APPLICATION**NOTE**

Liquid Metals – LFA

Liquid Metals – Cast Iron

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Sample Holder for Liquid Metals (Sapphire)

Reduced development times and costs, optimization of manufacturing processes and lower masses in spite of increasingly higher demands on thermally stressed components are important goals of the automotive industry. For example, numerical simulations are used to predict the temperature distribition within the engine components during the casting process.

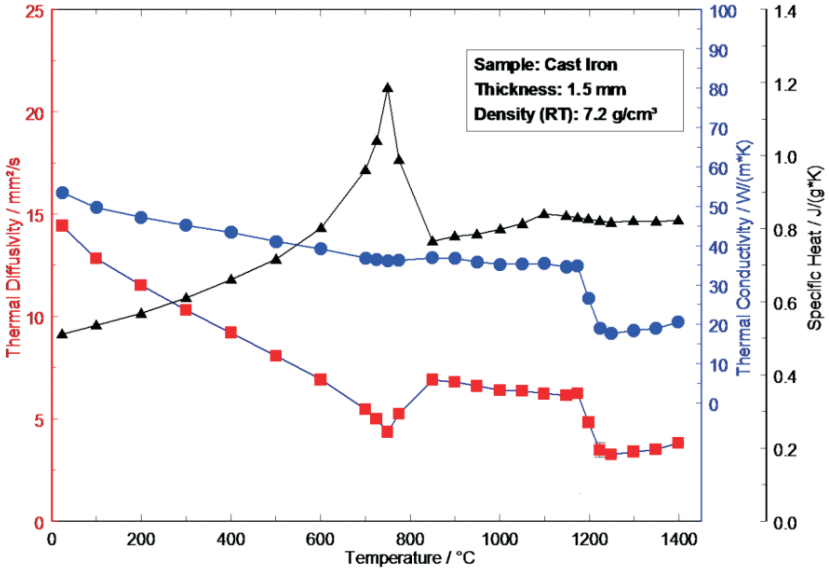
A basic necessity for this is the knowledge of the thermophysical properties of the casting material over the entire temperature range. In this application note, the results for the measurement of the thermophysical properties of cast iron are presented. The LFA measurements were carried out using a special sapphire container for measurements of liquid metals. The sapphire container ensures defined dimensions of the liquid.

Measurement Conditions

- Temperature range: RT to 1400°C
- Sample holder: Sapphire for liquids meatls
- Sample thickness: 1.5 mm
- Sample surface preparation: Sandblasted
- c_p from DSC, standard used: Sapphire

Results

The thermal diffusivity and specific heat capacity(measured with a DSC) show a typical behavior with peaks at the Curie transition (2nd order phase transition). The thermal conductivity decreases nearly continuously up to the melt. A typical step in the thermal diffusivity/conductivity was detected for the phase transition (solid/liquid) above 1150°C. The reason is that the lattice structure collapses during the phase transition.



1 LFA results for cast iron, red: thermal diffusivity; blue: thermal conductivity; black: specific heat capacity

The example clearly demonstrates that the LFA method is not limited to solid materials with defined dimensions. Using the sample holder for liquid metals, the measurement of iron alloys is possible also within the liquid phase.

NGB · Application Note 011 EN · 0923 · Technical specifications are subject to change.

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