RESEARCH EXPERIENCES FOR TEACHERS

Enhancing knowledges and skills in modern manufacturing

18 May 2018

Project #4: Surface Engineering & Quality – 4 teachers

- Research topic: Characterization of surface roughness, topology and composition of steel parts
- Focus: One week on Surface finish, Imaging techniques, Surface characterization
- Lab Training: Performance of a machined part and/or its cosmetic appearance depends on how the final layer of the surface was created. In this project, the surface finish will be quantified using different techniques and other advanced techniques will be used to capture the topology of the surface in high resolution, as well as the chemical composition distribution on the surface.
- Authentic research experience: Teachers would understand the surface metrology principles, gauge repeatability/reproducibility, and help collect data for a funded project on polishing.
- Equipment: Profilometer, white-light interferometer, Matlab/R.
- Expected outcomes: Understand surface finish and gain hands-on experiences with contact and non-contact surface roughness measurement. Expose to advanced imaging and analysis techniques. Although it is unlikely that a secondary school would have these advanced systems, the teachers can describe what each system does to and encourage discussion.

This module will be repeated 3 times (week #3, 4, and 5) for groups of 4 participants.

Date	Topic	Note
Mon – Jun 25 – Jul 2 – Jul 9	Overview of Profilometry Principles of Optical Profilometry Overview of software packages and learning tools	Classroom environment
Tue – June 26 – Jul 3 – Jul 10	– Demonstration of surface metrology using ZeGage – Learning optical profilometry using ZeGage	ETB 3006
Wed – June 27 – Jul 4 (off) – Jul 11	– Estimation of Surface characteristics – Estimation of Surface finish: Ra and Sa – Estimation of porosity, bearing area curve	ETB 3006 and computer labs
Thu – June 28 – Jul 5 – Jul 12	Advanced image analysis for surface characterization Comparison of conventional and modern tools	ETB 3006 and computer labs
Fri – Jun 29 – Jul 6 – Jul 13	Group discussion: implementation and challenge Tentative topic and plan for implementation	Group social activity follows