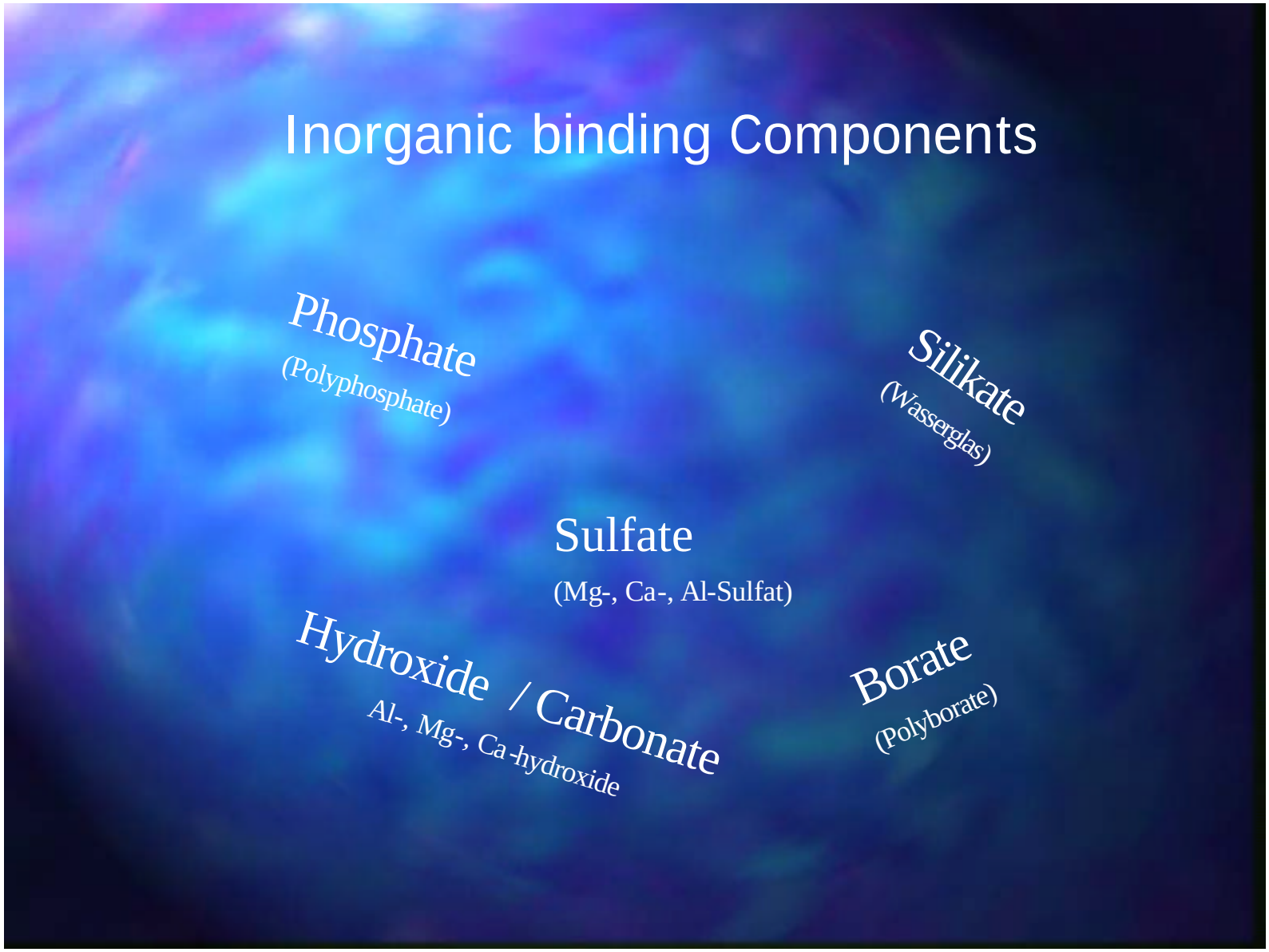
Inorganic Binder

BeachBox®

LaempeKuhs – Binder

2005

Inorganic binding Components



Advantages and Disadvantages of Inorganic Components

Components	Advantages	Disadvantages
Phosphate	Good solubility	No thermal stability
Borate	High strength	Sticking sand
Sulfate	Good solubility	Low strength
Silikate	Very high strength	Bad decomposition
Hydroxide/Carbon.	Fast curing	Bad reclaiming

Requested Properties

- Good mixibility with sand
- Good shootability
- Long storage
- No adhesive power to the corebox
- Fast and target curing
- Thermal dimensional stability
- No gas push
- No sand stick on the casting
- Good decoring
- Easy reclaiming of the sand

