



ADVANCED
MANUFACTURING

2016

THE COLUMBIA-WILLAMETTE WORKFORCE COLLABORATIVE

Working together to support and develop regional talent.



ABOUT THE COLUMBIA-WILLAMETTE WORKFORCE COLLABORATIVE

The Columbia-Willamette Workforce Collaborative (Collaborative) is a partnership between the Clackamas Workforce Partnership, Workforce Southwest Washington (formerly Southwest Washington Workforce Development Council) and Worksystems: the three Workforce Development Boards covering the Portland-Vancouver Metropolitan Area. The Collaborative delivers a unified approach to serving industry, supporting economic development, and guiding public workforce training investments to better address the needs of our combined labor shed.

We know that people are willing to travel throughout the region for the best opportunities and that employers need the most qualified workers regardless of where they live. By working together, we can cultivate our regional talent pool and build the foundation for a strong economy.

ABOUT THIS REPORT

The Collaborative is focused on aligning and investing resources to support the workforce needs of four sectors: Advanced Manufacturing, Health Care, Software/IT, and Construction. Sectors are chosen based on factors such as their economic significance to the region, current number of openings and job growth projections, average wages that support self-sufficiency, and career ladder opportunities across the skill continuum. By examining labor market intelligence (such as the data contained in this report) and vetting the information with business partners, we are able to better understand industry trends, identify current and emergent workforce needs, and develop customized solutions for each sector.

ACKNOWLEDGEMENTS

Much of the data in this report was provided by the Oregon Employment Department and the Washington Employment Security Department, key partners in the region's workforce development system. The Collaborative is dedicated to assuring this information is regularly updated and presented in a way that advances the region's capacity to understand and align regional workforce supply with business demand in key industry sectors.

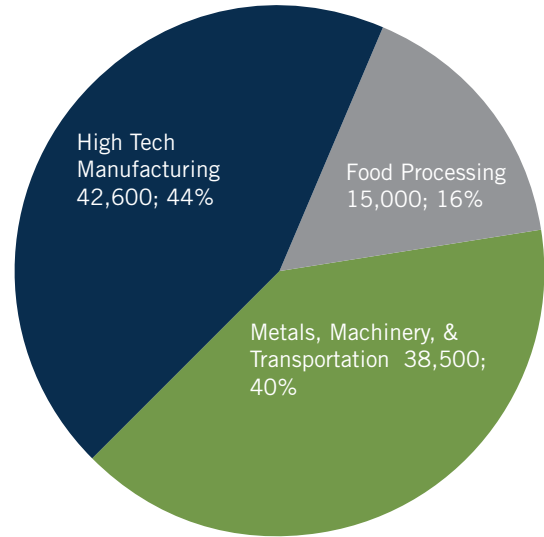
OVERVIEW

With nearly 100,000 jobs and a payroll of \$7.6 billion, Advanced Manufacturing accounts for 10 percent of the greater Portland region's private-sector employment and 15 percent of payroll.

The region's economy is highly dependent on the manufacturing sector. In 2014, the Portland Metro Area ranked third nationally among the nation's largest metro areas in the proportion of its GDP generated by manufacturing: 30 percent compared to 12 percent nationally.

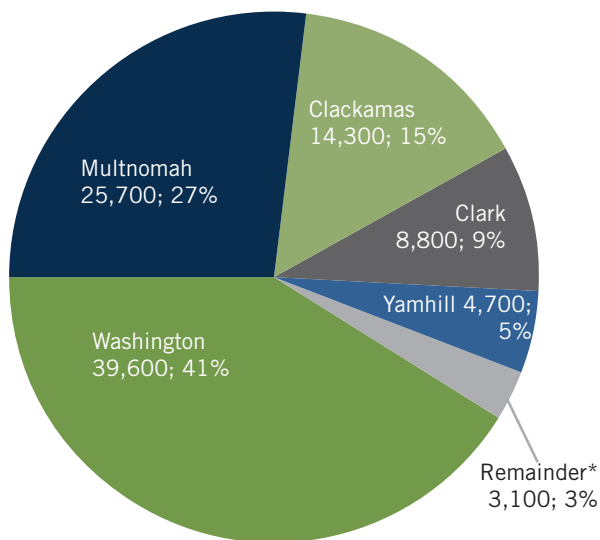
The Advanced Manufacturing sector includes high tech, metals, machinery, transportation equipment, and food processing.

ADVANCED MANUFACTURING EMPLOYMENT BY COMPONENT GREATER PORTLAND REGION: 2015



Source: EMSI

ADVANCED MANUFACTURING JOBS BY COUNTY GREATER PORTLAND REGION: 2015



Source: EMSI

*Columbia, Cowlitz, Skamania, Yamhill, Wahkiakum counties

Nearly half of the region's Advanced Manufacturing jobs are located in Washington County, due largely to Intel.

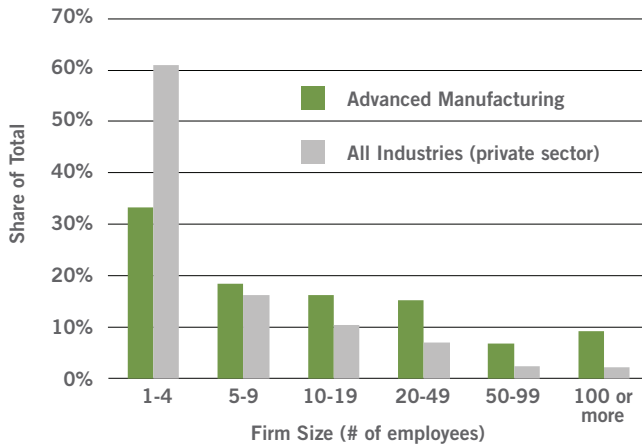
Multnomah County has a small concentration of jobs relative to the overall size of its economy.

