AVIATION

Supply & Demand Analysis

2022

MINNESOTA STATE
Transportation Center of Excellence

Introduction and Sector Overview

This report highlights the importance of the Aviation and Drone Technology career pathway for Minnesota's Transportation Industry. Professionals in Aviation and Drone Technology work in diverse roles from piloting, air traffic controlling, and aircraft maintenance technician, as well as designing, servicing, or piloting drones.[1] In all, about 9,162 people work in Aviation and Drone Technology roles in Minnesota as of the third quarter of 2022—a 7.5% increase (642 workers) from a year prior.

Overall employment in Minnesota has grown by nearly 118,000 workers (4.0%) between the second quarter of 2021 and the third quarter of 2022, and the five-year forecast recovered with a 45,970 expansion of employment over five years as of the most current baseline forecasts, or about 0.3% average annual growth. During this time frame, Aviation and Drone Technology employment is anticipated to grow moderately in Minnesota by about 86 total jobs (0.2% annually). Total baseline demand for Aviation and Drone Technology talent is anticipated to be around 4,615 professionals needed to fill positions due to job exits and transfers, such as retirements and job changes.

Transportation Pathways in Minnesota – Baseline Forecast, 2022Q3[1]

	Current						5-Year History		5-Year Baseline Forecast				
Occupation	Empl	Avg Ann Wages[2]	LQ	Unempl	Unempl Rate	Online Job Ads[3]	Empl Change	Ann %	Total Demand	Exits	Transfers	Empl Growth	Ann % Growth
Automotive Technology Pathway	21,227	$66,900	1.02	387	1.8%	1,183	-819	-0.8%	8,677	3,181	5,821	-279	-0.4%
Aviation and Drone Technology Pathway	9,162	$115,200	0.86	139	1.5%	313	-531	-1.1%	4,615	1,584	2,945	86	0.2%
Collision Repair Pathway	6,757	$54,100	1.05	177	2.6%	359	-44	-0.1%	3,236	1,128	2,142	-34	-0.1%
Diesel Equipment and Truck Pathway	12,518	$61,900	1.06	230	1.8%	593	-458	-0.7%	6,135	2,048	3,894	192	0.3%
Marine and Power Sports Pathway	4,799	$46,200	0.95	205	4.2%	75	95	0.4%	3,046	1,062	1,946	38	0.2%
Truck Driving Pathway*	98,845	$51,200	0.93	2,607	2.6%	6,446	5,748	1.2%	63,838	27,225	34,298	2,315	0.5%
Transportation Occupations	**145,613**	**$58,000**	**0.96**	**3,444**	**2.4%**	**8,585**	**1,899**	**0.3%**	**84,921**	**33,955**	**48,916**	**2,050**	**0.3%**
Total - All Occupations	**3,038,766**	**$63,700**	**1.00**	**68,550**	**2.3%**	**170,185**	**-11,615**	**-0.1%**	**1,800,961**	**734,547**	**1,020,444**	**45,970**	**0.3%**

*This pathway includes School Bus Driver careers as of 2022, which were not included in the 2020 or 2021 estimates of career pathway employment or demand.

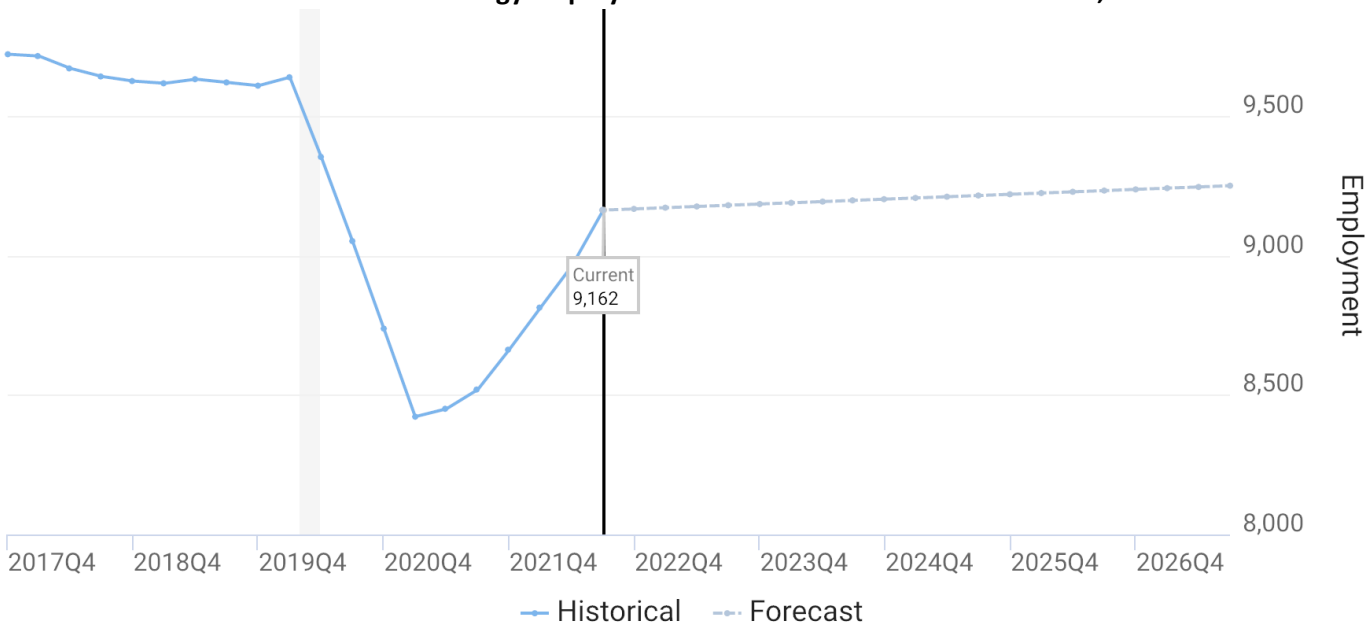
Source: JobsEQ®
Data as of 2023Q3 unless noted otherwise
Note: Figures may not sum due to rounding.
1. Data based on a four-quarter moving average unless noted otherwise.
2. Wage data represent the average for all Covered Employment
3. Data represent found online ads active within the last thirty days in the selected region; data represents a sampling rather than the complete universe of postings. Ads lacking zip code information but designating a place (city, town, etc.) may be assigned to the zip code with greatest employment in that place for queries in this analytic. Due to alternative county-assignment algorithms, ad counts in this analytic may not match that shown in RTI (nor in the popup window ad list).

[1] Drone Technology careers were added to the Aviation Pathway in this report, but were not included in the prior 2020 version of this report. Another way that this pathway has been described in other reports is Aviation and Drone Technology Pathway.

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

Minnesota saw a strong job market throughout 2022 and elevated recruitment among employers across most sectors. As the available talent pool was exhausted, unemployment rates dropped dramatically across critical roles and in many scenarios demand far outpaced talent supply. Forecasting future needs under current conditions with an eye to anticipated talent pipelines into Aviation and Drone Technology careers suggest that there may be shortages of talent across a large share of occupations in this career pathway unless more talent decides to enter the field. The pathway forecast has improved since 2021's estimates, with a baseline forecast of about 0.2% growth in overall employment by the second quarter of 2027.

Aviation and Drone Technology Employment Forecast Under Baseline Scenario, Minnesota



Source: JobsEQ®,Data as of 2022Q3,The shaded areas of the graph represent national recessions.

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

Industry/Occupation Mix

Aviation and Drone Technology talent is primarily concentrated in the Scheduled Air Transportation Industry (39.7%) but are critical to a wide range of air transportation and aerospace industries in Minnesota, beginning to rise to the pre-pandemic volumes of Aviation and Drone Technology talent employment.

