Automated Centering Of Bearing Rings On Machine Tools

Overview
Currently the Timken Company uses a Manual Process (an employee) to center bearing rings on a magnetic chuck. Timken is looking for an automated process, which replace the manual process and provides a more accurate result.

Objectives
To construct a prototype of an automated centering device. This device must center a bearing ring on a magnetic chuck within a 50 µm accuracy in less than 1 minute without obstructing the workspace.

Approach
• The customer needs and requirements were gathered by directly speaking to the sponsor and discussing the design goals.
• The team generated many concepts and designs, before settling on the final concept which was the best design that fit the project goals.
• The team searched for relevant patents, which used the same feedback algorithms to control the position and center different items.
• The sponsor company is based in Ohio, so all information and data were sent through email and discussed via Skype calls.
• A CAD model was created and updated until we approached the final version.
• Most of the design parts were assembled, only two aluminum plates were machined and three parts were 3-D printed.
• The testing was performed on 3 types of bearing rings.
• A dial Indicator was used to validate the test results and each test was timed. The results generated were within the requirements that the sponsor specified.

Outcomes
• The design offers a better way to center bearing rings, within a better range of accuracy.
• The design saves time when centering bearing rings, within 30 seconds to 1 minute.
• The design replaces the human error factor and provides a new and unique approach to centering.