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# **Aerospace Manufacturing Skills: Community And Technical College Enrollment and Outcomes**

The Aerospace and Advanced Materials Manufacturing Pipeline Advisory Committee provides periodic reports on the supply, demand, and outcomes for Washington’s aerospace training programs. Washington’s community and technical colleges (CTCs) play a critical role in preparing skilled employees in this important sector of our state’s economy. This brief examines enrollment and outcomes in key academic programs (based on Classification of Instructional Program, or CIP, codes) identified by the Pipeline Committee for inclusion in its next report (see Table 1).

Table CIPs identified by the Pipeline Committee

| **Program** | **CIP Code(s)** |
| --- | --- |
| Aircraft/Frame/Powerplant Mechanic | 470687 |
| Aircraft/Frame/Powerplant Mechanic | 470607 |
| Draft & design tech, genl | 151301 |
| Engineering tech, genl | 150000 |
| Machine tool tech | 480501 |
| Plastics engineer tech | 150607 |

In addition to enrollment figures, this brief evaluates wage and earnings data for those who exit the CTC system, comparing wages between those working in an identified aerospace industry with those outside the industry. Finally, the brief summarizes enrollment and outcomes for the Washington Aerospace Training & Research (WATR) Center at Edmonds Community College.

## Enrollment Trends

All programs, with the exception of one — Engineering Tech — experienced declining full-time equivalent (FTE) enrollment and headcounts over the last five years. FTE enrollment was down 27 percent and headcounts were down 18 percent since academic year 2014-15 (see Figures 1 and 2).

Figure FTE by Program

Figure Headcount by Program

The first two digits of the CIP code represent the “CIP area,” the most general grouping of like programs. Because of the limited scope of this brief in examining six CIP codes, research staff questioned whether broadening the criteria to evaluate enrollment patterns by CIP area would yield similar results.

Table 2. CIP area by CIP code

| **Program** | **CIP Area** |
| --- | --- |
| Aircraft/Frame/Powerplant Mechanic | Mechanic and Repair Tech |
| Draft & design tech, genl | Engineering Tech |
| Engineering tech, genl | Engineering Tech |
| Machine tool tech | Precision Production  |
| Plastics engineer tech | Engineering Tech |

As shown in Figure 3, a similar downward trend exists for these programs’ CIP areas, though the trend is smoothed by the volume of students. Again, the program “Engineering tech, genl” stands out with its positive enrollment trend despite decreasing enrollment in its CIP area. The overall decline in enrollment in both program and CIP area is consistent with both CTC system-wide and general higher education drops in enrollment, both in Washington and across the country.

Figure Headcount by CIP Area for Comparison

## 1,000 FTEs

Engrossed House Bill 2088, enacted in November 2013, provided additional funding to CTCs to increase high-demand aerospace enrollments by an additional 1,000 FTEs. The Washington State Board for Community and Technical Colleges (SBCTC) tracks such enrollments to ensure colleges are meeting their targets. If colleges meet or exceed targets over time for a particular program, the FTE are permanently awarded to that college program. As of the 2018-19 academic year, SBCTC is monitoring 22 aerospace-related programs across 15 colleges (see Appendix I).

Table 3. Headcount and FTE tracked for 1,000 FTE awards

| **College** | **Annual FTE** | **Annual Headcount** |
| --- | --- | --- |
| Bates | 95.4 | 121 |
| Bellingham | 105.2 | 125 |
| Big Bend | 22.2 | 31 |
| Clark | 47.1 | 74 |
| Clover Park | 1.3 | 2 |
| Everett | 466.7 | 792 |
| Green River | 92.7 | 161 |
| Lake Washington | 107.7 | 197 |
| Olympic | 74.4 | 152 |
| Peninsula | 13.1 | 13 |
| Renton | 32.9 | 51 |
| Seattle North | 100.3 | 198 |
| Seattle South | 164.0 | 214 |
| Tacoma | 238.6 | 441 |
| Whatcom | 113.5 | 219 |
| **Total** | **1,675.1** | **2,791** |

## Employment Outcomes[[1]](#footnote-1)

The Pipeline Committee report also discusses employment outcomes of those who exit the CTC system, defined as those who were not enrolled in the system for at least a year whether they completed a credential or not. Employment outcomes are measured three quarters after exit and categorized by whether the student’s employer is in the aerospace industry or not (Appendix II). It’s important to note that an employer’s industry does not necessarily reflect the employee’s job at a particular company or organization (e.g. a computer programmer at Starbucks Corporation would be classified under an accommodation and food service industry code).

