

TECHNICIAN

SUPPLY & DEMAND



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OVERVIEW

With the awareness that a transportation industry technician shortage had already been underway for some time, TechForce Foundation began providing forecasts on industry technician supply and demand numbers back in 2017.

This 2022 report¹ provides the current status for technician supply and new entrant demand. This year, the news is mixed. There are some signs of encouragement in the automotive and diesel sectors with total technician employment increasing over 2021. On the other hand, the number of collision technicians employed slipped lower once again, continuing the pattern seen over the past several years.

What is most concerning is the continuing trend seen in the inadequate supply of graduates from post-secondary programs (completions) in automotive, diesel and collision technology.

With completions, the most positive note is that the diesel segment did not lose any ground, remaining totally flat from 2020 to 2021. Collision numbers dropped very slightly, at a 0.4% decrease. Of greatest concern is the automotive sector, which incurred a very significant drop in completions of 11.8% in just one year.

For the first time this year, we will begin looking at the aviation industry with the intent to include it moving forward as an additional element of our Supply and Demand Report. In 2022, we will provide historical employment numbers for aviation and avionics technicians as well as Bureau of Labor Statistics (BLS) projections for segment growth and turnover from 2021-2031.

TECHNICIAN DEMAND

This report addresses projected annual demand for **new entrant technicians** in the automotive, collision and diesel fields. By definition, new entrant technicians are those entering the occupation for the first time, as opposed to experienced technicians who may be switching employers but don't increase the number of technicians available in the occupation. These new entrant techs come not only from postsecondary training programs, but also from high school shop programs and “off-the-street”, with no training at all.

As a reminder, the projections below are for new entrant **demand**, not actual hiring. To the extent that employers are not able to hire all the technicians they seek, the numbers below will exceed the total increase in technicians actually reported by the Bureau of Labor Statistics (BLS).

In our October 2021 report we began projections for the impact of Electric Vehicles (EV) on the demand for technicians. Those projections continue with this year's report. The methodology for determining that impact can be found in Appendix A.

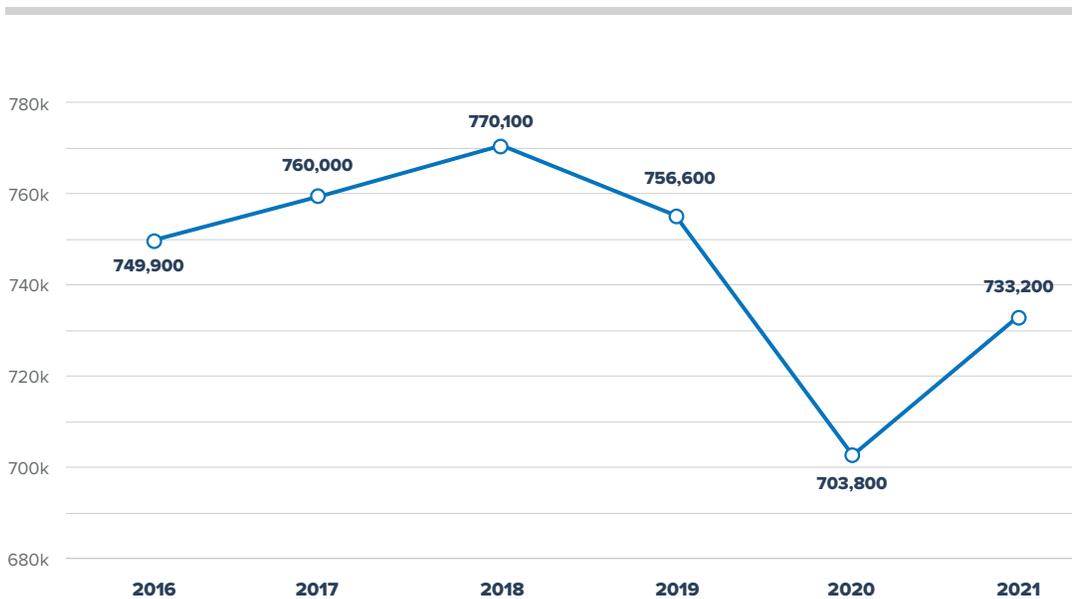


¹This report is a combined update supplement to TechForce Foundation's [Technician Demand report](#) (Oct. 2017), and the [Technician Supply report](#) (June 2018). For detailed information on methodology and background, please see those reports.

1. Automotive Technician Employment

With total automotive technicians employed, the industry had been experiencing a decline year-over-year since 2018. As previously mentioned, that trend has reversed in 2021, with an increase in employment of nearly 30,000, corresponding to a 4.2% increase from 2020 to 2021

Total Automotive Technicians Employed



2. Demand for Automotive New Entrant Technicians

As seen for the past several years, the demand created by Occupational Separations is much higher than that created by new growth in the sector. For example, between 2022 and 2026, just over 178,000 new positions are attributed to growth demand, while nearly 413,000 will be needed during this same period due to Occupational Separations. However, a large number of unfilled positions from 2021 also add a significant number to the 2022 demand projections as seen in the below chart.

