

ADVANCED MANUFACTURING OUTCOMES

ABOUT THE INDUSTRY

Minnesota had more than 307,200 manufacturing jobs statewide in 2013, which is 13 percent of all private-sector employment.

Manufacturing has the second-largest total payroll of any private-sector industry at \$18.3 billion annually, and manufacturing pays an average annual wage of \$59,565. That amount is 21 percent higher than the average wage in all other industries.

In addition, every manufacturing job also supports another 1.7 jobs in other segments of Minnesota's economy – or about 519,000 additional jobs – meaning in all, manufacturing accounts for about 826,000 jobs, or 31 percent of all jobs statewide.

Manufacturing also contributes \$43.7 billion to the state economy and accounts for 16 percent of Minnesota's gross domestic product. Minnesota companies sold nearly \$20 billion in manufactured products in foreign markets, and more than 8,600 companies had export sales in 2013.

ADVANCED MANUFACTURING INDUSTRY COUNCIL

Seventy-five people participated in the Advanced Manufacturing Industry Council meetings.

- 27 members of industry and industry associations
- 14 education representatives
- Seven labor and labor/education representatives
- 27 government, legislative and other representatives

Council membership includes employer representation from food, medical device, precision, and custom manufacturing sectors. Council members and additional representatives are listed in Appendix C.

The first Advanced Manufacturing Industry Council meeting was conducted Aug. 12, 2014, at the Department of Labor and Industry. The purpose of the PIPELINE Project and the vision for success were shared with the Council.

Industry Council member Kim Arrigoni, Board Officer at Haberman Machine, presented the business case for the advance manufacturing sector to begin investigating non-traditional workforce development options like dual-training or apprenticeship models as solutions to workforce shortages in their industry. Richard Wagner, President of

Advance Manufacturing is the PIPELINE industry that currently has the strongest apprenticeship infrastructure in the state, including 20 registered apprenticeship programs in manufacturing and 125 current manufacturing apprentices.

DLI has also partnered on a Customized Training Pilot Program (CTPP) in advanced manufacturing industry with DEED. The program tracks participant training and program completion in partnership with Alexandria Technical and Community College, Hennepin Technical College, Central Lakes College and Century College.

The CTPP program has 143 participants, 22 employers and includes 73 signed employer agreements. A full description is available in Appendix D.



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Dunwoody College of Technology, described the educational impact of dual-training and registered apprenticeship programs for employees, employers and the state. Using a facilitated process, the Council generated an inventory of abilities, knowledge and skills for high-demand advance manufacturing occupations; the occupations discussed at this meeting were used to generate a preliminary list of “apprenticeable” advance manufacturing occupations.

After the first Industry Council meeting, the list of high-demand occupations was cross-referenced with DEED labor-market data, MnSCU listening sessions results and Wanted Analytics data, a Web-supported database that provides current and past job openings in the state.

A survey was designed to identify the most “apprenticeable” advance manufacturing occupations. More than 100 industry representatives completed the survey selecting six of the most “apprenticeable” industry occupations. The survey also served to validate industry specific competencies related to personal effectiveness, academic, workplace, and industry-wide technical skills based on the PIPELINE Competency Standards Models adopted the U.S. DOL Competency Models.

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South Central College hosted the second Advance Manufacturing Industry Council meeting on Oct. 13, 2014. Jan Doebbert, Vice-President of Academic Affairs and Bob Defries, Dean of Customized Training both of Alexandria Technical and Community College discussed its registered apprenticeship program; opportunities, challenges and lessons learned. Dr. Annette Parker, President of South Central College, presented on dual-training programs and models throughout the United States, and the current U.S. DOL grant awarded to South Central College focusing on expanding dual-training throughout Minnesota.

The Industry Council identified four occupations for a dual-training focus, including the development of competency standards.

The final Advance Manufacturing Industry Council meeting was hosted by DLI on Nov. 14, 2014. The Industry Council made recommendations to move forward with occupational competency standard development and potential next steps to increase dual-training delivery in advanced manufacturing.

Occupations identified by the Advanced Manufacturing Industry Council for PIPELINE competency modeling and dual-training planning are:

- **CNC Operator/machinist**
- **Maintenance and repair worker**
- **Mechatronics technician**
- **Metal fabricators – welders, cutters solderers, brazers**

ADVANCED MANUFACTURING RECOMMENDATIONS

Recommendations specific to the Advanced Manufacturing industry are categorized by area of need:

1. Early exposure

Industry Council members strongly support creating a marketing and branding campaign to highlight career opportunities in advanced manufacturing, and to promote dual-training options in this industry sector. They suggest providing youth and adults greater awareness of this industry by linking career awareness initiatives and self-awareness assessments related to an individual's interest and aptitude. Other efforts to increasing awareness and understanding of this industry include:

- developing more youth and adult advance manufacturing camps,
- creating opportunities for hands-on experience in advanced manufacturing occupation, and
- establishing mentoring programs linking industry experts with youth and/or adults interested in learning more about advanced manufacturing.