Bindervariations by specified Mixtures of inorganic Components

Sulfates-Phosphates-Borates-Hydroxides-Silikates

LK 600

LK 700

LK 500

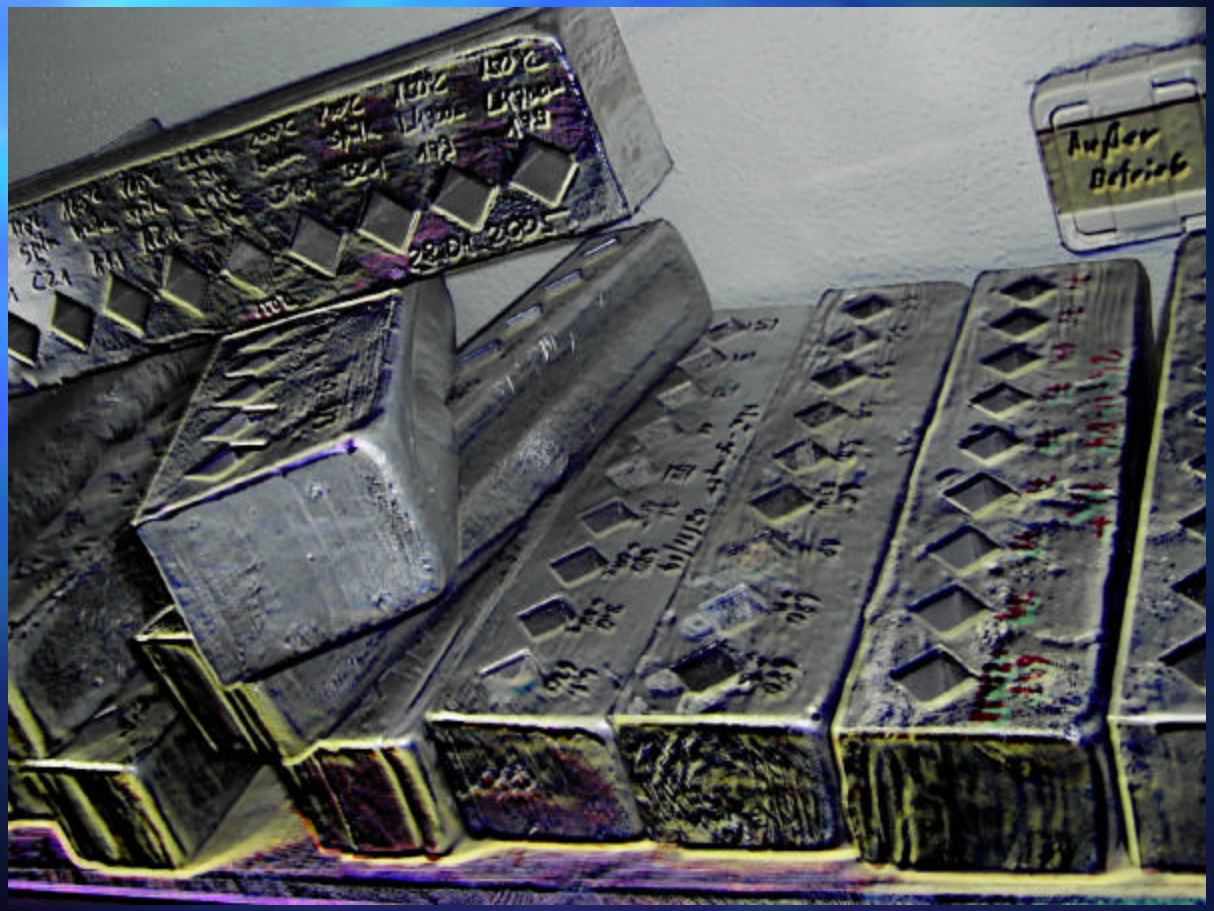
LK 800

Research and Development Centre in Germany

Laboratory for R & D

Quality Control

Development of new Binders



Type LK 600

For Aluminium castings

Dosage 3% Powder + 2,5% Water or 5,5% Liquid-binder. Strength of ca. 250 N/cm².

Special Properties:

Very good water solubility. Decoring is possible dry and wet.

Reclaiming of the binder is up to 70 % possible by reclaiming of 100 % of the sand.

Machine Equipment:

Heatable Corboxes (120°-150°C) and purching air necessary.

Type LK 700

Suitable for aluminium and grey iron castings
Dosage 2-3 % Liquid binder.
Strength of ca. 350 N/cm².

Special Properties:
Very good shootability. Very easy shakeout.
Sand can be fully reclaimed.

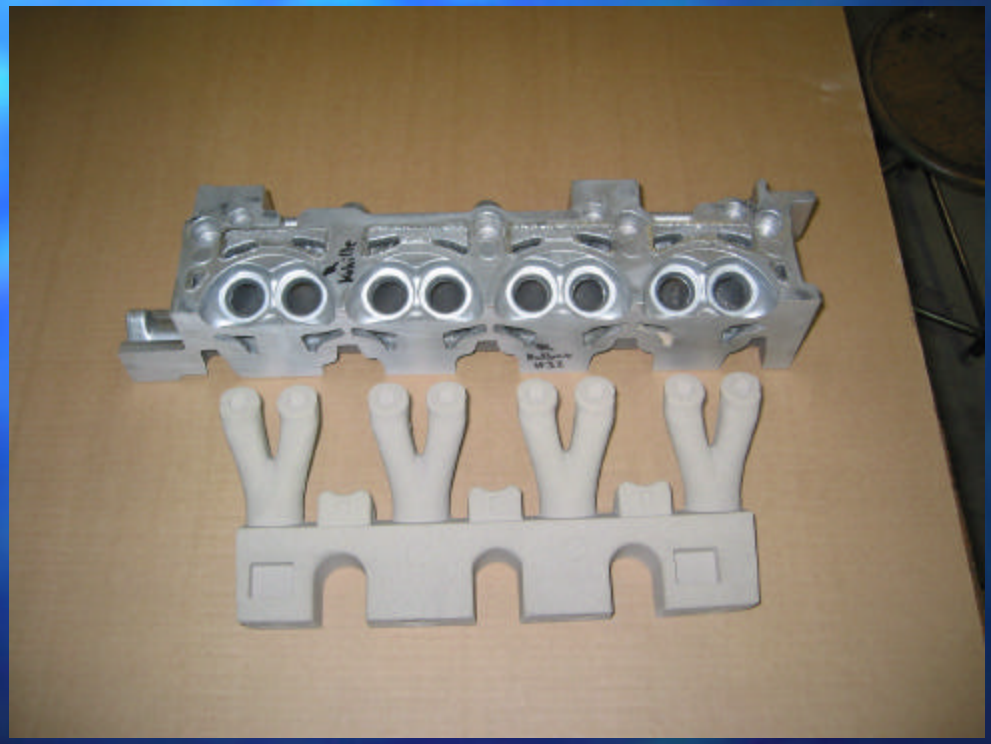
Machine Equipment:
Commonly used Hot Box Machines.
Heated Core Boxes (130°-160°C).
Purch air for big cores recommended.

