

Compound Casting of Sheet Metal and Aluminium Casting with Additively Manufactured Lost Sand Moulds

Steel-Al-Compound Zone
©Fraunhofer IGCV

Recently, stricter environmental laws and increased environmental awareness further drive the trend towards lightweight automotive construction. This challenges casting technologies in the industry and development facilities to meet the requirements.

Sheet Metal Compound Casting

In compound casting, an insert, usually a sheet metal or formed component made of steel or a wrought aluminum alloy, is in the mould and is cast on or around the liquid aluminum. Composite casting creates a bond between the casting and the sheet structure, eliminating the need for downstream joining operations.

However, several challenges make forming a material bond in sand casting difficult. In steel-Al composite casting, these include the poor wettability of uncoated inserts, the different thermophysical properties between the material pairings and the formation of brittle intermetallic phases.

In aluminium-aluminium composite casting, the oxide layer also reduces wettability and prevents the formation of a material bond due to its high melting point.

Hybrid manufacturing processes such as composite casting with additively manufactured lost moulds can contribute to producing topology-optimised sheet metal-light metal cast structures using unique process control. The degrees of freedom with additively manufactured lost sand moulds offer the possibility of exploiting design, material and process-related lightweight construction potential. Influencing variables in the manufacturing process play a central role here. These degrees of freedom are being intensively researched in the scientific field of casting technology to offer sustainable solutions.

Contact

Christopher Locke
+49 (0)89 350946 129
christopher.locke
@igcv.fraunhofer.de

Fraunhofer Institute for Casting, Composite and Processing Technology IGCV

Lichtenbergstraße 15
85748 Garching | Germany

www.igcv.fraunhofer.de/en

gtmmünchen
Gießereitechnik
Fraunhofer IGCV | TUM UTG