Oil Ring Testing Rig

Overview
Flowserv currently has no method to determine how much oil is delivered to the radial ball bearings via oil rings in their various pumps. The purpose of this project is to design build and test an oil ring testing rig. This design must be test various parameters to mimic the conditions of Flowserv’s pumps and determine how much oil passes through their bearings.

Objectives
The group’s objective was to design and build a functional testing rig. Preliminary testing was also to be done using the rig. The rig is to be delivered to Flowserv’s R&D department were more extensive testing will be performed using the Oil Ring testing Rig.

Approach
- An initial trip to Flowserv occurred where information was gathered regarding the customer needs, project scope, and project objectives.
- Weekly conference calls occurred to coordinate between students and sponsor and to stay on task.
- Initial concepts were generated and selected using quality function deployment (QFD) and concept scoring.
- A patent search was performed resulting in no current designs matching our needs.
- 3-D models were created in Solidworks.
- All parts to be ordered were first approved by the company sponsor and then purchased.
- Fabrication was performed in the learning factory to make the custom shaft, bath housing, bearing housing and belt cover.
- Design improvements were made as new challenges presented themselves, such as fitting the oil ring in the bearing housing and cooling the pillow block.
- Assembly occurred in the learning factory after all parts had arrived. Assembly was approved during a sponsor visit to Penn State
- Design was verified by using existing research and measuring the speed of the oil ring via a stroboscope.
- Testing was done using a Taguchi array to determine the most efficient oil delivery conditions.

Outcomes
- The testing rig was delivered to Flowserv where further testing will occur using this rig.
- Flowserv has begun to build a larger testing rig using concepts similar to this design with a $100,000 budget.
- This project was the first time an oil ring was observed in the same conditions as a pump. It is also the first device to measure the oil to pass through ball bearings in this system.