Inorganic LK-Glue

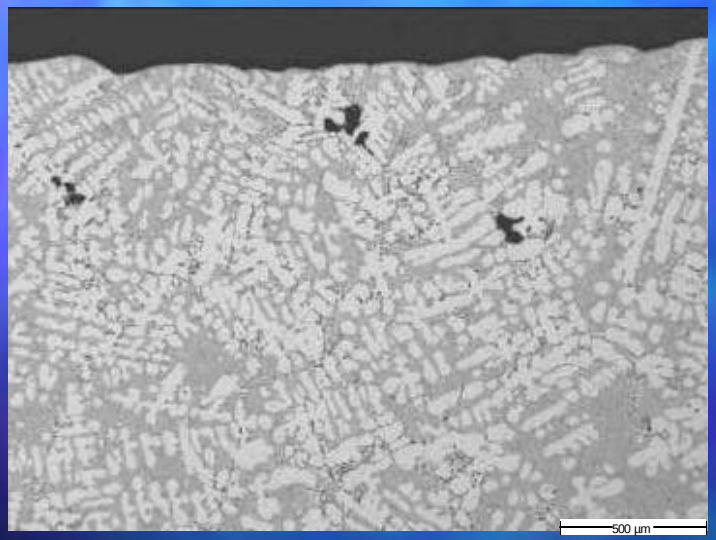
In Micorwave
dried gives
extreme strength

