

Effect of Magnesium Inoculation on the Microstructure and Mechanical Properties of a Spheroidal Cast Iron Knuckle: A Focus on the Steering Arm

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Abstract : The steering knuckle is an integral component of the suspension and stability control system of modern vehicles. Good mechanical properties with an emphasis on the fatigue properties are essential for this component as it is subjected to cyclical load of significant magnitude during service. These properties are a function of the microstructure achieved in the component during the various manufacturing processes including forging and casting. The strut mount of the knuckle is required to meet specified microstructure and mechanical properties. However, in line with the recent trend of stringent quality requirements of cast components, Original Equipment Manufacturers (OEMs) have had to extend the specifications to other sections of the knuckle. This paper evaluates the effect of cored wire inoculation on the microstructure and mechanical properties of the steering arm of a typical spheroidal cast iron component. The investigation shows that the use of a cored wire having higher rare earth content formulation could possibly lead to a homogeneous matrix containing consistent graphite nodule morphology. However, this was found not to be the condition for better mechanical properties along the knuckle arm in line with required specifications. The findings in this paper contribute to a better understanding of steering knuckle properties to allow its production for safer automobile applications.

Keywords : inoculation, magnesium cored wire, spheroidal graphite, steering knuckle

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