Top Industry Distribution for Aviation and Drone Technology Pathway Occupations in Minnesota

		CURRENT			10-YEAR DEMAND			
NAICS Code	Industry Title	% of Occ Empl	Empl	Avg Ann Wages	Exits	Transfers	Empl Growth	Total Demand
4811	Scheduled Air Transportation	39.7%	3,640	$118,300	1,447	2,807	105	4,359
4881	Support Activities for Air Transportation	10.4%	950	$72,000	322	575	93	990
5413	Architectural, Engineering, and Related Services	4.4%	400	$97,200	101	172	-27	247
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	4.1%	377	$111,100	101	169	-17	252
9261	Administration of Economic Programs	4.0%	364	$135,700	122	243	-17	348
4812	Nonscheduled Air Transportation	3.3%	305	$103,100	118	227	10	354
4921	Couriers and Express Delivery Services	3.2%	293	$99,400	103	194	33	330
5511	Management of Companies and Enterprises	3.0%	274	$109,200	78	139	2	220
5613	Employment Services	2.7%	246	$60,100	84	141	10	235
3364	Aerospace Product and Parts Manufacturing	2.5%	225	$61,500	78	128	-43	163
6219	Other Ambulatory Health Care Services	1.8%	164	$81,500	61	116	1	178
5417	Scientific Research and Development Services	1.2%	106	$116,400	28	48	8	84
9211	Executive, Legislative, and Other General Government Support	1.1%	99	$94,900	31	58	-3	85
3391	Medical Equipment and Supplies Manufacturing	1.1%	98	$90,300	26	44	2	73
5416	Management, Scientific, and Technical Consulting Services	1.0%	93	$103,100	26	45	11	81
9231	Administration of Human Resource Programs	0.9%	85	$110,400	25	46	-2	69
5415	Computer Systems Design and Related Services	0.9%	83	$117,900	24	41	14	79
9281	National Security and International Affairs	0.8%	77	$121,200	24	45	-5	64
9221	Justice, Public Order, and Safety Activities	0.8%	77	$110,500	23	42	-5	60
3344	Semiconductor and Other Electronic Component Manufacturing	0.8%	70	$114,100	18	30	-1	47
n/a	All Others	12.4%	1,136	n/a	330	581	5	916

Source: JobsEQ®
Data as of 2022Q3 except wages which are as of 2022. Note that occupation-by-industry wages represent adjusted national data and may not be consistent with regional, all-industry occupation wages shown elsewhere in JobsEQ.
Note: Figures may not sum due to rounding.

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

Talent Demand Detail

Employment and Wage Overview

Of all occupations found in the Aviation and Drone Technology pathway, the specific occupations of Airline Pilots, Air Traffic Controllers, and Electro-Mechanical and Mechatronics Techs are uniquely concentrated in Minnesota to a higher degree than seen in the nation overall. On average, Aviation careers pay about $115,200 per year—about $51,500 higher than the average wage statewide across all positions. There is significant variation in average wages across this field, with Airline Pilots with the highest average wages at $139,700 compared to Aircraft Structure, Surfaces, Rigging, and Systems Assemblers at $61,800 annually.

Aviation Pathway in Minnesota – Baseline Forecast, 2022Q3[1]

		Current						1-Year History		1-Year Forecast		5-Year Baseline Forecast				
SOC	Occupation	Empl	Avg Ann Wages[2]	LQ	Unempl	Unempl Rate	Online Job Ads[3]	Empl Change	Ann %	Empl Change	Ann %	Total Demand	Exits	Transfers	Empl Change	Ann % Change
53-2011	Airline Pilots, Copilots, and Flight Engineers	2,970	$139,700	1.74	36	1.2%	1	333	12.6%	9	0.3%	1,927	632	1,248	47	0.3%
49-3011	Aircraft Mechanics and Service Technicians	2,041	$85,300	0.75	24	1.2%	51	188	10.2%	10	0.5%	863	302	510	50	0.5%
17-2199	Engineers, All Other	1,981	$116,200	0.62	18	1.0%	80	9	0.5%	0	0.0%	632	237	396	-1	0.0%
53-2012	Commercial Pilots	636	$133,800	0.68	7	1.2%	38	61	10.6%	3	0.4%	418	136	269	13	0.4%
53-2021	Air Traffic Controllers	575	$154,000	1.48	16	2.8%	6	-15	-2.6%	-1	-0.2%	298	100	203	-5	-0.2%
51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	290	$61,800	0.42	21	7.1%	5	33	12.9%	-4	-1.3%	141	60	99	-18	-1.3%
17-3024	Electro-Mechanical and Mechatronics Technologists and Technicians	288	$64,400	1.22	4	1.4%	87	-3	-1.2%	-2	-0.7%	126	49	86	-9	-0.7%
53-2022	Airfield Operations Specialists	182	$65,000	0.69	5	2.7%	7	17	10.4%	1	0.5%	103	33	66	5	0.5%
53-1041	Aircraft Cargo Handling Supervisors	126	$69,200	0.64	1	0.9%	1	12	11.0%	0	0.4%	78	23	52	2	0.4%
49-2091	Avionics Technicians	73	$76,200	0.19	5	5.9%	37	7	10.3%	0	0.5%	30	12	15	2	0.5%
	Aviation and Drone Technology Pathway	**9,162**	**$115,200**	**0.86**	**139**	**1.5%**	**313**	**642**	**7.5%**	**17**	**0.2%**	**4,615**	**1,584**	**2,945**	**86**	**0.2%**
	Total - All Occupations	**3,038,766**	**$63,700**	**1.00**	**68,550**	**2.3%**	**170,185**	**91,312**	**3.1%**	**9,139**	**0.3%**	**1,800,961**	**734,547**	**1,020,444**	**45,970**	**0.3%**

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The Aviation and Drone Technology pathway saw wage averages drop from the prior year's estimates due in part to a greater influx of lower wage positions.[2] Entry-level wages in the pathways far exceed the average entry-level wages observed across all occupations statewide, paying an average of $79,800 annually for entry-level talent.

[2] Methodology for estimating wages changed between the 2021 and 2022 reports and are new as of the 2022Q3 dataset used here. They are estimated for the most current quarter of data available (2022Q3) using a combination of data from the Bureau of Labor Statistics and Chmura RTI wages, and no longer lag by a calendar year.

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

Occupation Wages, Average Annual in Minnesota, 2022Q3

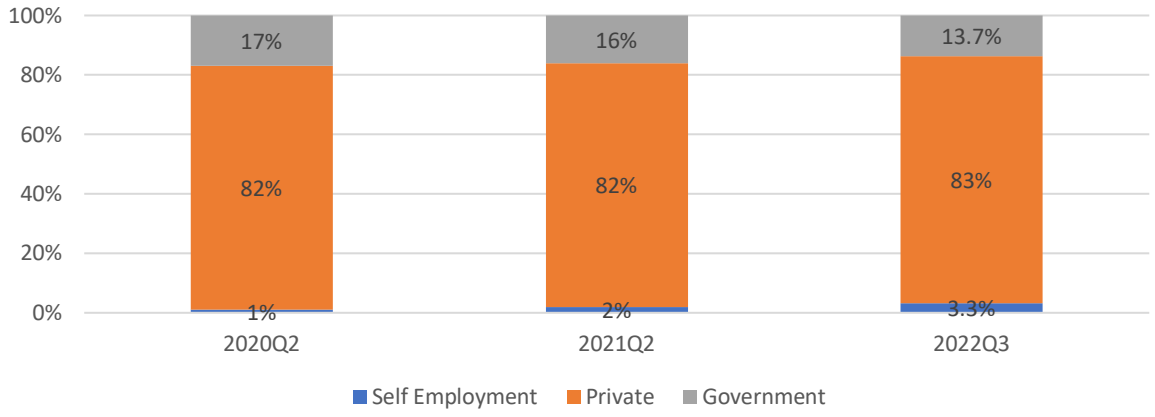
					Percentiles				
SOC	Occupation	Mean	Entry Level	Experienced	10%	25%	50% (Median)	75%	90%
17-2199	Engineers, All Other	$116,200	$79,000	$134,800	$71,900	$93,000	$112,000	$132,700	$163,500
17-3024	Electro-Mechanical and Mechatronics Technologists and Technicians	$64,400	$48,600	$72,400	$47,400	$52,500	$63,100	$76,000	$83,200
49-2091	Avionics Technicians	$76,200	$54,000	$87,200	$48,700	$63,000	$69,100	$81,700	$96,800
49-3011	Aircraft Mechanics and Service Technicians	$85,300	$51,400	$102,200	$45,400	$62,500	$78,600	$118,700	$128,800
51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	$61,800	$37,800	$73,800	$35,100	$43,500	$54,000	$78,000	$89,000
53-1041	Aircraft Cargo Handling Supervisors	$69,200	$50,500	$78,600	$48,900	$52,800	$52,900	$81,100	$102,000
53-2011	Airline Pilots, Copilots, and Flight Engineers	$139,700	$108,400	$155,300	$108,400	$108,500	$109,200	$137,300	$173,500
53-2012	Commercial Pilots	$133,800	$68,700	$166,300	$59,800	$86,500	$122,600	$160,100	$218,700
53-2021	Air Traffic Controllers	$154,000	$107,900	$177,100	$86,300	$142,600	$164,500	$181,400	$195,900
53-2022	Airfield Operations Specialists	$65,000	$38,700	$78,100	$35,600	$44,900	$57,800	$75,800	$91,300
	Aviation and Drone Technology Pathway	**$115,200**	**$79,800**	**$132,800**	**$74,700**	**$89,300**	**$102,100**	**$130,300**	**$157,200**
	Total - All Occupations	**$63,700**	**$31,400**	**$79,800**	**$29,100**	**$35,700**	**$49,800**	**$75,000**	**$108,400**

