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TüDöKSAD Akademi **10. Uluslararası Döküm Kongresi / 10th International Foundry Congress** by Tudöksad Academy

In conjunction with **ANKIROS / ANNOFER / TURKCAST** fairs

«Inorganic Binders: IOB Process, The next Generation»

«İnorganik Bağlayıcı Sistemlerinde Son Gelişmeler»

Christian Lustig

(Hüttenes-Albertus Chemische Werke GmbH)

6.Oturum / 6th Session

Oturum Başkanı / Session Chairman: Prof. Dr. Ali Kalkanlı (ODTÜ)



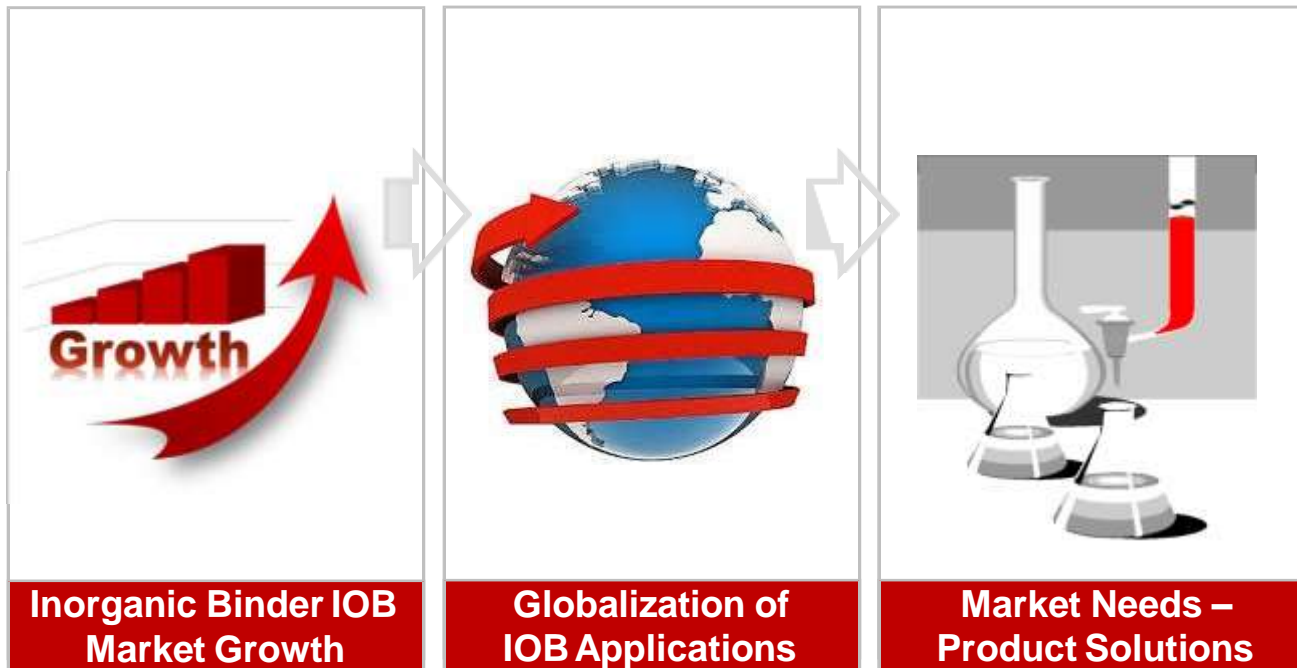
Inorganic Binder IOB Process

The next Generation

Dr. Christian Lustig, Ankiros 2018

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Motivation for Using Inorganic Binder Systems IOB



