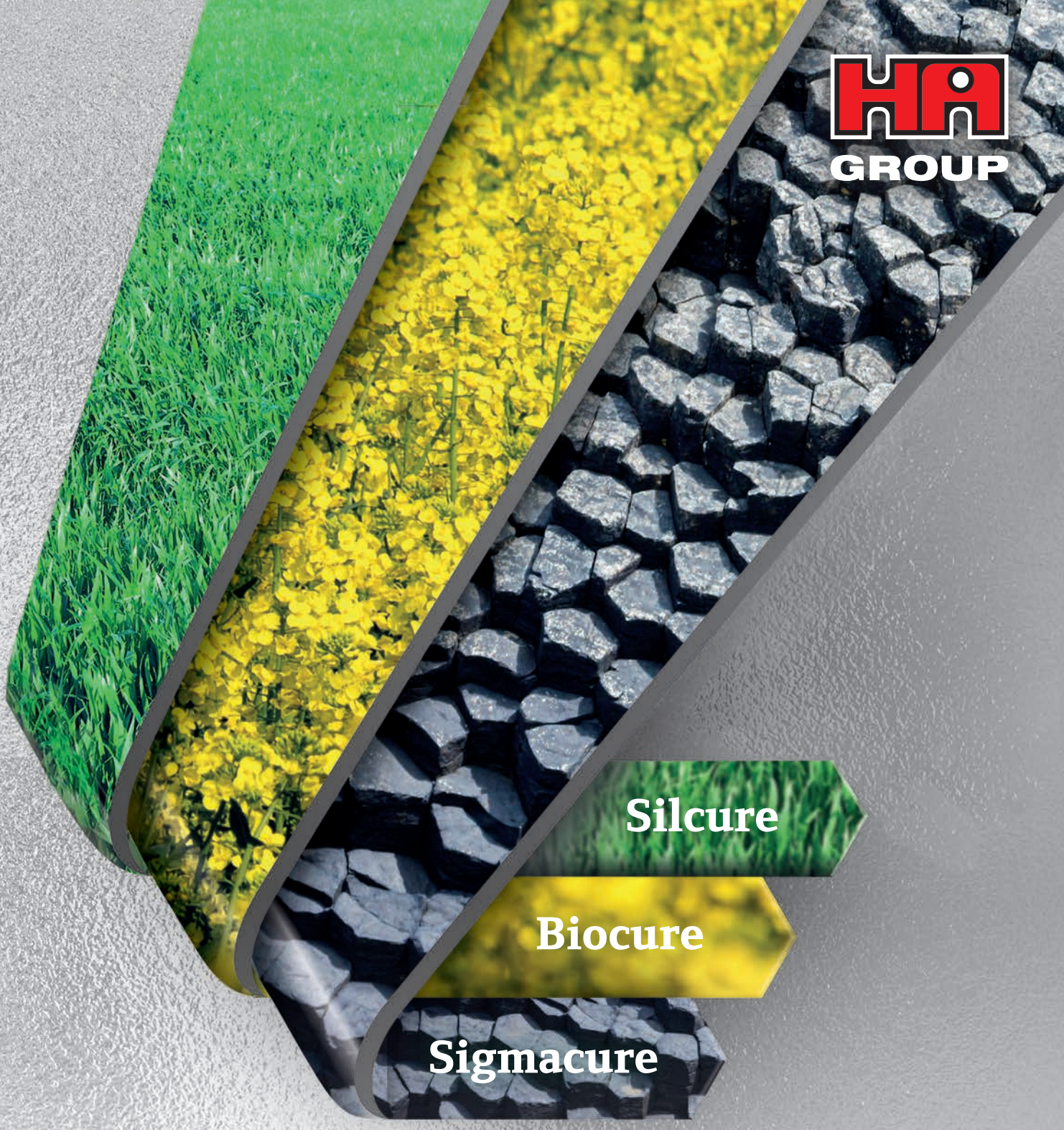
