CENTER OF EXCELLENCE
FOR AEROSPACE AND ADVANCED MANUFACTURING

2017 Annual Report

In this annual report, Washington's **Center of Excellence (COE) for Aerospace and Advanced Manufacturing** reflects on the promise, accomplishment, and progress of 2016, and looks forward to 2017.

Statewide aerospace and advanced manufacturing highlights

- Per recent Census Bureau reports, Washington was responsible for just over $81 billion in exports, the aerospace industry accounted for $51.1 billion, 59% of the state total.
- Close to 94,000 people are employed by the aerospace industry in Washington.
- It is predicted, two million jobs will go unfilled in the manufacturing sector over the next decade. All indicators point towards a growing manufacturing sector. In addition, the US appears to be leading an innovation revolution that will increasingly heighten the demand for skilled labor.
- Washington state is blessed with a robust labor force and a community and technical college system that is readily capable of preparing the next generation of workers to fill vital industry positions.

Our Focus

Convene
Identifying stakeholder needs and interests

Problem Solve
Identifying industry needs for training and education of the next generation of workers

Disseminate
Informing and forming alliances to move initiatives forward

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2016 HIGHLIGHTS & HEADLINES

MARKET ACTIVITY IN 2016

Overall, the key indicators related to deliveries, net orders and unfilled orders remain positive. While Boeing reports that the totals were down slightly in each area, the backlog of commercial airplanes ordered remains both statistically and economically significant. By comparison, Airbus lists a backlog as of January 31, 2017, of 6,851 planes. At projected production rates, they estimate that to be a 10-year backlog.

BOEING COMMERCIAL AIRPLANE DELIVERY/ORDER SUMMARY 2015-2016

Product	737	747	767	777	787	Total
Deliveries '14	485	19	6	99	114	723
Deliveries '15	495	18	16	98	135	762
Deliveries '16	490	9	13	99	137	748
Net Orders '15	588	2	49	58	71	768
Net Orders in '16	550	17	27	47	58	668
Unfilled Orders '15	4,392	20	80	524	779	5,795
Unfilled Orders '16	4,452	28	93	442	700	5,715

*Source: the Boeing Company

STATE EMPLOYMENT IN AEROSPACE-RELATED JOBS

Just as our state's production and export rates remained relatively stable throughout 2016, so did the recorded employment and unemployment rates. As noted below, employment in manufacturing jobs declined slightly, actual employment in the aerospace industry remained close to 94,000 (estimated). This can be attributed to Boeing and its suppliers.

STATE EMPLOYMENT SUMMARY (000)

Sector	1990	2000	2005	2010	2013	2014	2015	2016
Total Non-Farm	2,145	2,714	2,779	2,789	3,025	3,111	3,184	3,293
Manufacturing	336	331	272	258	287	293	290	283
Aerospace (ASP)	115	86	65	81	95	92	93.6	93.8
ASP % of Manuf.	34%	26%	24%	31%	33%	33%	32.3%	33.1%
ASP % of Total	5.4%	3.2%	2.4%	2.9%	3.1%	2.9%	2.9%	2.9%
Unemployment USA**			5.1	9.6	7.4	6.2	5.0	4.8%
Unemployment WA			5.4	9.7	6.5	5.8	5.8	5.2%

*Source: US Bureau of Labor Statistics

2016 HIGHLIGHTS & HEADLINES

STUDENT ENROLLMENT IN COMMUNITY AND TECHNICAL COLLEGES

Student enrollment in workforce education programs has remained steady and interest remains strong, coming in at 41% of total system FTEs. Actual enrollments continue to decline across the community and technical college system statewide due to lower unemployment rates.

PROGRAM PARTICIPATION—COLLEGE ENROLLMENT SUMMARY, THROUGH AY 2015-16***

PROGRAM	CIP* CODE	Colleges **	2012-13	2013-14	2014-15	2015-16	Delta
Aircraft/Airframe Mechanic	47.0687 47.0607 47.0608	5	702	731	651	692	+6.3%
Airline/Professional Pilot	49.0102	3	111	108	113	98	-13.6%
Electronics Technician	15.0303	6	369	329	256	232	-9.9%
Electronics Mechanical Technician	14.0403	3	85	95	100	122	+22.0%
Industrial Maintenance & Technology	47.0403	3	54	63	59	55	-7.5%
Mach Tool Tech	48.0501	14	779	733	641	659	+2.8%
Manufacturing Tech	15.0613	5	129	141	151	205	+35.6%
Plastics Engineering Technology****	15.0607	6	37	36	57	63	+10.7%
Process Machine Maintenance & Repair	47.0396	2	89	87	68	69	-
Robotics Tech	15.0405	2	8	8	19	13	-29.0%
Welding	48.0508	21	1,387	1,498	1,482	1,453	-1.9%
TOTAL		34	3,750	3,829	3,597	3,660	+1.8%
State FTEs (State Supported)		34 Colleges	146,542	142,549	138,279	135,108	-2.3%
Workforce Education (WFE)	FTEs		60,874	67,924	65,437	56,163	-2.7%
% COE of WFE	FTEs		6.2%	5.6%	6.2%	6.5%	+.3%
% WFE of Total	FTEs		41.5%	41.2%	41.7%	41.6%	-
State Headcount (HC) Total		34 Colleges	399,367	388,082	385,872	380,918	-1.3%
Workforce Education HC			127,760	124,828	123,404	119,350	-3.3%
% of Total	HC		32.0%	32.2%	32.0%	31.3%	-