Clackamas County, with 14,300 jobs, accounts for 15 percent of the region's employment, and Southwest Washington chips in 2,700 jobs (3%).

Companies tend to be clustered along major road, water, and rail transportation corridors.

FIRM CHARACTERISTICS

**FIRMS BY SIZE IN
GREATER PORTLAND REGION: 2015**



Source: Oregon Employment Department, Washington Employment Security Department

The sector has more large firms and fewer smaller firms compared to the overall economy.

The average firm size is over three times larger than the average company in the region: 43 employees per company versus 15 across all industries.

More than half of the region's Advanced Manufacturing employment is in establishments employing more than 250 people.

MAJOR EMPLOYERS

Intel, the region's largest private-sector employer, had an economic impact totaling \$26.8 billion in 2012 (source: EcoNorthwest). Although not headquartered in the region, Intel's Washington County campuses comprise the company's largest and most advanced operations in the world.

Major 'home grown' or locally headquartered companies include Blount (recently sold but still headquartered here), ESCO, Leatherman, Electro Scientific (ESI), Cascade Steel, Reser's, Tektronix, and Oregon Iron Works.

The region's Advanced Manufacturing firms produce a wide variety of products including semiconductors, streetcars, engine parts, electrical vehicle chargers and oscilloscopes.

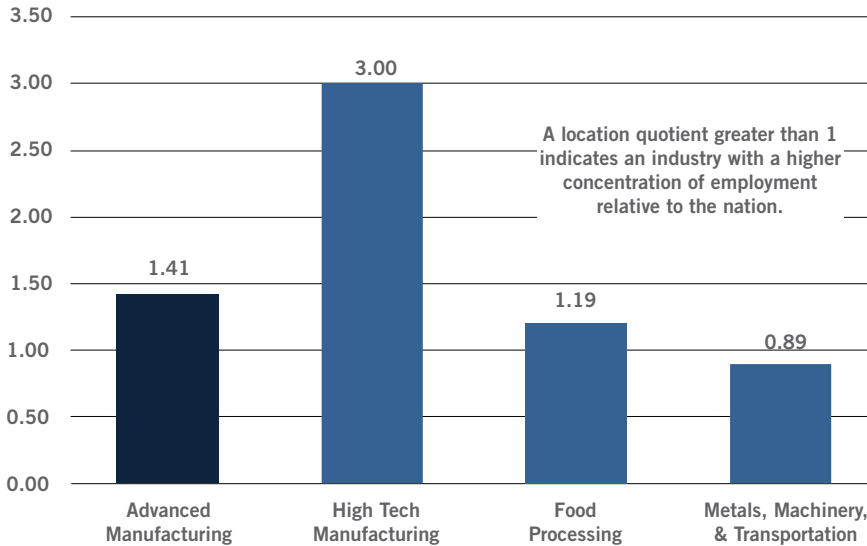
MAJOR EMPLOYERS: ADVANCED MANUFACTURING

Blount International Inc.	Oregon Iron Works
Bob's Red Mill Natural Foods	PDM Steel Service Centers
Boeing	Precision Castparts/PCC Structurals
C-Tech Industries	Reser's Fine Foods Inc.
Daimler Trucks	Rockwell Collins Aerospace & Electronics, Inc.
Electro Scientific Industries Inc.	Sharp Microelectronics
Foster Farms	Siltronic Corporation
Gunderson	Steelscape, Inc.
Intel Corporation	Tektronix
KapStone	TriQuint
Leatherman Tool Group, Inc.	United States Bakery
LifePort, Inc.	Viasystems (Merix)
Linear Technology	Vigor Marine
Mondelez International (formerly Kraft Foods)	WaferTech
Norpac LLC	Waite Specialty Machine Inc.
Neil Jones Food Co	Weyerhaeuser
	Xerox Corporation

Source: Equifax (EMSI), The Business Journal, The Oregonian

CONCENTRATION

**LOCATION QUOTIENTS
ADVANCED MANUFACTURING AND COMPONENTS
GREATER PORTLAND REGION: 2014**



Source: Oregon Employment Dept.; Washington Employment Security Dept., U.S. Bureau of Labor Statistics

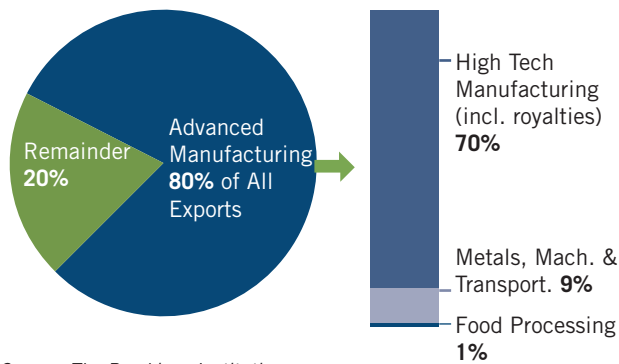
Location quotients are used to measure a sector’s employment concentration in an area. A figure greater than one indicates a higher concentration of employment relative to the nation.

Advanced Manufacturing comprises a larger share of employment in the greater Portland region compared to the U.S. due primarily to the high tech component, where employment is three times as concentrated as the nation.

The greater Portland region has a competitive advantage in Advanced Manufacturing and is a net exporter of goods, driven by computer and electronic products, and metals.

