

Lansing Community College

Course Cover Sheet



**M-CAM Training Area:**

CNC/Machining Multi-Skilled Mechatronics Production Operation Welding/Fabrications

**Program(s):** Certified Production Technician

**Course:** CPT Quality Processes / Practices and Measurement

**Course Description:**

Organizations must continuously improve in order to meet the ever-changing requirements of their customers. Manufacturing associates must possess the skills and be able to apply quality tools and techniques to work together in order to solve problems and help the organization to continuously improve.

This 40-hour course provides an understanding of blue prints, geometric dimensioning controls, and precision measurement tools and how they are related to quality tools. Participants will learn basic Quality Practices and Measurements that will enable them to produce high quality products.

Participants who finish this class will be eligible to take the MSSC CPT Quality Practices and Measurement assessment, which is part of the Certified Production Technician certification.

Delivery method is hybrid.

**Date Created:** Fall Semester, 2015. Revised January, 2016

**Employer/Industry Partner:** various manufacturing companies in Mid-Michigan. Course guidelines and online material provided by MSSC. IMPCO Microfinishing tested the course as 100% online.

**Faculty Developer(s)/Instructional Designers(s):** Brad Gilreath/Ann Lapo

**College Contact:** Jill Doederlein

**Phone:** 517.483.9665

**Email:** [doederj@lcc.edu](mailto:doederj@lcc.edu)

**Additional Information/Comments:** With a goal of incorporating a new Quality course into LCC's Technical Careers curriculum and to meet demands for corporate training in the area, successful corporate training modules (ftf) were enhanced with online components to produce this flexible, blended learning course.

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## CPT Quality Processes/CPT Quality Practices and Measurement (Lansing Community College)

### Program: Certified Production Technician

### Syllabus

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#### **DESCRIPTION:**

Organizations must continuously improve in order to meet the ever-changing requirements of their customers. Manufacturing associates must possess the skills and be able to apply quality tools and techniques to work together in order to solve problems and help the organization to continuously improve.

This 40-hour course provides an understanding of blue prints, geometric dimensioning controls, and precision measurement tools and how they are related to quality tools. Participants will learn basic Quality Practices and Measurements that will enable them to produce high quality products.

Participants who finish this class will be eligible to take the MSSC CPT Quality Practices and Measurement assessment, which is part of the Certified Production Technician certification.

**TOTAL TIME REQUIREMENT** for the course is 40 hours.

**PREREQUISITES:** Reading Level 4. Basic computer skills.

#### **OBJECTIVES:**

After completing this course, the student should be able to:

- Participate in periodic internal quality audit activities.
- Check calibration of gages and other data collection equipment.
- Suggest continuous improvements.
- Inspect materials and product/process at all stages to ensure they meet specifications.
- Document the results of quality tests.
- Communicate quality problems.
- Take corrective actions to restore or maintain quality.
- Record process outcomes and trends.
- Identify fundamentals of blueprint reading.
- Use common measurement systems and precision measurement tools.
- Take the MSSC CPT Quality Practices and Measurement assessment.

#### **MATERIALS:**

- MSSC online content
- Supplies from Inventory check list
- MSSC CPT Quality Practices & Measurement assessments

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#### GRADING POLICY:

- Satisfactory completion of training (at least 75%) recommended.

College Grading Standards	Percent
4.0 Excellent	91-100%
3.5	86-90%
3.0 Good	81-85%
2.5	76-80%
2.0 Satisfactory	71-75%
1.5	66-70%
1.0	60-65%
0.0	0-59%

#### ACCEPTABLE USE POLICY:

##### Computer Resources

Use of College-owned computer resources is a privilege extended by the College to students, employees, and other authorized users as a tool to promote the mission of the College. All users agree to be bound by the terms and conditions of the LCC Acceptable Use Policy at the time they complete an account application form. Copies of the LCC Acceptable Use Policy are available at the Library Circulation Desk and may also be accessed on the World Wide Web. The URL is [http://www.lcc.edu/policy/policies\\_1.aspx#ACCEPTABLE\\_USE\\_POLICY](http://www.lcc.edu/policy/policies_1.aspx#ACCEPTABLE_USE_POLICY)

##### Transfer Potential

For transferability information, please consult the Transfer Equivalency Information located at the LCC website at <http://www.lcc.edu/transfer>. For additional transferability information, contact the LCC Academic Advising Center, (517) 483-1904.

The MACRAO Transfer Agreement simplifies the transfer of students from one Michigan institution to another. The most current MACRAO Transfer Agreement information can be found at [http://www.lcc.edu/transfer/macrao\\_agreement.aspx](http://www.lcc.edu/transfer/macrao_agreement.aspx).

##### Student Code of Conduct and General Rules and Guidelines

LCC supports a positive educational environment that will benefit student success. In order to ensure this vision, the College has established the LCC Student Code of Conduct and the Student General Rules and Guidelines to ensure the protection of student rights and the health and safety of the College community, as well as to support the efficient operation of College programs. In addition, the College has established guidelines for the redress of grievances by individuals accused in such proceedings. A copy of the most current Code can be found on the College's website at [http://www.lcc.edu/catalog/policies\\_procedures/studentrulesguidelines.aspx#code](http://www.lcc.edu/catalog/policies_procedures/studentrulesguidelines.aspx#code).

