

Advanced Manufacturing

Seattle-Tacoma-Bellevue, WA MSA



Industry & Occupation Spotlight

Table of Contents

Advanced Manufacturing Industry Spotlight	3
Industry Definition	3
Industry Snapshot	5
Industry Staffing Pattern	6
Industry Geographic Employment Distribution	
Industry Employment Distribution by Type	8
Industry Total Establishments	9
Industry GDP and Productivity	10
Industry Supply Chain	11
Advanced Manufacturing Occupation Spotlight	12
Occupation Definition	12
Occupation Snapshot	
Talent Supply-Demand 10-Year Forecast	14
Annual Talent Supply: Post-Secondary Awards by School	15
Annual Talent Supply: Post-Secondary Awards by Program	16

Industry Definition

Advanced Manufacturing is defined as the following NAICS industries:

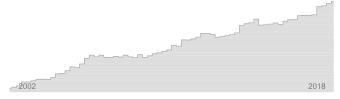
Code	Description
3241	Petroleum and Coal Products Manufacturing
3251	Basic Chemical Manufacturing
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing
3279	Other Nonmetallic Mineral Product Manufacturing
3331	Agriculture, Construction, and Mining Machinery Manufacturing
3332	Industrial Machinery Manufacturing
3335	Metalworking Machinery Manufacturing
3341	Computer and Peripheral Equipment Manufacturing
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
3363	Motor Vehicle Parts Manufacturing
3364	Aerospace Product and Parts Manufacturing
3366	Ship and Boat Building
3391	Medical Equipment and Supplies Manufacturing
3399	Other Miscellaneous Manufacturing

Advanced Manufacturing Seattle-Tacoma-Bellevue, WA MSA – 2018Q4

107,373

Regional employment / 3,515,997 in the nation





\$114,613

Avg Wages per Worker / \$85,098 in the nation



Avg Ann % Change Last 10 Years / **-0.2%** in the U.S.

Region Nation



% of Total Employment / 2.2 % in the U.S.

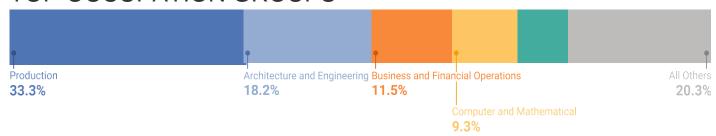
Region Nation



Avg Ann % Change Last 10 Years / +2.5% in the U.S.

Region Nation

TOP OCCUPATION GROUPS



TOP INDUSTRIES

Avg Ann % Change in Employment, Last 10 Years



Aerospace Product and Parts Manufacturing



Region Nation
Other Miscellaneous Manufacturing

Industry Snapshot

EMPLOYMENT







4-Digit Industry	Empl	Avg Ann Wages	LQ	5yr History	Annual Demand	Forecast Ann Growth
Aerospace Product and Parts Manufacturing	80,631	\$124,861	11.84		7,331	0.3%
Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	8,408	\$106,133	1.52		715	-0.4%
Other Miscellaneous Manufacturing	6,167	\$73,173	1.33		616	-0.3%
Medical Equipment and Supplies Manufacturing	2,786	\$58,625	0.65		304	0.7%
Metalworking Machinery Manufacturing	1,869	\$82,831	0.75		182	-0.2%
Ship and Boat Building	1,730	\$67,974	0.73		168	-0.3%
Motor Vehicle Parts Manufacturing	1,224	\$48,709	0.15		131	0.3%
Computer and Peripheral Equipment Manufacturing	1,111	\$131,194	0.52		79	-1.0%
Industrial Machinery Manufacturing	1,028	\$70,491	0.63		88	-1.0%
Petroleum and Coal Products Manufacturing	704	\$99,268	0.46		68	0.1%
Remaining Component Industries	1,715	\$69,058	0.28		183	0.4%
Advanced Manufacturing	107,373	\$114,613	2.28			0.2%

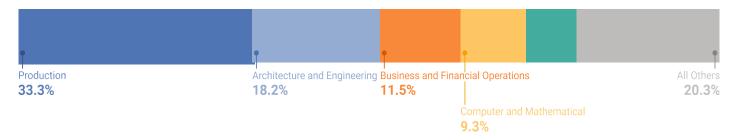


Employment is one of the broadest and most timely measures of a region's economy. Fluctuations in the number of jobs shed light on the health of an industry. A growing employment base creates more opportunities for regional residents and helps a region grow its population.