Source: JobsEQ®
Wage data represent the average for all Covered Employment

Employment Types

About 83% of people employed in Aviation and Drone Technology careers in Minnesota work for private employers, while only about 3.3% are self-employed (a slight increase over the past three years). The remaining 13.7% work for state, federal, or local government entities (mostly federal). The share employed by government agencies has declined considerably over the past few years.

Employment Types, Minnesota 2020-2022



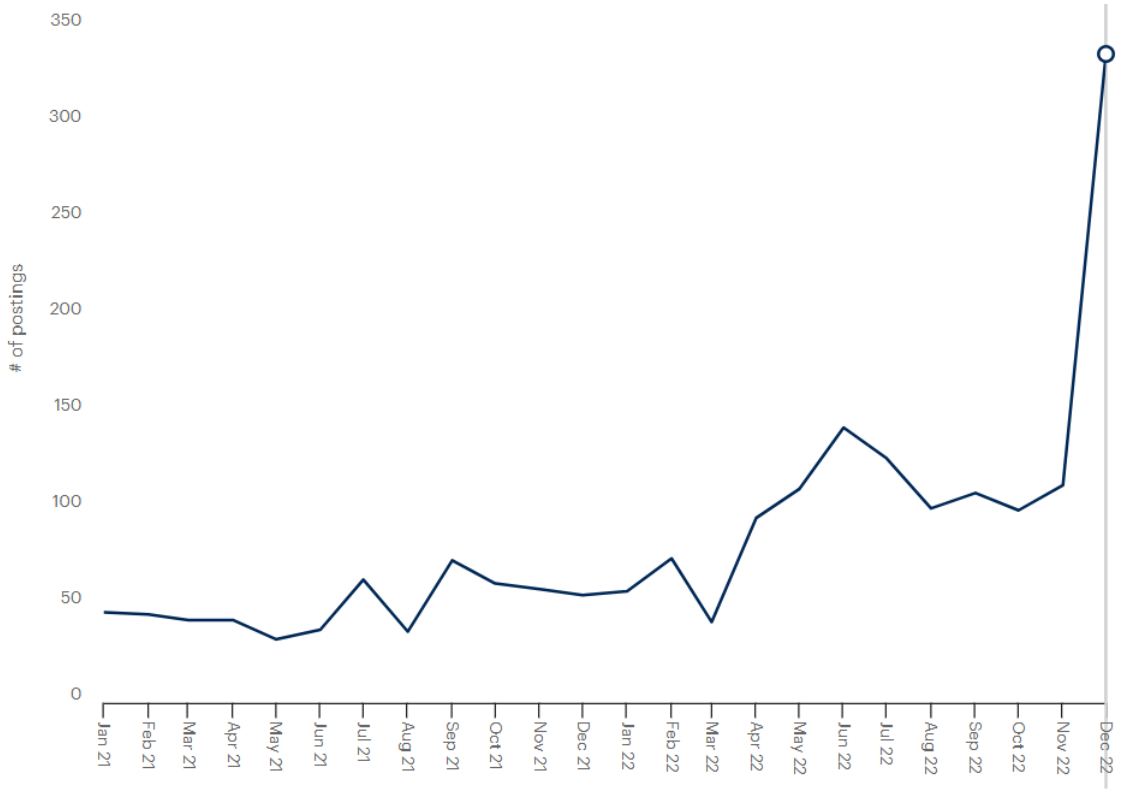
Job Posting Trends

Data in this section focuses on jobs newly advertised between January 1 and December 31, 2022 in Aviation and Drone Technology roles across Minnesota. Volume of total job postings, employer types (direct versus staffing), and top employers by unique job posting volumes comes from Gartner TalentNeuron; industry detail, skill and certification analysis, wage trends, and posting to hire analysis are from the Lightcast 2022Q4 dataset. Incredibly, there were 1,412 new jobs advertised in Aviation careers during this time frame, an increase of 135% from the prior 12-month period (2021; a 138% increase among direct employers) and the first turnaround in demand since the

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

onset of the COVID-19 pandemic. The largest number of job postings over the past two years were advertised in December 2022. The majority of postings were advertised in December 2022. Volume of posted positions advertised by staffing and temp agencies in the Aviation and Drone Technology pathway grew at a slightly lower rate than those of direct employers. Posted wages increased to an average $19.66 per hour as of 2022, and there was about 1 hire per every 3 unique job postings advertised based on Lightcast estimates.

Volume of Career Pathway Online Job Postings in 2021 and 2022

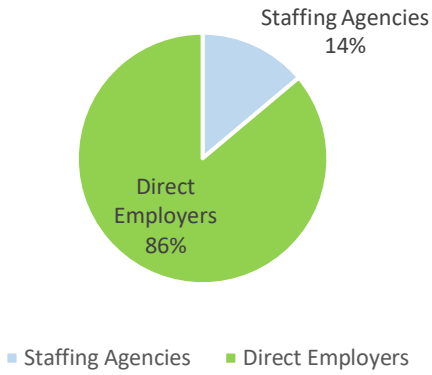


Top Employers by Volume of New Job Postings, With Change from Prior Year

	Employer	Percent Change between 2021 and 2022
1.	U.S. Customs & Border Protection	0%
2.	Army	63%
3.	Air Evac Lifeteam	2,533%
4.	Delta Air Lines	48%
5.	I.K. Hofmann	New Entrant
6.	Signature Aviation	93%
7.	United Airlines	0%
8.	Aerotek	0%
9.	U.S. Navy	283%
10.	Elliott Aviation	450%

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

New Job Postings Advertised in Minnesota by Employer Type



New Job Postings by Industry or Employer Type

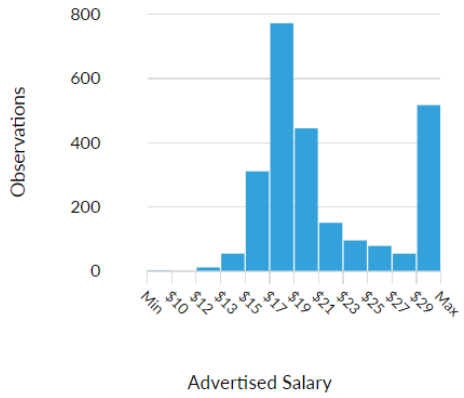
Industry	Total/Unique (Jan 2022 - Dec 2022)	Posting Intensity	Median Posting Duration
Manufacturing	5,546 / 1,496	4 : 1	28 days
Administrative and Support and Waste Management and Remediation Services	3,215 / 1,280	3 : 1	23 days
Professional, Scientific, and Technical Services	1,098 / 577	2 : 1	23 days
Retail Trade	996 / 422	2 : 1	21 days
Wholesale Trade	778 / 300	3 : 1	26 days
Health Care and Social Assistance	605 / 198	3 : 1	23 days
Finance and Insurance	385 / 151	3 : 1	21 days
Transportation and Warehousing	236 / 124	2 : 1	31 days
Other Services (except Public Administration)	379 / 124	3 : 1	31 days
Real Estate and Rental and Leasing	262 / 97	3 : 1	26 days