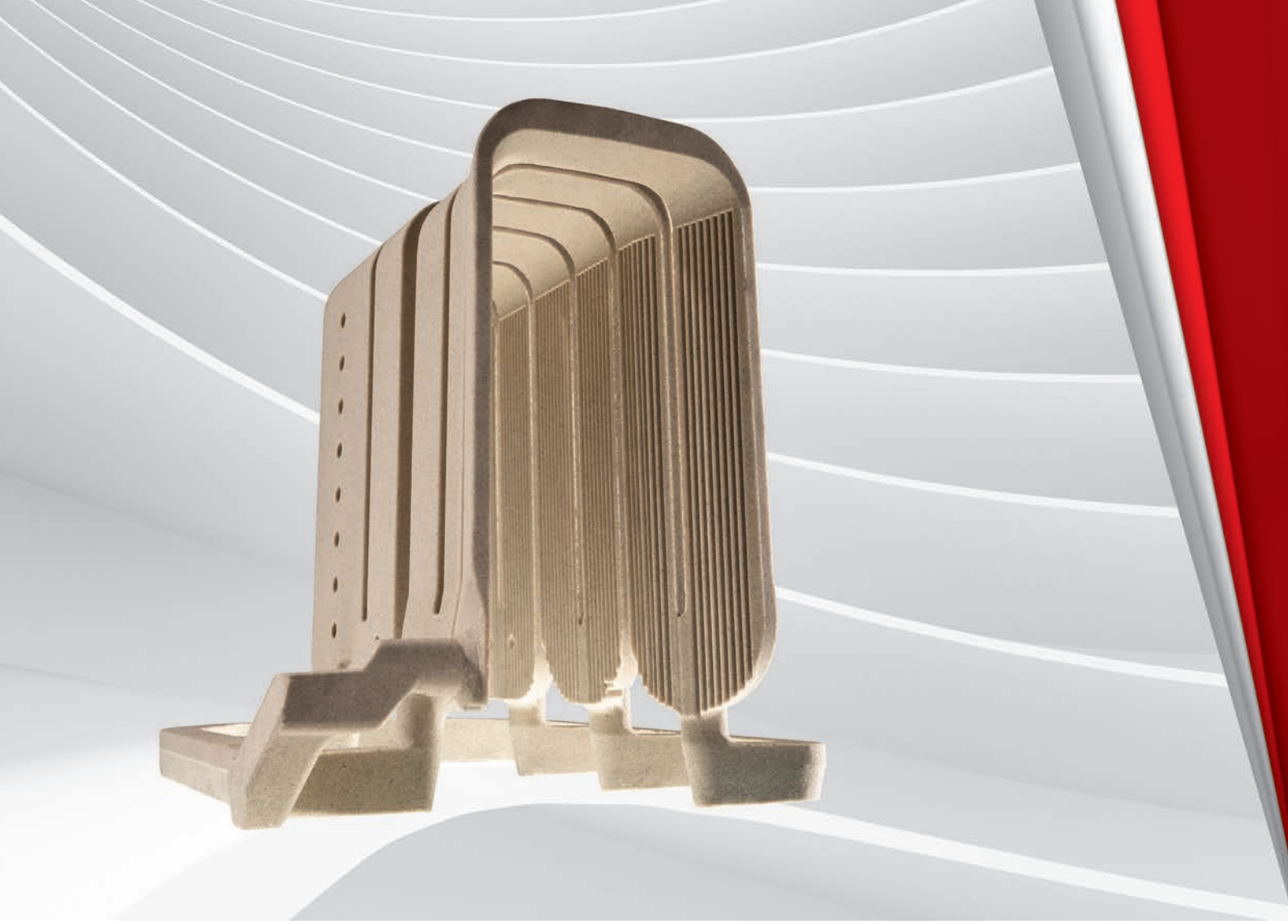