EXPORTING

PORTLAND METRO AREA EXPORTS: 2014



Source: The Brookings Institution

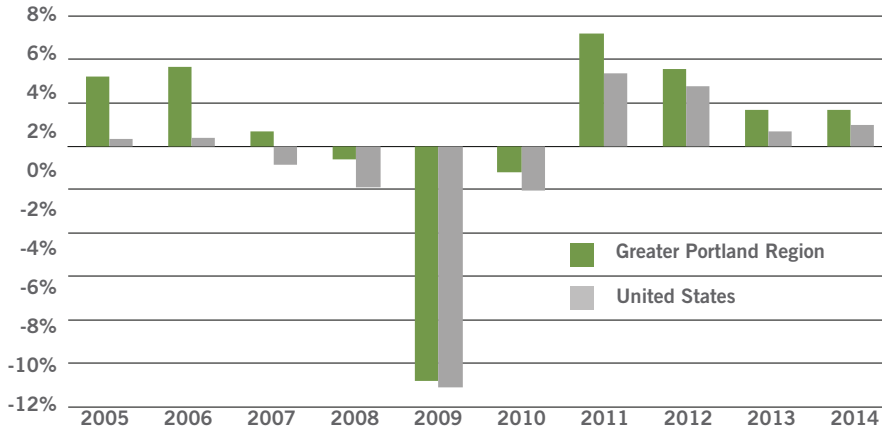
Exports are critical to the region’s economy. According to the Brookings Institution, total exports directly supported more than 94,000 jobs in the metro area in 2014.

Advanced Manufacturing accounted for 80 percent of the Portland Metropolitan Area’s total exports; the largest share among the nation’s 100 largest metro areas. Exports are dominated by computer equipment.

The metro area’s Gross Domestic Product grew by 5.8 percent in 2014, driven by a 6.6 percent growth in the manufacturing sector, the 13th fastest in the nation.

EMPLOYMENT TRENDS

**ADVANCED MANUFACTURING ANNUAL GROWTH RATES
GREATER PORTLAND REGION VS. UNITED STATES**



Source: EMSI

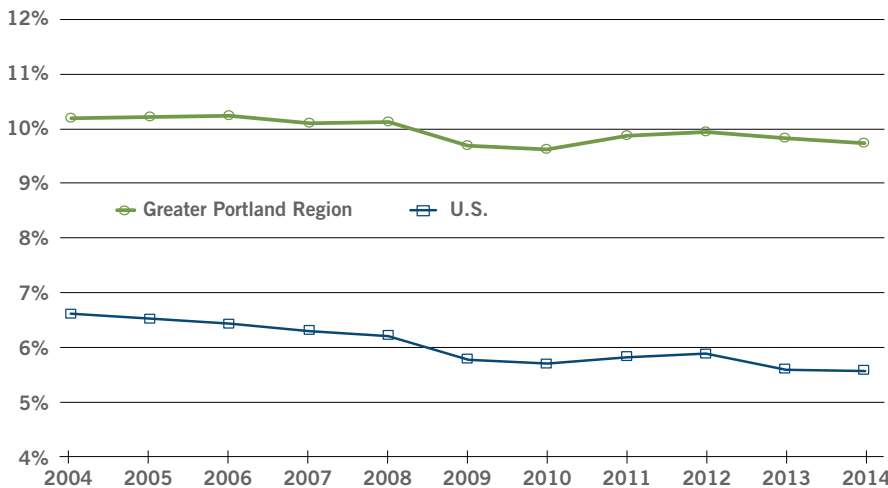
Advanced Manufacturing is a cyclical industry, both locally and nationally.

The Advanced Manufacturing sector in the greater Portland region consistently outperforms the nation.

The sector was hit hard during the Great Recession, losing 12 percent of its employment base (11,600 jobs).

However, the sector propelled the region out of the recession, growing nearly twice as fast as the rest of the economy between 2010 and 2012.

**ADVANCED MANUFACTURING'S SHARE OF EMPLOYMENT
GREATER PORTLAND REGION AND U.S.**

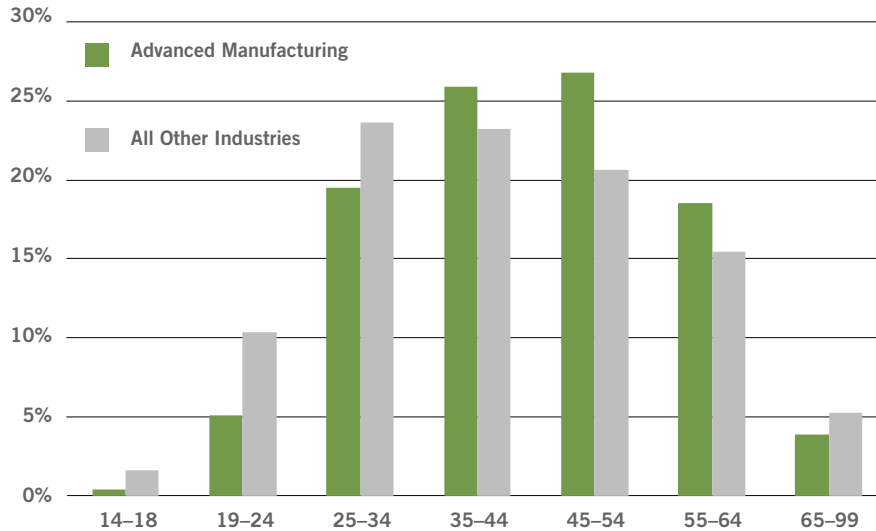


Source: Oregon Employment Dept.; Washington Employment Security Dept., U.S. Bureau of Labor Statistics

Although Advanced Manufacturing is declining as a share of total employment, the Portland region continues to have a much greater share compared to the nation.

