

Expanding HIP Applications as a Manufacturing Process by Overcoming the Long Existing Technical Barriers

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Recently, a Center of Excellence (CoE) in Hot Isostatic Pressing (HIP) has been established at the Ohio State University tasked with overcoming the long existing technical barriers to the use of HIP for critical applications and exploiting fully the advantages afforded by powder metallurgy processing. In particular the current research has been aimed at minimizing the influence of prior particle boundaries (PPBs) in Ni-base superalloys and obviating the deficit in fatigue properties in PM HIPed Ti-6Al-4V.

The main tasks of the COE are: i) the development of quantitative cost models; ii) the development of a physics-based computational modeling scheme that will permit the accurate prediction of the shape of tooling that will result in a given near-net shape of a component; iii) the development of an understanding of the variation in mechanical properties; iv) the development of solutions to technical barriers that limit the use of HIP for rotating components; v) development of techniques to permit the enhancement of local properties in components; and vi) the development of transfer functions that allow properties obtained from sub-scale parts to predict accurately those of large components. The paper presents and discusses the solutions achieved.

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Materials

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