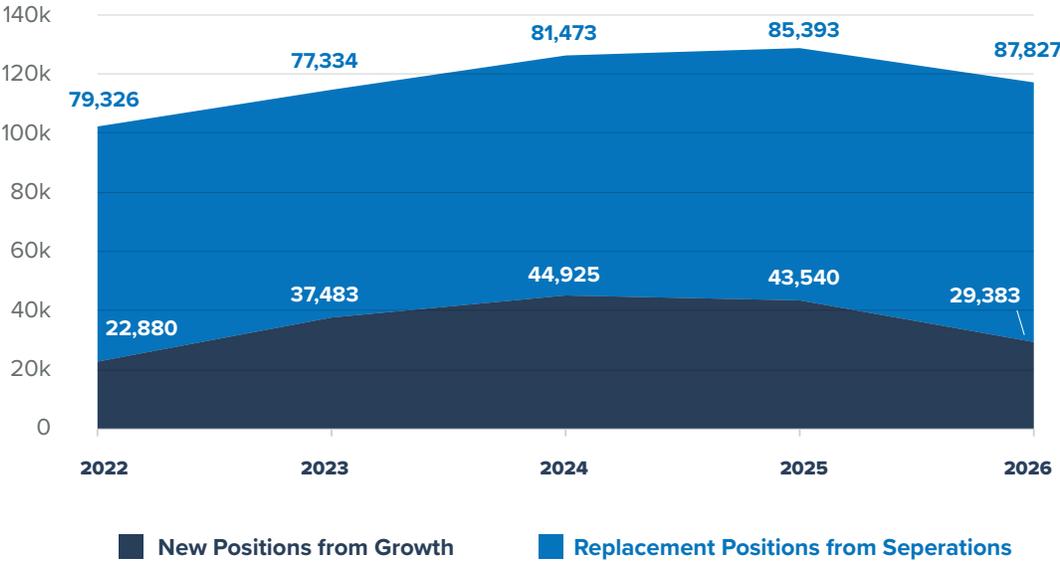
Projections (a)	2022	2023	2024	2025	2026
New Positions from growth	22,880	37,483	44,925	43,540	29,383
Replacement positions from separations	79,326	77,334	81,473	85,393	87,827
Unfilled positions from 2021—carried over to 2022 (b)	56,214				
Less reduced demand for maintenance & repair of electric vehicles (c)	2,843	4,444	7,127	10,673	15,221
Total New Entrant Demand	155,578	110,373	119,271	118,260	101,989

(a) Projections assume 2.2% growth in 2022, 2.0% in 2023, 1.7% in 2024, 1.6% in 2025, and 1.6% in 2026. Estimates based on a compilation of Congressional Budget Office (CBO), The World Bank, Federal Reserve Board, Survey of Professional Forecasters (SPF), and this author's projections. (b) Unfilled positions from previous year are calculated at an 80% factor with the assumption that employer has made some adjustments to compensate for shortage in techs (e.g., change in hours, change in shifts, stall utilization, etc.) (c) See Appendix A for methodology used to arrive at technician demand reductions attributed to the increased adoption of EVs.

The following chart illustrates the significant difference between new entrant demand from growth vs. demand from replacement positions, created by the retirement of baby boomers as well as turnover. After a rise in the BLS Replacement Rate from 8.7% in 2019 to 9.8% in 2020, that rate has remained steady at 9.8% for 2021.

Comparison of New vs. Replacement Auto Positions

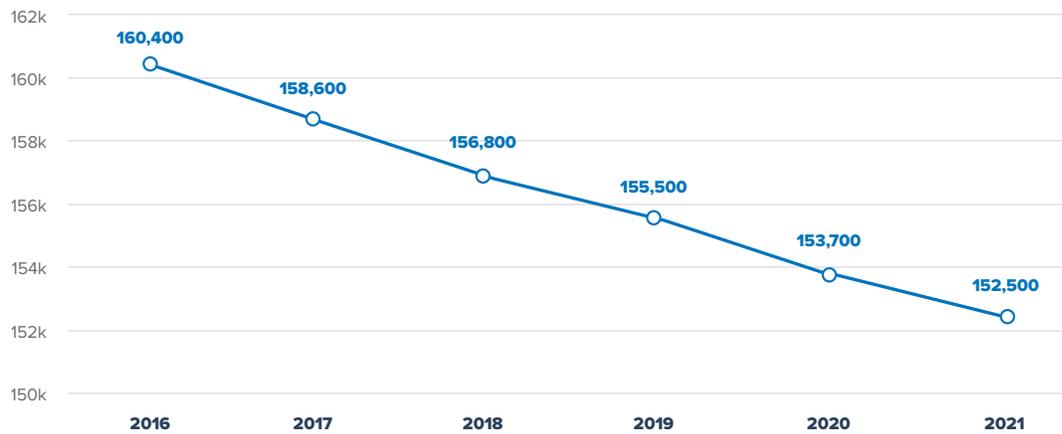
New positions are created by growth
Replacement positions are created by retirements and turnover



3. Collision Technician Employment

The chart below represents total industry employment of collision technicians over the past 6 years. There was a slight drop in employment of 1,200 technicians; a little under 1.0%. Although this one-year drop is not significant in itself, it is concerning in that it is the sixth year of continuous decreases in the collision sector.

Total Collision Technicians Employed



4. Demand for Collision New Entrant Technicians

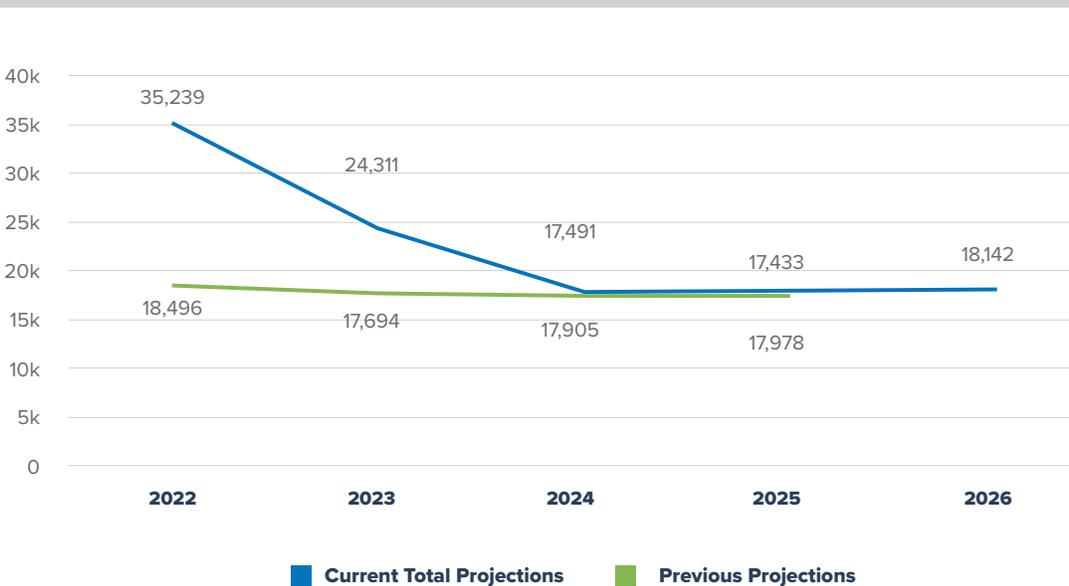
Similar to the situation with automotive technicians, the majority of new entrant demand will be created by Occupational Separations. Additionally, over 9,000 unfilled positions from 2021 add to the 2022 demand projections, as seen in the below chart.