Core packet with
4 cores

Surface Quality

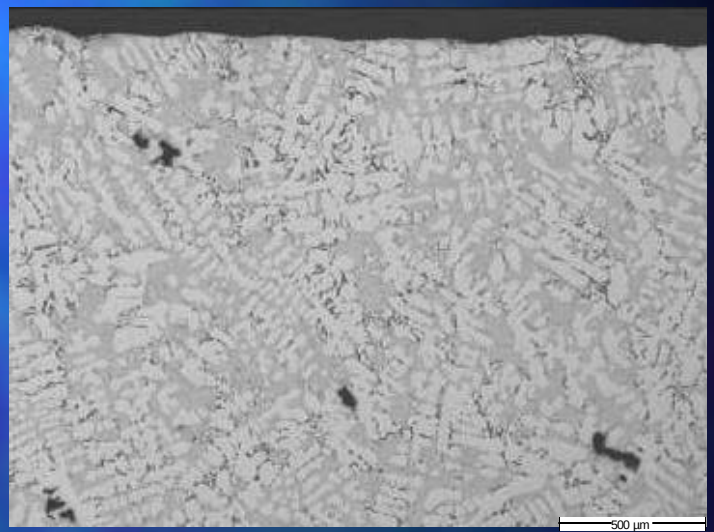


Metallurgy



500 µm

Cold Box

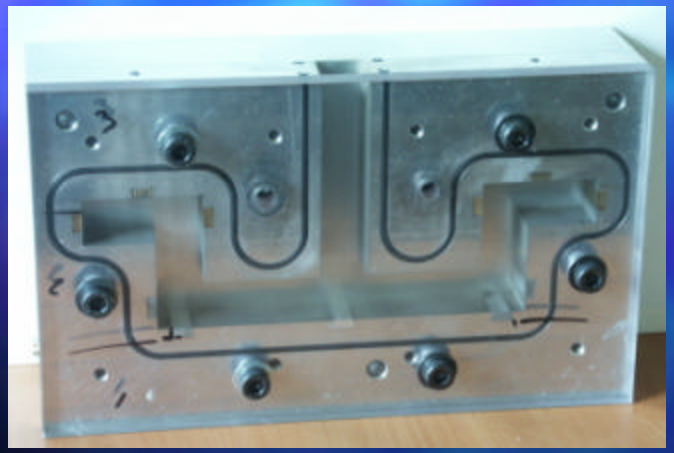


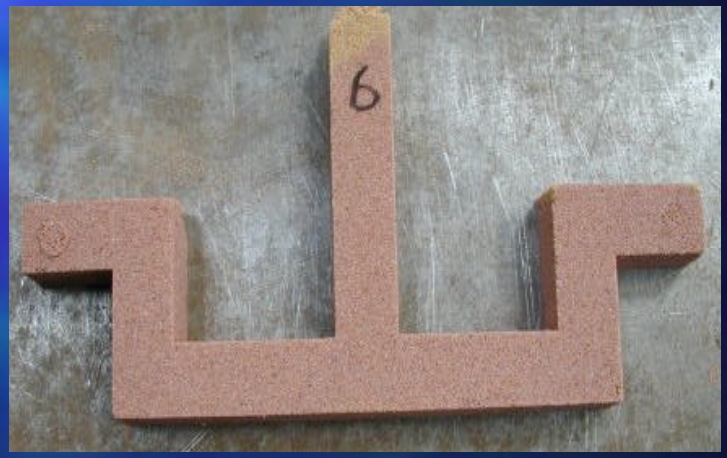
500 µm

LK Binder

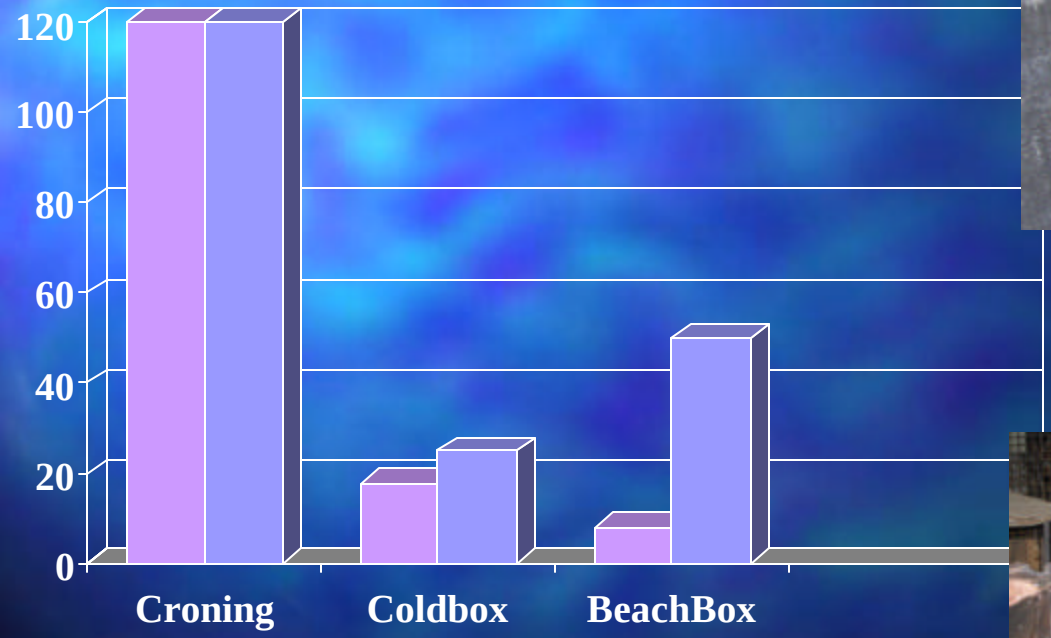
Shootability

Film start

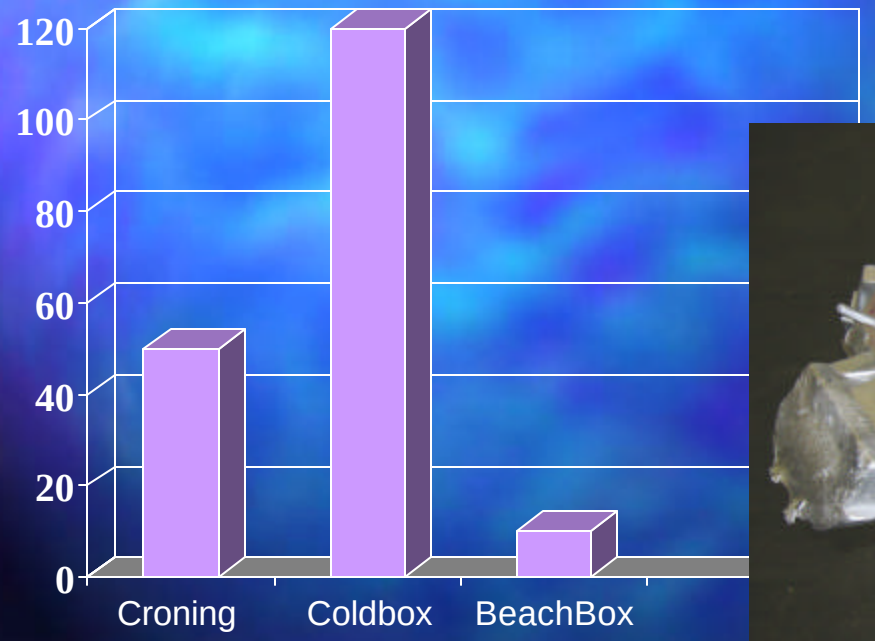




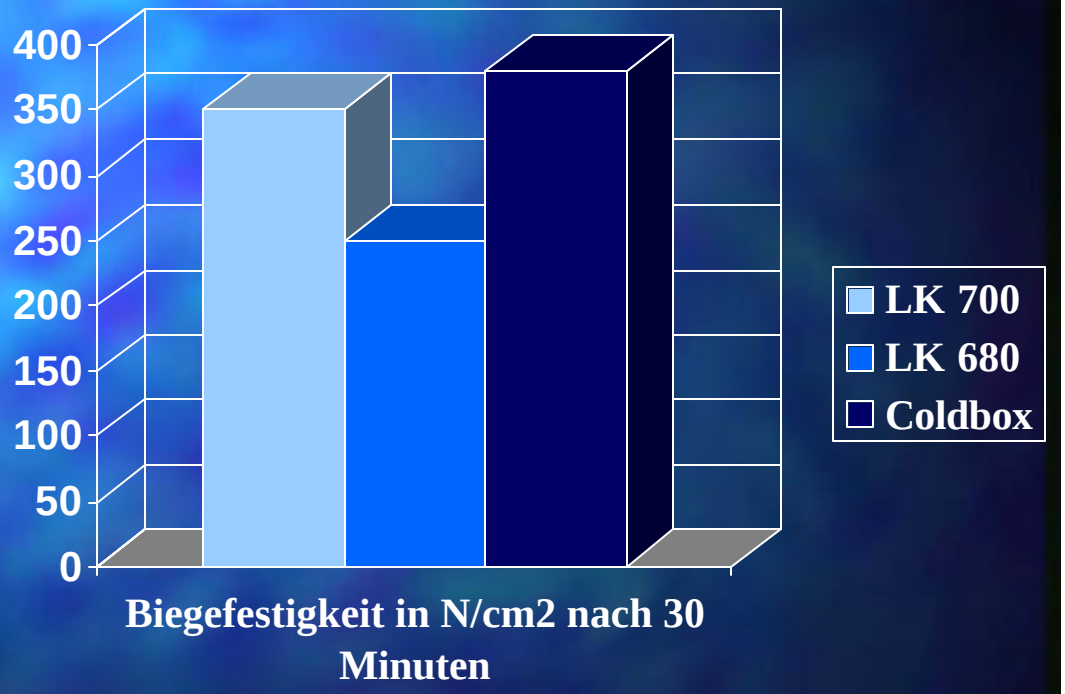
Core Curing Times in Sek.