HA GROUP

COLD-BOX

New Names – Proven Products

New brand names make it easier to identify and select products



HA Cold-Box Binder Systems

New brand names make it easier to identify and select products

The Cold-Box process has been the leading core production process for series casting for 50 years. In sync with the further advances in castings for highly developed consumer markets, Hüttenes-Albertus (HA), as one of the leading foundry chemical suppliers, has continuously optimized its binder systems ever since. A comprehensive product range is now available, especially for the Cold-Box process, so that foundries can always find the optimum binder solution depending on the area of application and their individual requirements.

HA has launched a new global product name strategy to help its customers find their way around the Cold-Box product range. Traditional designations of the components “Gasharz” and “Aktivator” will be replaced by strong and memorable brand names, which allow the respective product type to be recognized at first glance.

Our new naming system, which is both logical and internationally understandable, makes it possible to clearly assign products to one of the four Cold-Box product classes offered by HA. The name affixes P1 and P2 differentiate the two parts of the Cold-Box system.

The Strengths of Cold-Box Technology

The Cold-Box system owes its position as the leading core production process to its wide range of applications, efficiency and cost-effectiveness. Excellent strength properties and very good dimensional accuracy mean that Cold-Box cores meet the growing demands placed on modern castings. Special technical criteria, such as elasticity, thermal stability and low gas generation, have also been continuously optimized. Innovative Cold-Box binder systems from Hüttenes-Albertus enable:

→ The highest levels of casting quality
→ Highly complex casting structures
→ Minimal wall thicknesses
→ Highly automated production
→ The casting of various alloys

From the foundry's point of view, the following production-related advantages also make a strong case for the use of Cold-Box technology:

→ No heated core box required
→ Flexibility when selecting the tooling material (plastic, wood, metal)
→ Proven, robust process
→ Fastest possible cycle times
→ Optimal decomposition properties
→ Good reclaimability of core sand
→ Excellent shelf life of cores
→ Lowest binder addition

Classification of HA Cold-Box products and new brand names

Type		Brand name	Example of implementation
Aromatic CB systems		**Sigmacure**	Sigmacure 138 P1 Sigmacure 238 P2
Aliphatic CB systems		**Biocure**	Biocure 855 P1 Biocure 325 P2
Silicatic CB systems		**Silcure**	Silcure 310 P2

Insights into Cold-Box Binder Chemistry

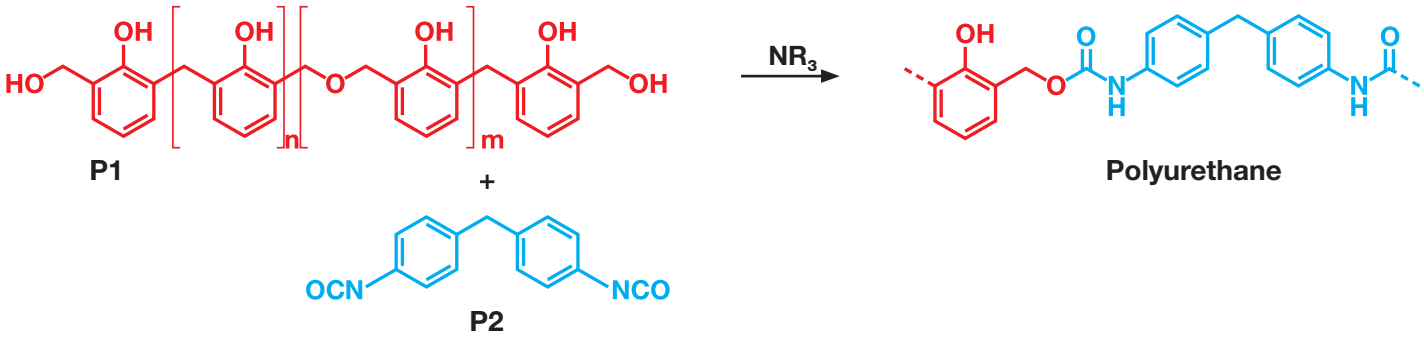
During the Cold-Box process, more precisely the Polyurethane Cold-Box process (PUCB), two binder components are added to the molding material – usually silica sand.