Council members believe that strong mentors both prior to employment and during dual-training will strengthen recruitment and career advancement in advanced manufacturing. This includes training mentors about K-20 pathways and how to mentor strong workplace skills.

Employers expressed a preference that programs be frontloaded with pre-employment training to ensure success as individuals enter the work setting. Many employers within the manufacturing industry currently use temp-to-hire or third party employment services to recruit and hire employees. Employees receive some general training through these employment services, followed by on-the-job training at the manufacturer.

The Industry Council suggests focusing outreach efforts to under-represented groups in this industry, such as people

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of color, women and veterans. In addition, the Industry Council believes it is critical to educate parents, school counselors, and teachers about the opportunities available in this industry.

The Advanced Manufacturing industry has been and continues to be dedicated to early exposure initiatives aimed at highlighting occupational opportunities and pathways in this industry. The Industry Council encourages the PIPELINE Project to link and to partner with the other advanced manufacturing initiatives and projects throughout the state to maximize impact and effectiveness.

2. Hiring and recruiting

Council members said that employers generally try to hire experienced operators and machinists to ensure efficiency and quality. Dual-training could be an alternative means of developing a talent pipeline and building the infrastructure for continuous improvement of the current workforce. The Industry Council also suggested the idea of hiring individuals as interns first to determine the employee's commitment and interest in the specific occupation; then converting the employee to an apprentice at the end of a successful internship experience.

The Industry Council recommends a coordinated recruitment initiative for advanced manufacturing by region and statewide. For example, it is likely that there is untapped opportunity to recruit and hire individuals who do not self-identify their skills or interests as aligning with careers in advanced manufacturing. Skills from unrelated occupations or the military could be identified as transferable to the industry; resulting in effective recruiting strategies and streamlined training. The aim of cross-industry partnerships is to reach a diverse untapped group of potential advanced manufacturing application; veterans, women, high school youth, transferable, but unrelated skilled workers, individuals in corrections facilities, persons with disabilities, people of color, and low-income communities.

3. Skills and training

The breadth of knowledge and skill needs within advanced manufacturing is significant. Council members identified skill needs such as stamping, blue print reading, and running a lathe, or more general needs such as efficiency, quality assurance, and flexibility.

Additionally, a mix of skills is needed within each sub-sectors of the industry. For example, medical manufacturing requires machinists, injection molding operators, regulatory specialists, sterilizations technicians, etc. As the advanced manufacturing industry continues to automate, different levels of skill are needed such as machine operators with programming abilities and knowledge of electrical applications— a technician and an engineer in one person.

Continuous improvements skills are needed to ensure employers remain competitive in a world economy. The council suggested a multi-employer and/or multi-function supply chain work rotation might maximize employee development. Additionally, national skills standards groups may be a resource for competencies mapping in advanced manufacturing.

The Industry Council recognizes the various drivers and structures available for delivering on-the-job training and related instruction for dual-training programs. They continue to seek assistance with developing dual-training and apprenticeship standards, and setting up the dual-training system framework.

Industry Council members explored the types of infrastructure this industry needs to support dual-training. The development of a “tool kit” for associations and employers new to dual-training emerged as a Council recommendation. The tools needed in the tool kit include training for new mentors, templates for competency mapping and program development, templates for related instruction curriculum development, and train-the trainer programs for program sponsors, supervisors, mentors, and faculty.

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4. Recommended next steps

- Validate occupational competency standards; identify means of analyzing and documenting transferable skills.
- Continue to provide education about dual-training and apprenticeship definitions, processes and benefits.
- Outreach to increase awareness on Advanced Manufacturing industry and dual-training opportunities throughout Minnesota.
- Assist and support employers with the processes and structure related to establishing dual-training or apprenticeship.
- Establish seed funding to assist employers and dual-trainee employees or apprentices in initiating new dual-training and/or apprenticeship programs in advance manufacturing.
- Create dual-training templates and program design options to facilitate quick and easy implementation of new dual-training programs in advance manufacturing throughout the state; ensuring that they are cross-functional and represent the industry as a whole.
- Implement one new dual-training program with newly established tools and occupational competency standards.
- Create industry specific marketing material to promote the advance manufacturing occupations and dual-training “tool-kits” to support employers, dual-training employees or apprentices, and early exposure initiatives.
- Lead the Minnesota effort in defining advanced manufacturing and defining each selected advance manufacturing occupation identified by this Industry Council thus creating standardized language throughout the state.
- Create innovative recruiting tools and models; for example girl high school clubs, veterans’ programs, and prison to work programs that aim to recruit more diverse audiences into this industry.
- Negotiate statewide agreements with MSSC, NIMS, PMMI, and AWS to ensure national credentialing standard are available to employers and employees throughout Minnesota.
- Identify opportunities for program variability based on industry sub-sectors and geographic differences in Minnesota.
- Perform a cost analysis of dual-training versus other methods of hiring and employee training and education.