Projections (a)	2022	2023	2024	2025	2026
New Positions	10,348	8,073	1,522	1,457	1,481
Replacement Positions	15,471	16,238	16,382	16,521	16,661
Unfilled positions from 2021—carried over to 2022 (b)	9,420				
Total New Entrant Demand	35,239	24,311	17,905	17,978	18,142

(a) Same economic projections as used for automotive projections. (b) Unfilled positions from previous year are calculated at an 80% factor with the assumption that employer has made some adjustments to compensate for shortage in techs (e.g., change in hours, change in shifts, stall utilization, etc.)

In the following chart, we compare the current collision technician new entrant demand with our previous report released in 2021. As noted above, the spike in immediate demand for 2022 due to the unfilled positions in 2021 is clearly evident.

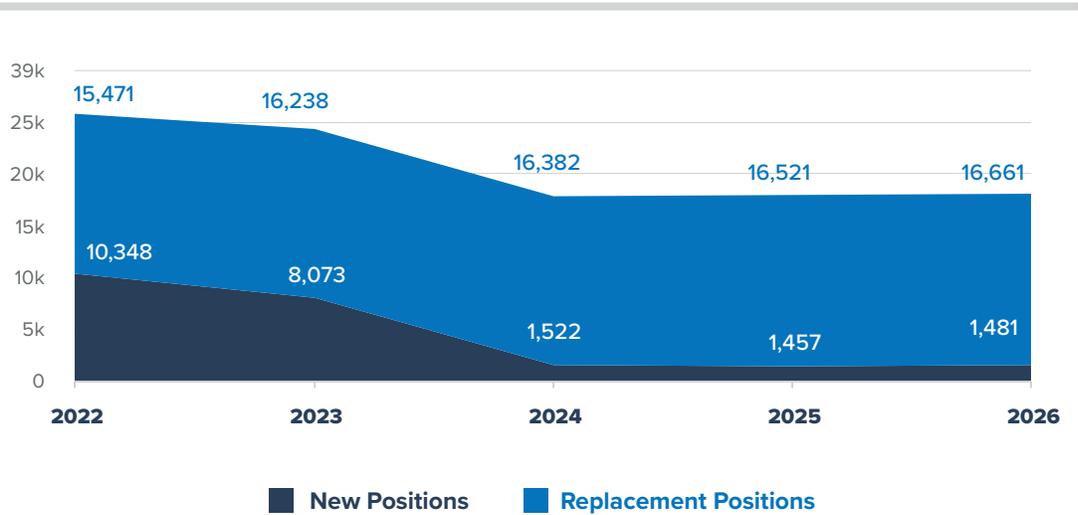
Comparison of Newest Collision Tech Demand Projections With Prior Numbers



This next chart illustrates the disproportion between new entrant demand from growth vs. demand from replacement positions, created by the retirement of baby boomers as well as transfers and turnover. The BLS Replacement Rate for collision technicians has risen slightly, from 9.1% in 2020 to 9.5% in 2021.

Comparison of New vs. Replacement Collision Positions

New positions are created by growth | Replacement positions are created by retirement and turnover



5. Diesel Technician Employment

The chart below represents total industry employment of diesel technicians over the past 6 years. After peaking in 2018, this number was on a downward slide through 2019 and 2020. Fortunately, it rebounded in 2021, with the segment adding 17,800 jobs, for a very respectable 6.5% increase.

Total Diesel Technicians Employed



6. Demand for Diesel New Entrant Technicians

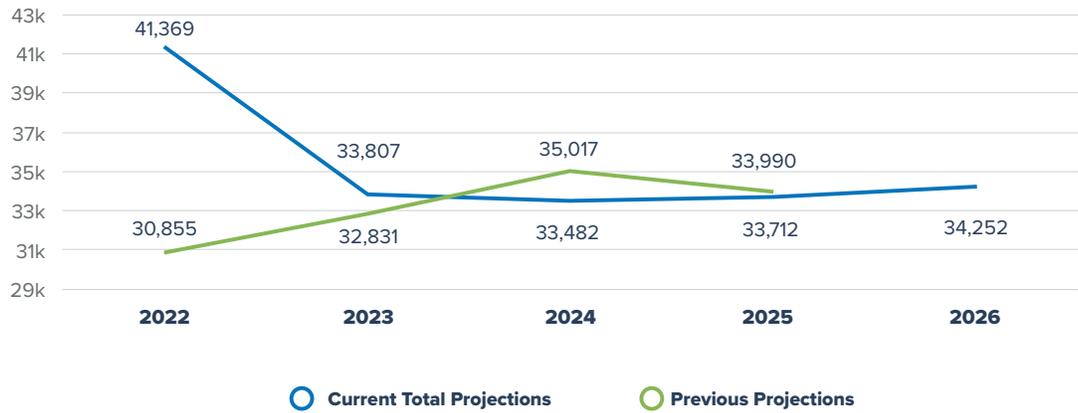
As with the automotive and collision sectors, the diesel sector is experiencing a much higher demand from Occupational Separations than by new growth. Occupational Separations are outpacing new growth by more than a 5:1 ratio. From 2022 to 2026, just under 28,000 new positions will be attributed to growth demand, as opposed to over 141,000 during this same period due to Occupational Separations. Unfilled positions carried over from 2021 add another 7,650 positions to the total.

Projections (a)	2022	2023	2024	2025	2026
New Positions	6,450	5,993	5,196	4,973	5,053
Replacement Positions	27,268	27,814	28,286	28,739	29,199
Unfilled positions from 2021 - carried over to 2022 (b)	7,650				
Total New Entrant Demand	41,369	33,807	33,482	33,712	34,252

(a) Same economic projections as used for automotive projections. (b) Unfilled positions from previous year are calculated at an 80% factor with the assumption that employer has made some adjustments to compensate for shortage in techs (e.g., change in hours, change in shifts, stall utilization, etc.)

