Comparative Analysis of the Machinability of Compacted Graphite Iron vs Ductile Iron

Overview
Quaker Chemical is a producer of machining coolants that are currently being used in industry. The company is constantly researching new solutions to industry problems, and in this case, is investigating the machinability of Compacted Graphite Iron (CGI.) A series of turning tests with constant cutting parameters was performed in order to collect and analyse data regarding the machinability of CGI as well as ductile iron grades 80-55-06 and 65-45-12 with the use of three of Quaker Chemical’s coolants.

Objectives
The overall goal of this experiment was to determine whether or not there was a significant difference in the performance of the coolants provided in regards to machinability of each of the three materials.

Approach
- Selected cutting tools for turning operation: Kennametal CNMA KCK05
- Determined cutting conditions by using several “practice” runs
- Machined all three materials using each lubricant
- Examined cutting tool after each machining pass to measure tool wear using a microscope
- Measured surface roughness after each pass
- Conducted several statistical analysis of the experiment including ANOVA and Gage R&R
- Performed a microstructural analysis of each machined material

Outcomes
After the completion of the project, it could be seen that several conclusions were able to be drawn:
- There was no significant statistical difference between the coolants
- There was a statistical difference between the materials
- Although no statistical differences could be seen between the coolants, there was a graphical finding that showed tool life will be longer for 80-55-06 and CGI when using Quakercool 7020 (human error incorporated)
- In the future, experiments should be performed with one material, so as to capture more data and perform and adequate analysis