

# Oregon Manufacturing Innovation Center: Strengthening Education in Partnership with Industry

Laura McKinney  
Academic Quality/Student Success  
Board of Trustees, June 29, 2016



# Summary observations

The overall goals of the OMIC initiative for Oregon Tech are:

- Expand business engagement with Oregon’s advanced manufacturing industry, resulting in applied research support;
- Build a nationally distinguished mechanical, manufacturing and applied business education offering in the Portland metro area;
- Relieve space issues, particularly with labs, at the Wilsonville campus;
- Complement Oregon Tech’s technical expertise and reputation by deepening applied research connections with industry, PSU and OSU.

This AQSS overview will focus on the educational opportunities for Oregon Tech with the OMIC:

1. Assess our state of academic readiness to engage;
2. Describe the benefits of applied research projects to the education program;
3. Survey the education market opportunities;
4. Address the Scappoose location and logistics of delivery.



# What is OMIC?

*Advanced manufacturing research and education center in Portland to support Oregon metals manufacturers in meeting global needs for advancement in materials, manufacturing and processes.*

- Modeled on AMRC-Sheffield and many other such sites globally.
- Boeing belongs to 14 other such sites. First in US.
- Team of industry, academia, government and philanthropy.
- Independent corporate entity (501c3 or c6). Membership based.
- Launch targeted for January 1, 2017.

*Key goal: accelerate technology transition.*



# Manufacturing Readiness Levels

Material Solution Analysis	1	Basic manufacturing implications identified.	Basic research expands scientific principles that may have manufacturing implications. The research is unfettered.
	2	Manufacturing concepts identified	Invention begins. Manufacturing science and/or concept described in application context. Identification of material and process approaches are limited to paper studies and analysis.
	3	Manufacturing proof of concept developed	Conduct analytical or laboratory experiments to validate paper studies. Experimental hardware or processes have been created, but are not yet integrated or representative. Materials and/or processes have been characterized for manufacturability and availability but further evaluation and demonstration is required.
	4	Capability to produce the technology in a laboratory environment.	Required investments, such as manufacturing technology development identified. Processes to ensure manufacturability, producibility and quality are in place and are sufficient to produce technology demonstrators. Producibility assessments of design concepts have been completed. Key design performance parameters identified. Special needs identified for tooling, facilities, material handling and skills.

# Manufacturing Readiness Levels

Technology Development	5	Capability to produce prototype components in a production relevant environment.	Identification of enabling/critical technologies and components is complete. Prototype materials, tooling and test equipment, as well as personnel skills, have been demonstrated on components in a production relevant environment, but many manufacturing processes and procedures are still in development. Manufacturing technology development efforts initiated or ongoing.
	6	Capability to produce a prototype system or subsystem in a production relevant environment.	Initial manufacturing approach developed. Majority of manufacturing processes have been defined and characterized, but there are still significant engineering/design changes. Preliminary design of critical components completed. Prototype materials, tooling and test equipment, as well as personnel skills have been demonstrated on subsystems/ systems in a production relevant environment.
Engineering and Manufacturing Development	7	Capability to produce systems, subsystems or components in a production representative environment.	Detailed design is underway. Material specifications are approved. Materials available to meet planned pilot line build schedule. Manufacturing processes and procedures demonstrated in a production representative environment. Production tooling and test equipment design and development initiated.
	8	Pilot line capability demonstrated. Ready to begin low rate production.	Detailed system design essentially complete and sufficiently stable to enter low rate production. All materials are available to meet planned low rate production schedule.

# Manufacturing Readiness Levels

Production and Deployment	9	Low Rate Production demonstrated. Capability in place to begin Full Rate Production.	Major system design features are stable and proven in test and evaluation. Materials are available to meet planned rate production schedules. Manufacturing processes and procedures are established and controlled to three-sigma or some other appropriate quality level to meet design key characteristic tolerances in a low rate production environment.
Operations and Support	10	Full Rate Production demonstrated and lean production practices in place.	This is the highest level of production readiness. Engineering/design changes are few and generally limited to quality and cost improvements. System, components or items are in rate production and meet all engineering, performance, quality and reliability requirements. All materials, manufacturing processes and procedures, inspection and test equipment are in production and controlled to six-sigma or some other appropriate quality level.

# A word about tech transition... and the opportunity for Oregon Tech

- Why this challenging... the “valley of death”
  - Engaging universities is problematic: incentives and IP.
  - Industry wants to cost share and risk share.
  - Requires mix of research and operational skills.
  - Industry cannot spare capacity or factory floor space.
- OMIC: Vision for Factory 2050: full production cycle.
  - Opportunity for many Oregon Tech programs due to breadth of operation.

Oregon Tech is very well positioned: industry savvy faculty, focus on applied learning, hands-on mission.