In the below chart, comparing last year’s diesel new entrant demand projections to this year’s, the spike for 2022 that is due to unfilled carryover positions from 2021 can be clearly seen. From 2023 on, both projections are on a relatively similar track, with no major changes.

Comparison of New Diesel Tech Projections vs. Prior Numbers



This next chart illustrates the imbalance between new entrant demand from growth vs. new entrant demand from replacement positions; a similar story as seen in the automotive and collision sectors. The BLS Replacement Rate for diesel technicians has remained steady at 9.1%, consistent with the rate in 2020.

Comparison of New vs. Replacement Diesel Positions

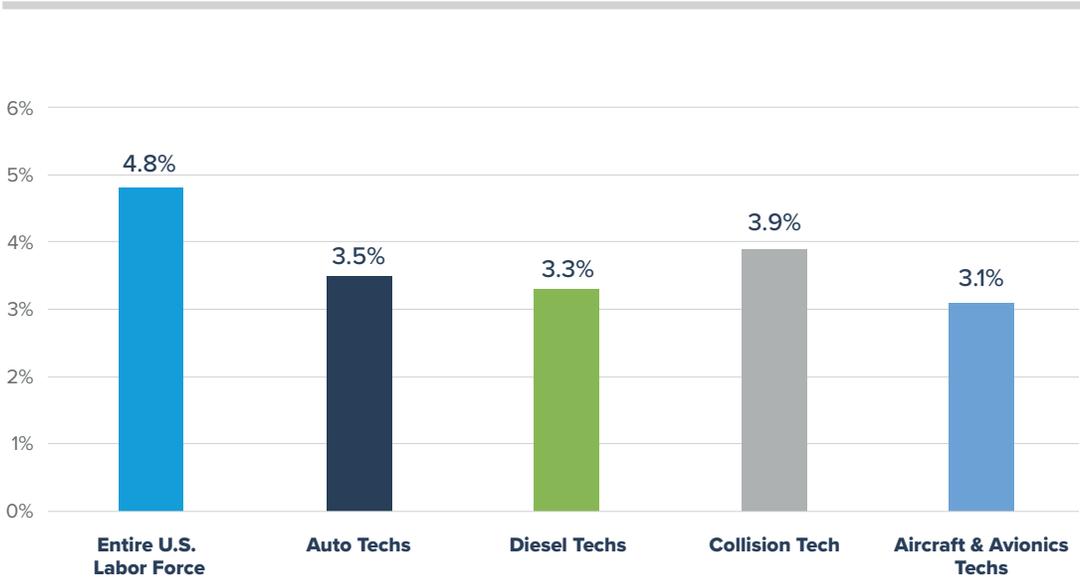
New positions are created by growth | Replacement positions are created by retirement and turnover



Graying of the Technician Workforce

In our 2021 report, for the first time, we addressed the subject of the graying of the transportation technician workforce. This was in response to widely-held beliefs in the industry that transportation technicians are an older-than-average, aging workforce with a higher percentage of individuals retiring than other job roles in the workforce. Those beliefs have led to a concern that this has compounded the technician shortage issue. In that report, it was established that this is in fact not true. For 2022 there is no change in the data. When looking at the automotive, diesel, collision and aviation fields, technicians are retiring at a lower rate than in the overall U.S. workforce.

Forecast for Labor Force Exits Annual Average 2021-2031



TECHNICIAN SUPPLY

This report provides completion data for automotive, collision and diesel technicians for the 2020-2021 school year from IPEDS¹. For information on the value and limitations of these numbers, please see the footnotes referenced on page 4 of this report.



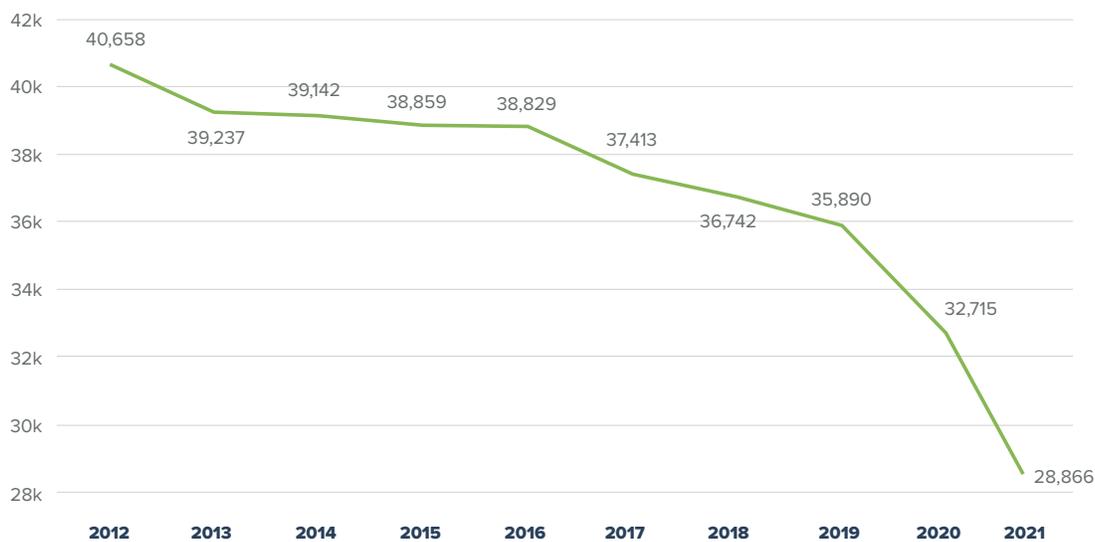
¹IPEDS is the Integrated Postsecondary Education Data System. It is a system of interrelated surveys conducted annually by the U.S. Department of Education's National Center for Education Statistics (NCES). IPEDS gathers information from every college, university, and technical and vocational institution that participates in the federal student financial aid programs.

1. Postsecondary Automotive Completions

Automotive completions continue the downward slide that began in 2012, with lower numbers in each consecutive year. In 2012, completions numbered 40,658. In 2021, that has dropped to 28,866, a 34% reduction in that ten-year span. The drop from 2020 to 2021 is the largest single drop in one year, **11.8%**. If there is a single metric that is most concerning in this year's report, this would be it.

