

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE MARIE, ON



COURSE OUTLINE

Course Title: METROLOGY & QUALITY CONTROL

Code No.: MET119

Semester: 2

Program: AVIATION MACHINIST

Author: **BOB ZUCCATO**

Date: DECEMBER 1998 Previous Outline Date: N/A

Approved:

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/ Date

Total Credits: 3

Prerequisite(s):

Length of Course: 18 Wks.

Total Credit Hours:

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L COURSE DESCRIPTION:

The measure of good tradespeople is dependent upon his/her ability to accurately maintain size on machine parts. This course is designed to strengthen the students ability to measure and inspect to precise tolerances and to acquaint the student with the use and care of precision inspection equipment. In today's market, industry is demanding quality. To achieve "quality", suppliers are being forced to use Statistical Process Control. The latter part of this course will be a basic introduction to SPC, including recording of data and its interpretation.

EL LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

(Generic Skills Learning Outcomes placement on the course outline will be determined and communicated at a later date.)

Upon successful completion of this course the student will demonstrate the ability to:

- 1) Be knowledgeable in the history of measurement

Potential Elements of the Performance:

- use of standards
- need for standards
- systems of measurement
- lab and demonstration followed by lab project

- 2) Use and recognize measurement tools

Potential Elements of the Performance:

- use and care of shop tools and precision inspection tools
- recognize sources of error
- use of gage blocks, including sets, build-up, care and use and accessories
- lab and demonstration followed by lab project
- measurement and use of tapers, dove tail, centre distance, large radius for measurement of geometric shapes
- lab and demonstration and lab project
- types and uses of comparators
- lab and demonstration, lab project
- use a gear tooth vernier & gear tooth gauges
- lab and demonstration and lab project
- thread measurement by 3 wire method
- lab and demonstration and lab project
- surface finish inspection by physical comparison and profilometer
- non-destructive testing using die penetrant to check for surface cracks
- apply polar coordinate system for locating holes on a bolt circle

**EL LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE
(Continued)**

3) Coordinate Measuring Machines

Potential Elements of the Performance:

- operate coordinate measuring machine (C.M.M.) to inspect and record dimensions of a sample part

Note: Each student will be able to use the C.M.M. on a one-on-one basis during regular shop class so that they can become more familiar with its operation.

4) Statistical Process Control

Potential Elements of the Performance:

- introduction including history, need for quality y and definition of quality
- where to start using pareto analysis and cause and effect
- histograms with data collection and how to construct
- variation with definition of variability, pattern analysis, spread and prediction
- basic probability, notation, arithmetic, distribution of averages
- capability concepts using normal curve, capability index and long run/short run capabilities
- interpretation of normal probability paper, advantages and how to use
- common and special cause variations on control charts-for averages and ranges* :as well as control chart concepts and construction of X and R control charts
- use of averages and range chart, including establishing control limits, action for out-of-control, control versus capability and evaluation of capability
- limitations and application of control charts for attributes P-Chart, including limits and construction of p - charts
- control chart interpretation using range chart, averages chart, X and R chart (patterns), - interpretation of runs, warning limits
- Measurement system analysis - measurement system, sources of error, gauge capability (range chart method), error calculation and implement SPC

m. TOPICS:

- 1) History of Measurement
- 2) Measurement Tools
- 3) Coordinate Measuring Machine
- 4) Statistical Process Control

IV. REQUIRED RESOURCE&TEXTS/MATERIALS:

Note Book, writing material

S.P.C. Manual

Machine Shop Text/Machine Tool Practices 6th Edition

Calculator

Instructor Handouts

V. EVALUATION PROCESS/GRADING SYSTEM

A+	90-100%	B	70-79%
A	80 - 89%	C	60 - 69%
R	0 - 59%	REPEAT	

GRADING:	Homework and lab assignments	25%
	Tests	40%
	Major Project	15%
	Attendance/Initiative/Cooperation	20%

Attendance is compulsory and you will lose 1% for every unexcused hour of class you are absent or late.

VI. SPECIAL NOTES:

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- Special Needs
If you are a student with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext. 493, 717, 491 so that support services can be arranged for you.
- Retention of Course Outlines
It is the responsibility of the student to retain all course outlines for possible fiiture use in acquiring advanced standing at other post-secondary institutions.
- Disclaimer for Meeting the Needs of the Learners
- Substitute Course Information is available at the Registrar's Office.

VH. PRIOR LEARNING ASSESSMENT

Students who wish to apply for advanced credit in the course should consult the instructor.