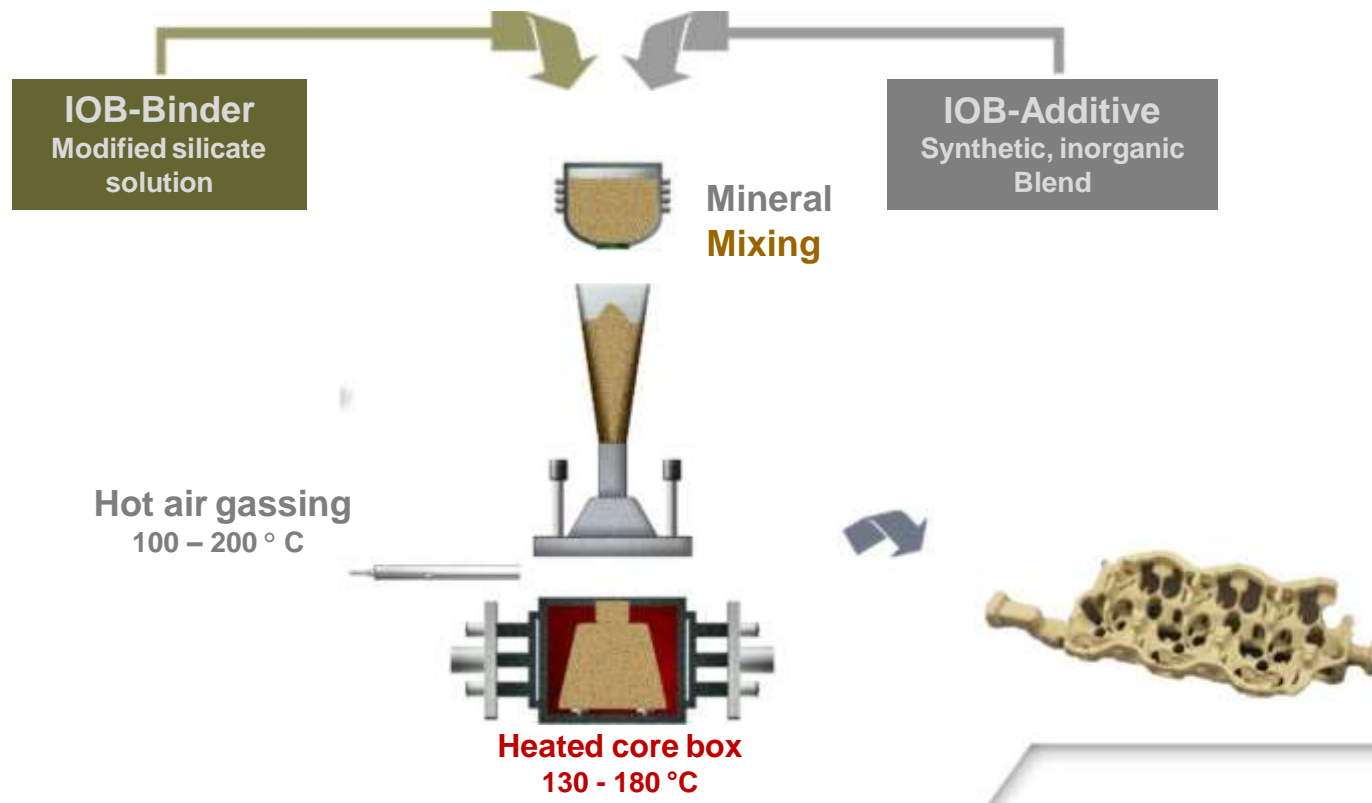
Employee Protection



Intensification of the Environmental Requirements

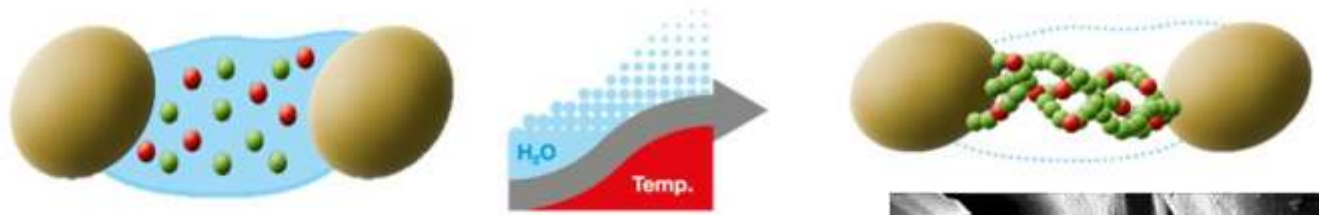


IOB Process Description



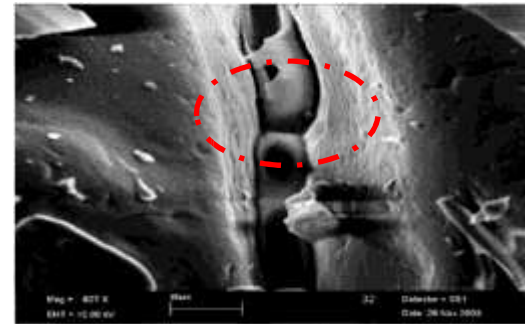
Modern IOB systems

Binder (modified alkali silicate solution)
+
Additive (synthetic, inorganic additives)