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## CERTIFIED PRODUCTION TECHNICIAN - COURSE LESSON PLAN

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“MSSC delivers its CPT Courses through well-established training organizations. There are three types of Courses to meet various individual and training needs. These Courses are designed (a) to align with MSSC Standards and (b) to help individuals enhance their core knowledge and skills for production work from entry-level to front-line supervisory level. These Courses are built upon MSSC’s e-learning which includes modular courses for: Safety, Quality Practices & Measurement, Manufacturing Production & Processes, Maintenance Awareness, and Green Production. The online, computer-based simulation training covers the basic and technical skills while providing students and workers with the knowledge and skills needed to prepare them for an advanced, high-performance manufacturing environment.”

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#### MSSC-M2 QUALITY PRACTICES AND MEASUREMENT

	<b>SUBJECT:</b>	<b>BLUEPRINT READING 1 (MULTIVIEW DRAWINGS)</b>		
	<b>DESCRIPTION:</b>	Reading multiview drawings to visualize part shapes, identify features, and identify dimensions		
	<b>Instructor Activity</b>	<b>Delivery Method</b>	<b>Student Activity</b>	<b>Materials</b>
	Explain Pre-Test and Review	Paper Copy	Take Pre-Test and review with class	Copy of Pre-Test for Blueprint Reading 1
	Review Purpose and Course Objectives	Course Lesson Plan Handout	Read and review as needed	Course Lesson Plan
	Segment 1 - Lecture, Lead	Power Point Slides	Group Discussion	Projector
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector
	Segment 2 – Lecture, lead	Power Point Slides	Group Discussion	
	Facilitate Exercise	Assign each participant a lego piece and have them create a multiview drawing with line types	Create a multiview Drawing using a ruler, assign line types	Oversized Lego Set Pencils, Graph Paper, Erasers and 12 inch ruler
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector
	Segment 3 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector

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<b>SEGMENT 1 INTRODUCTION TO BLUEPRINT READING</b>		
OBJECTIVE 1		Describe the function of a print.
OBJECTIVE 2		Describe two methods of creating a technical drawing.
SKILL 1		Interpret blueprint drawings when shown an object.
OBJECTIVE 3		Describe the function of two methods used to draw an object and give an advantage of each.
OBJECTIVE 4		Describe the three principal dimensions of an object.
OBJECTIVE 5		Explain how views are arranged in a multiview drawing.
OBJECTIVE 6		Describe a method used to visualize the views of an object in a multiview drawing.
SKILL 2		Identify Views on a Blueprint.
<b>SEGMENT 2 MULTIVIEW DRAWINGS</b>		
OBJECTIVE 7		Describe the function of three line types used in a multiview drawing: object, hidden, and center.
OBJECTIVE 8		Describe the function of line precedence.
SKILL 3		Identify Line Types Given a Blueprint Drawing.
OBJECTIVE 9		Describe how to choose the views for a multiview drawing.
SKILL 4		Select the front view of an object.

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<b>SEGMENT 3</b>		<b>INTRODUCTION TO BASIC DIMENSIONING</b>
	OBJECTIVE 10	Describe the function on a print.
	OBJECTIVE 11	Describe how to dimension a linear surface and the location of a point.
	SKILL 5	Interpret Linear Dimension Features on a Blueprint.
	OBJECTIVE 12	Describe how circular features are dimensioned.
	SKILL 6	Interpret Circular Dimension features on a Blueprint.
	OBJECTIVE 13	Describe how angular features are dimensioned.
	SKILL 7	Interpret Angular Dimension Features on a Blueprint.
	OBJECTIVE 14	Describe six rules for dimensioning a multiview print.
	SKILL 8	Identify dimensions of an object by reading a print drawing.

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SUBJECT: BLUEPRINT READING 2 (ASSEMBLY DRAWINGS AND FASTENERS)				
DESCRIPTION:				
Reading drawings to determine part hole sizes and locations, scales, title blocks, part section features, and fastener sizes				
Instructor Activity	Delivery Method	Student Activity	Materials	
Explain Pre-Test and Review	Paper Copy	Take Pre-Test and review with class	Copy of Pre-Test for Blueprint Reading 2	
Review Purpose and Course Objectives	Course Lesson Plan Handout	Read and review as needed	Course Lesson Plan	
Segment 1 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
Segment 2 – Lecture, lead	Power Point Slides	Group Discussion		
Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
Segment 3 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
Facilitate Exercise	Provide several samples of fasten types	View, review and discuss different fastener types that include UNC, UNF, UNEF. – Review the components of the fasteners	UNC, UNF, UNEF Fasteners	