Based on the historical data cited, the downward trend is illustrated in the chart below.

Auto Tech Postsecondary Completions | 2012-2021



In looking at the various types of schools that offer automotive programs, Public, 2-year schools and Private, for-profit 2-year schools graduate the highest number of students (completions).

Postsecondary Automotive Completions by Sector 2020-2021 (a)		
Sector	# Institutions	Auto Completions
Public, 4-year or above	92	3,487
Public, 2-year	514	15,708
Public, less-than 2-year	65	1,078
Total Public	671	20,273
Private not-for-profit, 4-year or above	10	508
Private for-profit, 4-year or above	2	154
Private not-for-profit, 2-year	6	137
Private for-profit, 2-year	35	6,221
Private not-for-profit, less-than 2-year	3	54
Private for-profit, less-than 2-year	25	1,519
Total Private	81	8,593
Grand Total	752	28,866

(a) Source: IPEDS database. Completions from first major, Automobile/Automotive Mechanics Technology/Technician programs, Bachelor's degrees and Associate's degrees as well as certificates below the B.A. level. <https://nces.ed.gov/ipeds/datacenter/login.aspx>

In 2021, the 10 largest providers of postsecondary automotive completions were:

Top 10 Postsecondary Automotive Providers 2021	
Institution	# Completions
Universal Technical Institute - Dallas Fort Worth	495
Ivy Tech Community College	460
Universal Technical Institute of Arizona Inc	450
Jefferson Community and Technical College	426
NASCAR Technical Institute	418
Spokane Community College	405
Mech-Tech College	403
Universal Technical Institute of Texas Inc.	369
Universal Technical Institute - Orlando	363
Universal Technical Institute of Illinois Inc	344

2. Postsecondary **Collision Completions**

As with automotive completions, collision completions have also been dropping year-over-year. In this case, since 2012. At that time, completions were at 7,441, but have dropped all the way to 4,487 in 2021, a 40% decrease.

Based on the historical data cited, the downward trend is shown in the chart below.

Collision Tech Postsecondary Completions | 2012-2021



As with automotive programs, looking at the various types of schools that offer collision programs, Public, 2-year schools and Private, for-profit 2-year schools graduate the highest number of students (completions).

Postsecondary Collision Completions by Sector 2020-2021 (a)		
Sector	# Institutions	Collision Completions
Public, 4-year or above	39	523
Public, 2-year	207	2,543
Public, less-than 2-year	25	235
Total Public	271	3,301
Private not-for-profit, 4-year or above	3	25
Private for-profit, 4-year or above	0	0
Private not-for-profit, 2-year	1	13
Private for-profit, 2-year	17	936
Private for-profit, less-than 2-year	4	212
Total Private	25	1,186
Grand Total	296	4487

(a) Source: IPEDS database. Completions from first major, Autobody/Collision and Repair Technology/Technician programs, Bachelor's and Associate's degrees as well as certificates below the B.A. level. <https://nces.ed.gov/ipeds/datacenter/login.aspx>

In 2021, the 10 largest providers of postsecondary collision completions were:

Postsecondary Collision Completions by Sector 2020-2021

Institution	Collision Completions
Dallas College	126
Mech-Tech College	109
Lincoln College of Technology-Nashville	106
Tulsa Technology Center	103
Automeca Technical College-Bayamon	91
Universal Technical Institute-Southern California	84
Hennepin Technical College	77
Central Community College	76
Universal Technical Institute of Northern California Inc	73
Universal Technical Institute of Texas Inc.	73

3. Postsecondary Diesel Completions

Diesel completions had been on an upward trend until 2017, when they totaled 12,807. Beginning in 2018 however, they have been dropping each year. For 2021, the number of completions is now at 10,699. When adding diesel into the results, we now have **all three industry sectors in an extended decline** for completions, a fact that we will address in the summary.

Based on the historical data cited, the trend from 2012 – 2020 is shown in the chart below.

Diesel Tech Postsecondary Completions | 2012-2021



Once again (as with automotive and collision) Public, 2-year schools and Private, for-profit 2-year schools graduate the highest number of students (completions) in the diesel sector.

Postsecondary Diesel Completions by Sector 2020-2021 (a)		
Sector	# Institutions	Diesel Completions
Public, 4-year or above	49	1,084
Public, 2-year	219	5,758
Public, less-than 2-year	33	404
Total Public	301	7,246
Private not-for-profit, 4-year or above	3	349
Private for-profit, 4-year or above	2	206
Private not-for-profit, 2-year	4	158
Private for-profit, 2-year	25	2,461
Private not-for-profit, less-than 2-year	1	4
Private for-profit, less-than 2-year	8	275
Total Private	43	3,453
Grand Total	349	10,989

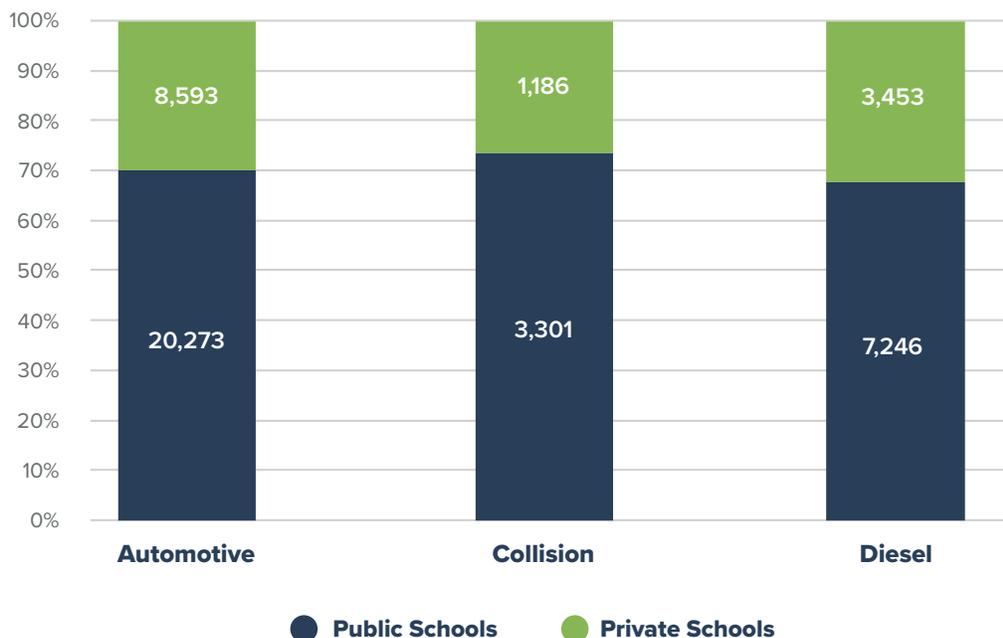
(a) Source: IPEDS database. Completions from First major Diesel Mechanics Technology/Technician Bachelor's degrees and Associate's degrees as well as certificates below the B.A. level. <https://nces.ed.gov/ipeds/datacenter/login.aspx>