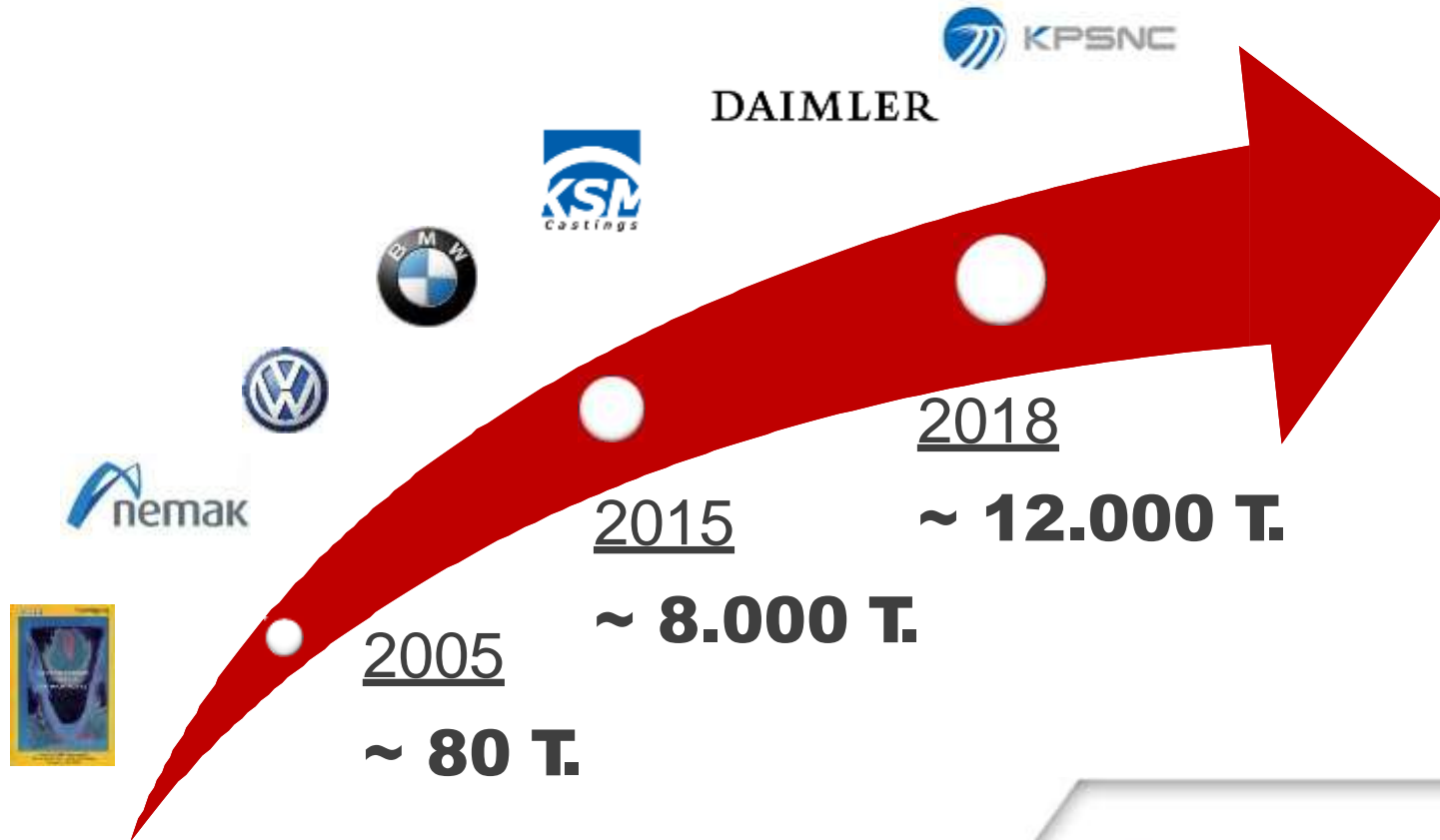


● Binder ● Additive ● Solvent water

The IOB binder reacts with the additive and forms a three-dimensional network when initiated by temperature in an virtually irreversible process.



IOB Growth – Estimated Binder Usage



Cordis Applications Worldwide

Europe

- Nemak
- Volkswagen
- Daimler
- Martinrea
- KSM
- Montupet
- Teksid
- Others.....

Asia

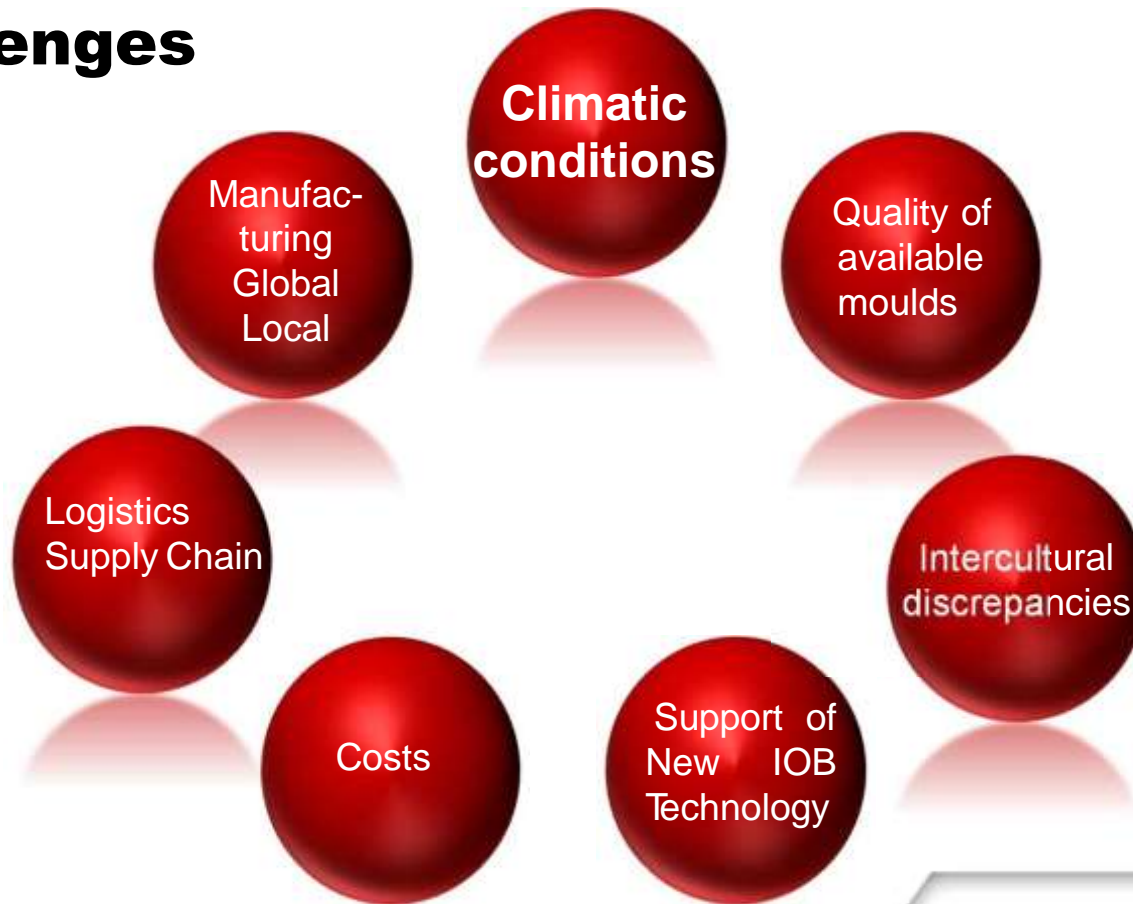
- Nemak
- Martinrea
- FAW
- Nissan
- KPSNC
- Montupet

