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Permeability and Strength of a Porous Metal Structure Fabricated by Additive Manufacturing

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Abstract:

This paper looks at the gas permeability of the porous structure of an injection moulding die fabricated by selective laser sintering (i.e., additive manufacturing), and how this is affected by the laser conditions used. The metal powder used is a mixture of alloy steel, copper phosphorous and nickel powders with an average particle diameter of 25 μm. A fibre laser (wavelength 1070 nm) is used to consolidate the metal powder, thus making any differences in the consolidation of the metal powder strongly related to the energy density under which it is irradiated; varying from fully melted to a fully sintered condition with decreasing energy density. The permeability of compressed gases is found to