CHARACTERISTICS OF THE WORKFORCE

**ADVANCED MANUFACTURING EMPLOYMENT BY AGE
GREATER PORTLAND REGION: 2014**



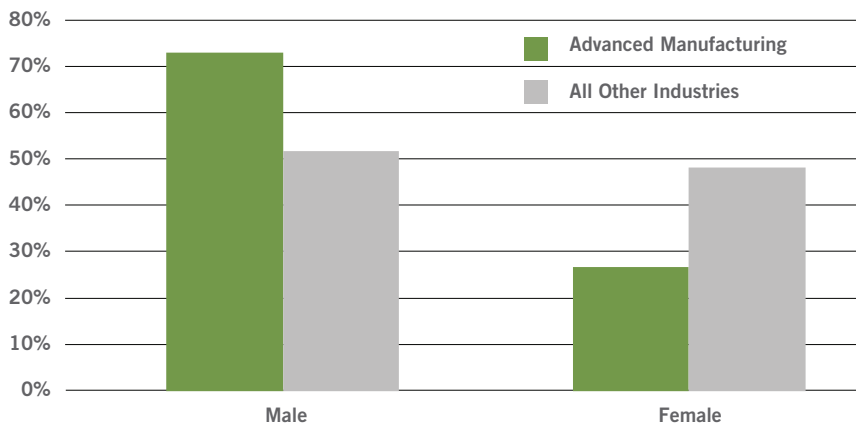
Source: U.S. Census Bureau; Longitudinal Employer-Household Dynamics

Half of the region’s Advanced Manufacturing workforce is 45 years or older.

The workforce is aging. It is projected that over the next decade, employers will need to fill more than 30,000 vacancies due just to retirements.

Youth employment is half that of the overall economy (5.4% vs. 11.9%).

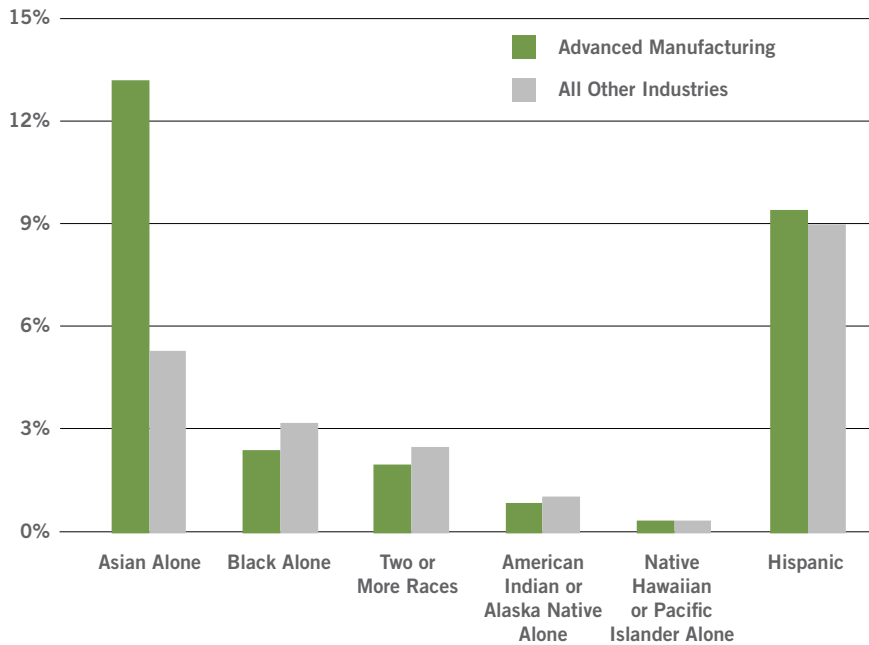
**ADVANCED MANUFACTURING EMPLOYMENT BY GENDER
GREATER PORTLAND REGION: 2014**



Source: U.S. Census Bureau; Longitudinal Employer-Household Dynamics

The Advanced Manufacturing sector is overwhelmingly male; 73 percent of the workforce compared to 52 percent across all other industries.

ADVANCED MANUFACTURING EMPLOYMENT BY RACE AND ETHNICITY GREATER PORTLAND REGION: 2014

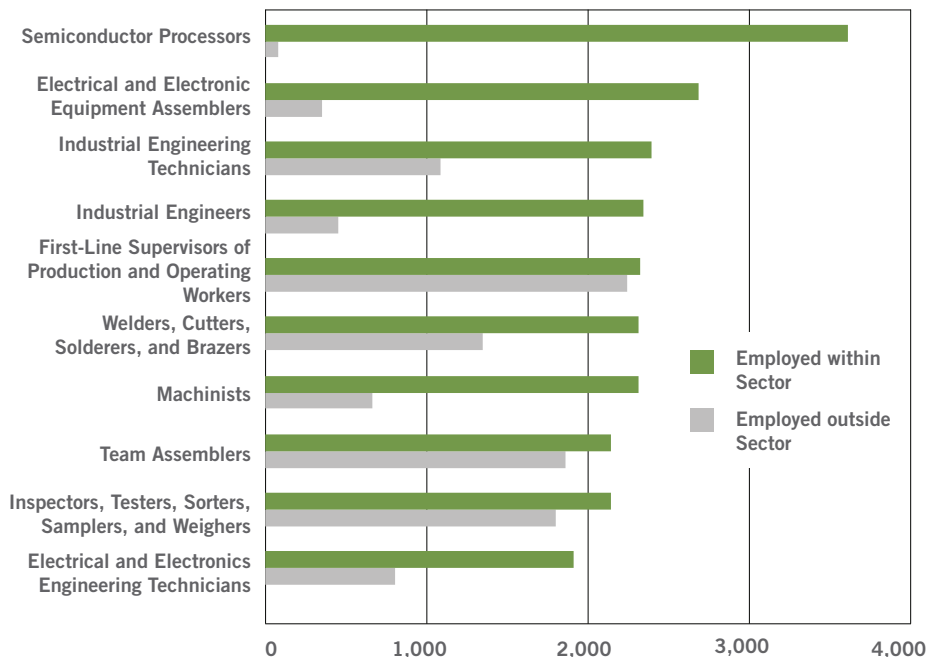


Whites make up the vast majority of the workforce (81%); slightly less than the workforce as a whole (87%).

