Machining Valve Seats

Overview:
The team worked with Quaker Chemical Corporation to machine valve seats using three different lubricants provided by the company: Microcut 3680, Quakerol 381-SD and Quakercool 7035. The cutting inserts used to machine a 45-degree chamfer on the valve seats are very specialized and expensive. For this project, the cutting tool used must feature PCBN Borazon coating on the cutting surface, as that is the particular coating used by many automotive manufacturers. The team will measure surface finish, flank wear, and use observations to compare the chemicals.

Objectives:

1. Develop a machine test which uses relevant conditions and a plunge cut to machine powdered metal valve seats

2. Test the three given types of lubrication for wear rate improvement while maintaining adequate surface finish requirements

3. Recommend a lubrication that yields the best results for use in this process.

Approach:

- Weekly conference calls with Dr. Bob Evans
- Developed a program used by the turning center to cut the seats
- Did pilot testing to determine if program was correct and to gather initial information
- Prepared the lubricants exactly to the sponsors specifications
- Machined the valve seats with aid from the techs in the lab
- Used profilometers with description from professor
- Used Minitab to analyze our results

Outcomes:

- The group used $764.58 of the company budget
- According to our results, there was no clear lubricant that could be used, but the team has recommended that the company use the experiment that the team developed to do further testing