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

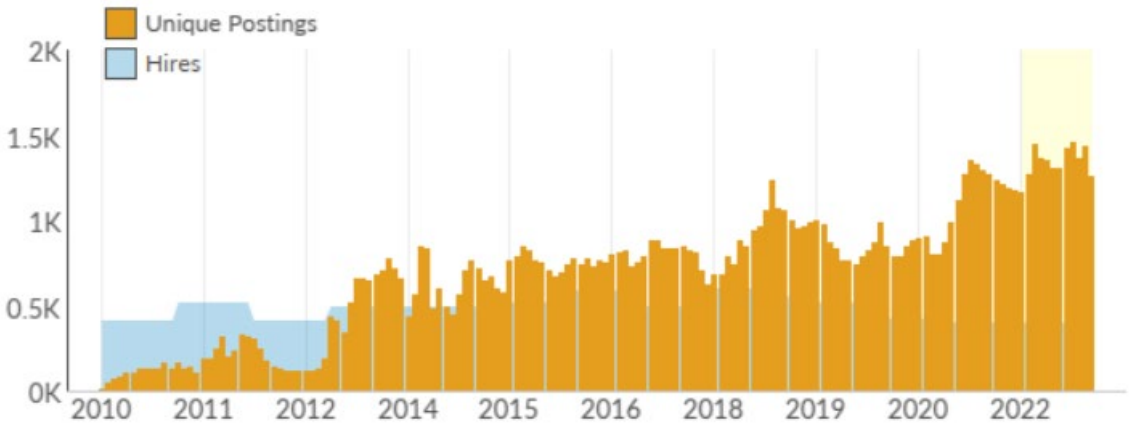
Pathway Advertised Salary Range

$19.66/hr

Median Advertised Salary



Monthly Ratio of Unique Job Postings to Estimated Hires



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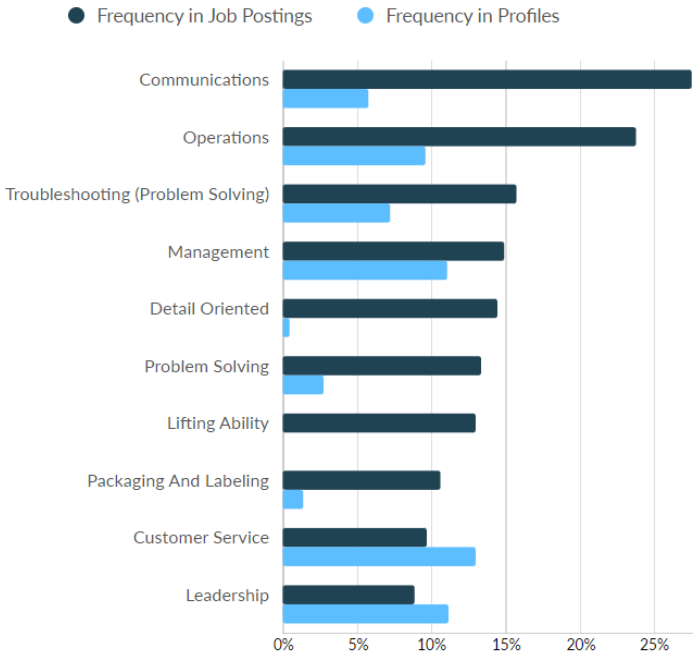
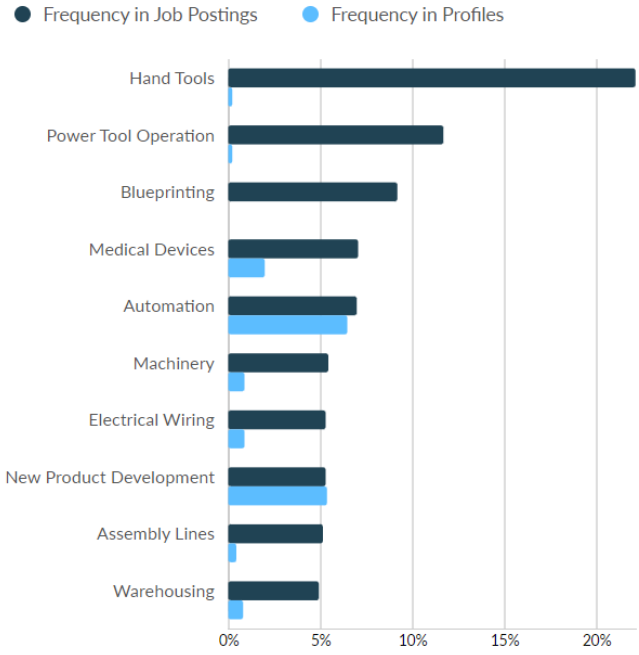
Top Common Skills



Top Specialized Skills



Top Certifications and Qualifications

Qualification	Postings with Qualification
Airframe & Powerplant (A&P) Certificate	126
Master Of Business Administration (MBA)	63
Professional Engineer	57
FAA Instrument Rating	56
Airline Transport Pilot Licence	39
Engineer in Training	36
Forklift Certification	35
Security Clearance	32
Product Certification	31
American Medical Technologists (AMT) Certification	24

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

Talent Supply Detail

Talent Unemployment, Underemployment, and Educational Attainment

At an overall pathway unemployment rate of 1.5%, there are about 139 unemployed Aviation and Drone Technology professionals statewide. An additional 986 Aviation professionals are underemployed—meaning they are working in roles for which they are overqualified by education or experience.

Aviation and Drone Technology Pathway in Minnesota

		Empl (Place of Residence)								Overall Occupation[1]		
SOC	Occupation	< High School	High School	Some College	Two-Year	Four-Year	Master's	PhD	Total Empl	Underemployed	Unemployed	Unempl Rate
17-2199	Engineers, All Other	0.2%	1.3%	3.2%	6.1%	54.8%	26.1%	8.4%	1,861	0	18	1.0%
17-3024	Electro-Mechanical and Mechatronics Technologists and Technicians	1.8%	17.4%	20.7%	29.3%	25.8%	3.9%	1.2%	275	78	4	1.4%
49-2091	Avionics Technicians	0.8%	16.3%	29.4%	33.6%	17.3%	2.6%	0.0%	73	14	5	5.9%
49-3011	Aircraft Mechanics and Service Technicians	1.6%	18.4%	26.4%	32.6%	17.4%	2.5%	0.9%	1,977	0	24	1.2%
51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	9.6%	42.7%	21.2%	13.9%	10.9%	1.3%	0.4%	281	33	21	7.1%
53-1041	Aircraft Cargo Handling Supervisors	3.6%	27.5%	22.1%	16.8%	24.2%	4.8%	0.9%	124	39	1	0.9%
53-2011	Airline Pilots, Copilots, and Flight Engineers	0.2%	1.7%	5.3%	5.6%	67.2%	16.4%	3.5%	2,902	0	36	1.2%
53-2012	Commercial Pilots	0.2%	2.1%	6.1%	6.8%	66.2%	15.4%	3.2%	596	0	7	1.2%
53-2021	Air Traffic Controllers	0.1%	6.9%	17.5%	16.0%	49.8%	8.7%	0.9%	562	313	26	2.8%
53-2022	Airfield Operations Specialists	0.1%	7.0%	17.6%	16.7%	49.3%	8.5%	0.8%	189	98	5	2.7%
	Aviation and Drone Technology Pathway	**0.9%**	**8.1%**	**12.1%**	**14.1%**	**47.8%**	**13.5%**	**3.5%**	**8,840**	**986**	**139**	**1.5%**
	Total - All Occupations	**4.9%**	**21.1%**	**15.4%**	**14.1%**	**30.4%**	**10.3%**	**3.8%**	**2,944,602**	**511,822**	**68,550**	**2.3%**

Source: JobsEQ®
Data as of 2022Q3 unless noted otherwise
Note: Figures may not sum due to rounding.
1. "Overall occupation" characteristics refer to attributes across all individuals in those occupations, not just those limited to the demographic categories shown in this table.

