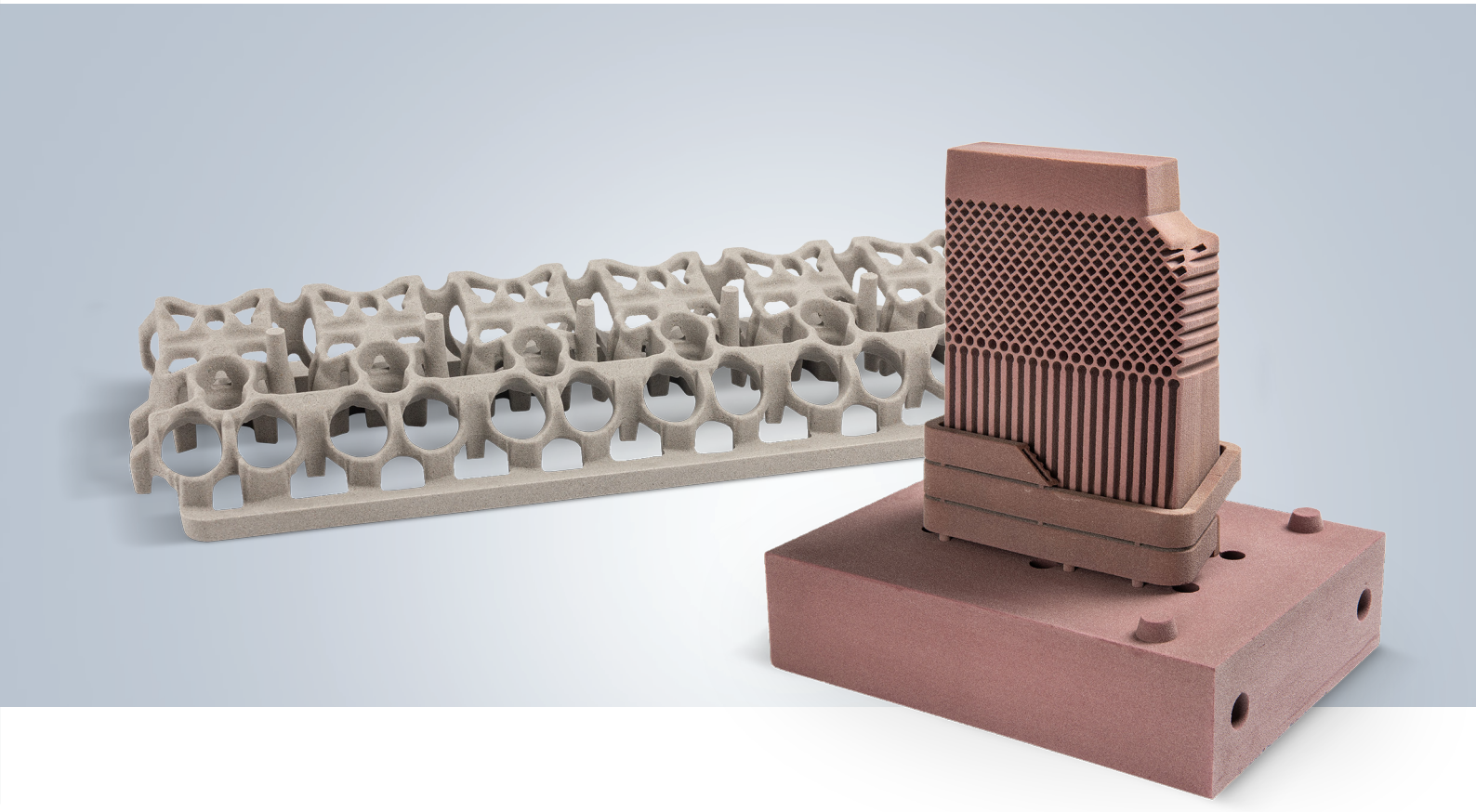
3D Binder Technology

Print head-compatible, dimensionally accurate and productive



ASKCHEMICALS

