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# Effects of Hollow Structures in Sand Mold Manufactured Using 3D Printing Technology

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## Abstract

The performance of 3D printed sand molds with internal hollow structures was studied. The influence of the internal hollow structures (a single layer air cavity or multilayer air cavities) on heat flux was theoretically analyzed and numerically simulated using COMSOL software. Better insulation effect was achieved by reducing the cavity spacing, and multilayer air cavities performed better than a single layer air cavity. 3D printed sand molds with these hollow structures for a stress-frame casting and a bar-shaped casting were designed and poured with aluminum alloy A356 melt. The solidification time of the riser surrounded by three layers of air cavities was prolonged by over

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