Since wages and salaries generally compose the majority of a household's income, the annual average wages of a region affect its average household income, housing market, quality of life, and other socioeconomic indicators.

Staffing Pattern



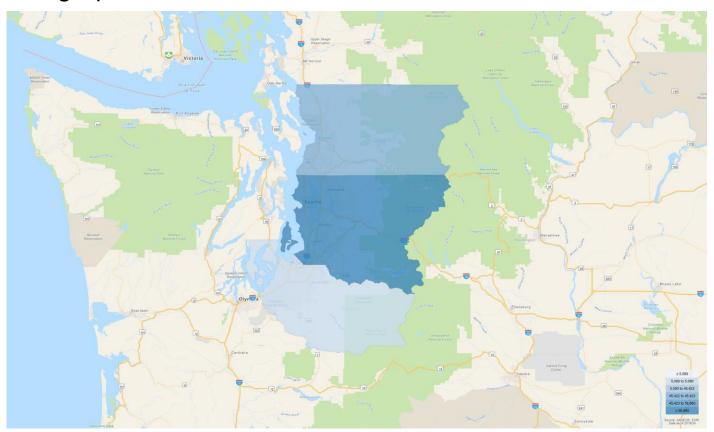
6-digit Occupation	Empl	Avg Ann Wages	Annual Demand
Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	6,344	\$66,000	526
Aerospace Engineers	4,539	\$128,300	302
Inspectors, Testers, Sorters, Samplers, and Weighers	4,171	\$62,600	409
Industrial Engineers	3,944	\$111,400	329
Team Assemblers	3,799	\$38,100	358
Machinists	3,684	\$53,500	396
Software Developers, Systems Software	3,391	\$120,000	234
Business Operations Specialists, All Other	2,748	\$78,800	265
Aircraft Mechanics and Service Technicians	2,735	\$69,300	227
Mechanical Engineers	2,607	\$100,100	181
Remaining Component Occupations	69,389	\$65,500	6,558
Total	107,373		



The mix of occupations points to the ability of a region to support an industry and its flexibility to adapt to future demand. Industry wages are a component of the cost of labor for regional employers.



Geographic Distribution



Region	Empl
King County, Washington	56,860
Snohomish County, Washington	45,423

Region	Empl				
Pierce County, Washington	5,090				

Source: JobsEQ®



A geographic concentration of firms in related fields of business may reduce production costs, attract more suppliers and customers, and increase supply and demand for specialized labor, but may also increase competitive pressure and drive down prices.

Employment Distribution by Type

The table below shows the employment mix by ownership type for Advanced Manufacturing for the Seattle-Tacoma-Bellevue, WA MSA. Four of these ownership types — federal, state, and local government and the private sector — together constitute "Covered Employment" (employment covered by the Unemployment Insurance programs of the United States and reported via the Quarterly Census of Employment and Wages).

"Self-Employment" refers to unincorporated self-employment and represents workers whose primary job is self-employment (that is, these data do not include workers whose primary job is a wage-and-salary position that is supplemented with self-employment).

$^{\circ}$	Λ.	$\boldsymbol{\circ}$	n	
9	×	ж		∕_

	Empl	%
Private	106,134	98.8%
Self-Employment	1,231	1.1%
Federal Government	8	0.0%
Other Non-Covered	0	0.0%

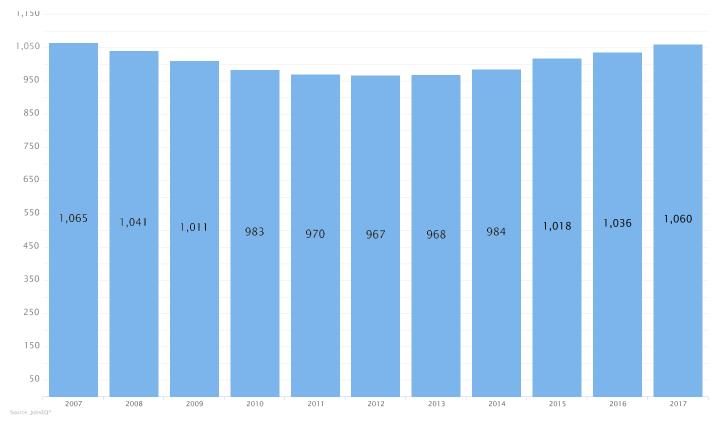
Source: JobsEQ[®]



Strong entrepreneurial activity is indicative of growing industries. Using self-employment as a proxy for entrepreneurs, a higher share of self-employed individuals within a regional industry points to future growth.

