Overview
The Quaker Chemical Team analyzed the performance of two coolants, Quakercool 7450 and Quakercool 7450-S, in their performance when face milling two bimetal systems. The systems were comprised of ductile or gray cast iron with aluminum 356. Insert wear, surface roughness, burr formation, and microstructure development were examined in the experiment.

Objectives
- Design of a face milling test
- Study of the machinability differences between the two bi-metal components
- Study the machining performance of two metalworking fluids in the bi-metal face milling operation.

Approach
- The scope of the project was determined in our first meeting with our sponsor
- The team became familiar with equipment in the FAME Lab through safety training
- The team reviewed ISO 8688, a standard on measuring tool wear for face milling
- The team prepared coolants and charged them into a CNC machine after cleaning it
- Rigs were constructed to hold the bimetal during machining and the cutter head during insert inspection
- After a test trial, the face milling parameters were chosen for the rest of the trials
- Tool wear and surface roughness data were collected and analyzed
- Milled-surface samples were cut from machined pieces for further examination
- Samples were mounted, polished, etched, and viewed using optical microscopy
- Samples were tested for hardness on the milled edge and in the bulk

Outcomes
- Quakercool 7450-S extends tool life relative to 7450 in this face milling operation
- Ductile cast iron causes more insert wear than gray cast iron
- The milling operation created a surface layer with increased hardness relative to the bulk material
- Microstructure and surface hardness were not a function of the coolant used.