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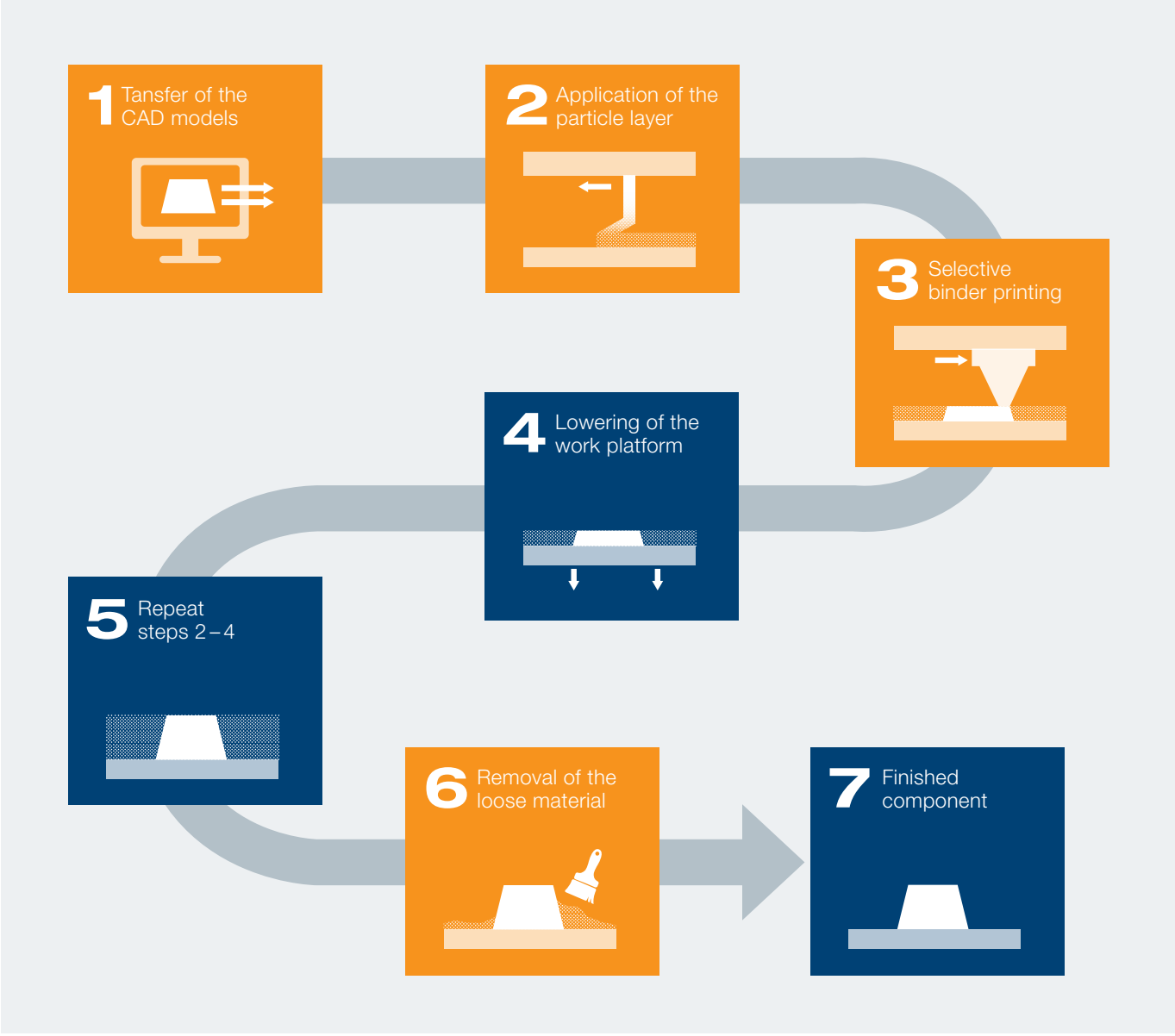
Print head-compatible, dimensionally accurate and productive

