High-output heater to heat molten aluminum

Heater output quintupled by high-density packing of high thermal conductivity ceramic filler

We have developed a high-output heater to heat molten aluminum. The developed heater uses a ceramic heater tube with excellent corrosion resistance against molten aluminum, packed to high density with high-thermal-conductivity ceramic filler particles. This structure improves the heat transfer from the heater element to the molten aluminum thereby achieving a quintuple increase in heater output in comparison to a conventional heater. This high output will allow reduction in the number of heaters required for heating molten aluminum and is expected to contribute to the reduction of heater equipment and to energy conservation in the metal casting industry.

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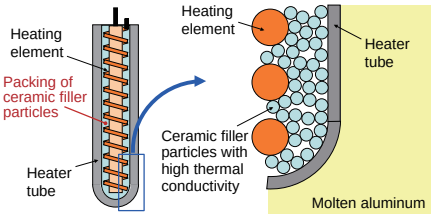
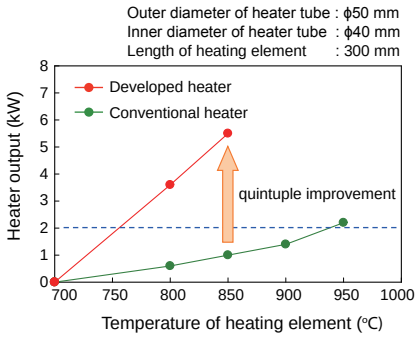
AIST TODAY Vol.14 No.11 p.13 (2014)



Schematic diagram of the high-density packed high-thermal-conductivity ceramic filler particles



Results of heater output test

Extrusion process for long-fine Mg alloy tube with high dimension accuracy

Enables the development of biodegradable Mg-based stent

Magnesium (Mg) alloy has attracted attention as a biomaterial for biodegradable stents. However, it is difficult to fabricate a long-fine Mg alloy tube precisely because of its low-plastic deformability. Additionally, conventional extrusion using a porthole die has problems in making extruded tubes with thin wall thickness and homogeneous microstructures.

We have developed a precise extrusion method without the porthole die for long-fine Mg alloy tubes with high dimension accuracy. The Mg alloy tube (meter-length scale, 3.0-3.4 mm in tube diameter) fabricated by the developed extrusion method had low wall thickness error below ±4 % and a homogeneous fine grain structure. On the other hand, the Mg alloy tube fabricated by conventional extrusion using the porthole die had welding lines and an inhomogeneous grain structure and segregation around the lines.

The developed extrusion method is expected to be used in developing biodegradable Mg alloy medical devices.

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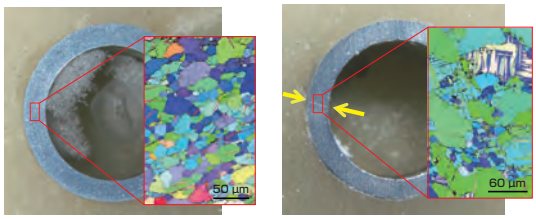
AIST TODAY Vol.14 No.12 p.13 (2014)

Long-fine Mg alloy tubes fabricated by developed tube extrusion method



Cross-sectional microstructures of Mg alloy fine tubes
Developed method (left), conventional method with a porthole die (right) and the arrows indicating the welding line