

## **Influence of Intercritical Austenitizing Temperature and Different Quenching Medium on Mechanical Properties and Wear Behaviour of Dual Matrix Structured Ductile Iron**

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**Abstract :** An investigation was performed to study the effect of intercritical austenitizing temperature and quenching medium on the martensite volume fraction of ductile iron (DI) with dual matrix structure (DMS). For this purpose, alloyed ductile iron (3.61 C wt. %, 2.1 Si wt. %, 0.2 Mn wt. %) is partially austenitized in two phase region ( $\alpha$  -  $\gamma$ ) at temperatures of 785<sup>o</sup>C and 815<sup>o</sup>C and subsequently samples were quenched into two different medium water and oil. Dual matrix structure (ferrite -martensite) ductile iron with different martensite volume fraction was obtained. Samples were tested for ductility, tensile strength and wear phenomena. The result shows that the volume fraction of ferrite and martensite can be controlled to influence the strength and ductility. Optical micrographs and X-ray diffraction pattern shows that with the increase in intercritical austenitizing temperature (ICAT) and degree of cooling rate, martensitic volume fraction increases. The resistance to weight loss and tensile strength increased and ductility decreased with increasing martensite volume fraction. Among the samples, the highest weight loss was obtained for the sample austenitized at 785<sup>o</sup>C oil quenched; however the weight loss was approximately linearly to the applied load. The worn surface was studied under SEM photographs, it was found that wear mechanism is mainly caused by the delamination of the subsurface.

**Keywords:** Ductile iron, Dual matrix structure, Martensite volume fraction, Weight loss.

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