Asians are more than twice as likely to work in Advanced Manufacturing than in other industries.

OCCUPATIONS

ADVANCED MANUFACTURING OCCUPATIONS EMPLOYMENT WITHIN SECTOR VS. OUTSIDE OF SECTOR GREATER PORTLAND REGION: 2015



Source: EMSI

Approximately 425 occupations are found within the Advanced Manufacturing sector.

The 10 largest occupations account for one-quarter of total employment.

The two largest occupations within Advanced Manufacturing are unique to the sector and are not generally found elsewhere in the economy.

2014-2024 PROJECTED GROWTH: GREATER PORTLAND REGION

Occupation	2014	2024	Projected Annual Growth Openings
Machinists	2,299	3,023	72
Team Assemblers	2,137	2,702	57
Electrical and Electronic Equipment Assemblers	2,675	3,211	54
Computer-Controlled Machine Tool Ops. Metal & Plastic	1,612	2,138	53
Inspectors, Testers, Sorters, Samplers, and Weighers	2,131	2,620	49
Supervisors of Production and Operating Workers	2,316	2,780	46
Welders, Cutters, Solderers, and Brazers	2,301	2,697	40
Industrial Engineers	2,379	2,768	39
Industrial Machinery Mechanics	1,230	1,613	38
Packaging and Filling Machine Operators and Tenders	1,066	1,351	29
General and Operations Managers	1,783	2,066	28
Sales Reps, Wholesale & Mfg., Excl. Technical & Sci. Products	1,357	1,640	28
Laborers and Freight, Stock, and Material Movers, Hand	1,450	1,732	28
Electrical and Electronics Engineering Technicians	1,903	2,162	26
Mechanical Engineers	1,486	1,732	25

Source: EMSI

LARGEST OCCUPATIONS IN ADVANCED MANUFACTURING: GREATER PORTLAND REGION

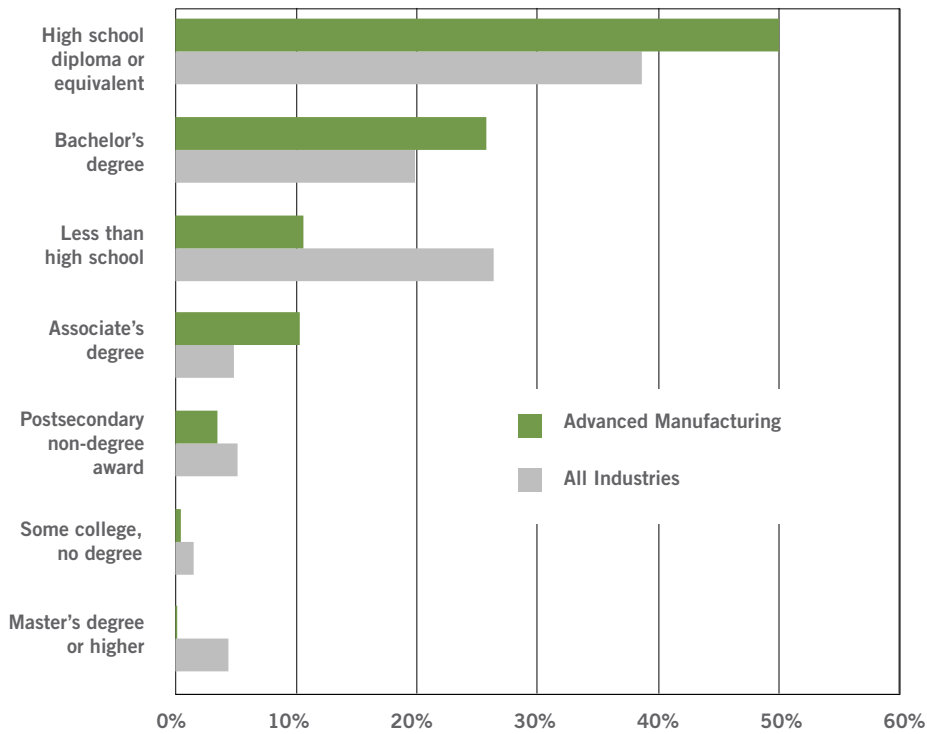
Occupation	2014 Sector Employment	% of Sector Employment	2014 Median Wage*	% of Median Wage, All Occupations*	Location Quotient*	Education Level
Semiconductor Processors	3,597	3.9%	\$16.36	87%	20.05	Associate's degree
Electrical & Electronic Equipment Assemblers	2,675	2.9%	\$15.06	80%	1.71	High school diploma or equivalent
Industrial Engineers	2,379	2.6%	\$48.08	255%	1.78	Bachelor's degree
Industrial Engineering Technicians	2,333	2.5%	\$27.07	143%	4.10	Associate's degree
Welders, Cutters, Solderers, and Brazers	2,301	2.5%	\$20.19	107%	1.17	High school diploma or equivalent
Machinists	2,299	2.5%	\$22.65	120%	0.91	High school diploma or equivalent
Team Assemblers	2,137	2.3%	\$13.19	70%	0.37	High school diploma or equivalent
Inspectors, Testers, Sorters, Samplers, and Weighers	2,131	2.3%	\$17.75	94%	0.89	High school diploma or equivalent
Electrical and Electronics Engineering Technicians	1,903	2.1%	\$28.15	149%	2.56	Associate's degree
Computer-Controlled Machine Tool Operators, Metal & Plastic	1,612	1.7%	\$18.16	96%	1.46	High school diploma or equivalent
Total All Occupations	92,135		\$18.88			

