Network
BEAM MELTING NETWORK

The Beam Melting Network was founded in 2010 by a group of enterprises and research institutions. Until 2013, it was funded within the Central Innovation Program SME (ZIM) by the German Federal Ministry of Economic Affairs and Energy (BMWi).

The network bundles know-how for the beam melting technology in a unique way and therefore covers the full process chain, ranging from powder production, machine development and manufacturing, technology development and process optimization to applying beam melting technology in several industrial key sectors (mold and die making, automotive engineering, agricultural engineering) and in manufacturing services (prototyping and small batches).

This network aims to further develop the beam melting technology including peripheral processes, clustering SMEs, large industry and research institutions, to open up new fields of application for beam melted components. In this context, to jointly gain and increase know-how in beam melting is in the center of attention of the network’s activities.
Technology
BEAM MELTING

Beam melting technology is an additive manufacturing process and is also known as metal 3D printing or SLM. In this process, the physical object is formed by the addition of single volume elements. 3D CAD data of the component to be produced are used as a base for beam melting and all other additive manufacturing processes.

In the next step, with the help of special software, this data set is sliced into single layers which have a thickness between 20 and 100 μm, depending on the requirements. Afterwards, metallic powder is being applied upon a build platform in the beam melting machine according to the selected layer thickness. Subsequently, the layer geometry is being melted with the help of a laser or electron beam. In the next step, the platform is being lowered according to the layer thickness and new powder is being applied upon the previously melted and solidified layer. Then the next layer is being melted which simultaneously coalesces with the before melted layer. These processes will now be repeated indefinitely until the last layer was melted. Layer by layer, a three-dimensional object has been created.

The powder locally melts completely and subsequently solidifies into a fully dense structure with 99.5 to 100% density. Beam melting technology can process standard metal alloys, including different stainless and tool steels, aluminum and titanium alloys, cobalt chrome as well as high-temperature-resistant nickel-base alloys (Inconel).
Products
PRODUCTS

Beam Melting Technology can be industrially applied for manufacturing of prototypes, mold and die inserts with complex cooling systems as well as serial components in small production volume. Beam melting technology enables manufacturing of particularly complex geometries such as undercuts, internal hollows and delicate structures, which could hardly or not at all be produced by conventional manufacturing methods. Ideally, components for this manufacturing process are characterized by a high degree of geometrical complexity with comparably low volume. Examples for this are medical technology applications such as patient-specific implants or special surgery tools, mold and die inserts with complex conformal cooling systems, e.g. for plastics injection molding, components for the aircraft or the motorsports industry as well as metallic prototypes for all types of application. Moreover, beam melting technology allows manufacturing of topologically optimized components and lattice-like structures.
PARTNERS

The partners united within the Beam Melting Network represent the beam melting technology ranging from the machine and powder production to the application in the service sector and the product utilization. The majority of the network partners are SMEs complemented by large enterprises and research institutions.

A further strengthening of the network should not only involve the steadily intensifying cooperation of the network partners but also the targeted expansion through new partner enterprises. If your company is interested to cooperate within our network, please do not hesitate to contact us.
The Beam Melting Network is coordinated by the Fraunhofer Institute for Machine Tools and Forming Technology IWU, a research and development partner in the field of production technology for the automotive and machine tool industry. Dr. Bernhard Müller and Thomas Töppel act as network managers.

**CONTACT**

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