

# **Master's Degree Program in Manufacturing Engineering Technology Annual Assessment Report for 2009-10**

## **I. Introduction**

The master's degree program in Manufacturing Engineering Technology offers courses in four curriculum content areas (CCA):

- a. engineering science & design technology
- b. manufacturing software & computer integration
- c. advanced manufacturing materials & process technology
- d. engineering management process

The program requires 45 credit hours of graduate work. In addition to the CCA credit hours, students must complete 12 credits toward thesis, or 3 to 9 credits toward an approved final project and 3 credits in graduate seminars. Students must take at least one course in each of the four CCAs and three courses in at least one CCA.

## **II. Program Mission, Objectives and Learning Outcomes**

The faculty in the master's degree program in Manufacturing Engineering Technology reviewed the current mission, objectives, and learning outcomes during the 2009-10 academic year. The current version is listed below:

### **Program Mission**

The mission of the Manufacturing Engineering Technology Master of Science Degree program is to produce engineering graduates with an advanced technical education that allows them to take on leadership roles in globally competitive manufacturing industries.

### **Educational Objectives**

1. Provide manufacturing and non-manufacturing engineers with advanced technical and managerial skills that allow them to be the leaders in manufacturing industries.
2. Expand graduates' expertise through industry-based applied research, lab-based design and analysis.
3. Strengthen graduates' ability to work productively in a global manufacturing environment.

### **Learning Outcomes**

The graduates of the Master of Science Degree program in Manufacturing Engineering Technology must demonstrate:

1. The ability to solve engineering problems using advanced mathematical, computational, and analytical methods appropriate to the discipline;

2. The ability to improve current manufacturing processes using a variety of techniques, including product life cycle management, quality and inventory control, and planning techniques.
3. The ability to use current computer tools for manufacturing problems.
4. The ability to plan and conduct professional activities (including manufacturing projects) in one or more areas of specialization in the discipline by using advanced knowledge.
5. Knowledge related to global awareness.
6. The ability to communicate effectively in both written and oral forms.

### III. Three-Year Cycle for Assessment of Student Learning Outcomes

The faculty agreed that we will have six main outcomes and will assess one or two each year on a three-year cycle, as listed in Table 1 below.

Learning Outcomes	'07-08	'08-09	'09-10	'10-11	'11-12	'12-13
1. Ability to solve engineering problems using advanced mathematical, computational, and analytical methods appropriate to the discipline;	X			X		
2. Ability to improve current manufacturing processes using a variety of techniques including product life cycle management, quality and inventory control and planning techniques.			X			X
3. The ability to use current computer tools for manufacturing problems.		X			X	
4. Ability to plan and conduct professional activities (including manufacturing projects) in one or more areas of specialization in the discipline by using advanced knowledge.			X			X
5. Knowledge related to global awareness.		X			X	
6. Ability to communicate effectively in both written and oral forms.	X			X		

Table 1. Master's Program in Manufacturing Engineering Technology Assessment Cycle.

### IV. Summary of 2009-10 Assessment Activities

Manufacturing faculty conducted formal assessment of two student learning outcomes during 2009–2010, as described below. The faculty assessed several graduate courses.

Since there are currently only a small group of graduate students in each course, these results should be viewed with that in mind.

**Student Learning Outcome #2: Ability to improve current manufacturing processes using a variety of techniques including product life cycle management, quality and inventory control and planning techniques.**

The faculty assessed this outcome using the following performance criteria:

1. Demonstrates application of product life cycle management to improvement of manufacturing processes.
2. Demonstrates use of quality control to improvement of manufacturing processes.
3. Demonstrates use of inventory control to improvement of manufacturing processes.
4. Demonstrates use of planning techniques to improvement of manufacturing processes.

For Klamath Falls, the faculty used MFG 598 Product Data Management and Configuration Control to assess this outcome in fall 2009. There were six students involved in this assessment. The results are shown in table 2 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Demonstrates application of product life cycle management to improvement of manufacturing processes.	Informative Presentation and Report on CAD systems w/ PDM/PLM	1 – 4 proficiency scale	80% at 3 or 4	66.7%
Demonstrates use of quality control to improvement of manufacturing processes.	Not Assessed in MFG 598 Fall 09	1 – 4 proficiency scale	80% at 3 or 4	n/a
Demonstrates use of inventory control to improvement of manufacturing processes.	Not Assessed in MFG 598 Fall 09	1 – 4 proficiency scale	80% at 3 or 4	n/a
Demonstrates use of planning techniques to improvement of manufacturing processes.	Semester Projects on Product Development and Info. Mgt.	1 – 4 proficiency scale	80% at 3 or 4	83.3%

Table 2. Assessment Results for SLO #2 in MFG 598, fall 2009, Klamath Campus

The assignment that was used for Performance Criteria #1 was completed in groups of 2 and required students to identify and discuss PLM functionality in commercial Computer Aided Design (CAD) systems. The results were good but many limited themselves to very few references to draw from. The table also shows that by using a website to track the planning and development of a product / assembly of the students' choice, performance for criteria #4 was met with a high level of success. Students were able to use planning techniques such as a needs assessment, brainstorming, literature searches, and prototype development to demonstrate how planning and concept generation not only simplify the manufacturing process, but also help to avoid unnecessary (common) pitfalls in the development of products and assemblies.