Workforce Demographics

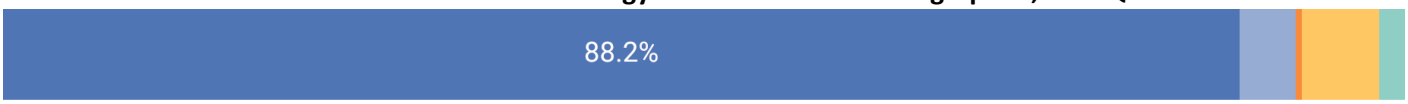
The Aviation and Drone Technology pathway has the smallest share of its workforce under the age of 25 out of all the Transportation pathways (4.6%), and 5% are over 64 years old. The largest demographic group by race are White, representing 88.2% of the total pathway's workforce, with the next largest cohort being Asian talent representing 5.6% of the workforce. About 3.3% of the pathway's workforce are Hispanic or Latinx, and 9.2% are female.

Aviation and Drone Technology Workforce Age Demographics, 2022Q3

16 to 19 years (0.4%)
20 to 24 years (4.2%)
25 to 34 years (22.0%)
35 to 44 years (25.7%)
45 to 54 years (22.5%)
55 to 64 years (20.2%)
65 years and over (5.0%)

Data for Aviation and Drone Technology Pathway, Minnesota
Source: JobsEQ®. Data as of 2022Q3.

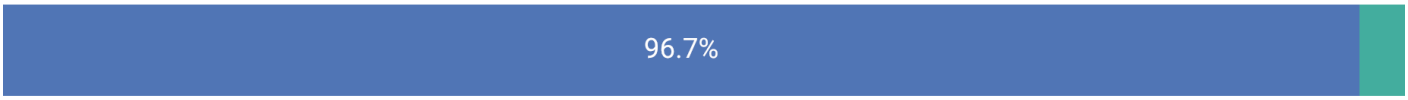
Aviation and Drone Technology Workforce Race Demographics, 2022Q3



White (88.2%)
Black (4.1%)
American Indian (0.4%)
Asian (5.6%)
Pacific Islander (0.0%)
Two or More Races (1.8%)

Data for Aviation and Drone Technology Pathway, Minnesota
Source: JobsEQ®. Data as of 2022Q3.

Aviation and Drone Technology Workforce Ethnicity Demographics, 2022Q3



Non-Hispanic/Latino (96.7%)
Hispanic or Latino (of any race) (3.3%)

Data for Aviation and Drone Technology Pathway, Minnesota
Source: JobsEQ®. Data as of 2022Q3.

Aviation and Drone Technology Workforce Gender Demographics, 2022Q3

Male (90.8%)
Female (9.2%)

Data for Aviation and Drone Technology Pathway, Minnesota
Source: JobsEQ®. Data as of 2022Q3.

Graduate Demographics

Postsecondary program diversity varies by program across the Aviation and Drone Technology pathway. Automation Engineering Technology postsecondary programs have the largest number of African American and Hispanic students who conferred awards in SY2021. All programs have an overrepresentation of male students.

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

Race and Gender of Graduates Receiving Postsecondary Awards in SY2021, Minnesota

CIP Code	Description	All 2021 Graduates	International Student*	Black or African American, non-Hispanic	American Indian or Alaska Native	Asian, Native Hawaiian or Other Pacific Islander	Hispanic or Latino	White, non-Hispanic	Multiple or unknown race/ethnicity	Gender - Males	Gender - Females
01.0205	Agricultural Mechanics and Equipment/Machine Technology/Technician	6	0	0	0	0	0	6	0	6	0
14.0101	Engineering, General	51	2	1	0	2	3	43	0	44	7
14.1201	Engineering Physics/Applied Physics	11	1	1	0	0	0	9	0	9	2
14.1301	Engineering Science	7	2	1	0	0	0	4	0	6	1
14.2701	Systems Engineering	19	2	2	0	1	1	9	4	11	8
14.3601	Manufacturing Engineering	53	5	4	0	4	1	32	7	38	15
14.3901	Geological/Geophysical Engineering	7	0	0	0	0	0	7	0	5	2
14.4201	Mechatronics, Robotics, and Automation Engineering	0	0	0	0	0	0	0	0	0	0
14.9999	Engineering, Other	30	2	0	0	2	1	22	3	16	14
15.0000	Engineering Technologies/Technicians, General	30	1	6	0	1	0	21	1	26	4
15.0303	Electrical, Electronic, and Communications Engineering Technology/Technician	102	0	6	0	24	2	62	8	94	8
15.0403	Electromechanical/Electromechanical Engineering Technology/Technician	0	0	0	0	0	0	0	0	0	0
15.0404	Instrumentation Technology/Technician	37	0	2	0	2	2	28	3	35	2
15.0405	Robotics Technology/Technician	33	1	2	0	3	1	26	0	28	5
15.0406	Automation Engineer Technology/Technician	188	2	14	1	9	13	141	8	166	22
15.0499	Electromechanical Technologies/Technicians, Other	9	0	0	0	0	0	8	1	9	0
15.0805	Mechanical/Mechanical Engineering Technology/Technician	1	0	0	0	0	0	1	0	1	0
15.1502	Engineering Design	13	0	3	0	0	1	8	1	6	7
15.1601	Nanotechnology	0	0	0	0	0	0	0	0	0	0
15.9999	Engineering/Engineering-Related Technologies/Technicians, Other	8	1	2	0	2	0	2	1	3	5
47.0607	Airframe Mechanics and Aircraft Maintenance Technology/Technician	45	0	3	1	3	2	33	3	41	4
47.0608	Aircraft Powerplant Technology/Technician	55	0	3	0	3	3	46	0	52	3
47.0609	Avionics Maintenance Technology/Technician	3	0	0	0	0	0	3	0	3	0
49.0102	Airline/Commercial/Professional Pilot and Flight Crew	14	0	0	0	1	1	12	0	12	2
49.0104	Aviation/Airway Management and Operations	3	0	1	0	0	1	1	0	2	1
52.0203	Logistics, Materials, and Supply Chain Management	46	1	11	0	9	2	22	1	32	14
	All Aviation and Drone Technology Postsecondary Programs	**771**	**20**	**62**	**2**	**66**	**34**	**546**	**41**	**645**	**126**

NCES IPEDS refers to international students that do not have resident status in the United States as "nonresident aliens." This title aligns to Federal tax definitions and according to NCES IPEDS refers to "a person who is not a citizen or national of the United States and who is in this country on a visa or temporary basis and does not have the right to remain indefinitely. Note: Nonresident aliens are reported separately, rather than in any of the racial/ethnic categories." They are not included in calculations of BIPOC talent in this report as race and ethnicity information is not provided for these international students. The terminology of "international student" has been used in this report as it is more familiar to a common audience. https://nces.ed.gov/ipeds/report-your-data/race-ethnicity-definitions. For more information, view this article from Berkeley on tax filing status of international students. https://internationaloffice.berkeley.edu/taxes/tax-filing-status

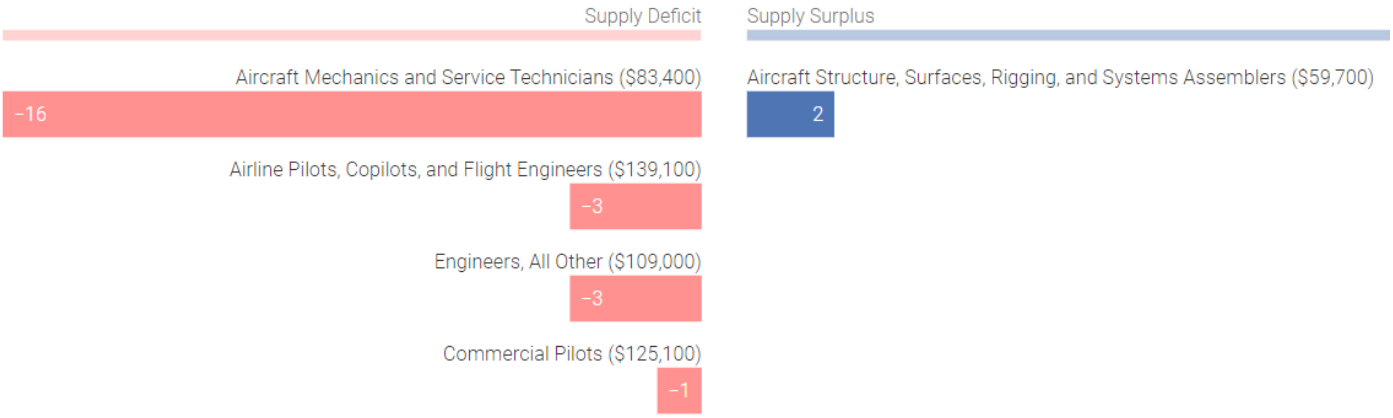
Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

Talent Gap Analysis

Occupation Gaps

By 2027, it is likely that Minnesota will see a growing shortage of talent in five critical Aviation and Drone Technology occupations (shown in red below). The estimated annual shortage of Aircraft Mechanics and Service Technicians has continued to worsen since 2020 estimates, while the other shortages shown below have improved slightly.