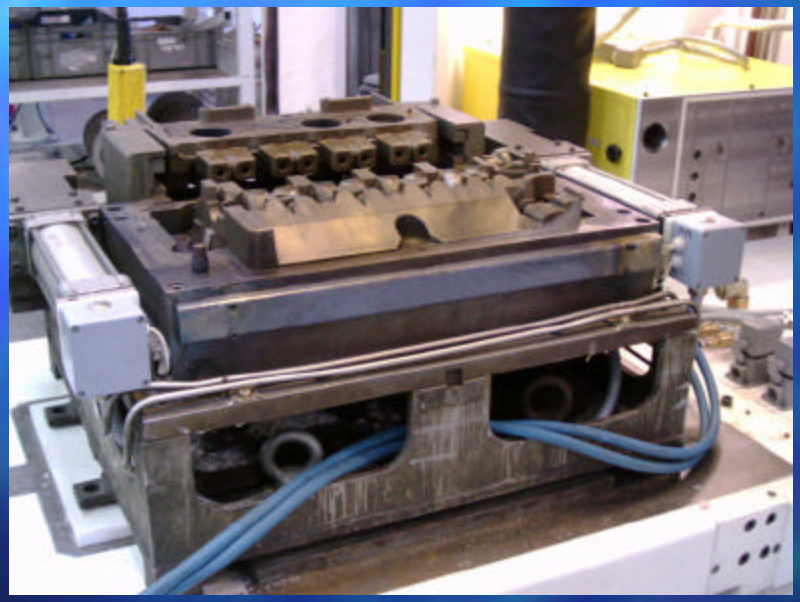
Decoring by shakeout in Sek.



Strength Comparison



No adhesive power on Core Box



Spraying on Core Box is by using LK- Binders not necassary anymore.

The Shooting Nozzles remain clean .

