Overview
Quaker Chemical is a publically traded, international producer of lubricants for industry. At their test facility in Conshohocken Pennsylvania, engineers evaluate the performance of their fluids. Using a process known as interpolation milling, the Penn State Capstone team tested the performance of two Quaker cutting fluids, statistically validated the findings, and designed an experiment for implementation at the Quaker facility.

Objectives
The objectives of the project stemmed from a design of experiment to test the performance of the coolants with regard to tool wear. Tool wear and results were plotted, fit with a regression line, and statistically validated. Quaker received the machining G-Code, research into methods, and project observations.

Approach
- Researched machining method
- Confirmed with sponsor the test parameters to ensure viability and align with goal of project
- Became certified in a machining center
- Wrote G-Code and developed a program to cut test holes in blocks
- Measured and recorded tool wear after each hole machined
- Utilized Minitab software to fit regression lines and confirm tool/wear relationship
- Examined microstructure and material properties of metals post-machining
- Recorded general observations on coolants and the test process
- Communicated via conference call with sponsor to inform on progress and keep focus on objectives

Outcomes
- Quaker Chemical has the research and tools necessary to implement this test at their facility.
- The knowledge of the process will aide Quaker in communication with their own clientele.
- Regression equations provided will lay the framework for evaluation of future test runs performed independently by Quaker Chemical.

MACHINING OF 80-55-6 DUCTILE IRON & 304 AUSTENITIC STAINLESS STEEL USING INTERPOLATIVE MILLING FOR LARGE DIAMETER HOLES