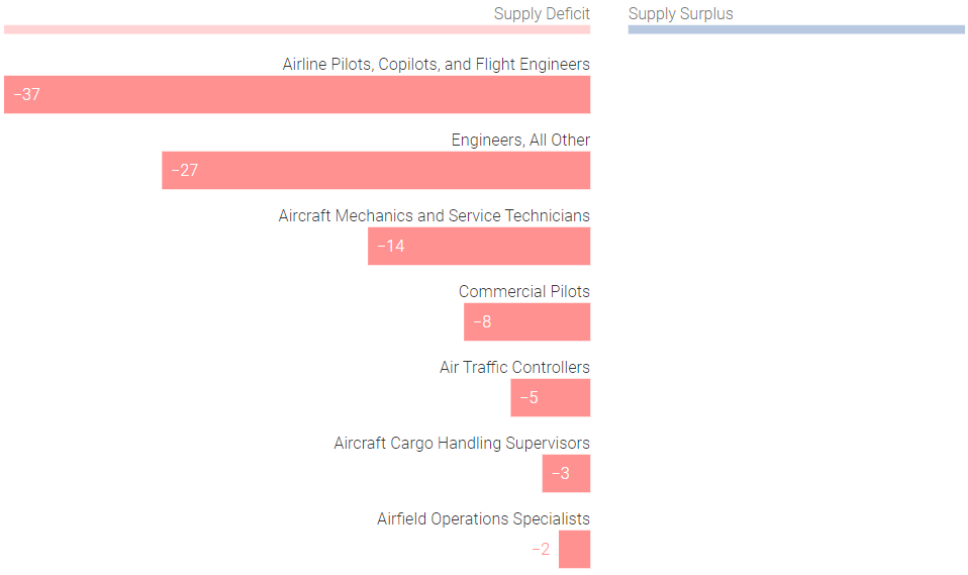
Estimated Occupation Gaps over Five Years in Minnesota



Award Gaps

Minnesota postsecondary institutions are underproducing credentials for Pilots and Aircraft Mechanics when compared to national benchmarks for how many awards are typically conferred per local demand. This award gap coupled with the talent shortages highlighted above suggest that increasing the volume of Airline Pilots, Commercial Pilots, Aircraft Mechanics, and Aircraft Technicians out of existing programs, or building new two-year programs aligned to these occupations may be warranted.

Estimated Award Gaps, Minnesota 2022Q3

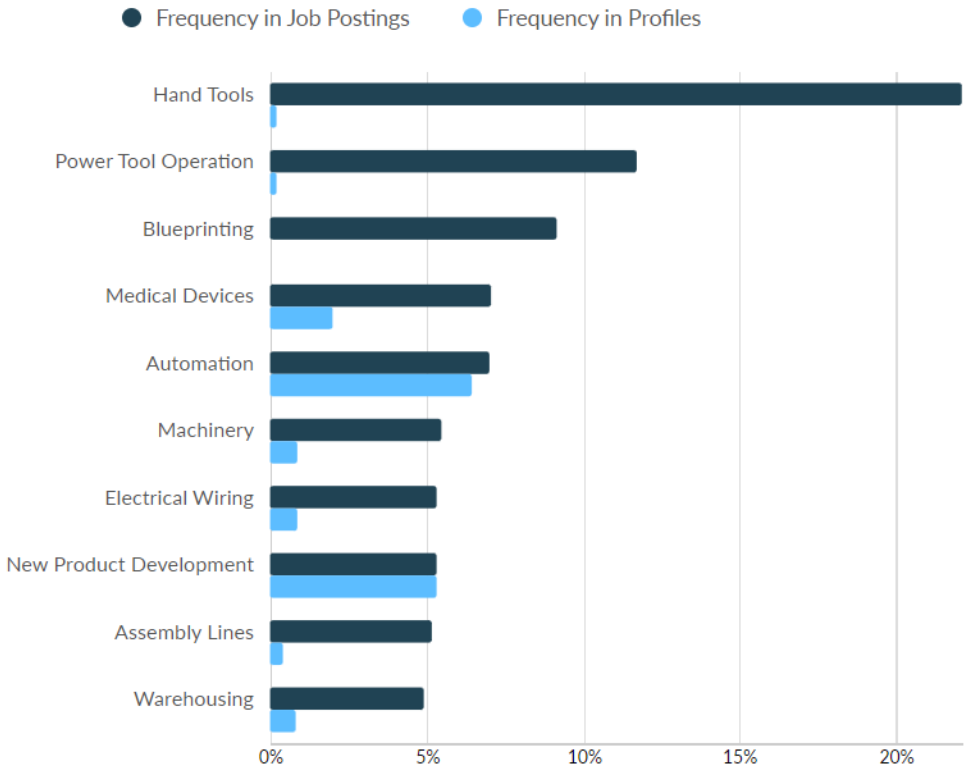


Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

Skill Misalignments

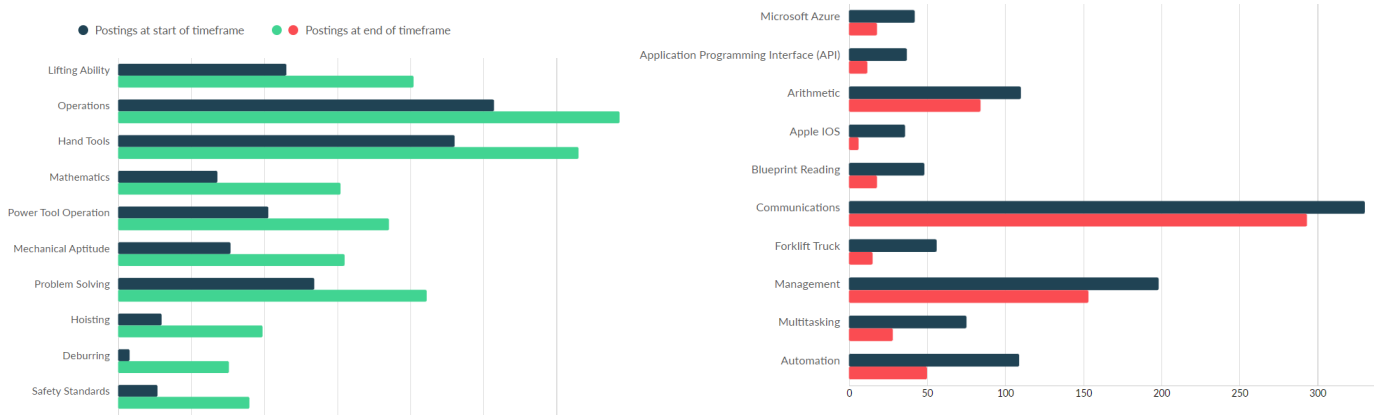
A number of specialized skills are more frequent in job postings than in candidate profiles found online. Ability to use hand tools, power tools, and blueprints are all named more frequently in Aviation and Drone Technology talent online job postings than in talent profiles.

Percent of Pathway Job Postings and Online Talent Profiles Indicating Specialized Skills in Minnesota, 2022



Several baseline requirements, such as physical skills, mathematical and mechanical aptitude, and knowledge of safety standards have been trending up at the close of 2022. The chart below indicates skills that have increased in frequency in online job postings between January and December 2022 (shown in green) and those that have declined in frequency (shown in red).