The first component of the binder is a condensed phenolic resin, traditionally dissolved in organic solvents. The second component is polyisocyanate dissolved in organic solvents. The resulting mixture is then highly compacted in a tool. In order to accelerate the reaction between the binder components, a tertiary catalyst in the form of amine gas is passed through the pores of the compacted core sand.

The hydroxyl-(OH-) group of the phenolic resin reacts with the NCO-group of the isocyanate to form a solid urethane polymer that bonds the individual sand grains together.

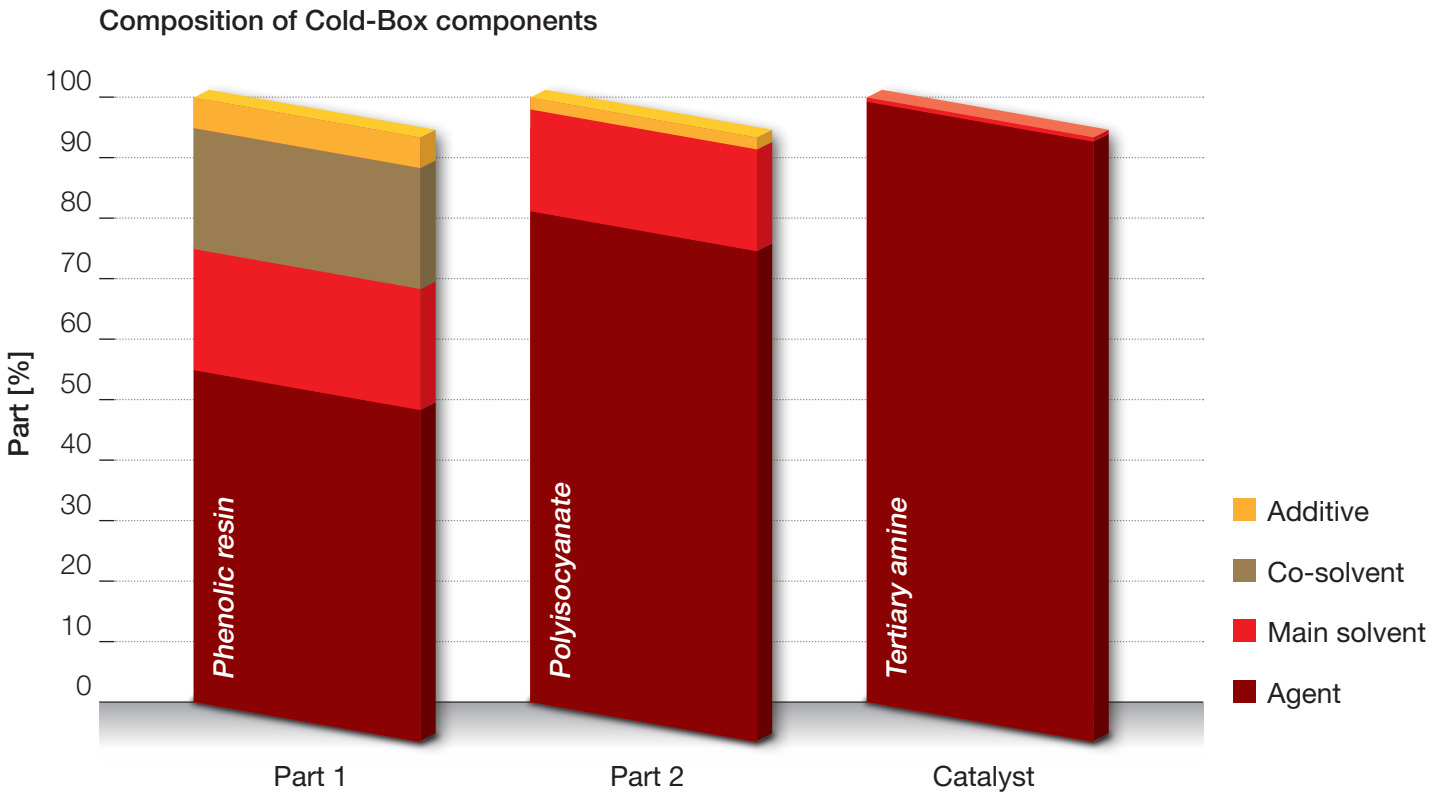
Both components can be modified with different additives in order to improve specific parameters and to adapt them to special foundry applications.

