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Freeform Polisher Performance Tests: Grinding, Polishing and CMM

Patrick J. Reardon
University of Alabama in Huntsville

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RCEU Proposal: Freeform Polisher Performance Tests: grinding, polishing and CMM

Faculty Mentor:

Patrick J. Reardon, ECE

Asst. Prof., Electrical and Computer Engineering Department

Assoc. Director, Center for Applied Optics

X2530

patrick.reardon@uah.edu

OPB400

Project Summary

The UAH-CAO operates a Zeeko IRP600X Freeform polishing system which can form and polish nearly any optical surface in virtually any relevant optical material. A 7-axis system, the Zeeko is an “Intelligent Robotic Polisher.” The grinding and polishing is achieved by the motion of a spherical bonnet which is either covered by a grinding surface lubricated by flowing water, or by a polymer pad lubricated by a flowing polishing slurry. The bonnet spins, and the tool moves in the proper path to either form the surface through a process called “grolishing,” or finishing the surface to mirror quality. The Zeeko system allows for many variations in the processing to approach the same result. This project will be to explore some of these many variables in order to quantify the dependence of its performance on them.

Over the course of this program, the student will learn by instruction, independent review and both assisted and some independent laboratory activity how to operate the Zeeko polishing system from blank substrate to finished optical surface. This will include training in relevant optical and mechanical tests which must be performed in order to measure the performance of the Zeeko polisher.

Student Prerequisites

The student must have a science and/or engineering background. Experience in using computers is a necessity, and programming, such as MatLab, is desired. Courses in geometrical optics and/or physical optics would be an advantage. The student must be prepared to run a large unique piece of optical fabrication equipment, performing manual activities, not just running a computer program.

Student Duties

The student will be responsible for operation and monitoring of the Zeeko polisher. The student must follow all rules for safety and proper lab techniques for each measurement. The student will be responsible for fully documenting and recording all data taken during the program. The student will be responsible for assisting in some mechanical assembly and manual work, such as

securing the optical substrate, securing the slurry lines, ensuring the bonnet is mounted properly and securely.

Mentor Supervision and Interaction

The PI will provide training and assistance for all optical tests being performed, and an overall overview of the program. This will include both a lecture format and lab training. Meetings will nominally be occurring daily. The student primarily and extensively interact with CAO staff member Ted Rogers, who is the lead Zeeko operator.