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<b>SEGMENT 1</b>	<b>Advanced Dimensioning</b>	
	OBJECTIVE 1	Describe the function and dimensioning of four types of holes.
	OBJECTIVE 2	Describe the function of a drawing scale.
	SKILL 1	Determine a dimension of an object given an undimensioned scaled drawing.
	OBJECTIVE 3	Describe the function of a title block.
	SKILL 2	Interpret the information in a blueprint title block.
<b>SEGMENT 2</b>	<b>SECTIONAL DRAWINGS</b>	
	OBJECTIVE 4	Describe the function of a sectional view.
	OBJECTIVE 5	Describe the function of a cutting plane and a cutting plane line.
	OBJECTIVE 6	Describe the function of hatch lines.
<b>SEGMENT 3</b>	<b>FASTENERS</b>	
	OBJECTIVE 7	Describe the function of a threaded fastener and identify its five basic parts.
	OBJECTIVE 8	Describe the function of two types of threads: external and internal.
	OBJECTIVE 9	Describe how to specify threaded fasteners.
	SKILL 3	Identify the size and type of fastener given an example.
<b>SEGMENT 4</b>	<b>ASSEMBLY DRAWINGS</b>	
	OBJECTIVE 10	List and describe two types of assembly drawings.
	OBJECTIVE 11	Describe how to interpret an assembly drawing.
	SKILL 4	Interpret an assembly drawing.



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	<b>SUBJECT: BLUEPRINT READING 3 (GEOMETRIC DIMENSIONING &amp; TOLERANCING)</b>			
	<b>DESCRIPTION:</b>			
	Interpretation of part dimension tolerances, geometric dimensioning and tolerancing (GD&T) symbols and frames, and data			
	<b>Instructor Activity</b>	<b>Delivery Method</b>	<b>Student Activity</b>	<b>Materials</b>
	Explain Pre-Test and Review	Paper Copy	Take Pre-Test and review with class	Copy of Pre-Test for Blueprint Reading 3
	Review Purpose and Course Objectives	Course Lesson Plan Handout	Read and review as needed	Course Lesson Plan
	Segment 1 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector
	Segment 2 – Lecture, lead	Power Point Slides	Group Discussion	
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector
	Segment 3 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector
	Segment 4 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector

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<b>SEGMENT 1</b>		<b>GENERAL TOLERANCING</b>
	OBJECTIVE 1	Define two types of conventional tolerances and explain how they are shown on a drawing.
	SKILL 1	Determine if a part dimension is within tolerance using conventional tolerancing.
	OBJECTIVE 2	Define a maximum material condition.
	OBJECTIVE 3	Define a least material condition.
	OBJECTIVE 4	Explain how tolerance notes are used.
	SKILL 2	Calculate the limits of a dimension given its tolerance.
<b>SEGMENT 2</b>		<b>ASSEMBLY TOLERANCES</b>
	OBJECTIVE 5	Define two types of fits.
	SKILL 3	Determine the type of fit between two mating parts.
	OBJECTIVE 6	Define baseline dimensioning and give an advantage.
	SKILL 4	Identify correct baseline dimensions.
	OBJECTIVE 7	Define a feature.
	OBJECTIVE 8	Define a feature of size.
<b>SEGMENT 3</b>		<b>FUNDAMENTALS OF GEOMETRIC DIMENSIONING AND TOLERANCING (GD&amp;T)</b>
	OBJECTIVE 9	Define geometric dimensioning and tolerancing.
	OBJECTIVE 10	Define five types of geometric features.
	OBJECTIVE 11	Define a datum and a datum feature and explain their importance.
	OBJECTIVE 12	Define a datum reference and give its symbol.
	OBJECTIVE 13	Describe how to place a datum feature symbol on a drawing.
	SKILL 5	Identify the correct datum to use as a reference point.

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SEGMENT 4		FEATURE CONTROL FRAMES
OBJECTIVE 14	Describe the functions of the three parts of a feature control frame.	
OBJECTIVE 15	Describe how to place a feature control frame on a part drawing.	
SKILL 6	Select a feature control frame for a part drawing.	
OBJECTIVE 16	Describe four reasons why GD&T is used.	