North America

- Nemak
- Martinrea
- Bocar

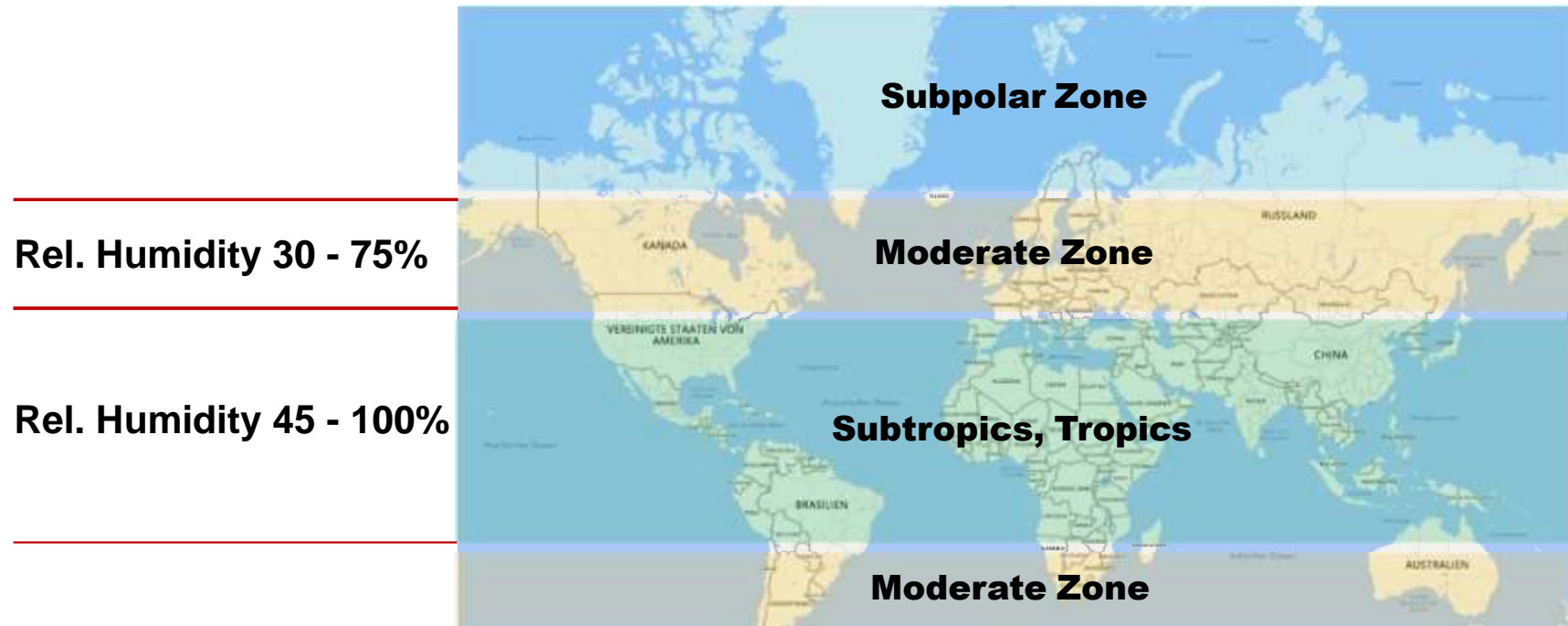


Challenges



Cordis® Applications Worldwide

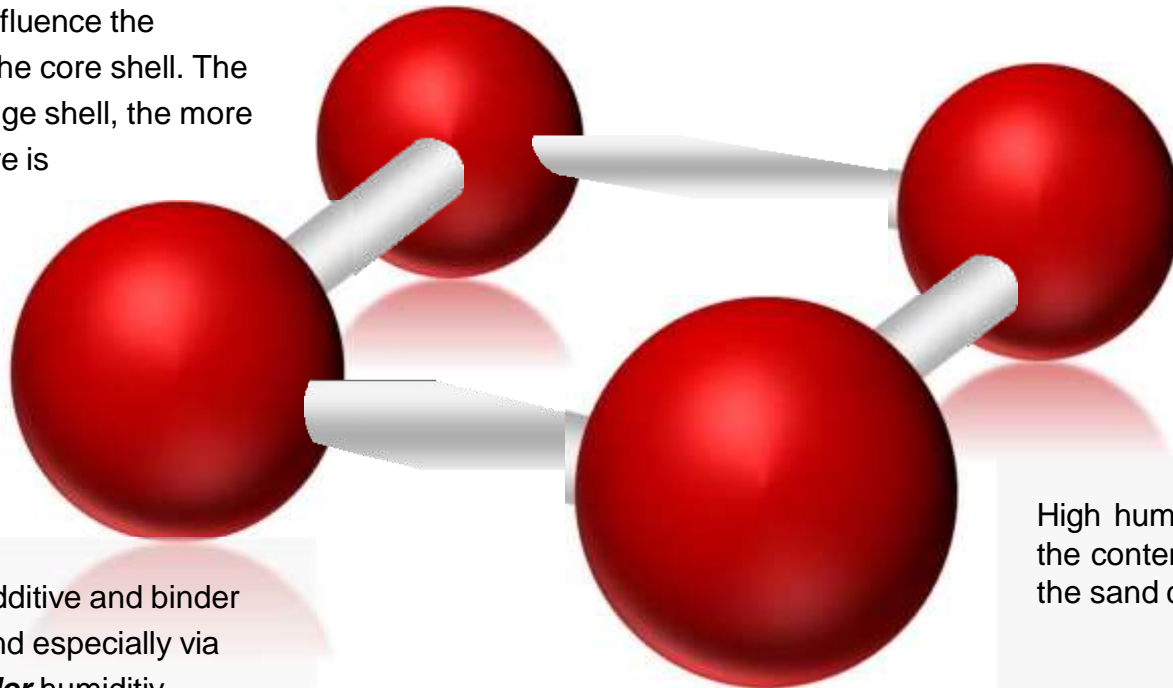
Climatic Conditions



Storage Stability: Influencing Factors

Core box temperature and curing time influence the thickness of the core shell. The thicker the edge shell, the more stable the core is