In 2021, the 10 largest providers of postsecondary diesel completions were:

Top 10 Postsecondary Diesel Providers 2021	
Institution	Diesel Completions
University of Northwestern Ohio	285
WyoTech	276
Universal Technical Institute of Arizona Inc	263
Texas State Technical College	209
Maysville Community and Technical College	185
Central Community College	168
Universal Technical Institute of Texas Inc.	157
Elizabethtown Community and Technical College	157
Lincoln College of Technology-Grand Prairie	153
Western Technical College	147

The following chart displays the distribution of graduates (completions) between public schools and private schools in 2021.

% and # of graduates - Public vs. Private Schools 2021



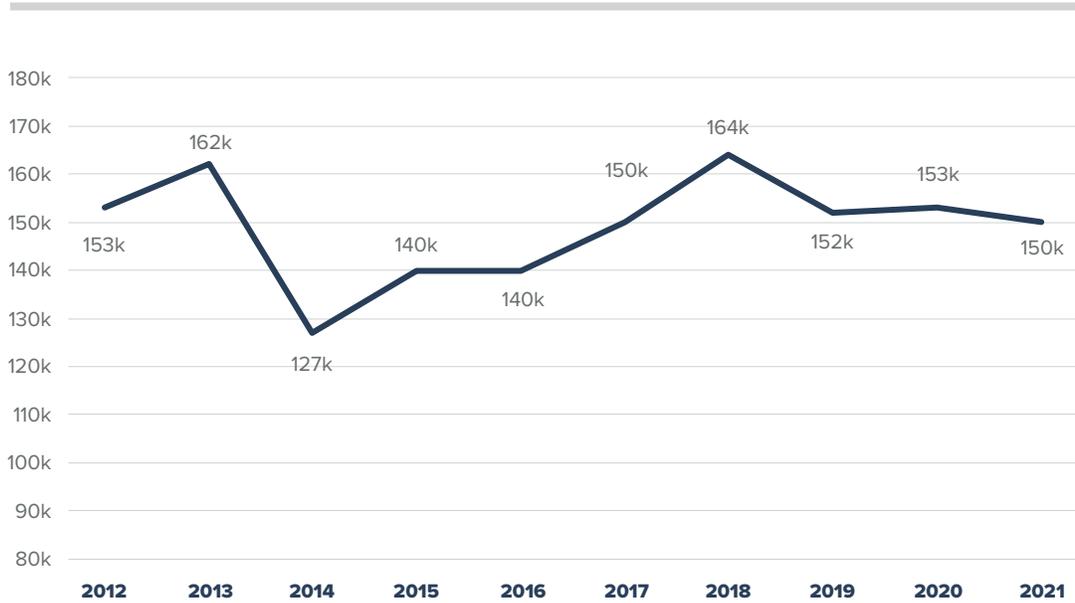
AVIATION

As mentioned in the overview at the beginning of this report, we are now including the aviation industry as an additional segment within this report. When compiling data on technicians within the aviation industry, the Bureau of Labor Statistics (BLS) breaks these jobs down into two separate roles; aviation technicians and avionics technicians. Therefore, you will see data for these two job roles separately at times, while at other times the two will be aggregated together, depending on the situation.

This chart provides historical data on the total number of aviation technicians employed in the U.S. for the past 10 years.