		SUBJECT: BASIC MEASUREMENT		
DESCRIPTION:		Interpret English and S.I. measurements; perform system conversion; use tape measures and rules; accuracy and repeatability		
Instructor Activity	Delivery Method	Student Activity	Materials	
Explain Pre-Test and Review	Paper Copy	Take Pre-Test and review with class	Copy of Pre-Test for Basic Measurement	
Review Purpose and Course Objectives	Course Lesson Plan Handout	Read and review as needed	Course Lesson Plan	
Segment 1 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
Segment 2 – Lecture, lead	Power Point Slides	Group Discussion		
Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
Segment 3 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
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	Segment 4 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector
	Facilitate Exercise	Provide several samples of measuring legos with steel rule	Measure parts with standard and metric steel rule using legos	Standard and Metric Steel Rule
	Facilitate Exercise	Provide several samples conversions from standard to metric and metric to standard	Review how to add, subtract, multiply and divide fractions, decimals and percentages. Complete conversion from standard to metric and metric to standard	Calculators
<b>SEGMENT 1</b>	<b>SI MEASUREMENT</b>			
	OBJECTIVE 1	Define dimensional measurement and explain its importance.		
	OBJECTIVE 2	Describe two systems of dimensional measurement used in manufacturing: U.S. Customary and S.I. Metric.		
	OBJECTIVE 3	Describe the function and construction of a machinist’s rule.		
	OBJECTIVE 4	Describe how to use a metric machinist’s rule.		
	SKILL 1	Use a metric rule to measure an outside length of a part.		
<b>SEGMENT 2</b>	<b>U.S. CUSTOMARY MEASUREMENT</b>			
	OBJECTIVE 5	Define measurement accuracy and explain its importance.		
	OBJECTIVE 6	Define resolution and explain its effect on accuracy.		
	OBJECTIVE 7	Describe how to use a decimal inch rule.		
	SKILL 2	Use a decimal inch rule to measure a length.		
	OBJECTIVE 8	Describe how to use a rule with a common fraction inch scale.		
	SKILL 3	Use a rule graduated in common fractions of an inch to measure a length.		

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<b>SEGMENT 3</b>	<b>TAPE MEASURE</b>	
	OBJECTIVE 9	Describe the function and construction of a tape measure.
	OBJECTIVE 10	Describe how to use a tape measure to measure a length.
	SKILL 4	Use a tape measure to measure a length.
	OBJECTIVE 11	Describe four sources of measurement error.
<b>SEGMENT 4</b>	<b>MEASUREMENT CONVERSION</b>	
	OBJECTIVE 12	Describe how to convert measurements made in common inch fractions to decimal inches.
	SKILL 5	Convert between common inch fractions and decimal inches.
	OBJECTIVE 13	Describe how to convert between the U.S. Customary System and the SI Metric System.
	SKILL 6	Convert between U.S. customary units and S.I. metric units.

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SUBJECT: PRECISION MEASUREMENT TOOLS				
	<b>DESCRIPTION:</b>	Making precision measurements using dial calipers, digital calipers, and micrometers		
	<b>PREREQUISITE:</b>	Unit 22		
	<b>Instructor Activity</b>	<b>Delivery Method</b>	<b>Student Activity</b>	<b>Materials</b>
	Explain Pre-Test and Review	Paper Copy	Take Pre-Test and review with class	Copy of Pre-Test for Precision Measurement Tools
	Review Purpose and Course Objectives	Course Lesson Plan Handout	Read and review as needed	Course Lesson Plan
	Segment 1 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector
	Segment 2 – Lecture, lead	Power Point Slides	Group Discussion	
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector
	Segment 3 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector
	Segment 4 - Lecture, Lead	Power Point Slides	Group Discussion	Projector
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector
	Facilitate Exercise	Use of Dial Caliper	Use the dial Caliper to identify components	Dial Caliper

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	Facilitate Exercise	Use of Dial Caliper	Use the dial Caliper to measure gauge blocks and calculate measurement	Dial Caliper
	Facilitate Exercise	Use of Digital Caliper	Use the digital Caliper to identify components	Digital Caliper
	Facilitate Exercise	Use of Digital Caliper	Use the digital Caliper to measure gauge blocks and calculate measurement	Digital Caliper
	Facilitate Exercise	Use of Vernier Micrometer	Use the Vernier Micrometer to identify components	Vernier Micrometer
	Facilitate Exercise	Use of Vernier Micrometer	Use the Vernier Micrometer to measure gauge blocks and calculate measurement	Vernier Micrometer
	Facilitate Exercise	Use of Digital Micrometer	Use the digital Micrometer to identify components	Digital Micrometer
	Facilitate Exercise	Use of Digital Micrometer	Use the digital Micrometer to measure gauge blocks and calculate measurement	Digital Micrometer

### SEGMENT 1 DIAL CALIPER

OBJECTIVE 1	Describe the function of a precision measurement tool and give an example.
OBJECTIVE 2	Describe the function of a dial caliper and give an application.
OBJECTIVE 3	Describe how to use a dial caliper.
ACTIVITY 1	Dial caliper operation.

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	SKILL 1	Calibrate a dial caliper.
	SKILL 2	Use a caliper to measure an outside length of a part.
	SKILL 3	Use a caliper to measure an inside length of a part.
	OBJECTIVE 4	State the typical accuracy of a dial caliper measurement and explain what affects it.
<b>SEGMENT 2</b>	<b>DIGITAL CALIPER</b>	
	OBJECTIVE 5	Describe the function of a digital caliper and give an application.
	OBJECTIVE 6	Describe how to use a digital caliper.
	ACTIVITY 2	Digital caliper operation.
	OBJECTIVE 7	State the typical accuracy of a digital caliper and explain what affects it.
	SKILL 4	Use a digital caliper to measure an outside length of a part.
	SKILL 5	Use a digital caliper to measure an inside length of a part.
<b>SEGMENT 3</b>	<b>ENGLISH MICROMETER</b>	
	OBJECTIVE 8	Describe the function of a micrometer and give an application.
	OBJECTIVE 9	Describe how to use an outside micrometer.
	ACTIVITY 3	Micrometer operation.
	SKILL 6	Use an outside micrometer graduated in English units to measure the length of a part.
<b>SEGMENT 4</b>	<b>METRIC MICROMETER</b>	
	SKILL 7	Use an outside micrometer graduated in metric units to measure the outside length of a part.
	SKILL 8	Use a micrometer to measure the outside diameter of a cylindrical part.
	OBJECTIVE 10	Describe how to use an inside micrometer.
	OBJECTIVE 11	State the typical accuracy of an outside micrometer and explain what affects it.