*7-county metro area, all industries

Source: EMSI; Bureau of Labor Statistics

EDUCATIONAL REQUIREMENTS

**ADVANCED MANUFACTURING EMPLOYMENT BY EDUCATIONAL LEVEL
GREATER PORTLAND REGION: 2015**



Source: EMSI

While certain Advanced Manufacturing occupations require higher levels of education (engineers and managers), nearly two-thirds of the sector's jobs require less than an Associate degree.

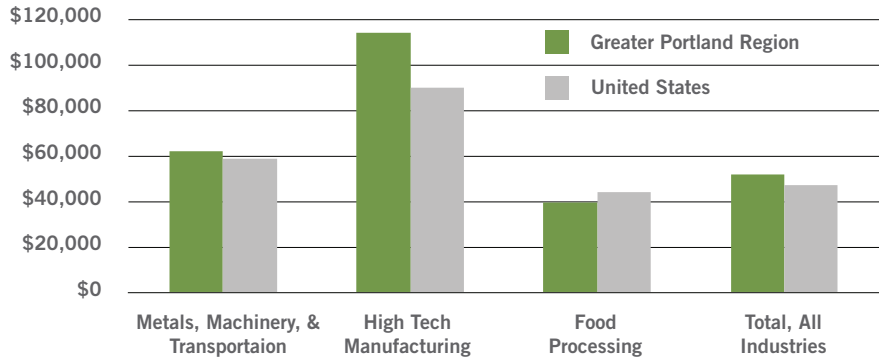
**TRAINING AND DEGREE GRADUATE COMPLETER DATA, ADVANCED MANUFACTURING-RELATED PROGRAMS:
GREATER PORTLAND REGION**

Training	2013 Completers	Award less than 2 years	Award at least 2 and less than 4	Assoc.	Bachelor's	Postbac. Certificate	Master's	Doctorate
Airframe Mechanics and Aircraft Maintenance Technology/Technician	24	1	5	18				
Autobody/Collision and Repair Technology/Technician	57	32	15	10				
Bioengineering and Biomedical Engineering	20			16			2	2
Drafting and Design Technology/Technician, General	20	19		1				
Electrical and Electronics Engineering	169			8	71	1	84	5
Electrical, Electronic and Communications Engineering Technology/Technician	146	56		90				
Electromechanical Technology/Electromechanical Engineering Technology	7			7				
Energy Management and Systems Technology/Technician	205	205						
Engineering Technology, General	6					6		
Engineering, General	31				30		1	
Engineering, Other	5					5		
Engineering/Industrial Management	61				4	14	34	9
Heavy Equipment Maintenance Technology/Technician	1			1				
Industrial and Product Design	17				17			
Industrial Engineering	14	11		3				
Industrial Mechanics and Maintenance Technology	2			2				
Industrial Production Technologies/Technicians, Other	5		5					
Industrial Technology/Technician	6			6				
Logistics, Materials, and Supply Chain Management	95				95			
Machine Shop Technology/Assistant	49	46		3				
Machine Tool Technology/Machinist	60	14	2	44				
Manufacturing Engineering Technology/Technician	98	22		59	17			
Materials Engineering	1						1	
Mechanical Drafting and Mechanical Drafting CAD/CADD	4	1		3				
Mechanical Engineering	137			16	105		16	
Mechanical Engineering/Mechanical Technology/Technician	25		1	24				
Welding Technology/Welder	122	85	3	34				

Source: EMSI

WAGES

ANNUAL AVERAGE WAGES FOR COMPONENTS OF ADVANCED MANUFACTURING, GREATER PORTLAND REGION AND U.S.: 2014

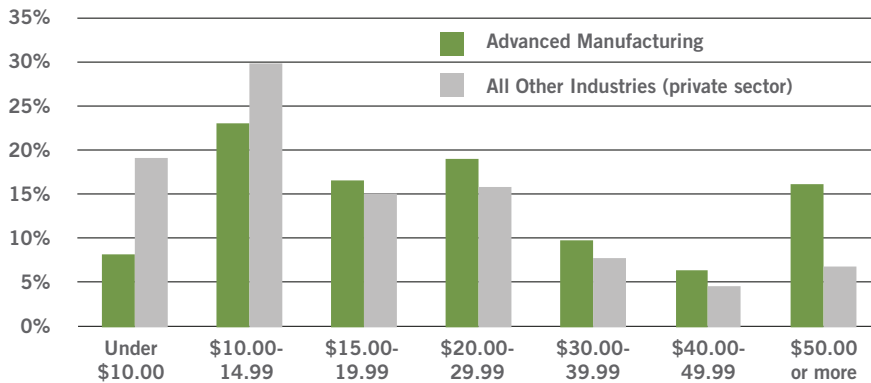


Source: Oregon Employment Department, Washington Employment Security Department

Advanced Manufacturing in the greater Portland region is comprised of several high-paying industries. They also pay better than their national counterparts. Overall, they pay 124 percent of the national average for the industry.