# What are the opportunities?

- OMIC reaches Wilsonville, Klamath Falls and Seattle.
  - Major focus on manufacturing, materials and mechanical engineering.
  - Cross-program potential, especially electrical/robotics and management.
- Applied research benefits.
  - Increased compensation for faculty.
  - Access to state-of-the-art equipment.
  - Professional development.
  - Broader peer group.
- Additional university revenue.
  - Grants. Increased participation in Federal initiatives.
  - Equipment donations.
  - Access to state funding such as OMI.
- Decreased university costs.
  - Equipment sharing.
  - Site sharing.



# And for students?

- OMIC provides opportunities for all students: Wilsonville, Klamath Falls, Seattle.
  - Summer internships, senior capstones that are tied into applied research initiatives.
  - Access to specialized equipment and industry expertise.
  - Funding opportunities to support students, especially graduate students.
- Applied skills in state-of-the-art technologies.
  - Learn the latest techniques: increase competitiveness at graduation.
  - Bring skills back to existing work places...motivating further commitment to education.
- Career development.
  - Collaborative work with industry representatives.
  - Team projects with contributors at all academic levels (apprentices, BS, MS, PhD) simulating a realistic work environment.



# Are we ready to engage?

Campus	Faculty (FT FTE)	Adjunct	Staff	SCH 2015-16	Labs
Klamath Falls	11.5	6%	1.0	9613	Full capability.
Wilsonville	2.0+3.0 vacant	30%	0.0	2248	Small, specialized. Need CNC/welding.
Seattle	2.0+1.0 vacant		1.0	2073	Small, specialized. Contract w/CC for CNC/welding.
Online				1622	Machine design I/II Ocean Energy

- Do we have the faculty capacity and relevant research interests?
- Do our faculty have the motivation to engage in applied research? Is it rewarded institutionally?
- What about our lab facilities?
- Do we have institutional maturity to deal with intellectual property?
- What about ITAR and other requirements that can come with grant dollars?
- Research areas are a bit of a moving target. Looking for complementary areas to other universities.



# Wilsonville specifics: faculty first!

- **Wangping Sun:** expertise in plant design and materials handling, lean manufacturing, precision engineering systems, modeling and simulation, manufacturing information systems.
  - **Mike Myers:** metals additive manufacturing, virtual prototyping, design innovation.
- 
- Larry Wolfe
  - NWCSM #2. Reopen search.
  - Program director: ME. In search.



# Seeking capabilities...

1. Metal additive manufacturing.
2. Machining, forming, joining (including laser welding).
3. Coatings and advanced materials science.
4. Robotics and automation.



# Wilsonville program opportunities

- Mechanical/manufacturing:
  - BS MET.
  - MOU with PSU that Oregon Tech can offer BSME in nights/weekends format. For MSME, we use PSU as our pathway.
  - MS Engineering, which can be tailored to the specific research areas of the OMIC.
  - BS/MS Manufacturing/Technology. The MS has been quiescent in Wilsonville due to lack of faculty capacity.
- CSET. Embedded systems.
- Electrical: energy and controls.
- Management.



# Strategies for labs/equipment

- Need to provide educational infrastructure, such as CNC and welding machines. All of the options below are under consideration but no agreements are in place.
- \$100,000 matching grant from NWCSM for equipment.
- Decisions await the new faculty.
  - Partnership with PCC? Co-locate at Sylvania to get access to existing equipment and student pipeline.
  - Partnership with World of Speed? Co-locate small machine shop in their high bay facility. Similar to Seattle—specialized machines for small batch learning.
  - Sharing at Scappoose? Depending on the machinery available, these could provide classroom support.
  - Sharing with PSU?



# Market opportunities

- PCC pipeline, both apprentices and AS Engineering.
- Industry professionals seeking continuing education.
- Broaden access across the metro area: can attend classes at multiple locations. May also be true for labs.
- Co-branding and visibility.
- Federal grants, especially collaborative with industry such as NNMI.



# Scappoose location

- Remote delivery options.
  - Consistent with overall strategy of branching out within metro area.
  - Simulcast with lecture capture.
  - Provides access to Klamath Falls!
- Faculty offices.
  - Enough space for hot desks in either Wilsonville or Scappoose depending on faculty preference.
- Student transportation.
  - Collaboration with PCC: already has a shuttle that moves students around the metro area from campus to campus.
- PCC collaboration.
  - Proximity to student target population and equipment.
- Potential for industry growth in the local area.
  - Recently added into the urban growth boundary.



# Recap

The overall goals of the OMIC initiative for Oregon Tech are:

- Expand business engagement with Oregon’s advanced manufacturing industry, resulting in applied research support;
- Build a nationally distinguished mechanical, manufacturing and applied business education offering in the Portland metro area;
- Relieve space issues, particularly with labs, at the Wilsonville campus;
- Complement Oregon Tech’s technical expertise and reputation by deepening applied research connections with industry, PSU and OSU.

This AQSS overview will focus on the educational opportunities for Oregon Tech with the OMIC:

1. Assess our state of academic readiness to engage;
2. Describe the benefits of applied research projects to the education program;
3. Survey the education market opportunities;
4. Address the Scappoose location and logistics of delivery.