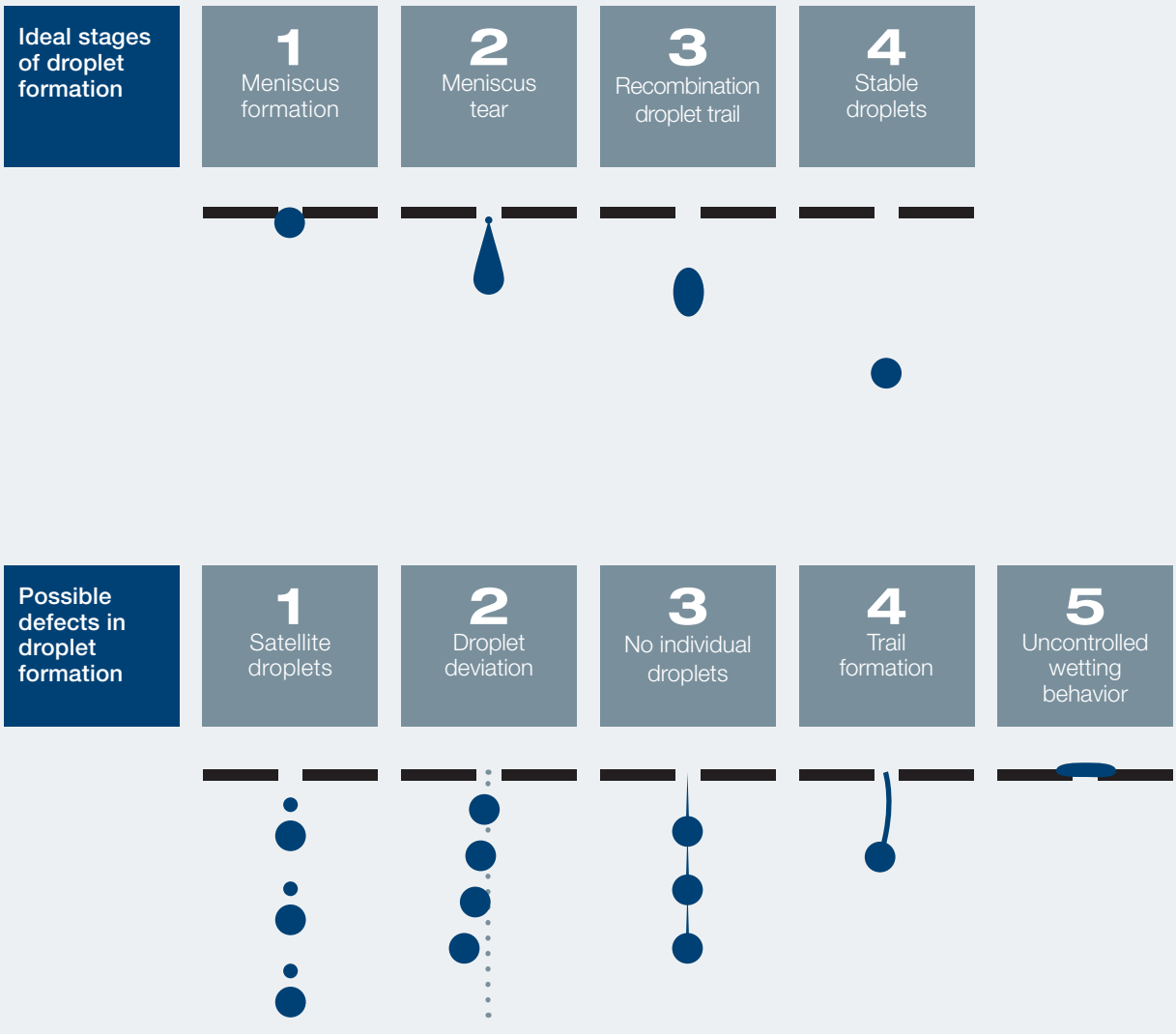
The 3D binder technology from ASK Chemicals combines the specific requirements of 3D sand printing with the high performance profile of ASK Chemicals binder technology. During 3D sand printing in the powder binder jetting process, cores and molds are created without tools on the basis of a digital 3D data model through layer-by-layer application of the mold material e. g. sand. The liquid jetting fluid is then applied point-by-point in layers to the area to be rendered in order to create the geometry predefined by CAD.

Process stages of the powder binder jetting process



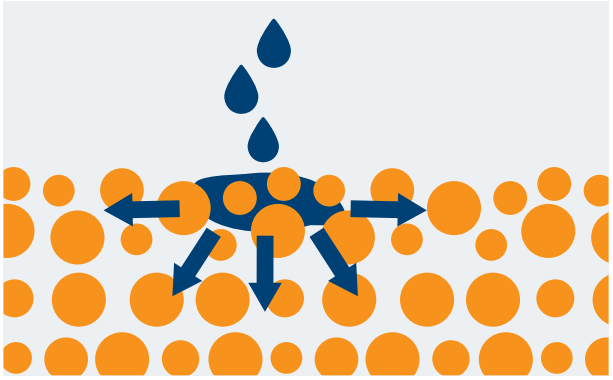
Droplet formation in 3D sand printing

Proper function of the print head modules that finely apply the printing fluid to each layer of sand is particularly crucial for the quality of the printed result. High material compatibility and resistance of the components installed in the print head modules with respect to the chemical components of the 3D printing fluid are thus essential. The physical and chemical parameters of the 3D printing fluid, such as the viscosity and surface tension, also influence droplet formation behavior and thus the dimensional accuracy of the additive core production process.