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<b>SUBJECT:</b>		<b>DIMENSIONAL GAUGING</b>		
<b>DESCRIPTION:</b>		Gaging parts using dial indicators, digital indicators, and data acquisition software; calibration of instruments; part mastering		
<b>Instructor Activity</b>	<b>Delivery Method</b>	<b>Student Activity</b>	<b>Materials</b>	
Explain Pre-Test and Review	Paper Copy	Take Pre-Test and review with class	Copy of Pre-Test for Dimensional Gauging	
Review Purpose and Course Objectives	Course Lesson Plan Handout	Read and review as needed	Course Lesson Plan	
Segment 1 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
Segment 2 – Lecture, lead	Power Point Slides	Group Discussion		
Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
Segment 3 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
Facilitate Exercise	Use of Gauge Block	Use the gauge block with dial indicator to demonstrate the indirect measuring process of mastering	Gauge Blocks, Dial Indicator	
Facilitate Exercise	Use of Dial Indicator	Use the dial indicator to identify components	Dial Indicator	
Facilitate Exercise	Use of Dial Indicator	Use the dial Indicator to measure gauge blocks and calculate measurement	Gauge Blocks, Dial Indicator	

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	Facilitate Exercise	Use of Digital Indicator	Use the digital indicator to identify components	Digital Indicator
	Facilitate Exercise	Use of Digital Indicator	Use the digital indicator to measure gauge blocks and calculate measurement	Gauge Blocks, Digital Indicator
	Facilitate Exercise	Check Sheet, Histogram	Use a pair of dice and throw 100 times and create a frequency tally, Histogram	Dice, Graph Paper
<b>SEGMENT 1</b>	<b>INTRODUCTION TO GAUGING</b>			
	OBJECTIVE 1	Define a tolerance and explain its importance.		
	OBJECTIVE 2	Describe the function of two methods gauging and give an application of each.		
	OBJECTIVE 3	Describe the function of two types of indicators and give an application of each.		
	OBJECTIVE 4	Describe how to use a dial indicator to measure a length.		
	ACTIVITY 1	Dial indicator operation.		
<b>SEGMENT 2</b>	<b>INDICATOR MEASUREMENT</b>			
	OBJECTIVE 5	Describe the function of a gauge block.		
	ACTIVITY 2	1-2-3 Gauge Block Inspection.		
	OBJECTIVE 6	Describe the function of mastering.		
	SKILL 1	Master a dial indicator.		
	SKILL 2	Measure a dimension using a dial indicator.		
	OBJECTIVE 7	Describe how to use a digital indicator to measure length.		
	OBJECTIVE 8	Describe the function of a gauge fixture and give an application.		
<b>SEGMENT 3</b>	<b>DATA COLLECTION</b>			
	OBJECTIVE 9	Describe three ways to collect process data and give an advantage of each.		

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OBJECTIVE 10	Describe the function of a historical data set.
SKILL 3	Collect and display data using data acquisition software.

<b>SUBJECT:</b>		<b>QUALITY SYSTEMS</b>		
<b>DESCRIPTION:</b>		Quality system elements, definition of quality, ISO 9000 standard, types of quality management systems, PDCA cycle, continuous improvement concepts, audits, inspections		
<b>Instructor Activity</b>	<b>Delivery Method</b>	<b>Student Activity</b>	<b>Materials</b>	
Explain Pre-Test and Review	Paper Copy	Take Pre-Test and review with class	Copy of Pre-Test for Quality Systems	
Review Purpose and Course Objectives	Course Lesson Plan Handout	Read and review as needed	Course Lesson Plan	
Video of Cost of Quality	Video	View the video on Cost of Quality and discuss	Video Cost of Quality	
Segment 1 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
Segment 2 – Lecture, lead	Power Point Slides	Group Discussion		
Segment 3 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
Segment 4 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
Facilitate Exercise	Team Discussion	Assign each table a clause of ISO9001:2015 and have them present	Copy of ISO9001:2015 Standard	

