Quaker Chemical Corporation

**Overview**
Quaker Chemical Corporation’s goal was to determine how well their coolant, Quakercool 7450, worked with aluminum alloys. Aluminum 319-T6, 356-T6, 380, and 6061-T6 were all tested. Average hole diameters for both drilling and reaming, forces required to cut, and reamed hole surface measurements were obtained to determine machinability of each alloy with respect to alloy type.

**Objectives**
Determine the machinability of each alloy with the coolant Quakercool 7450, and also determine which alloy works best with the coolant.

**Approach**
- Conduct a controlled machining procedure to drill, ream and tap the blocks
- Study the holes in the metrology lab to measure diameters and cylindricity
- Compare each alloy’s average hole diameter, average surface finish, and average forces to cut for both drilling, reaming, and tapping per block, then across alloys to determine any differences between blocks and between alloys. Variance was also taken into account, as well as performing one-way ANOVAs on each block.
- Carefully examine tool wear and take pictures for comparisons after machining
- Team tested each alloy with tensile test to determine ultimate tensile strength and young’s modulus
- Hardness values were determined using Brinell and Rockwell tests
- Microstructure of each alloy observed through optical microscope
- Observe how material analysis data correlates with drill force data
- Determine machinability of each alloy in reference to other alloys.

**Outcomes**
Finally, list the outcomes for this project making sure to clearly convey their implications for the sponsoring company:
- It was determined that the Al 356 had the most consistent data from both the drilling forces and material analysis.
- Al 356 seems to be the optimal alloy to use if you are drilling and using Quaker cool 7450.