Master's Degree Program in Manufacturing Engineering Technology
Annual Assessment Report for 2012 - 2013

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 was approved by the Oregon Higher Education Board in 2005. It offers master's degree at three locations of Oregon Tech, namely Klamath Falls, Wilsonville and Seattle. 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 2012-13 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 2012-13 Assessment Activities

Manufacturing faculty conducted formal assessment of two student learning outcomes during 2012-2013, 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 – PLM, PDM and Configuration Control, Winter Term – 2013 taught by Professor David Culler to assess this outcome. There were 4 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.	Exam Questions	1 – 4 proficiency scale	80% at 3 or 4	Met criteria
Demonstrates use of quality control to improvement of manufacturing processes.	Exam Questions	1 – 4 proficiency scale	80% at 3 or 4	Met criteria
Demonstrates use of inventory control to improvement of manufacturing processes.	Exam Questions	1 – 4 proficiency scale	80% at 3 or 4	Met criteria
Demonstrates use of planning techniques to improvement of manufacturing processes.	Exam Questions	1 – 4 proficiency scale	80% at 3 or 4	Met criteria

Table 2. Assessment Results for SLO #2 in MFG 598 – PLM, PDM and Configuration Control, Winter Term – 2013, Klamath Campus

For this SLO assessment, we used our tour of WARN Industries in February as the basis for applying the concepts and tools learned in class during the final exam. The idea was to put students in the position of a manufacturing engineer at WARN to identify areas of opportunity to improve areas such as design, planning, quality and inventory control by implementing known tools from CAD/CAE/CAM, PDM and PLM. The above table shows that students understand the concepts and have the know how to apply the tools that are available for the implementation of Product Lifecycle Management and Product Data Management in manufacturing processes. The results were good but many limited themselves to very few references and did not present enough concrete details to demonstrate the application of the concepts to the WARN manufacturing and engineering processes. 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 can not only simplify the manufacturing process but, also avoid unnecessary (common) pitfalls in the development of products and assemblies.

For the Seattle campus, the faculty used two different courses to address the outcome. These courses were MFG 534 Design Technology for Manufacturability and MFG 598 Advanced Statistical Process Control. 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.	Student Project	1 – 4 proficiency scale	80% at 3 or 4	Met criteria
Demonstrates use of quality control to improvement of manufacturing processes.	Course Assignments	1 – 4 proficiency scale	80% at 3 or 4	Met criteria
Demonstrates use of inventory control to improvement of manufacturing processes.	Material not covered in these courses	n/a	80% at 3 or 4	None
Demonstrates use of planning techniques to improvement of manufacturing processes.	Student Project	1 – 4 proficiency scale	80% at 3 or 4	Met criteria

Table 3. Assessment Results for SLO #2 in MFG 534 and MFG 598 at the Seattle campus.

The above table shows that when relevant material was included in the courses Seattle graduate students performed up to program expectations. The non-covered material is regularly covered during Lean Manufacturing training and activities at The Boeing Company and all Seattle students are familiar with this material and processes.

For the Wilsonville Campus, the faculty used MFG535 Product Lifecycle Management as the assessment vehicle to assess this outcome. There were 4 students involved in the assessment. They were very serious about PLM. All four of them have been employed in a technical capacity in visible industries within in the Portland area. All of them are the persons of achievement within their companies, and have had leadership experience in PLM. All of them have experienced actual evaluation and adoption of PLM software. 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.	Student paper	1 – 4 proficiency scale	80% at 3 or 4	Met criteria (100%)
Demonstrates use of quality control to improvement of manufacturing processes.	Student paper	1 – 4 proficiency scale	80% at 3 or 4	Met criteria (100%)
Demonstrates use of inventory control to improvement of manufacturing processes.	Student paper	1 – 4 proficiency scale	80% at 3 or 4	Met criteria (100%)
Demonstrates use of planning techniques to improvement of manufacturing processes.	Student paper	1 – 4 proficiency scale	80% at 3 or 4	Met criteria (100%)

Table 4. Assessment Results for SLO #2 in MFG535 Product Lifecycle Management, Wilsonville Campus

The results showed that the students met the criteria.

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 the graduate final project reports in the last 4 years to assess this outcome. There were 5 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.	Graduate final reports	1 – 4 proficiency scale	80% at 3 – 4	Met criteria (100%)
Demonstrates use of advanced discipline or interdisciplinary knowledge to conduct manufacturing projects.	Graduate final reports	1 – 4 proficiency scale	80% at 3 – 4	Met criteria (100%)

Table 5. Assessment Results for SLO #4 in MFG 503 at the Klamath Falls campus.

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

For Seattle, the faculty used graduate project reports to assess this outcome. There were four 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.	Graduate Project	1 – 4 proficiency scale	80% at 3 – 4	Met Criteria
Demonstrates use of advanced discipline or interdisciplinary knowledge to conduct manufacturing projects.	Graduate Project	1 – 4 proficiency scale	80% at 3 – 4	Met Criteria

Table 6. Assessment Results for SLO #4 at the Seattle campus.

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

For Wilsonville, faculty used Theses (MFG 503), MFG 538 Special Problems in MFG Software and MFG 596 (Selected Topics/Engr Science & Design) to assess this outcome. There were three students involved in the assessment. All were master's students. They prepared and presented papers for -- and attended-- the COE 2013 Annual PLM (Product Life Management) Conference in Orlando, April 21-24. The conference was entitled "Making it work." One paper presented in session by two of the students was entitled "CATIA V6 Master's Research Project at Oregon Institute of Technology." The other

submitted paper was played continuously in the poster session because the student had to report to her new professional position with Intel in Phoenix. It was entitled, "Using CATIA Knowledgeware and Visual Basic in Optimizing the Design of an Internal Combustion Engine Connecting Rod." Professor Wolf attended the conference as well. 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.	Papers were prepared and presented at a professional conference.	1 – 4 proficiency scale	80% at 3 – 4	Met the criteria
Demonstrates use of advanced discipline or interdisciplinary knowledge to conduct manufacturing projects.	Papers were prepared and presented at a professional conference.	1 – 4 proficiency scale	80% at 3 – 4	Met the criteria

Table 7. Assessment Results for SLO #4 at the Wilsonville Campus.

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

V. Summary of Student Learning Outcomes

During the 2012-13 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.

The above result shows that students have met the performance criteria.

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 above result shows that students have met the performance criteria.

Appendix A

SLO – Curriculum Matrix

Curriculum	SLO # 2	SLO #4
MFG 598 – PLM, PDM and Configuration Control	**X (Klamath Falls)**	
MFG 534 & MFG 598	**X (Seattle)**	
MFG535 Product Lifecycle Management	**X (Wilsonville)**	
Graduate project reports		**X (Klamath Falls)**
Graduate project		**X (Seattle)**
MFG 503, MFG 538, MFG 596		**X (Wilsonville)**