Pathway Hot and Cold Skills in Demand in Minnesota, 2022



Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

High Need, High Demand Pathways

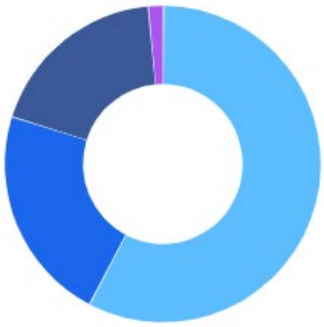
There were about 771 awards conferred at 29 different Minnesota postsecondary institutions in programs aligned to Aviation and Drone Technology careers in SY2021. Among these 300 were at the Associate level, and 142 were certificates that could be earned in less than two years. The average school had about 27 completions, but range from one to 90 completions. Four institutions offered programs remotely (14% of institutions), with 44 awards obtained remotely in 2021 (6% of all pathway completions).

Programs mapping to this career pathway are diverse and several align to other occupations outside of this career pathway, namely in STEM and Manufacturing clusters.

Aviation and Drone Technology Postsecondary Program Awards by Level, SY2021

CIP Code	Title	Certificate < 1 Yr	Certificate 1+ but < 2 Yr	Associate's	Certificate 2+ but < 4 Yr	Bachelor's	Post Bacc.	Masters	Total Awards
15.0406	Automation Engineer Technology/Technician	25	35	111	17	0	0	0	188
15.0303	Electrical, Electronic, and Communications Engineering Technology/Technician	21	6	58	8	9	0	0	102
47.0608	Aircraft Powerplant Technology/Technician	39	0	16	0	0	0	0	55
14.3601	Manufacturing Engineering	0	0	0	0	27	16	10	53
14.0101	Engineering, General	0	0	0	0	48	1	2	51
52.0203	Logistics, Materials, and Supply Chain Management	0	0	8	0	38	0	0	46
47.0607	Airframe Mechanics and Aircraft Maintenance Technology/Technician	2	0	23	20	0	0	0	45
15.0404	Instrumentation Technology/Technician	0	0	35	2	0	0	0	37
15.0405	Robotics Technology/Technician	1	0	31	0	0	0	1	33
15.0000	Engineering Technologies/Technicians, General	0	0	5	0	25	0	0	30
14.9999	Engineering, Other	0	0	0	0	0	9	21	30
14.2701	Systems Engineering	0	0	0	0	0	0	19	19
49.0102	Airline/Commercial/Professional Pilot and Flight Crew	0	0	8	0	6	0	0	14
15.1502	Engineering Design	0	0	0	0	0	0	13	13
14.1201	Engineering Physics/Applied Physics	0	0	0	0	11	0	0	11
15.0499	Electromechanical Technologies/Technicians, Other	9	0	0	0	0	0	0	9
15.9999	Engineering/Engineering-Related Technologies/Technicians, Other	0	0	0	0	0	0	8	8
14.1301	Engineering Science	0	0	0	0	7	0	0	7
14.3901	Geological/Geophysical Engineering	0	0	0	0	5	0	2	7
01.0205	Agricultural Mechanics and Equipment/Machine Technology/Technician	0	1	1	4	0	0	0	6
49.0104	Aviation/Airway Management and Operations	0	0	3	0	0	0	0	3
47.0609	Avionics Maintenance Technology/Technician	3	0	0	0	0	0	0	3
15.0805	Mechanical/Mechanical Engineering Technology/Technician	0	0	1	0	0	0	0	1
15.0403	Electromechanical/Electromechanical Engineering Technology/Technician	0	0	0	0	0	0	0	0
14.4201	Mechatronics, Robotics, and Automation Engineering	0	0	0	0	0	0	0	0
15.1601	Nanotechnology	0	0	0	0	0	0	0	0
	Total	**100 (13.0%)**	**42 (5.4%)**	**300 (38.9%)**	**51 (6.6%)**	**176 (22.8%)**	**26 (3.4%)**	**76 (9.9%)**	**771**

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com



Institution Type	Completions (2021)	Market Share
Public, 2-year	444	57.6%
Public, 4-year or above	171	22.2%
Private not-for-profit, 4-year or above	144	18.7%
Private for-profit, 4-year or above	12	1.6%

Over half (57.6%) of awards were conferred by public two-year institutions, with Hennepin Technical College and Minneapolis Community and Technical College together comprising 23% of SY2021 awards conferred. Completions are up overall by 39.4% from 2012.

Aviation and Drone Technology Postsecondary Program Awards by Institution, SY2021

Institution	Completions (2021)	Growth % YOY (2021)	Market Share (2021)	IPEDS Tuition & Fees (2021)	Completions Tren (2017-202
Hennepin Technical College	90	-23.1%	11.7%	$5,741	
Minneapolis Community and Technical College	87	123.1%	11.3%	$5,906	
Dunwoody College of Technology	62	-13.9%	8.0%	$23,863	
University of St Thomas	52	-10.3%	6.7%	$48,329	
Minnesota State University-Mankato	46	-14.8%	6.0%	$9,146	
Ridgewater College	40	-11.1%	5.2%	$5,914	
South Central College	38	-35.6%	4.9%	$5,966	
Lake Superior College	36	28.6%	4.7%	$5,616	
Metropolitan State University	32	3.2%	4.2%	$9,394	
Saint Cloud State University	30	57.9%	3.9%	$9,170	

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

University of Minnesota-Twin Cities	29	0.0%	3.8%	$15,254	
Central Lakes College-Brainerd	26	0.0%	3.4%	$5,954	
Bemidji State University	25	31.6%	3.2%	$9,806	
Alexandria Technical & Community College	24	-11.1%	3.1%	$5,910	
Northland Community and Technical College	22	-31.3%	2.9%	$6,052	
St Cloud Technical and Community College	21	31.3%	2.7%	$5,874	
Saint Paul College	17	88.9%	2.2%	$6,041	
Minnesota State College Southeast	14	366.7%	1.8%	$6,562	
University of Northwestern-St Paul	14	-30.0%	1.8%	$34,180	
Anoka Technical College	13	18.2%	1.7%	$6,075	
Academy College	12	20.0%	1.6%	$18,644	
Minnesota West Community and Technical College	11	-15.4%	1.4%	$6,286	
Minnesota State University Moorhead	7	75.0%	0.9%	$9,468	
Hamline University	7	133.3%	0.9%	$46,221	
Bethany Lutheran College	6	50.0%	0.8%	$28,660	
Century College	5	-16.7%	0.6%	$5,907	
University of Minnesota-Duluth	2	0.0%	0.3%	$13,850	
Saint Mary's University of Minnesota	2	Insf. Data	0.3%	$39,410	
Bethel University	1	-85.7%	0.1%	$40,080	

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

The clearest gap in program offerings is for Airline Pilots, which are both an area of talent shortages and where Minnesota institutions fall short of national award benchmarks. There were only 8 Associate-level and 6 Bachelor's-level graduates in the most recent school year. In addition, Airline Mechanics and Service Technicians have significant talent shortages and low graduate supplies to meet local demand.

Promising Approaches to Addressing Possible Misalignments

A variety of strategies may improve the outlook for transportation talent in need. In the Aviation and Drone Technology pathway, all have low talent diversity by gender—both among the workforce and new graduates. Many also have a higher than average share of their workforce that is over 45 years of age, and a much higher share of white talent than the overall workforce representation.

Most occupations with local talent shortages are also underproducing postsecondary graduates in comparison to national benchmarks. Electro-Mechanical and Mechatronics Technologists and Technicians have the largest number of annual graduate completions of certificate or two-year degrees in alignment, seemingly able to meet local demand. However, the diversity of graduates from these programs is low in comparison to postsecondary programs as a whole. Airline Pilots and Airline Mechanics, both mentioned above as important award gaps to address, also have low diversity in their workforce and graduate talent pools.

