

SYLLABUS

Date/Revision : May 23, 2015/02 May 2017/PP
 Faculty : Engineering
 Study Program(s) : Aviation Eng. (AVE), Industrial Eng. (INE), Mechanical Eng. (MEE), Mechatronics Eng. (MTE)

SUBJECT: Industrial Metrology & Quality Control

1 Basic Information

1.01	Subject Name	Industrial Metrology & Quality Control
1.02	Semester	6
1.03	Level	0
1.04	SKS	3
1.05	Mandatory / Curriculum	F-02
1.06	Subject Code	IMQC
1.07	Subject Code	ENG-F-IMQC-605
1.08	Year	2017 (7)
1.09	Quality Control	Final Test, OFSE, see evaluation
1.10	Limitations	Min 12 and Max 32 students in one class
1.11	Combined with	AVE; INE; MEE; MTE
1.12	Prerequisite	Engineering Mathematics 1,2; Engineering Statistics; Manufacturing Processes
1.13	Responsible	To be assigned
1.14	Revision	15-05-2017/pp

2 Description of Subject

The industrial metrology and quality control course is a course consists of twofold, namely industrial metrology, and quality control. Industrial metrology discusses about the equipment and methodology for measuring physical parameter such as length, roundness, straightness, flatness, concentricity, etc. Those parameters measured from a product being produced from the result of machining processes or other add-value processes in forming of material and/or metal work-parts. The Quality Control part discusses about the acceptance of measured sample representing a batch or set of produced parts/products being manufactured. It involves a level of acceptance either qualitatively and/or quantitatively. Statistical method is used as the tool.

3 Objectives

- To learn dimensional metrology, surfaces, roundness, concentricity for industrial manufacturing purposes.
- To learn quality of parts through statistical measures

4 Competency

After having the course, students are expected to:

- Understand the theory, applications, and technology of measurement for manufacturing products/parts
- Knowing the parameters required for dimensional metrology and quality control
- Building awareness of quality control aspect from quality instrument, methodology, raw materials, goods receiving inspections, and reliability.

5 Learning Approach / Methodology

- Lectures/ Class contact (time-tabled) supplemented with interactive questions and answers;
- Circuit simulation using Electronic Workbench Software;
- Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing;
- Student Study Effort: homework/assignment; preparation for test/quizzes/ examination.

6 Evaluation

5.1	Absence maximum	25%
5.2	Participation in Discussion	05 Points
5.3	Homework / Classwork	05 Points
5.4	Presentation /Simulation	10 Points
5.5	Daily Quiz	20 Points
5.6	Final Examination	60 Points
	Total	100 Points

7 Text Book and Reference

1	Main Text Book: “Industrial Metrology, Surfaces and Roundness, 2002”, Authors: Graham T Smith, Publisher: Springer, ISBN: 978-1-84996-878-2
2	Supplement Textbooks: “The Control of Quality”, Author: V. G. Parry, Publisher: The Macmillan Press, ISBN: 978-0-333-14542-5

Wee	Content/ Topics of Lecturing	Text Book	Remark
1	Introduction to Industrial Metrology and Quality Control:		
1,2	Surface Texture; 2 dimensional: Establishing the Ra numerical value of surface from production process, Surface texture roughness comparison blocks and precision reference specimens, The basic operating principle of the pick-up, its stylus and skid, Filters and cut-off, Measuring lengths, Filtering effects, Geometrical parameters, Surface profile parameters, Auto-correlation function, Appearance of peaks and valleys, Stylus based and non-contact systems	Ch1,[1]	
3	Surface Texture: 3 dimensional Introduction to three-dimensional characteristics, three dimensional analysis software. Portable three-dimensional measuring instruments, Fractal Techniques. Textures metal sheets. Surface topography characteristics by neural network, non-contact measurement.	Ch2:	Quiz
3,4	Roundness and Cylindricity : Roundness measurement. Measuring Instruments. Measuring Methods. Display and Interpretation. Geometric roundness parameters. Non-contact spherical and roundness assessment.	Ch4	
5,6	Machined Surface Integrity : The machine surface. Surface engineering.	Ch5	Quiz
6,7	Quality and Calibration Techniques : Size and scale. Predictable accuracy. Trace-ability of measurement. Measurement uncertainty. Calibration: surface texture. Calibration: roundness	Ch6	
8	MIDTERM SEMESTER BREAK		
9	Tooling and Gauging : Gauge planning and provisioning. Routine gauge controls and systems. Metrology laboratory - standard room, jig, tools, inspection. Tool try-out. Press tools. Press tools maintenance. Jig and Tool personnel ratios.	Ch3, [2]	Quiz
10	Raw Materials : Critical factors. Possible sources of trouble. Safeguards. Range. Controls. Destructive and Non-destructive testing.	Ch4, [2]	
11	Good Receiving Inspection : Purpose. Costs. Location and Space. 'Flow' system. Routines and supplier liaison. Purchase department interactions. Goods inwards inspection procedures. Electronics component problems. Electrical breakdown tests. Some case experiences of electrical component problems.		

11,12	Piece Part Manufacture : General Principles. Machine Capability. First-off inspection and inspectors. Typical machine problems. Gauging; tooling; instrumentation; instructions. Documentation. Process operations. 100 % inspection.	Ch 6[2]	Quiz
12,13	Assembly and Test : Concepts. Welded assemblies and spot welding. Sequential assembly and in-line testing. Functional and final tests. Cleaning. Salvage. Packaging and dispatch. Assembly paperwork: modification controls. Electrical wiring and connections. Semi-automated assembly checking. Personnel rations.	Ch7,8, [2]	
14	Reliability Test : Design reliability and quality reliability. Examination following quality cycling tests. Reliability test economics.	Ch8,[2]	
15	Silent week :		
16	Final Examination :		