Sector wages are pulled up by the high tech component, which pays more than \$114,000 annually on average. Nationally, this component averages \$90,000 annually.

ADVANCED MANUFACTURING SHARE OF EMPLOYMENT BY HOURLY WAGE OREGON: 2014

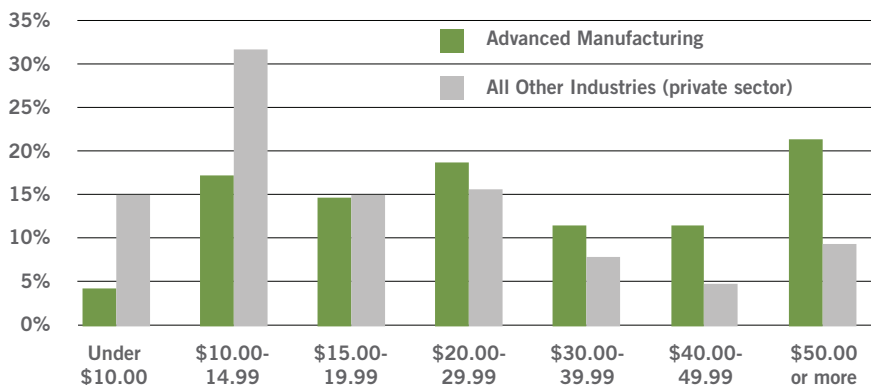


Source: Oregon Employment Department Unemployment Insurance Wage Records

Across Oregon, Advanced Manufacturing's median wage is \$20.68 (2014); 33 percent more than for all industries (\$15.40).

Nearly one-quarter of the workforce earns \$40 hourly or more compared to 12 percent of workers across all other industries.

ADVANCED MANUFACTURING SHARE OF EMPLOYMENT BY HOURLY WAGE WASHINGTON: 2014



Source: Washington Employment Security Department

Across Washington, one-third of Advanced Manufacturing's workforce earns \$40 hourly or more compared to 14 percent of workers across all other industries.

TURNOVER

TURNOVER RATE IN ADVANCED MANUFACTURING GREATER PORTLAND REGION: 2014

Total, Advanced Manufacturing	4.9%
Metals, Machinery, & Transportation	5.3%
High Tech Manufacturing	3.5%
Food Processing	8.4%
Total, All Industries (private sector)	9.5%

Source: Oregon Employment Dept. analysis of U.S. Census Bureau (LEHD) data

Excludes Skamania County

Turnover refers to the change in the workforce due to employee separations and hiring.

There is less turnover in Advanced Manufacturing than in the overall economy.

Workers in the high tech component are very likely to stay at their current jobs.

VACANCIES

LARGEST NUMBER OF VACANCIES IN MANUFACTURING-RELATED OCCUPATIONS PORTLAND TRI-COUNTY: 2015

Occupation	2015 Vacancies, All Industries
Heavy and Tractor-Trailer Truck Drivers	1,241
Motor Vehicle Operators, All Other	597
Production Workers, All Other	499
Machinists	444
Helpers – Production Workers	371
Driver/Sales Workers	311
Laborers and Freight, Stock, and Material Movers, Hand	244
Automotive and Watercraft Service Attendants	228
Light Truck or Delivery Services Drivers	216
Team Assemblers	163

Tri-County: Clackamas, Multnomah, Washington counties NOTE: Information not available for SW Washington
Source: Oregon Employment Department, 2015 Job Vacancy Survey

From a national survey of manufacturers by the Manufacturing Institute and Deloitte:

- An overwhelming majority (82%) of executives agree there is a skills shortage in manufacturing.
- Six out of 10 positions remain unfilled due to the talent shortage.
- Over the next decade, nearly 3.5 million manufacturing jobs will need to be filled, and the skills gap is expected to result in two million of those jobs going unfilled.

CURRENT SUPPLY

REGISTERED JOBSEEKERS

ADVANCED MANUFACTURING: PORTLAND METRO AREA (OREGON PORTION)

Occupation	Jobseekers ¹
Semiconductor Processors	299
Electrical and Electronic Equipment Assemblers	692
Industrial Engineers	234
Machinists	452
Industrial Engineering Technicians	198
Welders, Cutters, Solderers, and Brazers	737
Team Assemblers	1,478
Inspectors, Testers, Sorters, Samplers, and Weighers	994
Electrical and Electronic Engineering Technicians	429
Computer-Controlled Machine Tool Operators, Metal and Plastic	409
Computer Hardware Engineers	268
Mechanical Engineers	212

¹ Data represents jobseekers registered with The Oregon Employment Department, iMatchSkills (active status, August 2015). Data is self-reported. Job seekers can include more than one occupation in their iMS profile, therefore job seekers might be counted more than once in the data.

Portland Metro Area (Oregon portion): Clackamas, Columbia, Multnomah, Washington, Yamhill counties

NOTE: Information not available for SW Washington

Source: Oregon Employment Department

There are several ways to depict the current supply of workers. Unemployment Insurance (UI) claimants are a subset of jobseekers and does not include those unemployed workers who don't qualify for, or have exhausted, benefits. This data is only available in Washington State. Persons registered with the Oregon Employment Department are both employed and unemployed jobseekers including but not limited to those receiving unemployment benefits. This is a much larger pool of workers than UI claimants.

UNEMPLOYMENT INSURANCE CLAIMANTS

SOUTHWEST WASHINGTON: 2015

Occupation	Claimants ¹
Welders, Cutters, Solderers, and Brazers	57
Inspectors, Testers, Sorters, Samplers, and Weighers	16
Computer-Controlled Machine Tool Operators, Metal and Plastic	13
Electrical and Electronic Engineering Technicians	8
Mechanical Engineers	5
Machinists	3
Team Assemblers	3
Semiconductor Processors	2
Electrical and Electronic Equipment Assemblers	2
Industrial Engineering Technicians	2

¹ Data represents claimants registered with The Washington Employment Security Department (active status, August 2015).

