

Hot Isostatic Pressing (HIP) of Castings to Improve Quality and Material Properties

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Hot Isostatic Pressing, HIP, is a method to apply a high pressure, typically 7,500 – 30,000 psi, at elevated temperatures, typically 700F up to 4000F, to eliminate voids in the material, like pores and gas bubbles, for increased material properties, i.e fatigue, tensile strength and elongation, and remove cracks and to reduce scrap.

Another advantage with HIP is the heat treatment that can be performed at high pressure, compared with traditional sintering and annealing methods where you either have lowered pressure in vacuum sintering or annealing furnaces where you operate at 1 atm. Even furnaces with slightly increased pressure like sinter-HIPs, the applied pressure is typically 700 psi, the advantages reached at higher pressures are far better.

For example, the scatter of data is dramatically reduced, the rapid quenching in a HIP gives less distortion and lowers residual stresses so the material can be machined without intermediate stress relief heat treatment.

This paper will present the results from HIPing and heat treatment of Aluminium castings, where the material properties are significantly improved

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Materials

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