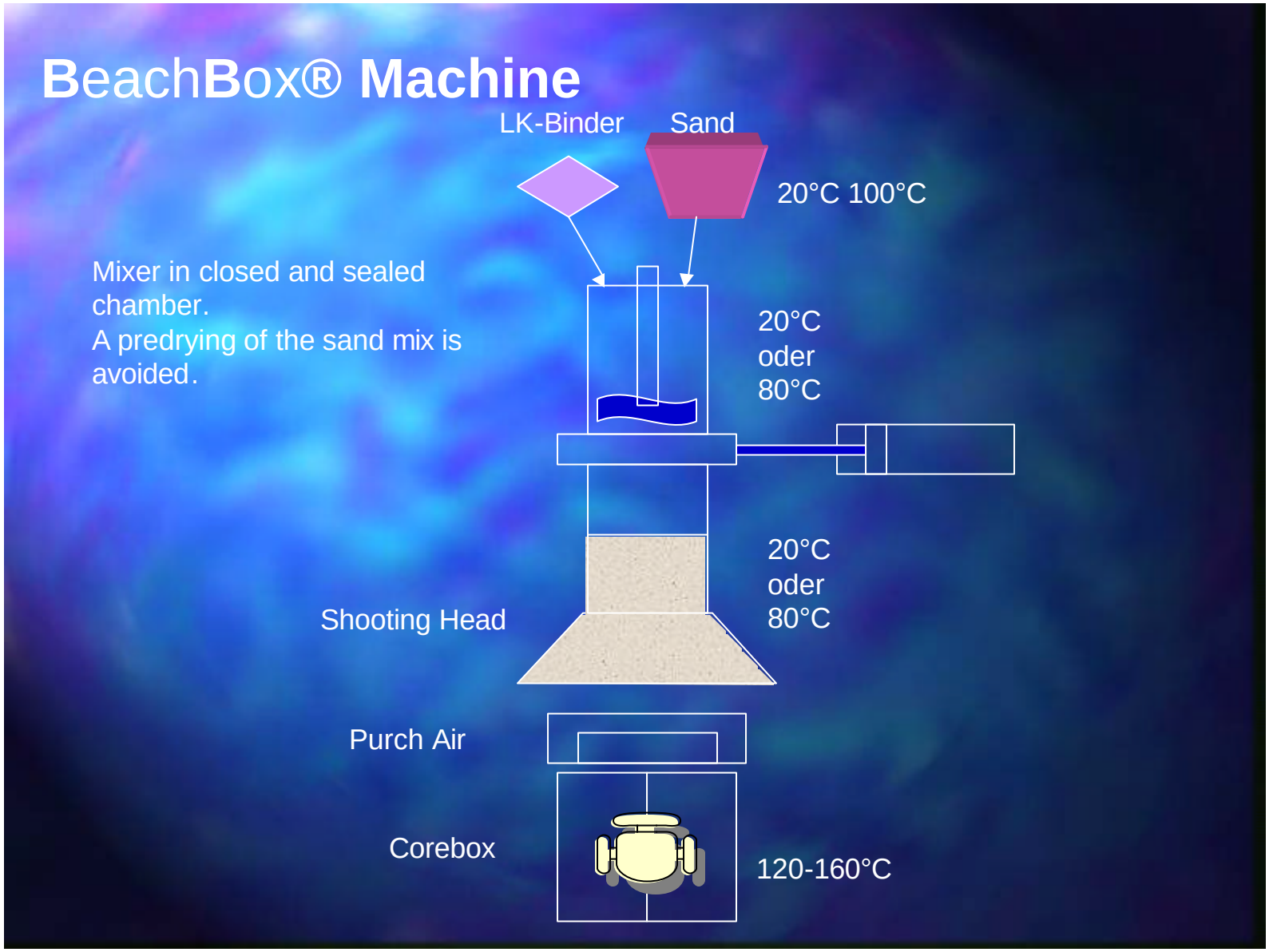
Cleaning of the Core Box

Only with water

and

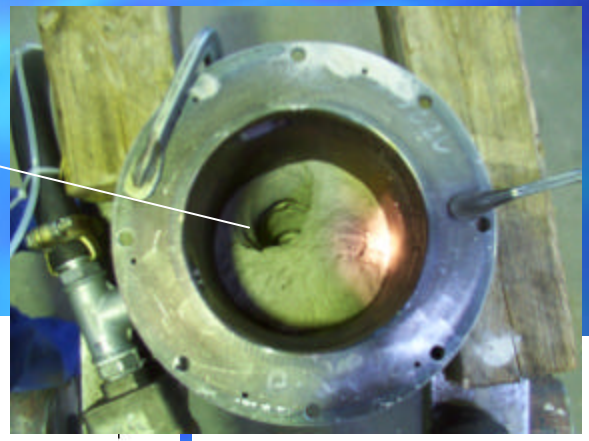
vacuum cleaner

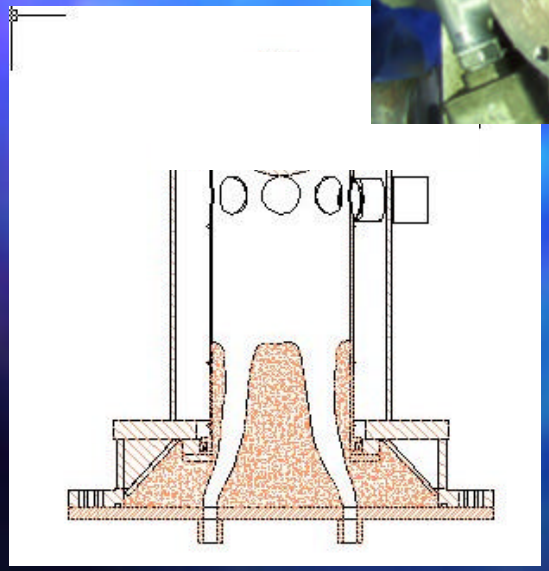
BeachBox® Machine



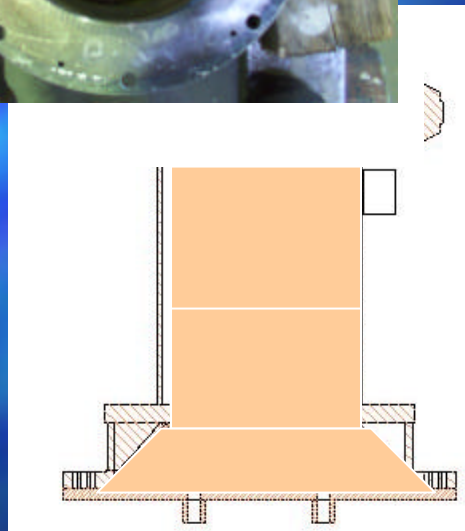
BeachBox
Modifications of the Corebox Machine