The number of former students employed at aerospace industry employers has declined by more than half in the last three years, from a total of 448 exiting in 2014-15 to 209 exiting in 2016-17 (Figure 4). Meanwhile employment in non-aerospace-related industries is mixed. Total employment in non-aerospace industries increased sharply for those exiting in 2015-16 to 853 from 665 the prior year, but dropped down to 568 for students exiting in 2016-17. Overall, more students in these programs are employed in non-aerospace industries across all years.

Figure Employment in aerospace industry

Figure Employment in non-aerospace industries

Median wages among those employed in the aerospace industry, adjusted for inflation to the first quarter of 2018, saw modest improvements over the most recently available three years. Draft & design tech experienced an uptick in wages; however, the small N-size (as shown in Figure 4) for this program likely caused the increase.

Figure Median aerospace industry wages

Median Earnings tell a similar story in the aerospace industry, with slight improvement in most programs.

Figure Median aerospace industry earnings

Meanwhile, wages and earnings among those in non-aerospace industries were mostly flat and declined in some cases.

Figure Median non-aerospace industry wages

Figure Median non-aerospace industry earnings

In general, students who exit one of these programs and gain employment in the aerospace industry enjoy higher earnings and wages compared with those in non-aerospace industries.

Table 4 Median wages across all programs by industry

| **Year** | **2014-15** | **2015-16** | **2016-17** |
| --- | --- | --- | --- |
| Aerospace Industry | $19.05 | $18.73 | $20.60 |
| Non-Aerospace Industry | $16.08 | $15.25 | $17.37 |
| Difference | $2.97  | $3.48  | $3.23  |

Table 5 Median earnings across all programs by industry

| **Year** | **2014-15** | **2015-16** | **2016-17** |
| --- | --- | --- | --- |
| Aerospace Industry | $42,332 | $40,375 | $42,991 |
| Non-Aerospace Industry | $31,187 | $35,749 | $32,080 |
| Difference | $11,145  | $4,627  | $10,910  |

Taking a broader view of the wage and earnings advantage experienced by those in the aerospace industry, however, points to a shrinking gap over the last six years (see Figure 10). For example, those employed in the aerospace industry who exited the CTC system in 2011-12 earned median wages nearly $5.00 higher than those in non-aerospace industries. For those who exited in 2016-17, the gap narrowed to just over $3.00. This may explain why employment in the aerospace industry among participants in these aerospace programs is not growing, as discussed earlier and illustrated in Figures 4 and 5.

Figure The shrinking gap in wages between aerospace and non-aerospace industry wages and earnings

## Washington Aerospace Training and Research Center[[2]](#footnote-2)

The Washington Aerospace Training and Research Center (WATR) at Edmonds Community College opened in 2010 and provides short-term job skills training designed to prepare students “for high-paying jobs in the shortest possible amount of time.”[[3]](#footnote-3)

With the exception of 2015-16, the high-water mark year, annualized FTE enrollment at the WATR center since the implementation of the new coding has hovered around 100 FTE and headcounts of about 250 students over the last three years.

