



- 1 *Lost foam salt cores with optionally variable porous supporting structure.*
- 2 *Lost foam salt core with corresponding die-casting, with a hollow after removal of the salt core.*

CAST SALT CORES

To date, the production of salt cores has been predominantly limited to very simple geometries without undercuts in cases where the salt cores proper are produced by chill casting or die-casting. This is attributable to problems, such as shrinkage on cooling and a high susceptibility to cracking, when these methods are used. So far it has not been possible to produce salt cores with complex forms by casting in this way.

Complex salt cores with LOST FOAM

By adapting the lost foam process, researchers at Fraunhofer IFAM have succeeded in producing geometrically complex salt cores for light alloy casting. Using this method, the production of undercuts in the salt core is just as possible as the production of hollow structures inside the core.

Solid shell – porous core

One special feature of the production of salt cores using the lost foam method is that it enables the production of supporting, spongy and porous inner structures combined with a closed, solid outer shell. The advantages of this include easy removal of the lost core and low weight, while at the same time less salt is required for core production with this technology. The surface structure of the salt cores can be varied as required and, for example in media-conducting ducts (oil channels, water jackets, etc.), the flow properties can be selectively influenced.

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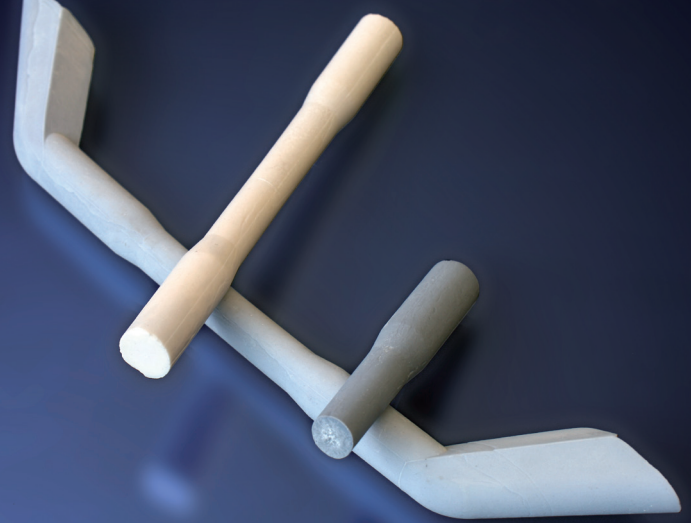
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The LOST FOAM method

The lost foam method is an economical production technique for the casting of parts with unusually complex geometries that cannot be produced by other casting methods. The geometric freedom of design of the process is used to selectively produce salt cores with complex shapes, hollows, undercuts or porous supporting structures combined with a sturdy, closed outer shell. The lost foam method thereby offers a high level of flexibility with respect to the size of the salt cores and the intended production volumes. The production of small filigree structures is just as possible as the creation of large core structures weighing up to 50 kg. Applications lie in particular in the prototype sector and in the production of small and large series. The production of solid cores known from the "lost core" die-casting process is just as attainable as the production of cores with internal hollow structures.

Risk of corrosion is eliminated

Due to the process technology used, the lost foam method requires neither permanent molds nor casting chambers of tool steel, both of which suffer greatly from the corrosive and aggressive salt melts used during the production of salt cores by die-casting. There is less wear, and hence maintenance costs for plant engineering are reduced.

Salt cores in low-pressure die-casting

In addition, Fraunhofer IFAM pursues further innovative approaches to the production of salt cores. Apart from the lost foam, die-casting, salt cores will also be produced by low-pressure die-casting in future. The focus lies on the development of an alternative production method to die-cast salt cores and the production of complex salt cores.

Particular advantages of low-pressure die-casting include a high and reproducible casting quality due to the laminar and controllable mold filling of the salt melts, reduced corrosion of the plant equipment due to an encapsulated furnace chamber, and the ability to produce hollow-cast salt cores.

Consultancy and project development

The Fraunhofer IFAM offers consultancy as well as the planning and conducting of development projects in the field of salt core technology. The lost foam, low-pressure die-casting, mold-casting, precision-casting and gravity die-casting methods can be used in the casting technical laboratory. Prototypes and functional specimens for salt cores are available, and we also plan and conduct specimen series.

Our offer

The Casting Technology department at Fraunhofer IFAM provides support and assistance for the whole field of cast salt cores:

- Brainstorming and project consultancy
- Development and characterization of salt mixtures
- Casting simulation of cast salt cores
- Production of salt cores using the lost foam, low-pressure die-casting, mold-casting, precision-casting and gravity die-casting methods
- Characterization of salt cores (microstructure, mechanical testing, pore analysis, etc.)
- Casting trials with salt cores in metallic melts

Further information can be found on our website

www.ifam.fraunhofer.de

- 3 *EPS model and lost foam salt core.*
- 4 *Diez samples produced from various salt mixtures by mold casting.*