Establishments

In 2017, there were 1,060 Advanced Manufacturing establishments in the Seattle-Tacoma-Bellevue, WA MSA (per covered employment establishment counts), a decrease from 1,065 establishments ten years earlier in 2007.

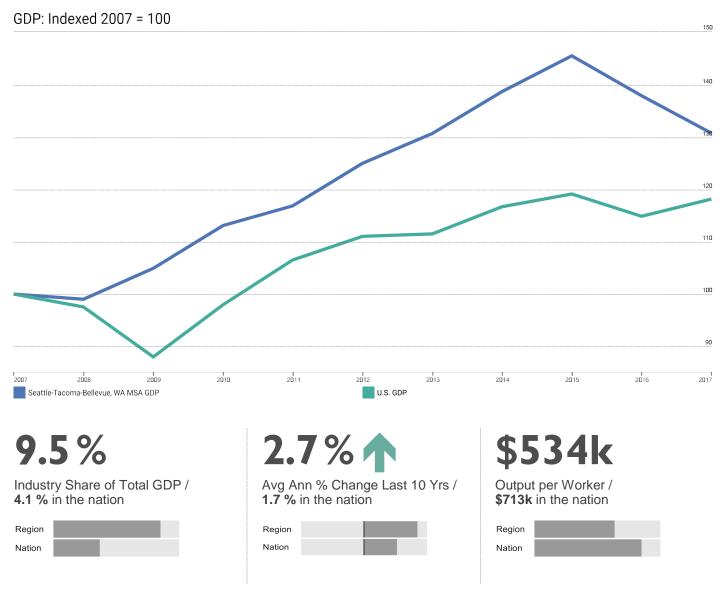




New business formations are an important source of job creation in a regional economy, spurring innovation and competition, and driving productivity growth. Establishment data can provide an indicator of growth in businesses by counting each single location (such as a factory or a store) where business activity takes place, and with at least one employee.

GDP & Productivity

In 2017, Advanced Manufacturing produced \$34 billion in GDP for the Seattle-Tacoma-Bellevue, WA MSA.





Gross domestic product (GDP) is the most comprehensive measure of regional economic activity, and an industry's contribution to GDP is an important indicator of regional industry strength. It is a measure of total value-added to a regional economy in the form of labor income, proprietor's income, and business profits, among others.



Growth in productivity (output per worker) leads to increases in wealth and higher average standards of living in a region.

Supply Chain: Top Suppliers

As of 2018Q4, Advanced Manufacturing in the Seattle-Tacoma-Bellevue, WA MSA are estimated to make \$40.9 billion in annual purchases from suppliers in the United States with about 27% or \$11.2 billion of these purchases being made from businesses located in the Seattle-Tacoma-Bellevue, WA MSA.

4-digit Supplier Industries	Purchases from In- Region (\$M)	Purchases from Out- of-Region (\$M)
Aerospace Product and Parts Manufacturing	\$4,283.1	\$6,035.9
Semiconductor and Other Electronic Component Manufacturing	\$255.8	\$2,602.6
Management of Companies and Enterprises	\$1,143.7	\$1,308.2
Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	\$588.2	\$1,822.5
Computer Systems Design and Related Services	\$417.2	\$544.9
Remaining Supplier Industries	\$4,480.4	\$17,408.8
Total	\$11,168.2	\$29,723.0



Supplier-buyer networks can indicate local linkages between industries, regional capacity to support growth in an industry, and potential leakage of sales out of the region.

Occupation Definition

Advanced Manufacturing is defined by the following the SOC occupations:

soc	Title
51-2092	Team Assemblers
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers
51-1011	First-Line Supervisors of Production and Operating Workers
51-4041	Machinists
51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers
17-2112	Industrial Engineers
17-2141	Mechanical Engineers
17-2011	Aerospace Engineers
51-4121	Welders, Cutters, Solderers, and Brazers
51-9198	HelpersProduction Workers
51-9199	Production Workers, All Other
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic
51-2022	Electrical and Electronic Equipment Assemblers
51-2099	Assemblers and Fabricators, All Other
17-2072	Electronics Engineers, Except Computer
17-2199	Engineers, All Other
17-3023	Electrical and Electronic Engineering Technicians
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic
51-9122	Painters, Transportation Equipment
17-3013	Mechanical Drafters
17-2061	Computer Hardware Engineers
17-3026	Industrial Engineering Technicians
51-4111	Tool and Die Makers
51-2041	Structural Metal Fabricators and Fitters
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic
17-2131	Materials Engineers
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic
51-9081	Dental Laboratory Technicians
51-9083	Ophthalmic Laboratory Technicians
51-4035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic
51-9022	Grinding and Polishing Workers, Hand
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders
17-2041	Chemical Engineers
51-4192	Layout Workers, Metal and Plastic
51-4032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic