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

Postsecondary Strategy Summary Table, Minnesota 2022

Occupation	Related Programs*	2022Q3 Empl	Talent Shortage	Workforce BIPOC by Race	Workforce Hispanic/Latinx	Workforce Female	Workforce Under 45	SY2021 Graduates (Certificate and AA/AS only)	Award Gap (All Award Levels)**	Graduates BIPOC by Race or Ethnicity (All Award Levels)	Graduates Female (All Award Levels)
Airline Pilots, Copilots, and Flight Engineers	• Airline/Commercial/Professional Pilot and Flight Crew	2,970	Y	6.7%	2.0%	4.7%	45.4%	8	Y	14.3%	14.3%
Aircraft Mechanics and Service Technicians	• Agricultural Mechanics and Equipment/Machine Technology/Technician • Airframe Mechanics and Aircraft Maintenance Technology/Technician	2,041	Y	9.7%	4.4%	3.2%	56.6%	51	Y	23.5%	7.8%
Engineers, All Other	• Engineering, General • Engineering Physics/Applied Physics • Engineering Science • Systems Engineering • Manufacturing Engineering • Geological/Geophysical Engineering • Mechatronics, Robotics, and Automation Engineering • Engineering, Other	1,981	Y	20.0%	2.5%	14.1%	54.9%	0	Y	21.3%	27.5%
Commercial Pilots*	• Airline/Commercial/Professional Pilot and Flight Crew	636	Y	4.2%	1.5%	4.5%	42.2%	8	Y	14.3%	14.3%
Air Traffic Controllers	• Aviation/Airway Management and Operations	575	N	19.1%	7.1%	19.5%	60.4%	3	Y	66.7%	33.3%
Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	• Aircraft Powerplant Technology/Technician	290	N	19.5%	6.3%	30.3%	80.0%	55	N	16.4%	5.5%
Electro-Mechanical and Mechatronics Technologists and Technicians	• Engineering Technologies/Technicians, General • Electrical, Electronic, and Communications Engineering Technology/Technician • Electromechanical/Electromechanical Engineering Technology/Technician • Instrumentation Technology/Technician • Robotics Technology/Technician • Automation Engineer Technology/Technician • Mechanical/Mechanical Engineering Technology/Technician • Engineering Design • Nanotechnology • Engineering/Engineering-Related Technicians, Other	288	N	12.4%	3.1%	21.9%	48.7%	365	N	28.3%	12.6%
Airfield Operations Specialists*	• Aviation/Airway Management and Operations	182	N	17.9%	6.8%	19.6%	60.3%	3	Y	66.7%	33.3%
Aircraft Cargo Handling Supervisors	• Logistics, Materials, and Supply Chain Management	126	N	20.1%	6.4%	25.8%	61.7%	8	Y	50.0%	30.4%
Avionics Technicians	• Avionics Maintenance Technology/Technician	73	N	13.6%	5.7%	4.4%	43.1%	3	N	0.0%	0.0%
Aviation and Drone Technology Pathway	**All 26 aligned programs**	**9,162**	**Y**	**11.8%**	**3.3%**	**9.2%**	**52.4%**	**771**	**Y**	**29.2%**	**16.3%**
All Occupations		**3,038,766**		**15.0%**	**5.2%**	**48.3%**	**56.5%**	**29,484**		**37.3%**	**65.6%**

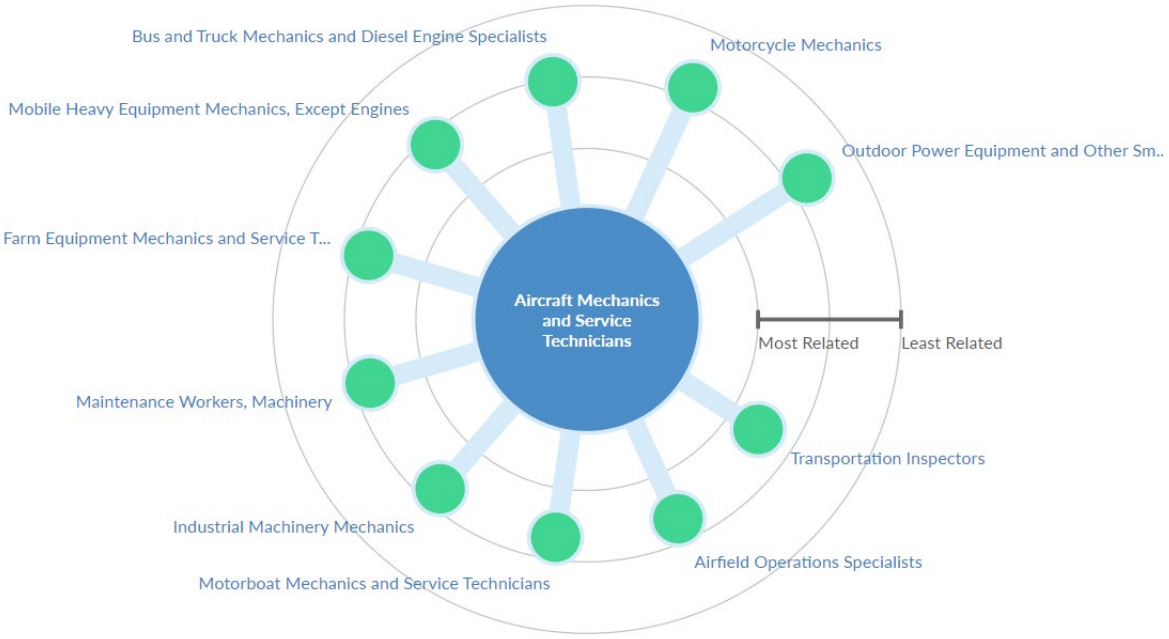
NOTE: Red highlighting indicates lower than overall share of workforce or graduate pool, or existence of occupation or award gap. *Related programs may overlap among occupations within the pathway or across other Transportation career pathways. Only those programs most tightly aligned to the occupation in question are listed in this column. **Award gaps are estimated based on a wider alignment of programs than what is illustrated in this table.

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

Career Pathway Opportunities

When considering occupations that have significant skill and experience overlap with the occupations of highest need in this pathway, the majority have low employment numbers or are other careers in the Transportation sector that share high demand. The graphic below offers several careers related to the Aircraft Mechanics and Service Technicians occupation in skill demands that have highly relevant skill and experience overlap that would be strong feeder occupations for talent.

Feeder Occupations into Aircraft Mechanic and Service Technician Roles, 2023Q1



Occupation	Category	Relevance	Avg. Unique Monthly Postings from Jan 2022 - Dec 2022	Mea Salary Dif
Transportation Inspectors	Lateral Advancement	77%	6	-$7,96
Airfield Operations Specialists	Lateral Advancement	66%	2	-$8,40
Motorboat Mechanics and Service Technicians	Advancement	66%	1	-$11,88
Industrial Machinery Mechanics	Lateral Advancement	63%	108	-$10,44
Maintenance Workers, Machinery	Lateral Advancement	62%	3	-$10,78
Farm Equipment Mechanics and Service Technicians	Advancement	60%	7	-$16,84
Mobile Heavy Equipment Mechanics, Except Engines	Advancement	58%	33	-$6,95
Bus and Truck Mechanics and Diesel Engine Specialists	Advancement	52%	173	-$8,61
Motorcycle Mechanics	Advancement	41%	1	-$15,47
Outdoor Power Equipment and Other Small Engine Mechanics	Advancement	37%	4	-$25,43

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com

FAQ

What is a location quotient?

A location quotient (LQ) 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 a cluster?

A cluster is a geographic concentration of interrelated industries or occupations. If a regional cluster has a location quotient of 1.25 or greater, the region is considered to possess a competitive advantage in that cluster.

What is 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. The total projected demand for an occupation is the sum of the separation demand and the growth demand (which is the increase or decrease of jobs in an occupation expected due to expansion or contraction of the overall number of jobs in that occupation).

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.

What is NAICS?

The North American Industry Classification System (NAICS) is used to classify business establishments according to the type of economic activity. The NAICS Code comprises six levels, from the "all industry" level to the 6-digit level. The first two digits define the top level category, known as the "sector," which is the level examined in this report.

What is SOC?

The Standard Occupational Classification system (SOC) is used to classify workers into occupational categories. All workers are classified into one of over 804 occupations according to their occupational definition. To facilitate classification, occupations are combined to form 22 major groups, 95 minor groups, and 452 occupation groups. Each occupation group includes detailed occupations requiring similar job duties, skills, education, or experience.

Who created this report?

This report was developed by RealTime Talent for the Transportation Center of Excellence. If you have questions about the data found in this report, or are interested in learning more, please contact the Senior Director of Strategic Research Erin Olson at erin@realtimetalentmn.org or visit the RealTime Talent website at www.realtimetalent.org

Source: RealTime Talent analysis of Chmura Economics JobsEQ®, http://www.chmuraecon.com/jobseq/. Job Posting Trends section uses data from Gartner TalentNeuron Plan, accessed 1/21/2023 at talentneuronplan.gartner.com