Kanalbildung

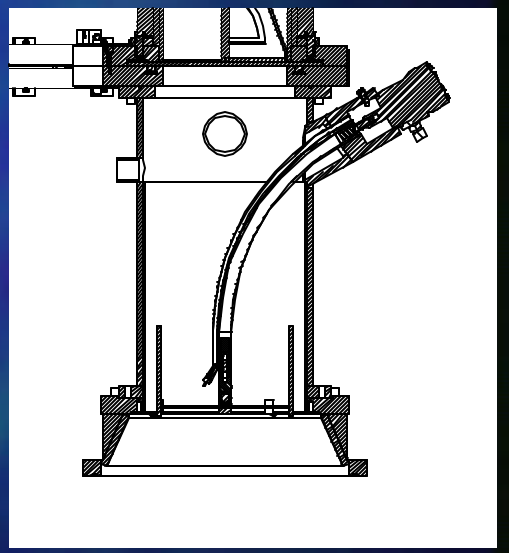




mit Schiessrohr



ohne Schiessrohr



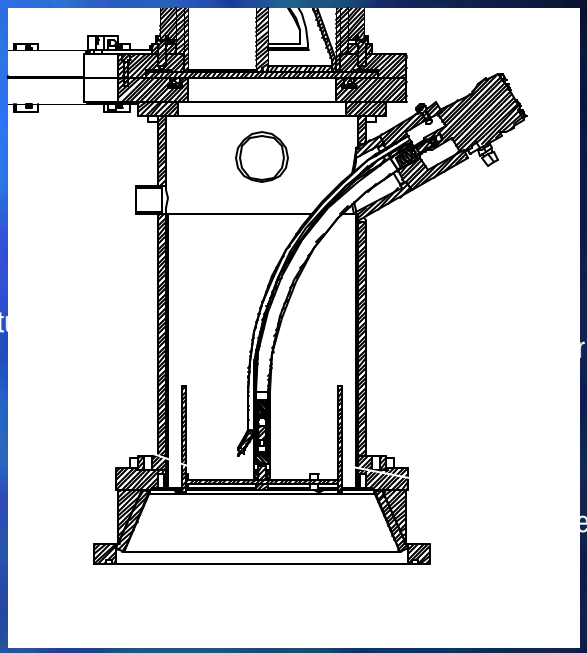
mit Brückenbrecher im Rohr

BeachBox
Modifications of the Core Shooter

Brückenbrecher in der Schiesseinheit

Teflonauskleidung der Schiesseinheit

Temperat
PT100



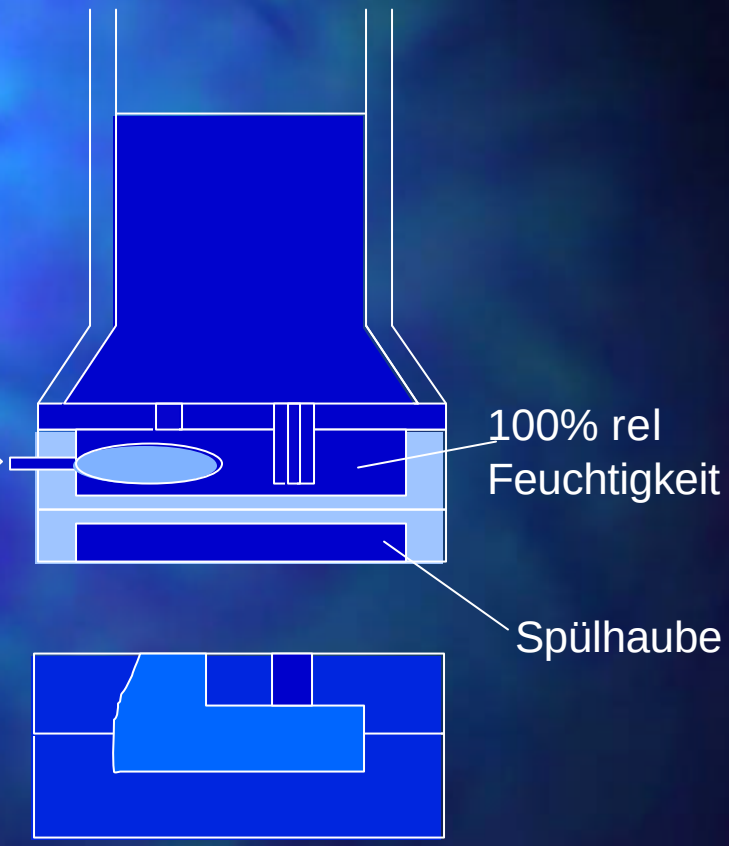
Vermeidung von Kanalbildung

Füllstandsmessung durch Drehmoment des Antriebsmotor

BeachBox
Modifizierung der Kernschiessmaschine

Vermeiden von
Austrocknung der
Schiessdüsen

Wasser
Zerstäuberdüse

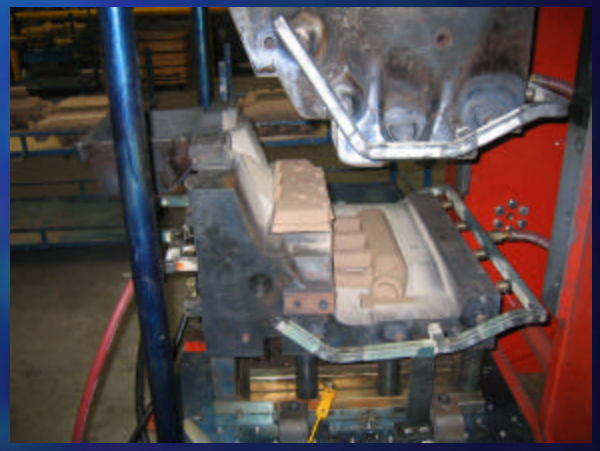


LK – Binder anywhere

Core package

Green sand

Die Casting



BeachBox with LK Binder

LBB 10

Saugrohre VW - DISA

Aufnahme Juli 2003

Core package by

Production Beach Box – LK Binder

Waterjacket

for Cylinderhead

Waterjacket for
6 Cylinder
Motorblock

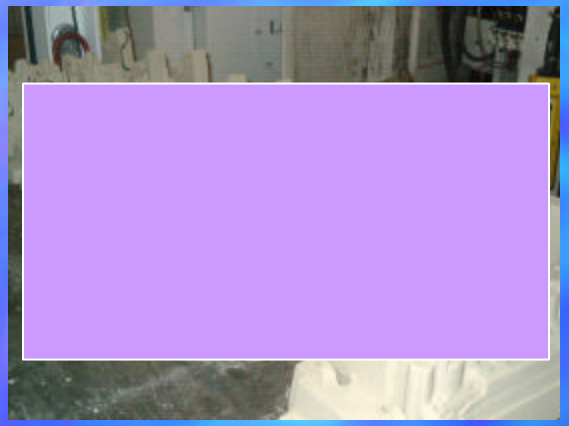
Motorrad-
schwinge

Core Production with LK-Binder incl. Sand Reclaiming by Mett Austr.