Occupation Snapshot

		Current Q4 2018					5-Year History		
soc	Title	Empl	Avg Ann Wages ¹	LQ	Unempl	Unempl Rate	Online Job Ads ²	Total Change	Avg Ann % Chg in Empl
51-2092	Team Assemblers	10,778	\$38,100	0.70	667	6.0%	63	538	1.0%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	8,773	\$62,600	1.18	315	3.6%	219	75	0.2%
51-1011	First-Line Supervisors of Production and Operating Workers	7,764	\$77,000	0.92	179	2.3%	588	145	0.4%
51-4041	Machinists	6,464	\$53,500	1.21	103	1.7%	136	-308	-0.9%
51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	6,427	\$66,000	11.60	355	5.5%	53	-1,018	-2.9%
17-2112	Industrial Engineers	5,688	\$111,500	1.54	161	2.8%	338	-367	-1.2%
17-2141	Mechanical Engineers	5,280	\$100,100	1.30	77	1.4%	334	-186	-0.7%
17-2011	Aerospace Engineers	4,977	\$128,300	5.29	82	1.7%	210	-657	-2.4%
51-4121	Welders, Cutters, Solderers, and Brazers	4,581	\$51,500	0.83	246	5.2%	74	369	1.7%
51-9198	HelpersProduction Workers	3,930	\$33,400	0.73	315	7.8%	5	384	2.1%
51-9199	Production Workers, All Other	3,016	\$33,500	0.83	185	5.9%	687	410	3.0%
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	2,849	\$67,900	1.42	68	2.5%	82	-232	-1.6%
51-2022	Electrical and Electronic Equipment Assemblers	2,847	\$42,400	0.95	119	4.1%	118	-68	-0.5%
51-2099	Assemblers and Fabricators, All Other	2,847	\$38,100	0.93	252	8.3%	120	221	1.6%
17-2072	Electronics Engineers, Except Computer	2,791	\$120,000	1.46	87	3.0%	88	-61	-0.4%
17-2199	Engineers, All Other	2,325	\$101,100	1.24	39	1.6%	241	-45	-0.4%
17-3023	Electrical and Electronic Engineering Technicians	1,475	\$70,400	0.82	52	3.7%	34	33	0.5%
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	1,457	\$47,300	0.57	57	3.8%	33	41	0.6%
51-9122	Painters, Transportation Equipment	1,440	\$62,100	1.84	48	3.2%	50	38	0.5%
17-3013	Mechanical Drafters	1,412	\$88,700	1.67	63	4.6%	92	-18	-0.3%
17-2061	Computer Hardware Engineers	1,308	\$129,400	1.37	45	3.2%	51	132	2.1%
17-3026	Industrial Engineering Technicians	1,304	\$64,300	1.44	40	3.2%	6	-86	-1.3%
51-4111	Tool and Die Makers	1,183	\$63,500	1.18	19	1.8%	12	-59	-1.0%
51-2041	Structural Metal Fabricators and Fitters	1,104	\$44,800	1.01	26	2.3%	32	81	1.5%
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	1,037	\$37,900	0.82	26	2.4%	13	32	0.6%
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	863	\$36,900	0.80	19	2.1%	31	-54	-1.2%
17-2131	Materials Engineers	814	\$109,700	2.13	17	2.0%	22	-87	-2.0%
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	473	\$66,400	1.39	10	2.4%	30	-30	-1.2%
8475	Advanced Manufacturing	97,043	\$68,400	1.09	3,745	3.8%	3,808	-655	-0.1%