Sand with smaller grain size has a higher capillary action and is thus easier to draw water into the core



In variation of additive and binder addition rates and especially via the type of **Binder** humidity resistance as well as humidity uptake can be controlled.

High humidity increases the content of water into the sand core.

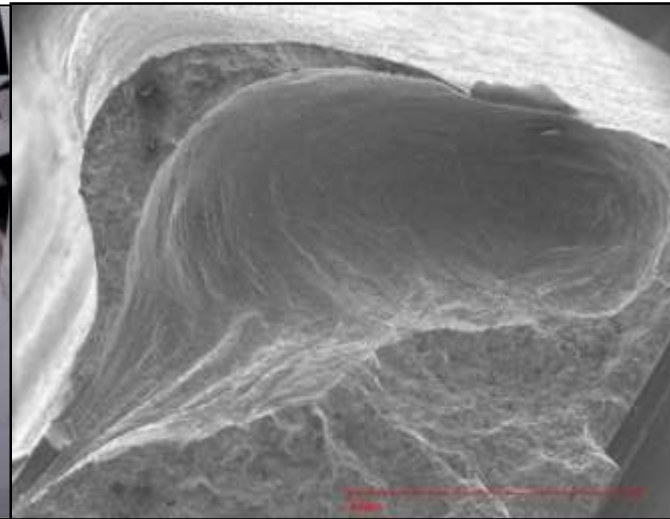
Types of Defects



Core cracks

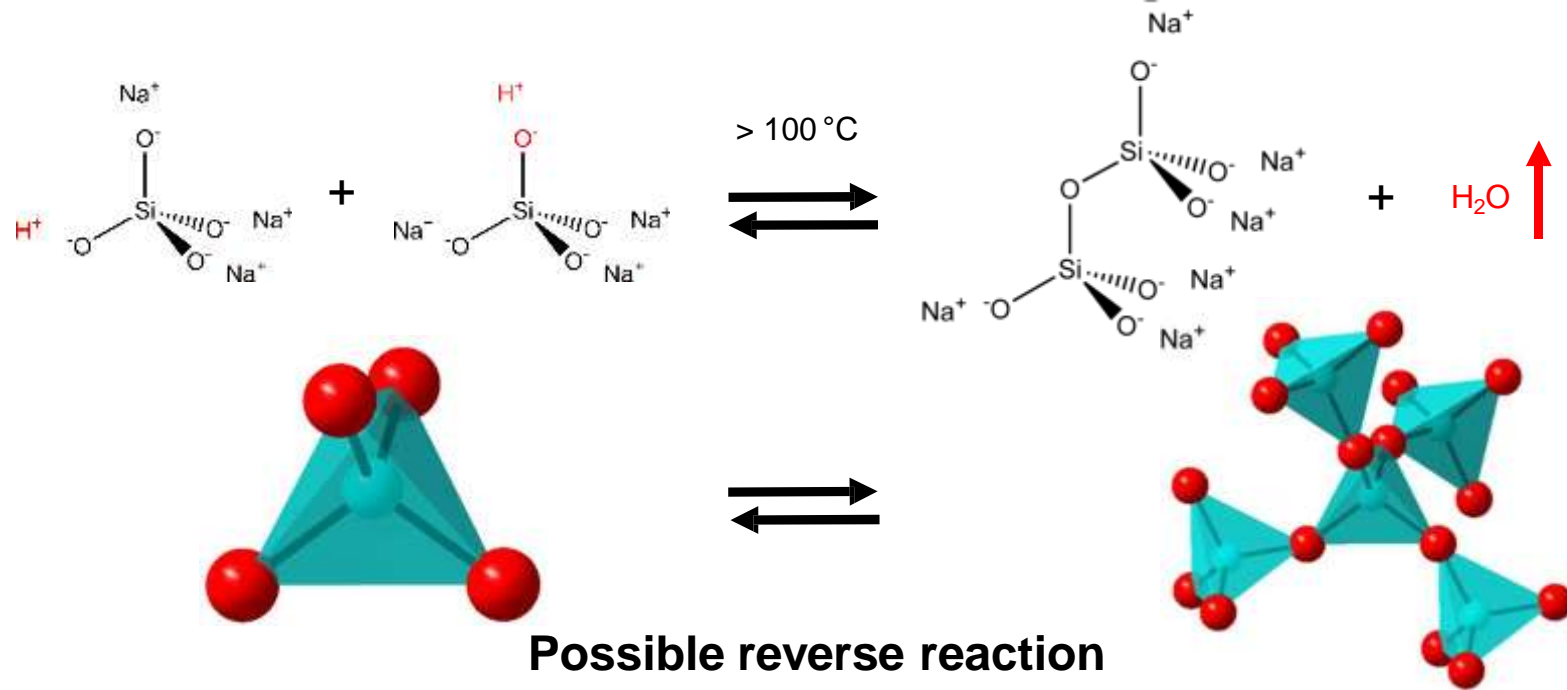


Gas formation during casting



Gas inclusion in the casting

Curing Mechanism - Thermic Dehydration



- Core breakage
- Loss of strength
- Abrasion strength

Market Needs

- Flexible and robust binder system
- A binder system that can be adjusted to climatic conditions
- Good shelf life of IOB cores at high humidity
- Low humidity uptake low gas formation during casting
- Keeping all other sand core properties identical or improved

