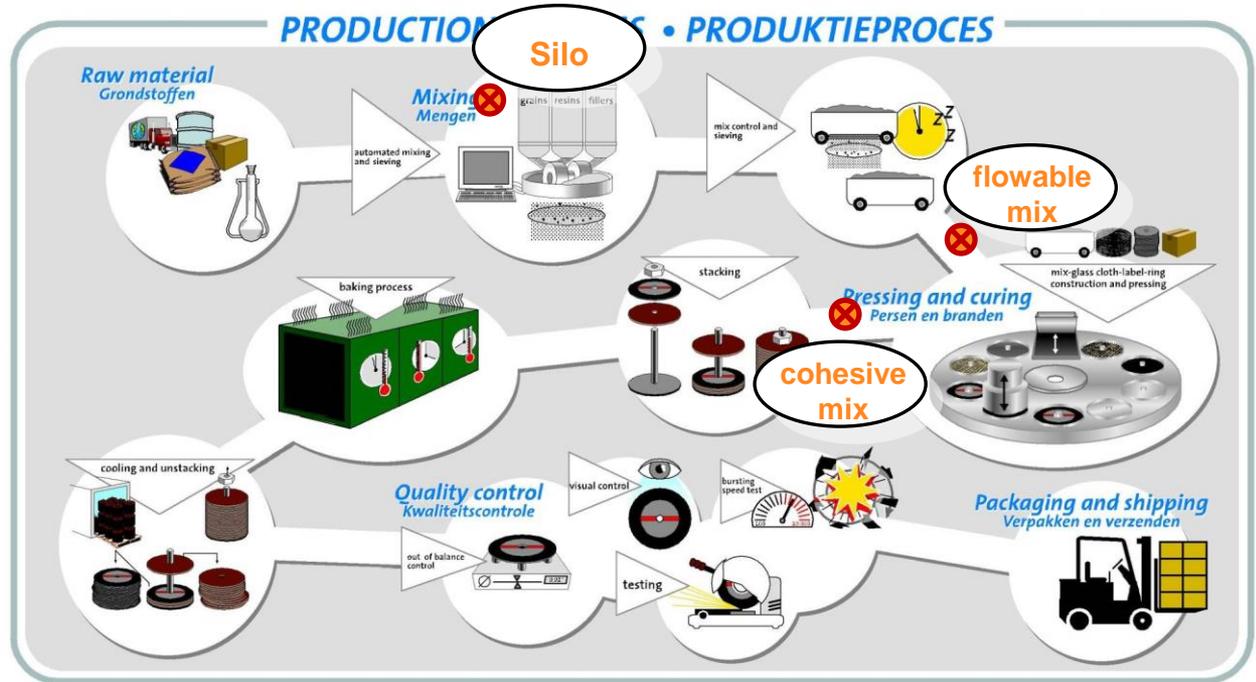
HANDLING SMALL AMOUNTS OF POWDERS OR GRAINS

FEEDING LINES, FILLING MOLDS

Continuous feeding (gypsum by screws)

Extrusion of ceramics

Abrasive mix
(grains, fillers, powder resin, liquid resin)



CONSTRAINS

HANDLING COHESIVE MATERIALS

Different origin of the cohesion (powders, liquid)

SPRECTRE OF DIFFERENT SITUATIONS

Different products

Different processes

SEARCH FOR ALTERNATIVES GRAINS

Environmental concerns

CO2 emission

Energy savings

Ressources savings



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WISH LIST

FAST WAYS TO TEST THE BEHAVIOR OF A POWDER FOR A GIVEN APPLICATION

To switch faster from one to another raw material

PREDICTIVE MODEL

Based on a set a measurements, can we predict the flow of materials?

PROMOTE ADHESION OF POWDER

When needed what are the means to amplify the cohesion?

SOLUTIONS TO MITIGATE THE COHESION

Tools to control and adjust of the cohesion or its effects on the flow.





THANK YOU

SAINT-GOBAIN RESEARCH PARIS