Talent Supply-Demand 10-Year Forecast

soc	Title	Annual Supply Gap (or Surplus)	Current Employment 2018Q4	Total Annual Demand	Projected Employment 2028	Accumulated Supply 2028	Accumulated Demand 2028	10-year Supply Gap (or Surplus)	Avg Wages
	Total - All Occupations	(198)	95859	9676	98446	70264	68327	(1,937)	\$68,466
17-2112	Industrial Engineers	49	5,688	482	6,600	2,950	3,444	494	\$111,500
17-2141	Mechanical Engineers	32	5,280	407	5,903	2,681	3,000	319	\$100,200
17-2011	Aerospace Engineers	20	4,977	340	5,342	2,371	2,566	195	\$128,400
17-2199	Engineers, All Other	12	2,325	177	2,565	1,196	1,315	119	\$101,200
51-4121	Welders, Cutters, Solderers, and Brazers	11	4,581	545	5,016	3,524	3,633	109	\$51,500
17-2061	Computer Hardware Engineers	10	1,308	108	1,517	675	776	101	\$129,600
17-2072	Electronics Engineers, Except Computer	10	2,791	205	3,019	1,440	1,541	101	\$119,900
17-3013	Mechanical Drafters	5	1,412	137	1,546	917	964	47	\$88,700
17-3023	Electrical and Electronic Engineering Technicians	5	1,475	143	1,603	962	1,008	46	\$70,400
51-9122	Painters, Transportation Equipment	4	1,440	171	1,582	1,085	1,130	45	\$62,100
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	4	473	61	575	346	387	41	\$66,500
51-4041	Machinists	3	6,464	709	6,893	4,832	4,866	34	\$53,500
51-9199	Production Workers, All Other	3	3,016	392	3,374	2,497	2,531	34	\$33,500
17-2131	Materials Engineers	2	814	64	874	456	480	24	\$109,800
17-3026	Industrial Engineering Technicians	2	1,304	123	1,388	851	875	24	\$64,400
51-1011	First-Line Supervisors of Production and Operating Workers	2	7,764	812	8,220	5,630	5,650	20	\$77,000
51-9081	Dental Laboratory Technicians	1	439	61	526	367	381	14	\$47,200
17-2041	Chemical Engineers	1	114	9	130	59	67	8	\$85,200
51-9083	Ophthalmic Laboratory Technicians	0	345	46	402	291	294	3	\$37,700
51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	0	1,037	116	1,091	787	789	2	\$37,800
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers	0	186	19	191	138	134	(4)	\$38,100
51-4032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	0	45	4	39	34	30	(4)	\$38,000
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	(1)	151	15	146	116	109	(7)	\$52,800
51-4192	Layout Workers, Metal and Plastic	(1)	95	9	88	74	68	(6)	\$74,400
51-9022	Grinding and Polishing Workers, Hand	(2)	222	24	213	183	168	(15)	\$33,500
51-4035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	(2)	238	20	204	180	160	(20)	\$58,100
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	(4)	863	85	826	659	623	(36)	\$36,900
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	(5)	2,849	304	3,017	2,151	2,104	(47)	\$68,000
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	(7)	1,457	155	1,397	1,180	1,106	(74)	\$47,300
51-9198	HelpersProduction Workers	(8)	3,930	725	4,767	4,190	4,109	(81)	\$33,300
51-2041	Structural Metal Fabricators and Fitters	(10)	1,104	101	983	874	774	(100)	\$44,900
51-2099	Assemblers and Fabricators, All Other	(27)	2,847	290	2,598	2,408	2,138	(270)	\$38,100
51-2022	Electrical and Electronic Equipment Assemblers	(40)	2,847	259	2,379	2,432	2,037	(395)	\$42,400
51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	(54)	6,427	518	5,487	4,737	4,202	(535)	\$66,100
51-2092	Team Assemblers	(106)	10,778	1,099	9,847	9,153	8,098	(1,055)	\$38,100
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	(107)	8,773	941	8,098	7,838	6,770	(1,068)	\$62,700

Annual Talent Supply: Post-Secondary Awards by School

		All Award Levels	Certificates and 2-yr	Bachelor's	Master's	Doctorate
Regions and Schools	Programs and Occupations	Awards	Awards	Awards	Awards	Awards
Seattle-Tacoma-Bellevue, WA MSA- All Schools (4266)	Advanced Manufacturing - Related Programs	3,408	2120	848	369	71
University of Washington-Seattle Campus (236948)	Advanced Manufacturing - Related Programs	1,065	0	632	362	71
Edmonds Community College (235103)	Advanced Manufacturing - Related Programs	401	401	n/a	n/a	n/a
Everett Community College (235149)	Advanced Manufacturing - Related Programs	313	313	n/a	n/a	n/a
Shoreline Community College (236610)	Advanced Manufacturing - Related Programs	242	242	n/a	n/a	n/a
Green River College (235343)	Advanced Manufacturing - Related Programs	305	305	n/a	n/a	n/a
Clover Park Technical College (234951)	Advanced Manufacturing - Related Programs	186	182	4	n/a	n/a
Renton Technical College (236382)	Advanced Manufacturing - Related Programs	139	139	n/a	n/a	n/a
Bates Technical College (235671)	Advanced Manufacturing - Related Programs	70	70	n/a	n/a	n/a
South Seattle College (236504)	Advanced Manufacturing - Related Programs	54	54	n/a	n/a	n/a

