



- 1 Aircraft engine with high-temperature bearings. (Image: © MEV-Verlag, Germany)
- 2 Graphite pre-form infiltrated with aluminum.

## INFILTRATION OF POROUS MATERIALS: METAL-GRAPHITE COMPOSITES

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### Motivation

The demand for performance and efficiency increases in bearing applications, for example for increased rotational speed in aircraft turbines. In this case higher operation and emergency mode temperatures need to be possible. Bearings currently consist of, among others, polyimide, a polymer material that can be used at higher temperatures yet begins to degrade during use and thus does not offer sufficient reliability. To increase the service life of bearings, for example in aircraft engines, novel temperature-stable materials are necessary.

### Bearings for the high temperature range

At Fraunhofer IFAM in Bremen, the current research efforts of the Casting Technology and Lightweight Construction department

focus on the infiltration of porous graphite. The resulting metal-graphite composite material is specifically designed for use in high-temperature bearing applications. To this end, graphite with various porosity levels is infiltrated with aluminum or magnesium alloys in a high-pressure casting machine under high process pressures and temperatures. Both the material and the process parameters need to be developed and adapted to fulfil the specific demands of the composite material.

### Infiltration of porous materials

Besides the infiltration of porous graphite, at Fraunhofer IFAM there also exist technologies for the infiltration of diverse porous materials such as metals, plastics or ceramics with lightweight metal in order to optimize their application-specific properties.