Table WATR Center FTE

| **Program** | **2015-16** | **2016-17** | **2017-18** | **2018-19** |
| --- | --- | --- | --- | --- |
| Aircraft elect fab & instl | 15.6 | 8.6 | 13.3 | 19.6 |
| Airframe mech & aircraft | 86.8 | 38.6 | 44.4 | 49.3 |
| Elect/electr & comm tech | 8.6 | 4.3 |   |   |
| Engineering tech, genl | 67.9 | 33.8 |   |   |
| Ind electronics tech |   |   | 6.6 | 9.8 |
| Occ safety & health tech | 6.4 | 3.2 | 1.2 | 0.8 |
| Quality control |   |   |   | 3.0 |
| Tool & die tech | 17.0 | 15.2 | 44.9 | 19.7 |
| Total | 202.3 | 103.7 | 110.4 | 102.2 |

Table WATR Center Headcounts

| **Program** | **2015-16** | **2016-17** | **2017-18** | **2018-19** |
| --- | --- | --- | --- | --- |
| Aircraft elect fab & instl | 78.0 | 43.0 | 66.0 | 98.0 |
| Airframe mech & aircraft | 391.0 | 227.0 | 202.0 | 209.0 |
| Elect/electr & comm tech | 78.0 | 43.0 |   |   |
| Engineering tech, genl | 366.0 | 238.0 |   |   |
| Ind electronics tech |   |   | 66.0 | 98.0 |
| Occ safety & health tech | 63.0 | 32.0 | 12.0 | 8.0 |
| Quality control |   |   |   | 10.0 |
| Tool & die tech | 82.0 | 76.0 | 112.0 | 53.0 |
| Total | 438.0 | 255.0 | 260.0 | 247.0 |

##### WATR Center Employment Outcomes

Tracking employment outcomes for smaller programs, such as the WATR center, can prove challenging. SBCTC’s method for measuring employment relies on a valid Social Security Number and measures employment based on Unemployment Insurance data, which won’t include all employers (such as self-employed, out-of-state, and federal employers). Further, SBCTC’s data view employment as a snapshot in time rather than longitudinally.

Employment outcomes based on this data show 152 students, who at some point since 2015-16 had enrolled in WATR center coursework, employed three quarters after exiting the CTC system in 2016-17. Median wages and earnings were higher for WATR participants employed in the aerospace industry, primarily due to higher compensation among students in the Tool & Die Tech program.

Table WATR Center employment outcomes for students exiting 2016-17

| **Program** | **Measure** | **Aerospace Industry** | **Non-Aerospace Industry** |
| --- | --- | --- | --- |
| Airframe mech & aircraft | Count | 18 | 45 |
| Median Earnings | $36,972 | $30,805 |
| Median Wages | $16.29 | $16.33 |
| Computer programming | Count | <10 |   |
| Median Earnings |   |   |
| Median Wages |   |   |
| Engineering tech, genl | Count |   | <10 |
| Median Earnings |   |   |
| Median Wages |   |   |
| Ind electronics tech | Count | <10 | 10 |
| Median Earnings |   | $39,631 |
| Median Wages |   | $17.17 |
| Microcomputer apps, genl | Count | <10 |   |
| Median Earnings |   |   |
| Median Wages |   |   |
| Quality control | Count |   | <10 |
| Median Earnings |   |   |
| Median Wages |   |   |
| Tool & die tech | Count | 57 | 10 |
| Median Earnings | $57,302 | $35,814 |
| Median Wages | $24.83 | $17.70 |
| All Programs | Count | 84 | 68 |
| Median Earnings | $51,766  | $32,802  |
| Median Wages | $23.57  | $16.51  |

## Appendix I. 1000 FTE programs tracked by SBCTC

| **College** | **Program Title** |
| --- | --- |
| Bates | Mechanical Engineering Technology |
| Bates | Welding |
| Bellingham Tech | Mechatronics |
| Bellingham Tech | Machining Expansion |
| Bellingham Tech | Welding |
| Big Bend | AMT Program |
| Clark  | Machine Technology |
| Clover Park | Avionics |
| Everett | Aircraft Mechanic (AMT) & Avionics |
| Everett | Engineering |
| Green River | Aero. Engineering |
| Lake Washington | Welding |
| Lake Washington | Engineering Transfer |
| Olympic | Engineering Technology |
| Peninsula | CNC Machining/Composites Technology |
| Renton | Mechatronics |
| Seattle North | Avionics/Electronics |
| Seattle North | Electronics |
| Seattle South | AMT Program |
| Tacoma | Engineering |
| Whatcom | Engineering Transfer |
| Green River | Mechatronics |