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<b>SEGMENT 1</b>		<b>QUALITY SYSTEMS</b>
	OBJECTIVE 1	Define product quality.
	OBJECTIVE 2	Explain the four classifications of Quality Costs.
	OBJECTIVE 3	Describe elements of a quality management system.
	OBJECTIVE 4	Define ISO 9000.
	OBJECTIVE 5	Describe the Total Quality Management System.
	OBJECTIVE 6	Describe the Six Sigma Quality System.
<b>SEGMENT 2</b>		<b>CONTINUOUS IMPROVEMENT</b>
	OBJECTIVE 7	Describe the PDCA cycle.
	OBJECTIVE 8	Describe four methods used in improving a manufacturing process.
	OBJECTIVE 9	Describe benchmarking.
	OBJECTIVE 10	Describe the roles and responsibilities for quality improvement.
	OBJECTIVE 11	Explain the impact of quality improvement on productivity.
<b>SEGMENT 3</b>		<b>INSPECTION</b>
	OBJECTIVE 12	Describe three types of inspection.
	OBJECTIVE 13	Define a sampling plan.
	SKILL 1	Perform an operation according to a sampling plan.
	OBJECTIVE 14	Describe how to perform a product inspection.
	SKILL 2	Perform a product inspection.
	OBJECTIVE 15	Describe how to process a non-conforming product.
	OBJECTIVE 16	Describe how to document a non-conforming product.

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<b>SEGMENT 4</b>	<b>AUDITS</b>
	OBJECTIVE 17 Describe the purpose of a quality audit.
	OBJECTIVE 18 Describe three types of quality audits.
	OBJECTIVE 19 Describe the procedure for a quality audit.
	OBJECTIVE 20 Describe the purpose of a material review board.

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<b>SUBJECT:</b>		<b>INTRODUCTION TO STATISTICAL PROCESS CONTROL (SPC)</b>		
<b>DESCRIPTION:</b>		Concepts of statistical process control, calculate mean, range, construct and analyze histograms, determine and interpret Cpk		
<b>Instructor Activity</b>	<b>Delivery Method</b>	<b>Student Activity</b>	<b>Materials</b>	
Explain Pre-Test and Review	Paper Copy	Take Pre-Test and review with class	Copy of Pre-Test for Introduction to SPC	
Review Purpose and Course Objectives	Course Lesson Plan Handout	Read and review as needed	Course Lesson Plan	
Segment 1 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
Segment 2 – Lecture, lead	Power Point Slides	Group Discussion		
Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
Segment 3 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
Facilitate Exercise	Calculate Mean, Median and Mode	Using dice throw 100 times and create a frequency tally. Then calculate the mean, median and mode	Dice, Graph Paper	
Facilitate Exercise	Build a Histogram and complete a CPK	Using data B create a histogram W/Normal Distribution Curve and show CPK	Data Set B, Graph Paper	

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<b>SEGMENT 1</b>		<b>BASIC STATISTICAL CONCEPTS</b>
	OBJECTIVE 1	Define the function of statistical process control and give an application.
	OBJECTIVE 2	Define two types of variation and explain their importance.
	SKILL 1	Identify the type of variation given a cause.
	OBJECTIVE 3	Define central tendency and explain how it is used.
	OBJECTIVE 4	Define three measures of central tendency.
	SKILL 2	Calculate the mean of a set of data.
	SKILL 3	Calculate the range of a set of data.
<b>SEGMENT 2</b>		<b>HISTOGRAM CONSTRUCTION</b>
	OBJECTIVE 5	Describe the function of a histogram and give an application.
	OBJECTIVE 6	Describe how to manually construct a histogram.
	SKILL 4	Manually construct a histogram given a set of data.
<b>SEGMENT 3</b>		<b>HISTOGRAM ANALYSIS</b>
	OBJECTIVE 7	Describe how to analyze a histogram.
	OBJECTIVE 8	Define Cpk and explain how it is used.
	SKILL 5	Analyze a histogram.

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UNIT 28*	SUBJECT: CONTROL CHARTS			
	DESCRIPTION:			
	Types and applications of control charts; construct and analyze an X bar and R chart			
Instructor Activity	Delivery Method	Student Activity	Materials	
Explain Pre-Test and Review	Paper Copy	Take Pre-Test and review with class	Copy of Pre-Test for Control Charts	
Review Purpose and Course Objectives	Course Lesson Plan Handout	Read and review as needed	Course Lesson Plan	
Segment 1 - Lecture, Lead	Power Point Slides	Group Discussion	Projector	
Segment 2 – Lecture, lead	Power Point Slides	Group Discussion		
Segment 3 & 4 - Lecture, Lead	Power Point Slides	Group Discussion	Projector	
Facilitate Exercise	X Bar and R Chart	Using Data sets A, B and D create an X Bar and R Chart for each set	Graph Paper, Calculators	
SEGMENT 1	INTRODUCTION TO CONTROL CHARTS			
	OBJECTIVE 1	Describe the function of a control chart and explain its importance.		
	OBJECTIVE 2	Define two types of data.		
	SKILL 1	Classify types of given data.		
SEGMENT 2	X-bar AND R CHART OPERATION			
	OBJECTIVE 3	Describe the function of two types of control charts and give an application of each.		
	OBJECTIVE 4	Describe the construction of an X-bar and R chart.		
	OBJECTIVE 5	Describe how to record data on an X-bar and R chart.		
	SKILL 2	Manually record process data on an X-bar and R chart.		