Mechanical Sand Reclaiming

click picture to start video

Core Production with LK-Binder



Deckkern in Serie Kernschiessmaschine LBB 25
Der Kernkasten ist durch Dampf beheizt.
Kernkastentemperatur 125°C.
Aushärtezeit 43 sec.
Gesamttaktzeit incl. Kernentnahme 58 sec.

Wasseranschluss (Mett, Australien) ca. **3500** Teile mit LK Binder produziert.
Kernschiessmaschine LBB10
Entkernzeit 5 sec auf konventionellem Rüttler.

Zum Vergleich Coldbox:
Gussteil mit Kern wurde erst im Ofen gebacken und dann im Rüttler mit 30 sec entkernt.

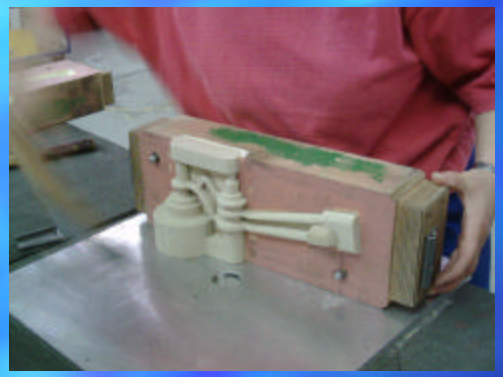
Production with LK-Binder on Laempe BeachBox

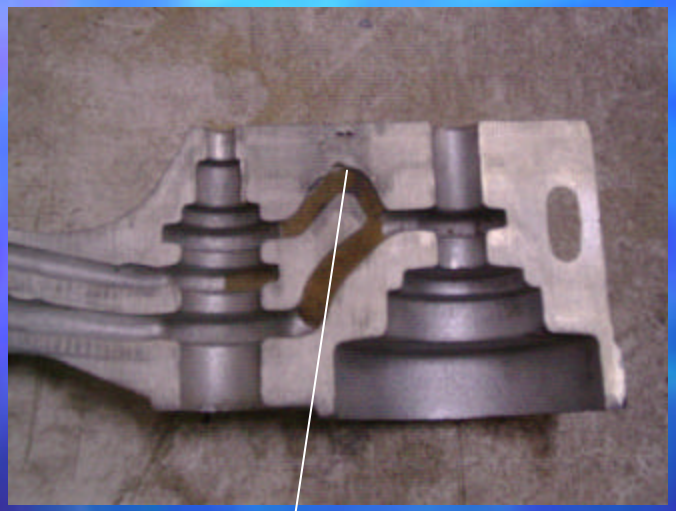
Serienfertigung von Saugrohren bestehend aus vier Einzelkernen

Kerne kleben mit anorganischem LK-Kleber

Production with LK-Binder on Laempe Beach Box

Production in wooden corebox with LK-Binder





Dasselbe Teil ist mit einem COLDBOX Kern nicht machbar gewesen. Der Coldbox Kern konnte nicht entfernt werden. Ebenso war das Gussteil schadhaft durch Gasentwicklung.

Der BeachBox Kern löste sich in Wasser innerhalb 30 sec vollständig auf und wurde ausgespült.
Keine Gasentwicklung.

Beach**B**ox - **LK**-Binder

Komatsu GGG

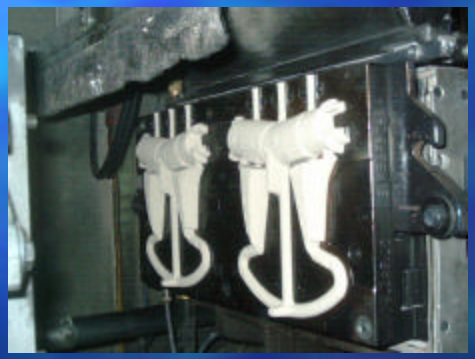
Honda

Beach**B**ox - **LK**-**B**inder

Corebox heating by steam

Aluminium
Motorblockfertigung

Core Production with LK-Binder on existing Hot Box Machines



„Everything works better with LK Binder and without smoke“

Advantages of the LK-Binders

- No smell during Core production
- No smell during casting
- No gas push during pouring
- No built up of condensate on the die
- No condensate or sand sticking on casting
- Easy decoring
- Easy regeneration of the sand
- No invironmental polution by emissiones

Advantages for the Process

- No Gasgenerator necessary
- No Amincleaner
- No Ventilation for Core production and whole casting process
- Easy decoring by common shakeout
- No thermal treatment necessary
- Good surfaces without coating of cores
- Easy cleaning of coreboxes and dies
- Longer lifetime of coreboxes and dies
- Totally less space required

Brass Casting

Beach_box_Brass_Caradon_Mira_Report.doc

Mould filling using a dezincification grade brass at 1000^{0}C

These pictures when compared to figure 12 showing the internal surface of the casting, show just how clean the surfaces of the casting…, there is **no sand burn on or penetration of the core surface at all**.

Dr Paul Lansdell C Eng. M.I.M.^{3} F.I.M.F. PhD BSc (Hons)
20th July 2003

Innovation Prize

Innovation Prize of Baden-Württemberg, - Dr.-Rudolf-Eberle-Preis - given for the **B**each**B**ox®-Procedure at 17. Novembre 2003

Beach**B**ox®

is recommended from:

Euopeean Commission Directorate - General JRC Joint Research Center, Sevilla als

Best Available Technique (BAT)

The Golden Future

for foundries

Beach**B**ox®

Laempe**K**uhs**B**inder®