Structured Light for Measurement of Bearing Component as Final Inspection - GLOBAL PROJECT WITH SJTU

Overview
Current CMM techniques, used by Timken to ensure quality of parts and ensure that parts remain within design specifications, use a physical probe. The wear caused by sampling using the contact probe means that eventual replacement of the probe which costs money, time, and downtime.

Objectives
Utilise a structured light system to evaluate the bearing components manufactured by Timken before and after heat treatment processes. This will replace the current CMM process, and move to a contactless system. Keep the cycle time of the whole process less than 5 minutes. The primary target functionality will be to dimension the outside face, while the secondary objective is to provide a larger scoped 3d model.

Approach
● Generate customer needs from initial contact
● Refine specifications for customer needs
● Create system level design breakdown
● Establish prototype designs and methods
● Rank methods using an AHP matrix
● Create initial alpha prototype
● Order and test individual components
● Generate final CAD model
● Construct and print physical hardware
● System integration and combined software testing
● Collect sample data
● Post-Processing for usable results and models

Outcomes
● Prototype establishes low cost entry point into non-contact bearing measurement system.
● Sponsor can use results to inform future development, create software solutions, and invest in higher accuracy laser solutions based on testing done by the Penn State team.
● Models, software, and results show initial results of being able to accurately and quickly attain 3D surface models for later interpolation and check surface qualities.