Project Summary and Recap

Of the course of the semester, a team consisting of Akeem Spencer, Tim Messman, Samir Shahani, and Ian Davis were required to determine if there were any variations between the 380, 356, and 319 test blocks in regards to the machinability and the mechanical testing of each specimen. The teammates devised a strategy to test the mechanical properties by conducting a series of hardness tests and ultimate strength tensile tests.

In a fashioned timeline, the teammates created a cutting fluid in order to have accurate data measurements from the CNC machine. The fluid was made up of 7% QUAKERAL 380D diluted in 50% tap water and 50% distilled water. The coolant was then pumped into a reservoir tank and the cutting program devised by the help of Mr. Dan Supko, Mr. Randy Wells, and Dr. Edward DeMeter was a success for the drilling and extrapolation of cutting force data measurements from the dynamometer instrument. The CMM machine program was effectively installed by Tim Messman in order to get 92 cylindricity and hole diameter readings in the Metrology lab in room 231 Leonhard. After the CMM measurements were completed, the profilometer was used along the cylindrical hole wall of each block 31 times. Finally hardness measurements and UTS tests were conducted using the machines in the FAME lab. The hardness test used a brinell standard and the UTS was performed by a standard strain gage machine.

With all the output parameters (cylindricity, actual hole diameter, surface roughness, and the cutting force), the values were statistically analyzed using minitab and Microsoft excel.

Conclusive evidence from ANOVA analysis confirms the proportionality of hardness vs tensile strength increases linearly. Through the mechanical features, the effects of cutting force causes a weighty variation on hole diameter and cylindricity. Evidence pinpoints that cutting force does not cause a weighted shift on surface roughness. Between the lots of 356, there are very large variations for surface roughness, but the cylindricity and hole diameters are very minimal for variation.

With regard to the team, the project was greatly appreciated to be brought into our hands. We took great time and effort analyzing the data and frequently calling the sponsor weekly to receive guidance. In the world of companies we will prosper and thrive to succeed in, this project showed us the value of time management, cost analysis and teamwork. Even if we had contrasting and different ideas, constructive criticism was beneficiary to us in order to gain a better scope of the project. We would like to give a sincere gratitude to Mr. Michael Immel, Dr. Edward DeMeter, Mr. Dan Supko, and Mr. Randy Wells, Dr. Bob Evans, and Mr. Edward Platt for guiding us to correctly fix the machines and operate machinery in the FAME lab.