AIMS^2 Research Project in Manufacturing Systems Engineering

Research Duration: Fall 2017 – Spring 2018

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Title of Project: Surface Measurement of Machined Metals

Goals and Objectives of the Project, Expectations and Outcomes

The main superior property of machining processes to other manufacturing processes is the achievement of precision surfaces. The smooth surface finish after machining makes these processes the primary choice for finishing operations. However, it is important to understand how the best surface finish can be achieved based on process inputs. In order to predict the outcomes, first, calibration of the surface roughness measurement device must be completed. Once the equipment readings are verified, a series of experiments need to be conducted to understand how the process parameters affect the results.
In this project, a surface profilometer will first be calibrated. Then, different surfaces will be created using different machining parameters, and the roughness of each surface will be measured. These measurements will then be analyzed to see the effects of each machining parameter.

Surface Measurement of Machined Metals		
Week	Task	Anticipated hours/student
1	Learning the surface roughness concept	5
2	Learning the theory behind how surface roughness is measured	5
3	Calibrating the equipment and taking basic measurements	10
4	Learning the use of CNC machine for machining experiments	15
5	Learning the basics of machining processes	15
6	Initial machining experiments & surface roughness measurements	5
7	Initial machining experiments & surface roughness measurements	5
8	Creation of proper design of experiments for machining experiments	5
9	Conducting machining experiments & measuring surface roughness	15
10	Conducting machining experiments & measuring surface roughness	15
11	Conducting machining experiments & measuring surface roughness	15
12	Analysis of machining experiments & effect of parameters	15
13	Final machining experiments & surface roughness measurements	10
14	Final machining experiments & surface roughness measurements	10
15	Analysis of final results, report & poster preparation, and project wra	5
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