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Abrasion behaviour of cryogenic treated permanent moulded austempered ductile iron

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Content :

Austempered Ductile Iron (ADI) has emerged as an alternate engineering material in recent years owing to its excellent combination of high fatigue strength and superior wear resistance properties. They are being majorly used in railroad, agricultural, military, automotive, mining and power plant applications. ADI when produced with permanent molds has better advantages such as better surface finish, fine graphite nodules and better dimensional stability. Review of literature has revealed that cryogenic treated ADI samples have resulted in changes in its microstructure and wear properties. The austenite in the matrix gets transformed to a hard and brittle phase of martensite. In the present experimental work, permanent mould austempered ductile iron (PMADI) samples austempered at 350°C for 60, 90 and 120 minutes were subjected to cryogenic treatment at -175°C for 36 hours in specially designed cryotreatment unit. These cryotreated samples were then tested for rubber wheel abrasion wear. The results have indicated that PMADI samples austempered at 350°C for 90 minutes have shown about 8 to 10% superior abrasion resistance as compared to samples austempered for 60 and 120 minutes. The results are discussed in terms of structure property correlation, austempering time and cryogenic treatment. This work aims to stabilize the optimum heat treatment parameters for developing a wear resistance material for industrial applications.

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