Chemistry of the Cold-Box binder system



Focus of Development: Improved Environmental Properties

An increasing challenge for foundries, however, is meeting ever stricter environmental requirements. Since emissions in the Cold-Box process are inherent to the system, efforts to further develop Cold-Box binders have focused not only on technological optimization, but also on improving environmental properties. For more than three decades, the research department of HA has been dedicated to reducing the environmental impact and emissions from its products. Our research and development aim to reduce emissions step by step through the reduction of organic components.



Solution Approaches

→ Performance improvement to allow for reduced quantities of additives
→ Replacing aromatic solvents
→ Substitution of harmful ingredients
→ Use of inorganic elements in organic binders
→ Use of additives that “capture and neutralize” contaminants

HA has successfully pursued all these paths in product development over recent years and decades, resulting in our three product types: Sigmacure, Biocure, and Silcure.

Sigmacure: A Robust Classic

Sigmacure is the universal classic product: a Cold-Box binder system in which the two components, phenolic resin and polyisocyanate, come dissolved in aromatic solvents. This system provides foundries with a product line whose efficiency is based on decades of experience.

Features:

+ High productivity, fast cycle times
+ Good processability, good sand durability even with moderate sand quality
+ Moisture resistant, even under difficult climatic conditions
+ Many variants for special requirements
+ Suitable for any existing equipment
+ High process safety

Biocure: Over 20 Years of Experience with Plant-Based Solvents

In 1996, HA was the first supplier in the world to launch a patented, more environmentally friendly Cold-Box alternative, which enabled both a reduction in odor emissions during core production and a significant reduction in BTX values (benzene, toluene, xylene) after casting. HA has replaced the aromatic solvents in Biocure products, for example, by using methyl esters that are obtained from plant-based, renewable raw materials such as rapeseed. Since the chained (aliphatic) molecules contain more hydrogen and less carbon, CO_2 emissions are also reduced.

Features:

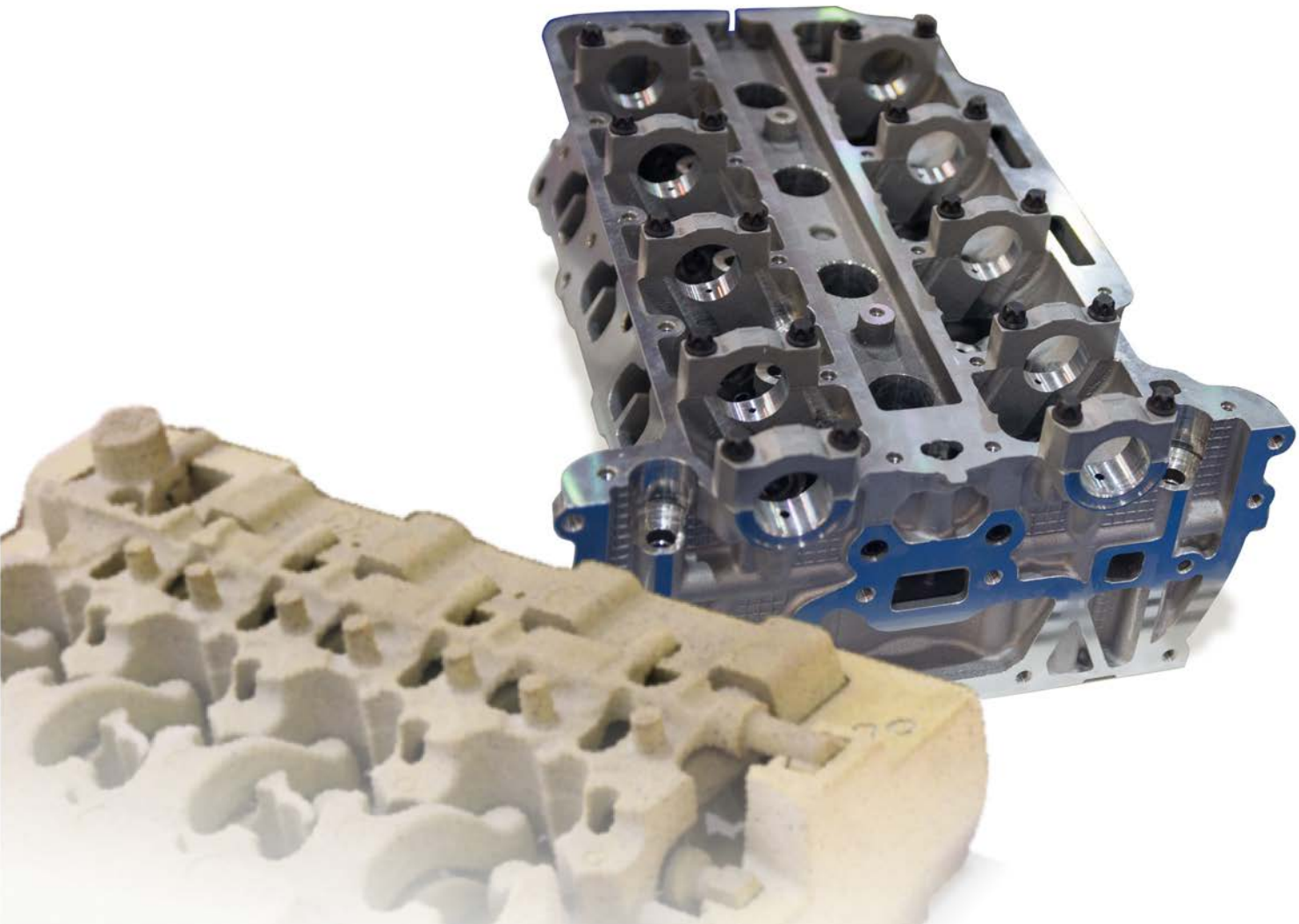
+ HA is the only manufacturer with more than 20 years of experience with plant-based CB
+ Use of renewable raw materials
+ Reduced BTX, BTEX and CO_2 emissions
+ Reduced odor during core production
+ Reduced catalyst consumption
+ Superior separation of core and tool
+ Elimination of casting defects such as erosion and scabbing due to high heat resistance
+ Excellent dimensional accuracy
+ Particularly suitable for casting in bentonite-bonded molding material

Silcure: Inorganic Elements in Solvent

In 1999, HA introduced Cold-Box systems with shares of silicate-containing solvents to the foundry industry. These solvents contain Si compounds in the molecule instead of hydrocarbons. A lower carbon content results in reduced BTX, BTEX and CO_2 emissions.

Features:

+ Significantly reduced emissions, fumes and odor during pouring
+ High thermal stability
+ Very low condensate formation, thus less cleaning effort
+ Low gas formation, thus fewer casting defects (scabbing, gas defects, pinholes)
+ Very suitable for die casting



Technological Milestones of the Cold-Box Process

Automation
Core shooting, handling, coating

Core Package Application
Very effective way to produce high quality products

Curing Technology
Developing and improving curing technology

Application of Water Coatings
Improved water and moisture resistance of the cores

Sustainability Milestones of the Cold-Box process

Reclaimability
Developing binder systems suitable for different sand qualities

Reduction of Organics
Silicatic CB Systems, inorganic additives

Reduction of Aromatic Solvents
Use of renewable resources

HARP (Amine Recovery Program)
Reduction of emissions saves crucial resources

Improved Workplace Conditions
Reduction of free monomers and harmful ingredients

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