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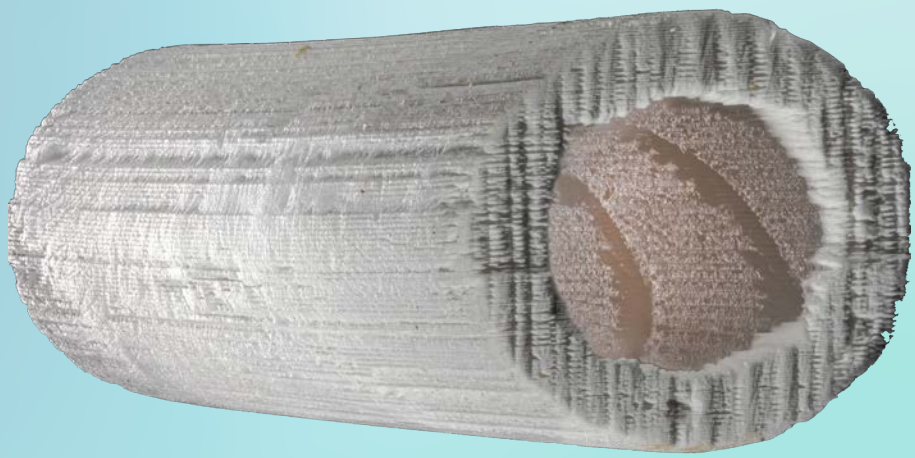


ceramic casting core with predetermined breaking points ©Fraunhofer IGCV

Slurry-based 3D printing for casting applications

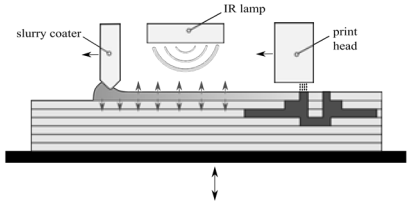
High-strength collapsible ceramic cores for contour-close coolings

High-resolution digital code tags for part traceability

3D printing of sand molds and cores is a key process in foundry applications and is already used in series production. However, the design of cavities is limited by the low (hot) strength and the achievable surface quality is restricted as only relatively coarse sands can be processed.

Slurry-based 3D printing enables the production of mechanically and thermally stable casting cores with predetermined breaking points for realizing highly complex internal contours in cast components.

Instead of dry sand, fine quartz powder dispersed in an aqueous suspension is applied in layers, dried and printed via binder jetting.



process scheme ©Fraunhofer IGCV

Erhard et al. (2022). Evaluation and optimisation of a slurry-based layer casting process in additive manufacturing using multiphase simulations and spatial reconstruction. In: Prod. Eng. Res. Devel. 16, 43–54

A 3D printing test setup developed at Fraunhofer IGCV enables the development of suitable 3D printing process parameters. The roughness depths of slurry-based 3D printed test specimens were reduced by ~ 90% compared to sand cores and the final strengths were adjusted to 25 MPa via sintering. Mechanical de-coring is facilitated via imprinted predetermined breaking points.

Slurry-based 3D printing technology can also be used to produce filigree barcode inserts for flexible part marking to ensure traceability of castings.

3D printed barcode inserts ©Fraunhofer IGCV

Contact

Patricia Erhard
+49 (0)89 350946 125
patricia.erhard
@igcv.fraunhofer.de

Fraunhofer Institute for Casting, Composite and Processing Technology IGCV
Lichtenbergstraße 15
85748 Garching

www.igcv.fraunhofer.de/en

gtm München Gießereitechnik
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