Annual Talent Supply: Post-Secondary Awards by Occupation

CIP Code	Title	Total Awards	Certificates and 2yr Awards	Bachelor's Awards	Postgraduate Awards
	Total	3,408	2,120	848	440
48.0508	Welding Technology/Welder	505	505	0	0
14.1001	Electrical and Electronics Engineering	478	33	319	126
14.1901	Mechanical Engineering	359	80	178	101
15.0613	Manufacturing Engineering Technology/Technician	275	275	0	0
47.0607	Airframe Mechanics and Aircraft Maintenance Technology/Technician	247	247	0	0
48.0501	Machine Tool Technology/Machinist	242	242	0	0
14.0201	Aerospace, Aeronautical and Astronautical/Space Engineering	155	0	72	83
15.1301	Drafting and Design Technology/Technician, General	143	143	0	0
14.0701	Chemical Engineering	119	15	63	41
48.0510	Computer Numerically Controlled (CNC) Machinist Technology/CNC Machinist	110	110	0	0
15.0000	Engineering Technology, General	109	109	0	0
14.3501	Industrial Engineering	100	0	53	47
14.1801	Materials Engineering	95	0	55	40
15.0303	Electrical, Electronic and Communications Engineering Technology/Technician	82	82	0	0
48.0507	Tool and Die Technology/Technician	74	74	0	0
15.1302	CAD/CADD Drafting and/or Design Technology/Technician	52	52	0	0
47.0603	Autobody/Collision and Repair Technology/Technician	51	51	0	0
14.0901	Computer Engineering, General	47	0	47	0
14.4201	Mechatronics, Robotics, and Automation Engineering	28	0	28	0
48.0503	Machine Shop Technology/Assistant	25	25	0	0
15.1601	Nanotechnology	18	16	0	2
15.1202	Computer Technology/Computer Systems Technology	15	15	0	0
14.0101	Engineering, General	15	0	15	0
14.0702	Chemical and Biomolecular Engineering	11	0	11	0

Data Notes

- Industry employment and wages (including total regional employment and wages) are as of 2018Q4 and are based upon BLS QCEW data, imputed by Chmura where necessary, and supplemented by additional sources including Census ZBP data. Employment forecasts are modeled by Chmura and are consistent with BLS national-level 10-year forecasts.
- Occupation employment is as of 2018Q4 and is based on industry employment and local staffing patterns
 calculated by Chmura and utilizing BLS OES data. Occupation wages are per the BLS OES data and are as of
 2017.
- GDP is derived from BEA data and imputations by Chmura. Productivity (output per worker) is calculated by Chmura using industry employment and wages as well as GDP and BLS output data. Supply chain modeling including purchases by industry are developed by Chmura.
- Postsecondary awards are per the NCES and are for the 2016-2017 academic year.
- Establishment counts are per the BLS QCEW data.
- Figures may not sum due to rounding.

FAQ

What is (LQ) location quotient?

Location quotient is a measurement of concentration in comparison to the nation. An LQ of 1.00 indicates a region has the same concentration of an industry (or occupation) as the nation. An LQ of 2.00 would mean the region has twice the expected employment compared to the nation and an LQ of 0.50 would mean the region has half the expected employment in comparison to the nation.

What is annual demand?

Annual demand is a of the sum of the annual projected growth demand and separation demand. Separation demand is the number of jobs required due to separations—labor force exits (including retirements) and turnover resulting from workers moving from one occupation into another. Note that separation demand does not include all turnover—it does not include when workers stay in the same occupation but switch employers. Growth demand is the increase or decrease of jobs expected due to expansion or contraction of the overall number of jobs.

What is the difference between industry wages and occupation wages?

Industry wages and occupation wages are estimated via separate data sets, often the time periods being reported do not align, and wages are defined slightly differently in the two systems (for example, certain bonuses are included in the industry wages but not the occupation wages). It is therefore common that estimates of the average industry wages and average occupation wages in a region do not match exactly.