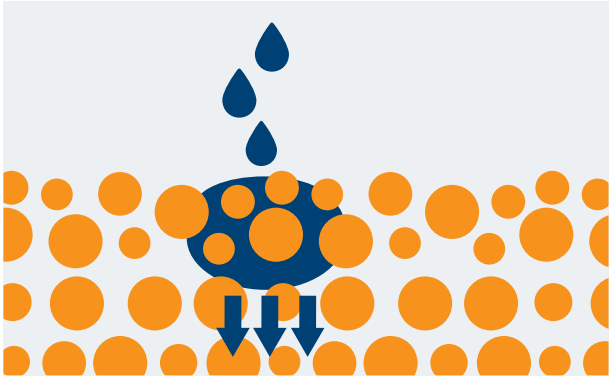


Dimensional accuracy in 3D sand printing

The dimensional accuracy of the components produced in the powder binder jetting process is a critical success factor in additive core production due to the absence of external contours, such as the molding box or core tool. Physical effects in particular must be overcome in this process to ensure high dimensional accuracy and low finishing effort of the components: an example is the migration of the fluid 3D binder agent to areas of the support sand due to capillary and gravitational forces or occurring shrinkage effects, which result from evaporation of the solvents of the 3D printing fluid in the printing process. These physical effects are in part counteracted through processing of the CAD data module.



Schematic representation of binder fluid migration due to capillary forces



Schematic representation of binder fluid migration due to gravity

3D binder technology in the additive core production process must satisfy the high thermal stability requirements to withstand the mechanical and thermal stress during the casting process so that cast products can be rendered with high dimensional accuracy.

ASK 3D binder portfolio

The 3D binder portfolio of ASK Chemicals includes inorganic 3D printing fluids as well as furan resin-based binders for acid curing and phenolic resin-based binding agents for cold curing.

Binder technology	Application	Casting material
INOTEC 3D	High-volume founders, prototype founders	Aluminum
CHEM REZ JETSET 3D	High-volume, low-volume, prototype founders	All types of casting
NOVASET 3D	High-volume, low-volume, prototype founders	All types of casting esp. steel and ductile cast iron

INOTEC 3D – The inorganic binder system for hot-curing additive manufacturing processes

INOTEC™ 3D

For light metal casting applications, we recommend our newly developed inorganic 2-component binder system consisting of the liquid INOTEC 3D printing fluid and the INOTEC PROMOTOR as fixed components.

The advantages of INOTEC 3D technology:

- Zero-emission core production, core storage and casting process in additive manufacturing
- Improves dimensional stability
- Less „finishing“ work on the printer sand cores
- Adjustable thermal stability through the choice of printing fluid
- Guarantees cast products with high surface quality and free from residual sand adhesions
- Microstructure with improved mechanical properties

NOVASET 3D – The new phenolic resin binder for cold curing

NOVASET 3D shows a unique print head compatibility, reduces the “finishing” work and increases productivity.

The advantages of NOVASET 3D technology:

- Good process stability
- Very good and clean casting surface
- Good thermal stability
- Nitrogen and sulfur-free, and thus particularly well suited to steel and ductile cast iron
- Very easy finishing

CHEM REZ JETSET 3D – The all-rounder under the furan binder for all casting types and dimensions

The versatile CHEM REZ JETSET 3D binder specifically developed for use in 3D sand printing is characterized by its print head compatibility

The advantages of CHEM REZ JETSET 3D technology:

- Easy print head cleaning
- Good process and printing stability
- Very long storage stability of the binder
- Applicable with all common mold materials
- Almost unlimited curing times
- Very efficient
- Very good storage capacity of the printed cores

Matching coating for organic 3D printing – VELVACOAT 3D

Specifically developed for 3D printing, VELVACOAT 3D convinces with very good fluidity and very quick drying. Air-drying is quick so that burning off is not necessary.

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