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<b>SEGMENT 3</b>		<b>CONTROL CHART SETUP</b>
	OBJECTIVE 6	Describe how to construct an X-bar and R chart.
	SKILL 3	Manually construct an X-bar and R chart.
<b>SEGMENT 4</b>		
<b>SEGMENT 4</b>		<b>CONTROL CHART ANALYSIS</b>
	OBJECTIVE 7	Describe how to apply control charts to process operation.
	OBJECTIVE 8	Describe how to analyze a control chart.
	OBJECTIVE 9	Describe how to analyze an X-bar and R chart.
	SKILL 4	Analyze an X-bar and R chart.

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		<b>SUBJECT: CONTINUOUS IMPROVEMENT - 1</b>			
		<b>DESCRIPTION:</b>			
		Applications of root cause failure analysis; construct and analyze Pareto charts; use brainstorming and fishbone diagrams to solve production problems, apply corrective and preventive action			
		<b>Instructor Activity</b>	<b>Delivery Method</b>	<b>Student Activity</b>	<b>Materials</b>
	Explain Pre-Test and Review	Paper Copy	Take Pre-Test and review with class	Copy of Pre-Test for Blueprint Reading 3	
	Review Purpose and Course Objectives	Course Lesson Plan Handout	Read and review as needed	Course Lesson Plan	
	Segment 1 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
	Segment 2 – Lecture, lead	Power Point Slides	Group Discussion		
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
	Segment 3 - Lecture, Lead Discussion	Power Point Slides	Group Discussion	Projector	
	Complete on-line skills tests	MSSC On-Line	Group test and review	Internet and Projector	
	Facilitate Exercise	Problem Solving Exercise	Complete each of the 7 basic quality tools	Memory Jogger Continuous Improvement	
	Facilitate Exercise	Problem Solving Exercise	In teams complete the Sash Bonding Case Study	Graph Paper	

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<b>SEGMENT 1 INTRODUCTION TO QUALITY TOOLS</b>	
OBJECTIVE 1	Describe the function of a root cause failure analysis (RCFA).
OBJECTIVE 2	Describe how to perform a root cause failure analysis (RCFA).
OBJECTIVE 3	List and describe the function of the seven quality tools.
OBJECTIVE 4	Describe the function and construction of three types of cause and effect diagrams.
OBJECTIVE 5	Describe how to construct a C&E diagram.
SKILL 1	Construct a C&E diagram given a set of causes.
<b>SEGMENT 2 BRAINSTORMING</b>	
OBJECTIVE 6	Define brainstorming and explain how it is related to cause and effect diagrams.
OBJECTIVE 7	Describe the six basic steps of the brainstorming process.
OBJECTIVE 8	Describe six methods to improve the results of the brainstorming process.
SKILL 2	Create a cause and effect diagram as part of a brainstorming process.
<b>SEGMENT 3 PARETO DIAGRAM</b>	
OBJECTIVE 9	Identify and describe the function of the two parts of a Pareto Diagram.
OBJECTIVE 10	Define Pareto Analysis.
OBJECTIVE 11	Describe the five steps used to manually construct a Pareto Diagram.
SKILL 3	Manually construct a Pareto Diagram.

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<b>SEGMENT 4</b>	<b>PREVENTIVE AND CORRECTIVE ACTION</b>	
	OBJECTIVE 12	Describe the processes of preventive and corrective action.
	OBJECTIVE 13	Describe how to troubleshoot a quality problem.
	OBJECTIVE 14	Define a critical and non-critical problem.
	OBJECTIVE 15	Describe how to document corrective action.
	OBJECTIVE 16	Describe how to respond to a quality problem.
	SKILL 4	Determine how to respond to a quality problem.



### Subject Matter Expert (SME) Course Review Summary

**College:** Lansing Community College

**M-CAM Training Area:** CNC/Machining Multi-Skilled/Mechatronics Production Operation Welding/Fabrication

**Degree Program Name:**

**Title of Course:** MSSC CPT Quality Practices and Measurement

#### Subject Matter Expert (SME) Reviewer Information

**Name:** Robert C. Hess

**Title:** Senior Instructional Designer/Trainer

**Phone:** 566-322-1033

**Email:** bob.hess@mhtechnologies.net

**Organization/Affiliation:** MH Technologies

**Attach Resume or provide credentials (showing years of experience and work experience that is relevant to course content):**

#### Synopsis of Findings:

1. No issues.

Reviewers Signature Robert C. Hess

Date: 3/10/17

**Michigan Coalition for Advanced Manufacturing  
Subject Matter Expert Course Review**

1. Course Overview and Objectives	Exceptional	Satisfactory	Ineffective
The goals and purpose of the course is clearly stated.		X	
Prerequisites and/or any required competencies are clearly stated.		X	
Learning objectives are specific and well-defined.		X	
Learning objectives describe outcomes that are measurable.		X	
Outcomes align to occupational focus (industry skills and standards).		X	
Comments or recommendations:			
2. Material and Resources	Exceptional	Satisfactory	Ineffective
The instructional materials contribute to the achievement of the course learning objectives.		X	
The materials and resources meet/reflect current industry practices and standards.		X	
The instructional materials provide options for a variety of learning styles.		X	
Resources and materials are cited appropriately. If applicable, license information is provided.		X	
Comments or recommendations:			
3. Learning Activities	Exceptional	Satisfactory	Ineffective
Provide opportunities for interaction and active learning.		X	
Help understand fundamental concepts, and build skills useful outside of the learning object.		X	
Activities are linked to current industry practices and standards.		X	