* The Classifications of Instructional Programs (CIP) system supports the tracking and reporting of fields of study.
** Number of contributing colleges across the state offering relevant programs in the area cited.
*** Drawn from SBCTC Data Warehouse in September 2016, non-duplicated enrollments by program for the years cited.
**** Excludes data from Clover Park Technical College as they embed Composite FTEs in their Aircraft Tech program.

COE 2017 PRIORITIES

BUILDING A SKILLED WORKFORCE FOR THE FUTURE

Given the growing demand for skilled labor, the Center for Excellence for Aerospace and Advanced Manufacturing continues to assess industry needs and works to match them with the energy and efforts of the state's robust Community and Technical College System.

BUILD A SUSTAINABLE PIPELINE

The general focus of the Center of Excellence has been and remains on building a skilled labor capacity by investing in college training and education programs that support and sustain industry needs. However, there are some remarkable secondary school programs that have attracted industry attention and deserve to be more closely connected to post-secondary pathways.

Instructors throughout these secondary school programs are eschewing traditional teaching practices and are engaging students more directly in "doing, practicing and participating." Creating viable pathways for creative efforts that are providing success is an area of high interest for the COE and the stakeholders it represents in the year ahead.

CREATING SUSTAINABLE PROGRAMS IN MECHATRONICS

Over the past two years, the COE, working closely with industry representatives, has developed a phased-in approach to building skilled labor capacity in Mechatronics, also referred to as Industrial Machine Technology. Three Phase I colleges are up and running including Centralia College, Clover Park Technical College and Everett Community College.

Recent visits to several other institutions suggest as Phase II colleges come on-board, program capacity will double in the coming year or two.

EXPAND AND PROVIDE WORK EXPERIENCE OPPORTUNITIES

A comprehensive survey conducted by the COE revealed that the lack of work experience disadvantages students in both secondary and post-secondary as they seek entry-level positions. A committed partnership between employers, colleges and state representatives is essential to expand the number of viable paid internship opportunities so that students may compete for the entry-level positions they seek upon completion of a professional-technical program.

BUILDING SUCCESSFUL AND SUSTAINABLE WORKFORCE PROGRAMS

In conjunction with a Department of Labor, American Apprenticeship Initiatives (AAI) grant, the COE completed a comprehensive survey of college pre-employment and pre-apprentice programs across the state this past year. This survey determined that for workforce programs to be both "successful and sustainable" they should consider the key factors outlined by Adela Soliz, former fellow at the Brookings Institution. Soliz argues that for workforce programs to succeed in the long-term, they should involve the following components.

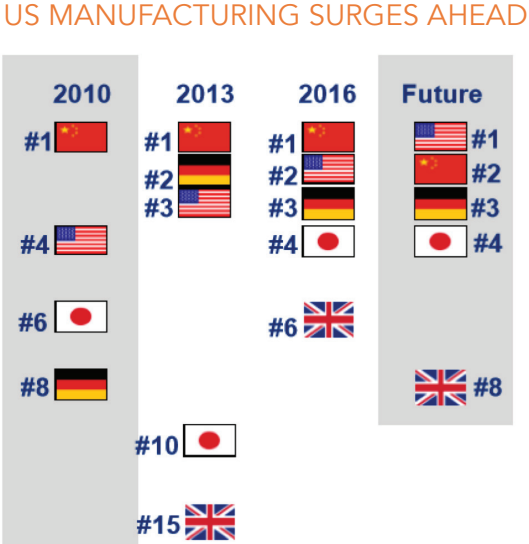
- Include industry or employer engagement in curricular development
- Integrate work experience into the program of study
- Build critical skills and provide "life" support outside the classroom
- Support a culture of innovation in developing and delivering programs
- Leverage outside funding to sustain program delivery

LOOKING AHEAD

MANUFACTURING

In April 2016, Deloitte, an international consulting firm based in the UK, published a report along with the US Council on Competitiveness detailing the progress US manufacturing is making towards regaining the top spot globally. In fact, many of the "traditional manufacturing powerhouses of the 1980's are back atop the global rankings . . . ." Listed as #8 globally in 2010, the US has steadily improved its status to #2 in 2016 and is projected to regain the top spot by 2020.