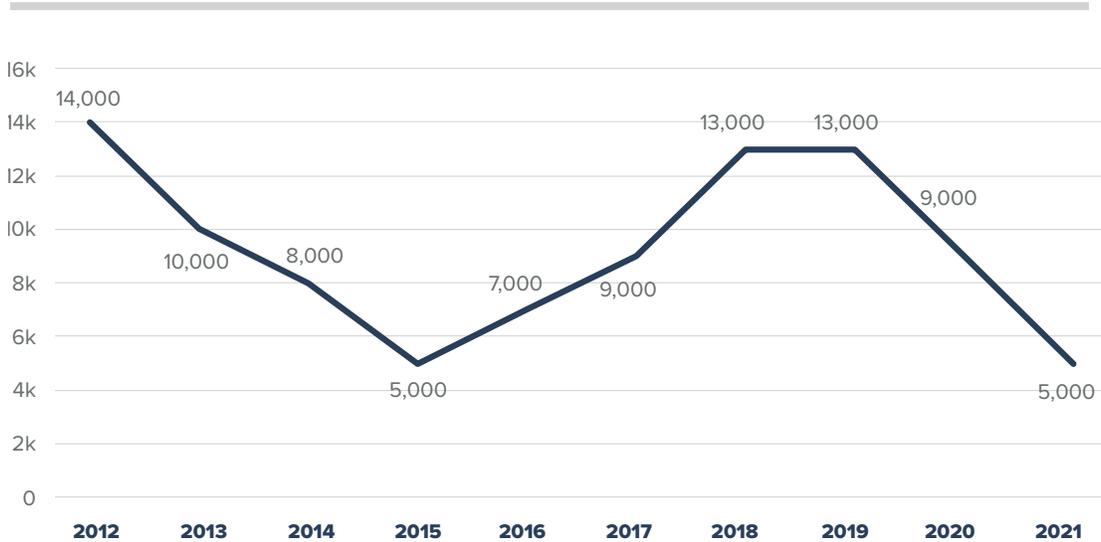


Total Aviation Technicians Employed



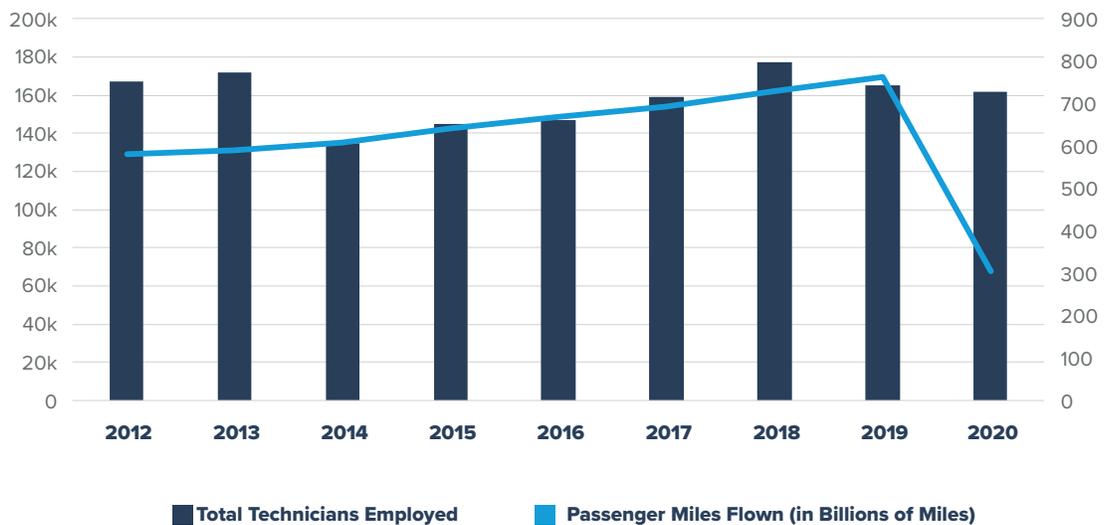
This chart provides historical data on the total number of aviation technicians employed in the U.S. for the past 10 years.

Total Avionics Technicians Employed



The following chart combines total aviation and avionics technicians employed over the past 10 years and compares that to the total number of U.S. passenger miles flown. In 2020, you see the devastating effect that the COVID-19 pandemic had on the airline industry.

Total Aviation & Avionics Technicians Employed vs. U.S. Passenger Miles Flown



The next two charts show demand projections by the BLS for the aviation and avionics technician job roles through 2026. Note that these are straight-line projections based on the 10-year period from 2021 to 2031. No research has yet been undertaken by TechForce to endeavor to apply formulas or algorithms to further adapt or modify these numbers to specific annual projections, as has been done with the automotive, diesel and collision industry sectors.

The chart below shows projections for the aviation technician job role through 2026. These projections are based on BLS estimates of a 7.9% annual total operational separations rate, and a 0.61% annual growth rate.

Aviation Technicians	Actual					
Projections (a)	2021	2022	2023	2024	2025	2026
Technicians Employed - start of year	131,700	132,500	133,300	134,100	134,900	135,700
New Positions (Growth)	800	800	800	800	800	800
Replacement Positions Needed	10,404	10,468	10,531	10,594	10,657	10,720
Total New Entrant Projections	11,204	11,268	11,331	11,394	11,457	11,520

The chart below shows projections for the avionics technician job role through 2026. These projections are based on BLS estimates of a 7.4% annual total operational separations rate, and a 0.51% annual growth rate.

Avionics Technicians	Actual					
	2021	2022	2023	2024	2025	2026
Technicians Employed – start of year	19,600	19,700	19,800	19,900	20,000	20,100
New Positions (Growth)	100	100	100	100	100	100
Replacement Positions Needed	1,450	1,458	1,465	1,473	1,480	1,487
Total New Entrant Projections	1,550	1,558	1,565	1,573	1,580	1,587



CONCLUSION

In this year's report, there are two areas of encouragement; the fact that the total number of employed technicians has increased in the automotive sector, and also in the diesel sector. That is indeed good news, particularly in the diesel sector where we see a robust 6.5% increase in just one year. But unfortunately, even those increases do not reflect the full number of new entrant positions that were needed. In automotive, over 56,000 new positions remained unfilled in 2021, and with diesel, an additional 7,600 positions were left on the table. Those employment numbers are going in the right direction, but at too slow a rate. Each year in which positions go unfilled merely rolls them over to the following year, digging a deeper hole to recover from.

Beyond those two employment increases, the news is not good. By far, the area of most concern is the prolonged drop in the number of students completing post-secondary programs for technician roles. These reductions are not short-term aberrations by any means. In the case of automotive, the downward trend began in 2013. With collision, it began a year later in 2014, and with diesel in 2018. Across the industry, we are looking at a 4-to-9-year downward trend.

There is another component that we need to be aware of as well, and that is the combination of a higher number of technicians employed in automotive and diesel in 2021, together with a lower number of postsecondary graduates. What that means is that the new entrant technicians to the workforce have less training. This, at a time when there is strong agreement within the industry that we need better-trained new entrant technicians for the future facing the industry; a future that is arguably already here. With the increased adoption of EV vehicles, autonomous vehicles and a myriad of other advanced technologies, hiring new entrant technicians with little or no training as the norm is a risky path to go down.

Therefore, one of the most important strategies that can be put into place is widespread, ongoing industry engagement with students beginning in middle school. This engagement needs to include a strong focus on messaging the benefits of enrollment in post-secondary training programs to jump-start their careers. Students need to be seriously considering this option early on, and that will only happen when they are able to interact with an engaged industry that shows them career opportunities they can be excited about. Further expansion of this topic is discussed in Appendix B.