From Idea to Innovation

Our path to innovative, customized products:



Idea

- Powerful R&D (Research and Development)
- Practical test and technology cooperation with our customers and partners at

Center of Competence CoC

Customer Needs

Innovation Process

R&D

CoC



Product innovations
and
Process innovations

Center of Competence

- core making and casting

Research & Development

- multidisciplinary team
- many different nationalities

Alternative Binder Concept

Current product

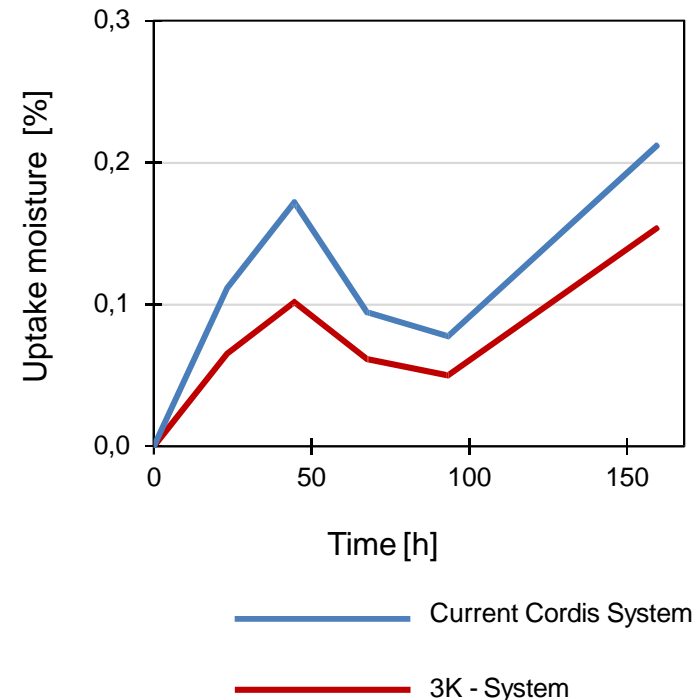
2 Component system with a liquid binder and powder additive