US MANUFACTURING SURGES AHEAD



Source: Deloitte and the US Council on Competitiveness

QUIET INDUSTRY REVOLUTION

While the volume of manufacturing capacity and output in the US may be returning to mid-century form, the actual "form" it is taking in the 21st century looks little like it did even 20 years ago. What's different today is that "smart" manufacturing technology has taken hold; characterized by cost-efficiency, leveraging clean technology and employing fewer and more highly skilled people. However, as promising as the future looks, the same Deloitte/US Council report referenced above cites that one of the primary "challenges faced by US companies includes a significant talent shortage and widening skills gap."

THE SPREAD OF TECHNOLOGY

Throughout much of its history, the agriculture industry has relied heavily on a pool of low-skilled labor to plant, pick and process their products. This was particularly true in the fruit industry. However, a recent visit to central Washington proved how far the industry has come in adapting to 21st century technology. The Executive Director for the COE and select staff were treated to an extensive tour of the processing plants operated by Gebbers Farms and McDougal and Sons. Both have embraced smart technology to run their plants in the Wenatchee Valley. In the case of Gebbers Farms (pictured here), their newly equipped, eco-friendly plant has reduced its employee footprint from over 300 to fewer than 30 while at the same time improving plant output.

TRENDS TO WATCH IN THE AEROSPACE INDUSTRY

Doug Gates, KPMG International Global Chair, for Industrial Manufacturing, Aerospace and Defense, suggests there are several key trends that may well influence growth and prosperity in the aerospace sector across the US.

TECHNOLOGICAL ADVANCEMENTS.

Significant improvements in "operating efficiency, advanced avionics and impressive interior cabin designs and noise reduction capabilities are all driving increased customer demand." As the industry becomes even more competitive, technological advancements in production tools and techniques may well determine the winners and losers on a global scale.

BOEING 737 TAKES FLIGHT

SUPPLY AND DEMAND BALANCE TILTING.

Concerns linger that the industry may be "oversupplying the market (deliveries increased by 30% between 2009 and 2014)." With forecasts predicting an increase in build-rates of another 40% by 2020, "seat deliveries" may out-pace the actual demand for air travel.

LOWER OIL PRICES IMPACT DEMAND AND GROWTH.

There's growing tension in the industry between building for fuel efficiency and comfort. As oil prices linger around historically low levels and airline profitability has risen, analysts wonder whether the situation will temper short-term replacement demand in the years ahead.

STRONG US DOLLAR AND HIGHER BORROWING RATES.

Financing investment needs and playing catch-up with a rising dollar has become a major issue for potential foreign buyers. "Since June 2014, the dollar has increased 20% against the currencies of the U.S.'s major trading partners and has risen more than 50% against emerging-market currencies such as Brazil and Russia."

CENTER OF EXCELLENCE OUTREACH

ACTIVITY AND STAFF SUPPORT

This table offers a summary of the key events and activities that the COE staff have conducted, supported and/or actively engaged in throughout 2016. These events are categorized in three important areas: "convene, problem solve and disseminate." A significant numerical increase is noted in all categories. As recorded, 2016 witnessed a modest 9.8% rise in events and a sizable 62% increase in the hours invested in these activities during the same period. The COE remains focused on identifying stakeholder needs and interests, forming and informing alliances to move initiatives forward, and focusing much needed energy and attention on the training and educational priorities connected to industry requirements.

Activity Focus	2013 Events/Hours		2014 Events/Hours		2015 Events/Hours		2016 Events/Hours	
Convene	59	199	52	245	113	536	121	708
Problem Solve	50	232	47	263	51	180	53	200
Disseminate	71	378	88	1,256	121	1531	139	2,746
Total	**180**	**809**	**187**	**1764**	**285**	**2,247**	**313**	**3,654**

COMMUNICATIONS AND OUTREACH

Communication to a variety of audiences is achieved through consistent attendance at meetings and conferences and through production of a variety of communication tools designed to drive interested parties to view industry content.

METHODS OF COMMUNICATION

- Quarterly newsletter with consistent sections: Hot Topics, Educational Focus, Industry Focus, Technology Focus, and Success Stories
    - Measurement - sent to 400+ industry and educational representatives; on average 20-30% open rate of messages.
- New website launched in December 2016 with a focus on inbound marketing; which means that the COE is positioned as a thought leader that is connected to both education and industry in Washington. The content on the website is reflective of the COE's relationships and its opportunities to be knowledgeable about current trends and successes. It is updated throughout the month with current aerospace and advanced manufacturing events, meetings, success stories, trends and technology reports.
    - Measurement - In 2016, there were 8,000+ visits, 6000+ visitors, with 4000+ visits from Washington state; a majority of people found the site through organic searches (typing in keywords), others through referrals from other websites. Two of the most popular pages in the website are the Jobs section and the Recent Graduates section. These two sections offer current data on available industry jobs - a free tool to industry to post with the COE; and updates on students graduating from our community and technical college programs.
- Facebook and Twitter - these social media accounts are updated throughout the week as staff members attend events. In addition all newsletter and event activity is pushed from Constant Contact, the newsletter tool, into scheduled posts automatically. These tools see a fair amount of likes and engagement.

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