**Michigan Coalition for Advanced Manufacturing  
Subject Matter Expert Course Review**

Comments or recommendations:			
<b>4. Assessment Tools/Criteria for Evaluation</b>	<b>Exceptional</b>	<b>Satisfactory</b>	<b>Ineffective</b>
The course evaluation criteria/course grading policy is stated clearly on syllabus.		X	
Measure stated learning objectives and link to industry standards.		X	
Align with course activities and resources.		X	
Include specific criteria for evaluation of student work and participation.		X	
Comments and recommendations:			
<b>5. Equipment/Technology</b>	<b>Exceptional</b>	<b>Satisfactory</b>	<b>Ineffective</b>
Meets industry standards and needs.		X	
Supports the course learning objectives.		X	
Provides students with easy access to the technologies required in the course/module.		X	
Comments and recommendations:			

This workforce solution was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

The eight community colleges and MCAM is an equal opportunity employer/program provider. Auxiliary aids and services are available upon request to individuals with disabilities. TTY users please call 1-877-878-8464 or visit [www.michigan.gov/mdcr](http://www.michigan.gov/mdcr).”

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# Robert C. Hess

47737 Remer Ave.  
Shelby Twp., MI 48317  
586-322-1033  
[bob.hess@mhtechnologies.net](mailto:bob.hess@mhtechnologies.net)

## Qualifications

Dedicated, articulate, and enthusiastic with strong analytical and organizational abilities. Effective communication and interpersonal skills. Ability to work independently or as an integral part of a team to accomplish goals. Experience prioritizing and completing numerous concurrent responsibilities while meeting time and organizational goals. Sound professional attitude, strong work ethic and pride in personal performance.

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## Experience

- |  |                                     |  |
|--|-------------------------------------|--|
| <b>2015 – Present</b>  | <b>M H Technologies LLC</b>         | <b>Warren, MI</b>                                      |
| <b>Senior Instructional Designer/Trainer</b>   |                                     |  |
| <ul style="list-style-type: none"><li>• Perform Needs Analysis and quote training programs</li><li>• Develop on-line training programs, system manuals, student workbooks, and job aids</li><li>• Deliver on-site training programs</li></ul>  |                                     |  |
| <b>2002 – 2015</b>   | <b>R.C. Technologies</b>            | <b>Shelby Twp. MI</b>                                  |
| <b>Business Owner – R.C. Technologies</b>  |                                     |  |
| <ul style="list-style-type: none"><li>• Research and quote training programs</li><li>• Development of training programs for Ford Motors, DaimlerChrysler, General Motors, Kuka Robotics, Fame Conveyor, Lamb Technicon, Delphi, Magna, and SPX</li><li>• Design training programs, system manuals, student workbooks, PowerPoint presentations, and job aids</li><li>• Deliver on-site training programs</li><li>• Professional Industrial photography</li></ul> |                                     |  |
| <b>1995 – 2002</b>   | <b>DCT Inc.</b>                     | <b>Sterling Heights, MI</b>                            |
| <b>Training Designer</b>   |                                     |  |
| <ul style="list-style-type: none"><li>• Research and quote training programs</li><li>• Design training programs, system manuals, student workbooks, and job aids</li><li>• Deliver on-site training programs</li></ul>   |                                     |  |
| <b>1990 – 1995</b>   | <b>Bond Robotics</b>                | <b>Sterling Heights, MI</b>                            |
| <b>Training Manager / Field Service Engineer</b>   |                                     |  |
| <ul style="list-style-type: none"><li>• Managed Training Department</li><li>• Research and quote training programs</li><li>• Design operation and maintenance manuals plus training guides</li><li>• Deliver all training programs</li><li>• Perform on-site electrical and mechanical customer support for installation, start-up, and debugging of pressroom automation</li></ul>  |                                     |  |
| <b>1986 – 1990</b>   | <b>Robotic Vision Systems, Inc.</b> | <b>Sterling Heights</b>                                |
| <b>Field Service Engineer / Trainer</b>  |                                     |  |
| <ul style="list-style-type: none"><li>• Research, installation, programming and training of 3D vision guided robotic welding and sealant systems for military, aerospace, and automotive industry</li></ul>  |                                     |  |
| <b>Education</b>   | <b>1977 – 1981</b>                  | <b>Ferris State University</b>                         |
|  |                                     | <b>Big Rapids, MI</b>                                  |
|  |                                     | <ul style="list-style-type: none"><li>• BSEE</li></ul> |