Southwest Washington: Clark, Cowlitz, Wahkiakum, Skamania counties

Source: Washington Employment Security Department

In Southwest Washington, there were just 113 unemployed workers claiming unemployment insurance in Advanced Manufacturing's 12 largest occupations (August 2015).

CURRENT DEMAND

ADVANCED MANUFACTURING OCCUPATIONS HELP-WANTED ONLINE (HWOL) LISTINGS GREATER PORTLAND REGION: SUMMER 2015

Occupation	HWOL Ads
Industrial Engineers	449
Industrial Engineers	444
Human Factors Engineers and Ergonomists	5
Software Developers, Applications	1,425
Supervisors of Production & Operating Workers	527
Marketing Managers	852
Computer Occupations, All Other	1,496
Computer Systems Engineers/Architects	244
Information Technology Project Managers	694
Software Quality Assurance Engineers & Testers	511
Search Marketing Strategists	22
Software Developers, Systems Software	201
Accountants and Auditors	819
Accountants	679
Auditors	140
Computer Hardware Engineers	87
Network and Computer Systems Administrators	777
Electrical Engineers	210

Source: The Conference Board, Help-Wanted OnLine (HWOL) data series

3-month average: June, July, August 2015

Note: Only about half of HWOL ads have an identified industry, so the Sector totals are a lower-bound figure.

Data includes ads across all industries and from all available sources (the firm itself, staffing agency ads, Oregon Employment Department job listings, etc., and is adjusted for duplications).

LONG-TERM DEMAND

Between 2014 and 2024, Advanced Manufacturing is projected to add 15,000 jobs for a growth rate of 16 percent; slightly slower than the overall economy (19%).

The largest number of new jobs will be in Washington County while SW Washington will grow the fastest.

The Advanced Manufacturing sector will account for one-in-12 new jobs across the region between 2014 and 2024.

**OCCUPATIONS ADDING THE LARGEST NUMBER OF JOBS, ADVANCED MANUFACTURING:
GREATER PORTLAND REGION**

Occupation	2014	2024	Change	Percent Growth	Share of Sector Growth	Projected Annual Growth Openings
Machinists	2,299	3,023	724	31%	5%	72
Team Assemblers	2,137	2,702	565	26%	4%	57
Electrical and Electronic Equipment Assemblers	2,675	3,211	536	20%	4%	54
Computer-Controlled Machine Tool Ops. Metal & Plastic	1,612	2,138	526	33%	3%	53
Inspectors, Testers, Sorters, Samplers, and Weighers	2,131	2,620	489	23%	3%	49
Supervisors of Production and Operating Workers	2,316	2,780	464	20%	3%	46
Welders, Cutters, Solderers, and Brazers	2,301	2,697	396	17%	3%	40
Industrial Engineers	2,379	2,768	389	16%	3%	39
Industrial Machinery Mechanics	1,230	1,613	383	31%	3%	38
Packaging and Filling Machine Operators and Tenders	1,066	1,351	285	27%	2%	29
General and Operations Managers	1,783	2,066	283	16%	2%	28
Sales Reps, Wholesale & Mfg., Excl. Technical & Sci. Products	1,357	1,640	282	21%	2%	28
Laborers and Freight, Stock, and Material Movers, Hand	1,450	1,732	282	19%	2%	28
Electrical and Electronics Engineering Technicians	1,903	2,162	259	14%	2%	26
Mechanical Engineers	1,486	1,732	246	17%	2%	25
Total Sector	92,135	107,199	15,064	16%		1,506

Source: EMSI

IMPORTING TALENT

H-1B VISAS FOR MANUFACTURING-RELATED OCCUPATIONS GREATER PORTLAND REGION: 2014

Occupation	# of Certified H-1B Visas
Industrial Engineers	412
Electronics Engineers, Except Computer	322
Software Developers, Systems Software	239
Software Developers, Applications	39
Computer Hardware Engineer	24
Electrical Engineers	25
Mechanical Engineers	16
Computer Systems Analysts	15
Commercial and Industrial Designers	14
Materials Engineers	14
Computer and Information Research Scientists	12
Computer Occupations, All Other	8
Computer and Information Systems Managers	8
General and Operations Managers	7
Information Security Analysts	7
Sales Engineers	7
Marketing Managers	5
Biomedical Engineers	4
Engineers, All Other	5
Logisticians	3
Accountants and Auditors	2
Architectural And Engineering Managers	1
Environmental Engineers	1

Source: Myvisajobs.com

The H-1B Visa allows employers to temporarily employ foreign workers in specialty occupations which include engineering, math, and medicine, and generally require a Bachelor's degree or equivalent.

Nearly 4,000 H-1B visas were certified in the Portland region in 2014. One-third were issued for occupations prevalent in the Advanced Manufacturing sector.

Nine out of 10 certified visas were filed by companies in just three cities: Hillsboro, Beaverton, and Portland. The Portland metro area is not a heavy user of H-1B visas relative to other areas in the country. However, we do stand out (along with Seattle, Durham, and San Diego) in that a small handful of large employers drive the majority of demand for H-1B visas in our region.

THE COLUMBIA-WILLAMETTE WORKFORCE COLLABORATIVE



These programs funded in whole or part through the U.S. Department of Labor. We are equal opportunity employers/programs. Auxiliary aids and services are available upon request to individuals with disabilities.