

# Wear Behaviour of different Grades of Spheroidal Graphite (SG) Cast Iron

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**Abstract**—*In the current scenario the demand for spheroidal graphite SG cast Iron components is on continuous rise due to its excellent metallurgical/mechanical properties at low production costs. In view of this it is necessary to improve the wear properties of SG Iron components used in critical applications like automobile sector where components are subjected to severe wear conditions. In past many researchers have worked on improving wear properties of SG Iron by addition of alloying elements. In this project wear behaviour of different grades (420/12, 550/6 and 600/3) of SG iron with variable copper and manganese content have been studied by using Reciprocating friction monitor (Magnum Eng.) with a ball on disk arrangement. Microstructural characterization through SEM was carried out to investigate wear mechanism in different samples. Optical microscopy was carried out to find out the various phases and their volume fractions in samples from all grades by using microscope with an inbuilt image analysis software which makes acquisitions as per ASTM standards. The wear volume and wear surface characteristics were measured by profilometer (3 D surface profilometer). It was observed that the samples from different grades show different wear characteristics. 420/12 grade was found to wear more as compared to 550/6 and 600/3. The hardness values suggest that there is an inverse relationship between the hardness and wear volume. Wear volume of  $0.415 \text{ mm}^3$  was observed in 420/12 whereas 550/6 has  $0.0479 \text{ mm}^3$  and 600/3 has  $0.0188 \text{ mm}^3$  respectively. It was evident from SEM micrographs that the wear mechanism in case of 420/12 samples was predominantly abrasive with deep ploughing grooves whereas, in case of 550/6 samples the ploughing grooves were not as deep as in case of 420/12 samples. The wear mechanism in case of 600/3 was both abrasive and adhesive, it was observed that the material from the ball has adhered on the surface of sample due to high hardness. Therefore, it is evident that the wear properties of materials improve with the increase in hardness and pearlite fraction in spheroidal graphite cast iron.*

**Keywords:** *Spheroidal Graphite cast iron; Wear; Phase fraction; Hardness; Pearlite.*