Overview
These days, the material of diesel engine blocks, grey cast iron is being replaced by CGI (Compacted Graphite cast Iron) due to its higher strength and better properties. However, CGI has low machinability and tool costs become higher. In order to solve this problem, better machining fluid which reduces tool wear must be developed.

Objectives
Quaker has developed a new lubricant to reduce tool wear in the machining of Compacted Graphite Iron (CGI) and other cast irons. Our goal is to determine if Quakeral (new lubricant) has better performance for machining of CGI, grey cast iron and high molybdenum cast iron than Quakercool (old fluid) does

Approach
- 276 holes drilled and reamed in each metal with each fluid using a CNC machining center
- Flank wear area on drills measured
- Thrust and torque forces collected
- Measurements of hole form (diameter, cylindricity, roundness) and surface finish (Ra)
- The hardness of each metal measured
- The microstructure of each metal observed and analysed
- Paired t-test conducted for thrust force, hole form and finish

Outcomes
- New fluid improved tool wear rate for each metal significantly
- New fluid did not change hole form quality
- Old fluid was better at surface roughness
- Microstructure analysis showed high molybdenum cast iron was segregated resulting in an influence on drill force
- Lower tool wear rate does not necessarily mean lower thrust force