- Inorganic Cordis binder
- Inorganic Anorgit powder additive

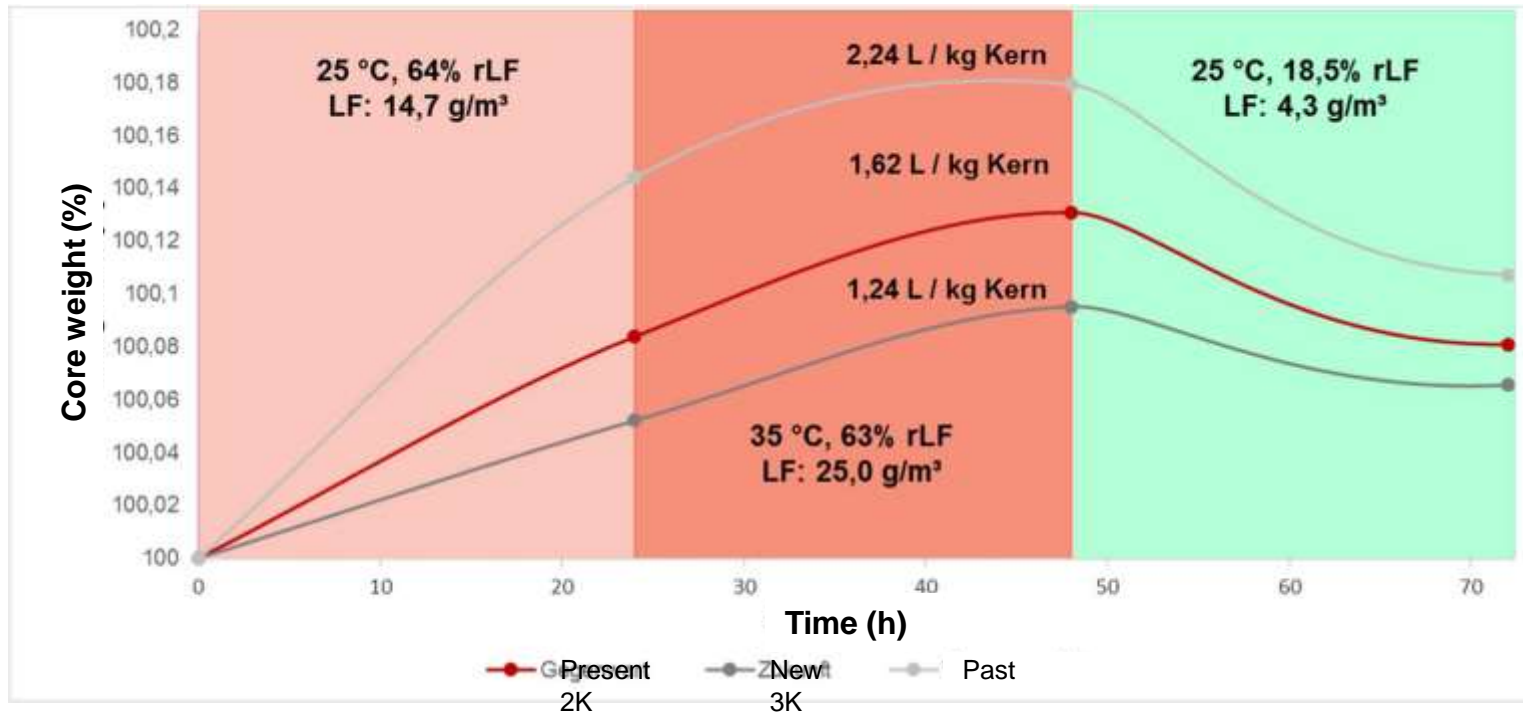
New product

3 Component (3K) system with a liquid permanent binder, a liquid modifier and powder additive

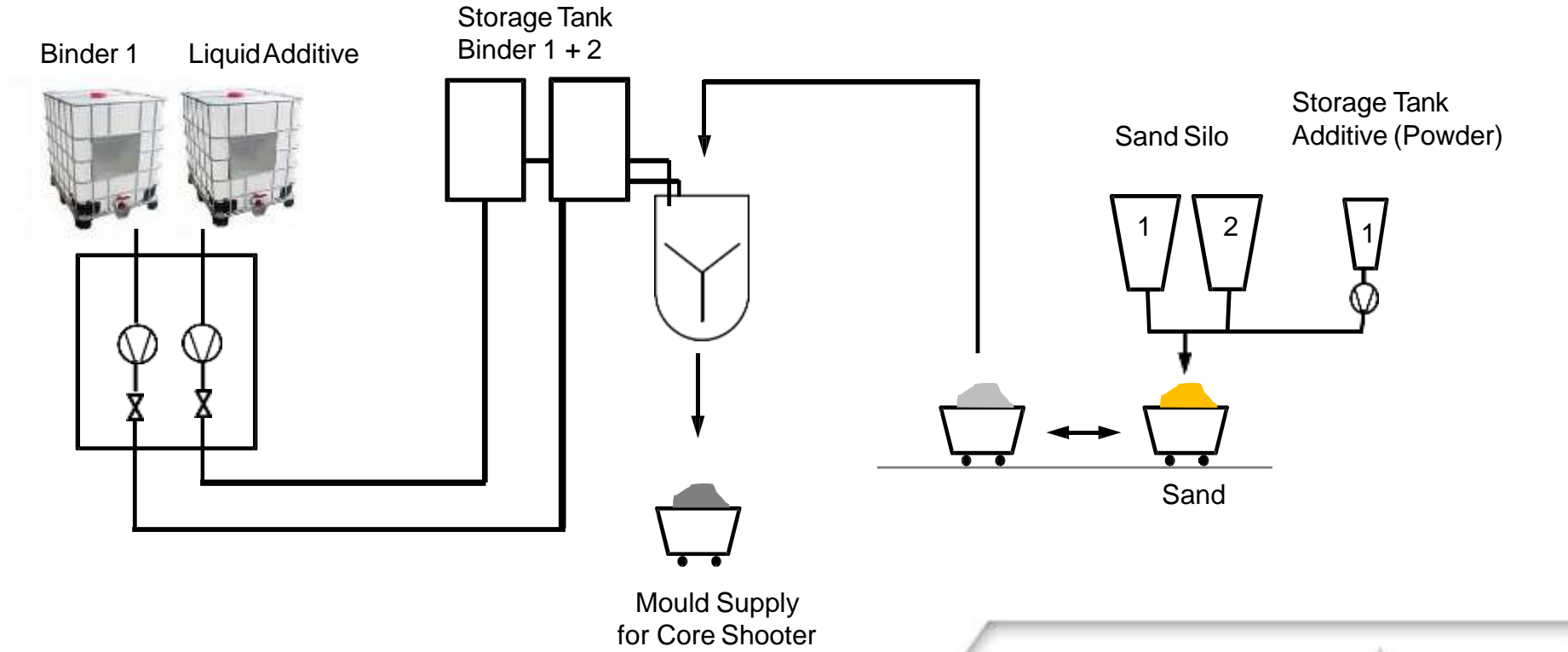
- liquid binder
- liquid modifier (low / high humidity)
- powder additive



