

## Potential of Green Sand Rice Husk Ash Mould as Carbide Deactivator in Thin Wall Ductile Iron

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**Abstract:** Thin wall ductile iron (TWDI) components are prone to massive carbide precipitates and non-nodular graphite in the as-cast microstructure. Precipitated carbide phase is brittle and damaging to mechanical properties of the iron matrix. The non-nodular graphite reduces nodularity ratings, ductility, tensile and fatigue strength. The use of cast 2 mm TWDI for automotive parts' applications is limited owing to the above short comings. Moulding sand thermal characteristics is vital in defining the solidification kinetics of a cast part, which in turn determines the evolving microstructure and mechanical properties. Modification of the thermal properties of moulding sand mix for the production of sound 2 mm TWDI castings in automotive applications is expected to suppress these microstructural features that limit this profile application. Efficient monitoring of cooling rate of solidifying cast parts will be a useful step towards controlling and tailoring cast TWDI properties to desired application. This study presents the effects of 1- 6 wt.% rice husk ash (RHA) additions to moulding sand on microstructure (Optical and SEM) and mechanical properties of cast 2 mm TWDI. RHA significantly reduced carbide precipitates in microstructure of cast 2 mm TWDI parts, also castings with nodularity ratings ~ 90%, high nodule count > 1,000 nodules / mm<sup>2</sup> and high strength of 564 MPa were obtained at 4 wt. % RHA addition. High ductility of 4.7 occurred at 6 wt. % RHA addition.

**Keywords:** Cooling rate, mould sand mix, microstructure, nodularity, mechanical properties, thermal properties