## Appendix II. Aerospace-related North American Industry Classification System (NAICS) Codes

| **NAICS Code** | **NAICS Title** | **NAICS Group** |
| --- | --- | --- |
| 325211 | Plastics Material and Resin Manufacturing  | Manufacturing |
| 332710 | Machine Shops | Manufacturing |
| 332813 | Electroplating, Plating, Polishing, Anodizing, and Coloring  | Manufacturing |
| 332999 | All Other Miscellaneous Fabricated Metal Product Manufacturing  | Manufacturing |
| 333512 | Machine Tool (Metal Cutting Types) Manufacturing | Manufacturing |
| 333514 | Special Die and Tool, Die Set, Jig, and Fixture Manufacturing  | Manufacturing |
| 333517 | Machine Tool Manufacturing  | Manufacturing |
| 333611 | Turbine and Turbine Generator Set Units Manufacturing  | Manufacturing |
| 333612 | Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing  | Manufacturing |
| 333613 | Mechanical Power Transmission Equipment Manufacturing  | Manufacturing |
| 333618 | Other Engine Equipment Manufacturing  | Manufacturing |
| 334418 | Printed Circuit Assembly (Electronic Assembly) Manufacturing  | Manufacturing |
| 334417 | Electronic Connector Manufacturing  | Manufacturing |
| 334419 | Other Electronic Component Manufacturing  | Manufacturing |
| 334511 | Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing  | Manufacturing |
| 334513 | Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables  | Manufacturing |
| 334515 | Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals  | Manufacturing |
| 334519 | Other Measuring and Controlling Device Manufacturing  | Manufacturing |
| 335311 | Power, Distribution, and Specialty Transformer Manufacturing  | Manufacturing |
| 335314 | Relay and Industrial Control Manufacturing  | Manufacturing |
| 335921 | Fiber Optic Cable Manufacturing  | Manufacturing |
| 335991 | Carbon and Graphite Product Manufacturing  | Manufacturing |
| 335999 | All Other Miscellaneous Electrical Equipment and Component Manufacturing  | Manufacturing |
| 336411 | Aircraft Manufacturing  | Manufacturing |
| 336412 | Aircraft Engine and Engine Parts Manufacturing  | Manufacturing |
| 336413 | Other Aircraft Parts and Auxiliary Equipment Manufacturing  | Manufacturing |
| 336414 | Guided Missile and Space Vehicle Manufacturing  | Manufacturing |
| 336415 | Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing  | Manufacturing |
| 336419 | Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing  | Manufacturing |
| 481111 | Scheduled Passenger Air Transportation  | Transportation and Warehousing |
| 481112 | Scheduled Freight Air Transportation  | Transportation and Warehousing |
| 481211 | Nonscheduled Chartered Passenger Air Transportation  | Transportation and Warehousing |
| 481212 | Nonscheduled Chartered Freight Air Transportation  | Transportation and Warehousing |
| 481219 | Other Nonscheduled Air Transportation  | Transportation and Warehousing |
| 488111 | Air Traffic Control | Transportation and Warehousing |
| 488119 | Other Airport Operations  | Transportation and Warehousing |
| 488190 | Other Support Activities for Air Transportation | Transportation and Warehousing |
| 611512 | Flight Training  | Educational Services |

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1. Datapoints in which N<10 have been suppressed in all employment-related data. [↑](#footnote-ref-1)
2. WATR outcomes in this brief will vary from prior Pipeline Committee reports due to the methodology in distinguishing WATR students. The 2016 version of the report used course item number to identify WATR students, while this brief uses a fee-pay status code first implemented in academic year 2014-15. FEE\_PAY\_STATUS = ‘WC’. [↑](#footnote-ref-2)
3. https://washingtonaerospace.com/history.htm [↑](#footnote-ref-3)