The faculty members discussed the results for product life cycle, which did not achieve the suggested benchmark in MFG 598 Product Data Management and Configuration Control. This course is still in the development process. The class size in fall 2009 was very small and the data collected were not very representative. With the growing enrollment in MFG graduate program, it is believed that a better and representative data can be obtained in the future. The faculty members do not see any program-level problems within the current graduate program at this time.

For the Boeing campus, the faculty used MFG 599 Advanced Project Management to address the outcome. There were three graduate students involved in the assessment. The results are shown in table 3 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Demonstrates application of product life cycle management to improvement of manufacturing processes.	Faculty-scored project	1 – 4 proficiency scale	80% at 3 or 4	66.7%
Demonstrates use of quality control to improvement of manufacturing processes.	Faculty-scored project	1 – 4 proficiency scale	80% at 3 or 4	100%
Demonstrates use of inventory control to improvement of manufacturing processes.	n/a	n/a	80% at 3 or 4	n/a
Demonstrates use of planning techniques to improvement of manufacturing processes.	Faculty-scored project	1 – 4 proficiency scale	80% at 3 or 4	100%

Table 3. Assessment Results for SLO #2 in MFG 599 in fall 2009, Boeing campus

The Boeing faculty noted that this was the first time the course was taught at that location. The faculty will use the class feedback to work on improvements. In addition, due to the small sample size, this data should be viewed with caution.

For the Portland Campus, the faculty used MFG 535 Product Life Software to assess this outcome in fall 2009. There were four students involved in the assessment. The results are shown in table 4 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Demonstrates application of product life cycle management to improvement of manufacturing processes.	Actual lab performance with CATIA PLM software	1 – 4 proficiency scale	80% at 3 or 4	100%
Demonstrates use of quality control to improvement of manufacturing processes.		1 – 4 proficiency scale	80% at 3 or 4	n/a
Demonstrates use of inventory control to improvement of manufacturing processes.		1 – 4 proficiency scale	80% at 3 or 4	n/a
Demonstrates use of planning techniques to improvement of manufacturing processes.		1 – 4 proficiency scale	80% at 3 or 4	n/a

Table 4. Assessment Results for SLO #2 in MFG 535 fall 2009, Portland Campus

Only the first performance criterion on product life cycle was assessed in this course. All students met proficiency for this criterion.

**Student Learning Outcome # 4: Ability to plan and conduct professional activities (including manufacturing projects) in one or more areas of specialization in the discipline by using advanced knowledge.**

The faculty assessed this outcome using the following performance criteria:

1. Demonstrates use of advanced discipline or interdisciplinary knowledge to plan manufacturing projects.
2. Demonstrates use of advanced discipline or interdisciplinary knowledge to conduct manufacturing projects.

For Klamath Falls, the faculty used MFG 503 Thesis to assess this outcome. There were two students involved in the assessment. The results are shown in table 5 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Demonstrates use of advanced discipline or interdisciplinary knowledge to plan manufacturing projects.	Observation and evaluation on the submitted reports	1 – 4 proficiency scale	80% at 3 – 4	100%
Demonstrates use of advanced discipline or interdisciplinary knowledge to conduct manufacturing projects.	Observation and evaluation on the submitted reports	1 – 4 proficiency scale	80% at 3 – 4	100%

Table 5. Assessment Results for SLO #4 in MFG 503, fall 2009, Klamath Falls campus

The above table shows that all students met the required performance criteria.

For Boeing, the faculty used Mfg 599 Advanced Project Management to assess this outcome. There were three students involved in the assessment. The results are shown in table 6 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Demonstrates use of advanced discipline or interdisciplinary knowledge to plan manufacturing projects.	Faculty-scored project	1 – 4 proficiency scale	80% at 3 – 4	100%
Demonstrates use of advanced discipline or interdisciplinary knowledge to conduct manufacturing projects.	Faculty-scored project	1 – 4 proficiency scale	80% at 3 – 4	100%

Table 6. Assessment Results for SLO #4 in Mfg 599, Boeing campus

The above table shows that all students met the required performance criteria.

For Portland, faculty used MFG 503 Thesis to assess this outcome. There were three students involved in the assessment. The results are shown in table 7 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Demonstrates use of advanced discipline or interdisciplinary knowledge to plan manufacturing projects.	Faculty-scored presentations	1 – 4 proficiency scale	80% at 3 – 4	100%
Demonstrates use of advanced discipline or interdisciplinary knowledge to conduct manufacturing projects.	Faculty-scored presentations	1 – 4 proficiency scale	80% at 3 – 4	100%

Table 7. Assessment Results for SLO #4 in MFG 503/507, fall 2009, Portland Campus.

The above table shows that all students met the required performance criteria.

## V. Summary of Student Learning Outcomes

During the 2009-10 academic year, the faculty in the Master’s Degree Program in Manufacturing Engineering Technology formally assessed the student learning outcomes summarized below.

### **Student Learning Outcome #2: Ability to improve current manufacturing processes using a variety of techniques including product life cycle management, quality and inventory control and planning techniques.**

In a spring faculty meeting, the faculty discussed a potential problem with product life cycle management. They decided that the courses involved are in a development stage and that there are only a small number of graduate students in these courses. Therefore, they decided there is not a program-level problem in product life cycle management at this time.

### **Student Learning Outcome #4: Ability to plan and conduct professional activities (including manufacturing projects) in one or more areas of specialization in the discipline by using advanced knowledge.**

Students met all performance criteria for this learning outcome. No further action is required at this time.