Advantages



Practical Application

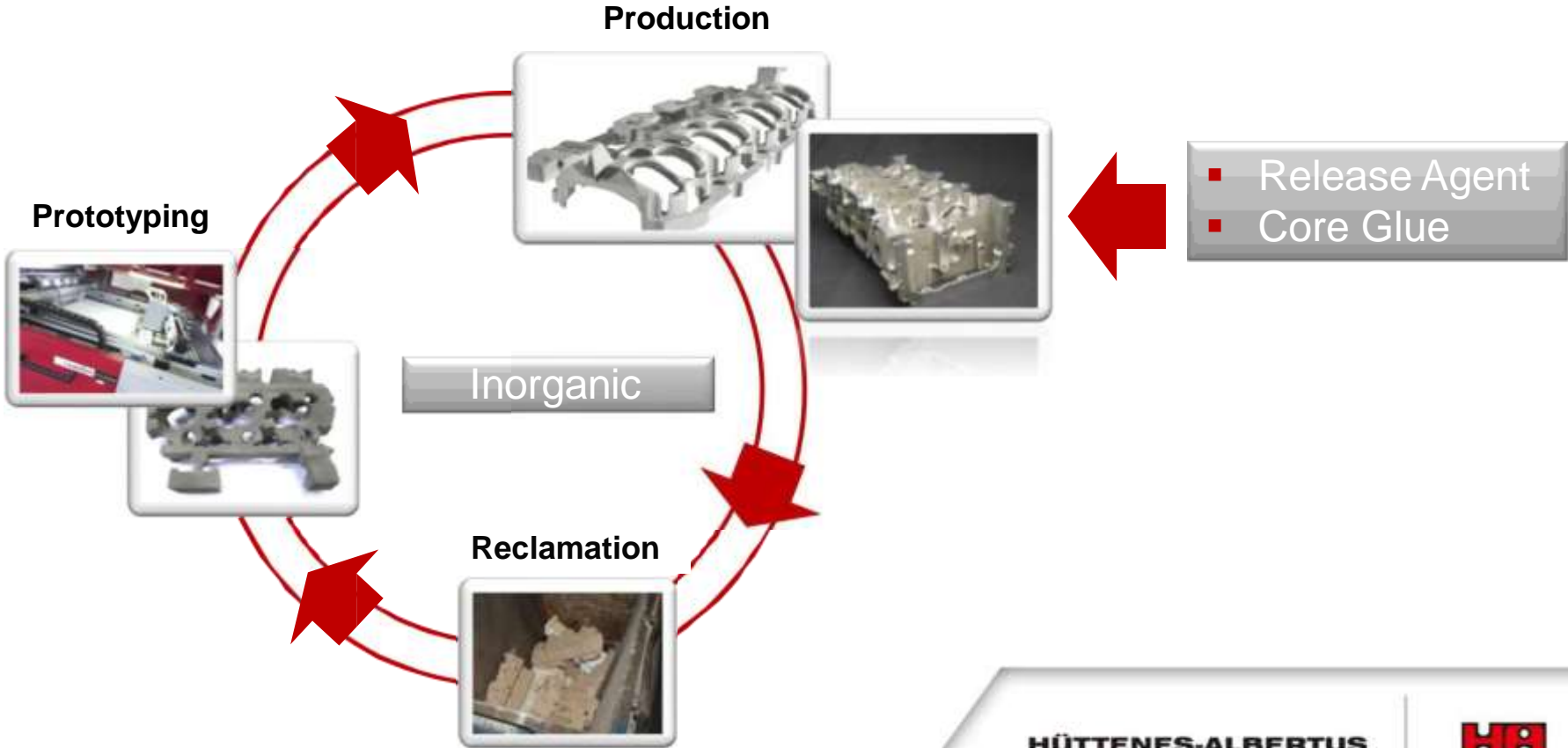


New IOB 3K Binder System

- A flexible binder system adjustable to climatic conditions was introduced to the market
- 3K System in serial application for more than a year
- Reduction of casting defects due to core breakage
- Significant reduction of casting defects due to core gas
- Customer needs fulfilled – additional core properties were improved
- Patent application has been filed for 3K system

Is this enough?

Inorganic Binders: Fields of Application

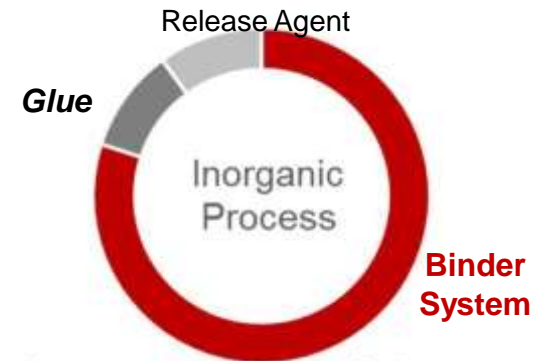


Inorganic 2-Component Glue

With application of **Inorganic** cores the use of **Organic** hot melt glue is getting more and more into the focus.

Inorganic and fast curing adhesives with...

- Main target: no organic components
- No harmful gas impact by organic components (hot melt glue 100% organic)
- No odor, fume and condensate formation during casting and cooling
- Reliability for the automatic application process



Inorganic 2-Component Glue

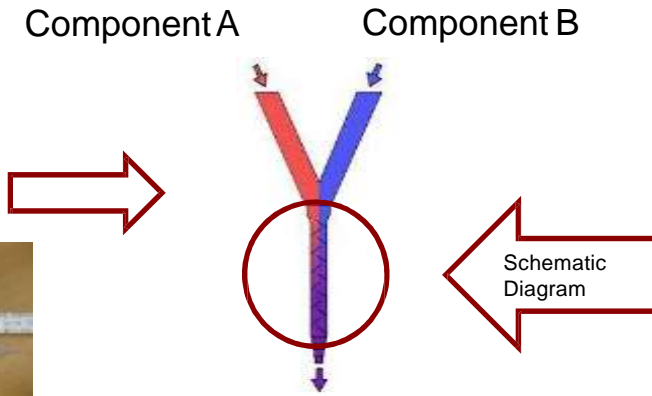
The new 2-Component glue *DUOSIL*

- Quick curing time > „reaction friendly“ glue is necessary
- 2-Component means:
 - Main component A as binder (10 parts)
 - Second component B as hardener (1 part)
- Components are filled in separate cartridges
- Both components are mixed in a mixing unit behind the cartridges – „static mixer“
- Mixing process is passive – taking place by conveying the components

Schematic Diagram of the Mixing Process



Double Cartridge -
Volume ratio 10:1
+
Static Mixing Tube



Activated glue
„Processing time“



Mixing process in dependance
of elements amount



Thank you for your attention.

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