QUICK FACTS



NEARLY

ONE MILLION

AUTO/DIESEL/COLLISION/AVIATION TECHNICIANS NEEDED

between 2022 and 2026

OVER

6 0 0 0 0 0

NEW ENTRANT AUTOMOTIVE TECHS

Needed between 2022 and 2026

OVER

1 1 3 0 0 0

NEW ENTRANT COLLISION TECHS

Needed between 2022 and 2026

NEARLY

1 7 7 0 0 0

NEW ENTRANT DIESEL TECHS

Needed between 2022 and 2026

NEARLY

7 8 0 0 0

NEW ENTRANT AVIATION & AVIONICS TECHS

Needed between 2022 and 2026

APPENDIX A

Methodology to determine technician demand reductions attributed to Electric Vehicles

This 2022 report continues the methodology used to determine the impact of electric vehicles (EV) on technician demand that was used in last year's report. The general consensus within the industry is that sales of EVs will be higher than projected last year. That conclusion is accounted for in the projections within this report.

For the methodology used to determine how much less repair and maintenance EVs require, we again used the results of a 2021 survey from the U.S. Department of Energy, Vehicle Technologies Office. The Vehicle Technologies Office monitors expenses for the U.S. government carpool, which is the largest carpool in the world. In their FOTW #190 report, released on June 14th, 2021, scheduled maintenance costs of ICE vehicles to EV vehicles were compared. Within the EV category, there are three subsets: Hybrid-Electric Vehicles (HEV), Plug-In Hybrid Electric Vehicles (PHEV) and Battery-Electric Vehicles (BEV). The key finding was that when looking at BEVs, maintenance costs were only 6.1 cents/mile as compared to ICE vehicles at 10.1 cents/mile, a savings of 4 cents a mile, or nearly 40%. With HEV and PHEV vehicles, the savings over ICE vehicles was negligible at .7 cents/mile and 1.1 cents/mile respectively. Therefore, our calculations focused on only BEV vehicles.

We next determined the number of new BEV vehicles that we can expect to enter the marketplace, and over what time period. Many factors affect the adoption of EVs, including the availability of charging stations nationwide, vehicle range, vehicle cost comparison to ICE vehicles, microchip shortages, state mandates, (such as recently announced by California), and government subsidies. Nonetheless, there are estimates and we looked specifically to those of IHS Markit, and Boston Consulting Group (BCG), a well-respected international firm that provides vehicle market estimates.

Finally, we needed to incorporate estimated annual vehicle sales, the impact that would have on the total U.S. VIO population annually and then the cumulative population of BEVs for the 2021-2031 period.

With the above information it was then possible to determine the reduction in technician demand that the adoption of EVs will likely bring over time. While the many variables carry with them a number of differing outcomes, this methodology should serve to provide a basic understanding

Registered Vehicles in U.S. by Year (1)	VIO by year (2)	VIO % increase per year (3)	Annual Light Vehicle Sales (4)	Light Vehicle % increase per year (5)	Light Vehicle Sales as % of VIO (6)	# of Light Vehicle Sales that are BEV (7)	% of Light Vehicle Sales that are BEV (8)	# of Cumulative BEV Vehicles in VIO (9)	% of Cumulative BEV Vehicles in VIO (10)	Impact to Light Vehicle Technician Demand (11)
2012	248,700,000	0.00	14,433,200	13.27%	5.80%	14,587	0.10%	14,587	0.01%	0.00%
2013	248,900,000	1.00	15,530,100	7.60%	6.24%	48,094	0.31%	62,681	0.03%	0.01%
2014	252,600,000	1.01	16,452,000	5.94%	6.51%	63,525	0.39%	126,206	0.05%	0.02%
2015	257,900,000	1.02	17,408,000	5.81%	6.75%	71,064	0.41%	197,270	0.08%	0.03%
2016	264,000,000	1.02	17,477,300	0.40%	6.62%	86,731	0.50%	284,001	0.11%	0.04%
2017	270,400,000	1.02	17,150,100	-1.87%	6.34%	104,487	0.61%	388,488	0.14%	0.06%
2018	279,100,000	1.03	17,224,900	0.44%	6.17%	207,062	1.20%	595,550	0.21%	0.08%
2019	284,500,000	1.02	16,961,100	-1.53%	5.96%	233,822	1.38%	829,372	0.29%	0.12%
2020	286,900,000	1.01	14,471,800	-14.68%	5.04%	240,053	1.66%	1,069,425	0.37%	0.15%
2021	289,500,000	1.01	14,926,900	14.71%	5.16%	522,442	3.50%	1,591,867	0.55%	0.22%
2022 (proj.)	290,800,000	1.00	14,200,000	2.50%	4.88%	994,000	7.00%	2,585,867	0.89%	0.35%
2023 (proj.)	295,600,000	1.02	14,555,000	2.50%	4.92%	1,601,050	11.00%	4,186,917	1.42%	0.56%
2024 (proj.)	300,400,000	1.02	14,918,875	2.50%	4.97%	2,237,831	15.00%	6,424,748	2.14%	0.85%
2025 (proj.)	305,300,000	1.02	15,291,847	2.50%	5.01%	2,905,451	19.00%	9,330,199	3.06%	1.21%
2026 (proj.)	310,400,000	1.02	15,674,143	2.50%	5.05%	3,761,794	24.00%	13,091,993	4.22%	1.67%
2027 (proj.)	315,400,000	1.02	16,065,997	2.50%	5.09%	3,213,199	29.00%	16,305,192	5.17%	2.05%
2028 (proj.)	320,600,000	1.02	16,467,647	2.50%	5.14%	5,599,000	34.00%	21,904,192	6.83%	2.71%
2029 (proj.)	325,900,000	1.02	16,879,338	2.50%	5.18%	6,751,735	40.00%	28,655,927	8.79%	3.48%
2030 (proj.)	331,200,000	1.03	16,879,338	2.50%	5.10%	7,933,289	47.00%	29,837,481	9.01%	3.57%
2031 (proj.)	336,600,000	1.03	17,301,321	2.50%	5.14%	8,996,687	52.00%	37,652,614	11.19%	4.43%

(1) Vehicle Registration for 2012-2020 from www.hedges.com. Vehicle Registration for 2021 based on current YTD light vehicle sales. Vehicle registration from 2022-2030 based on historical average of light vehicle sales increase from 2012 to 2019 (2020 excluded due to impact of COVID on sales) of 2.5%.

(2) VIO methodology – Same as # (1)

(3) VIO % increase per year from 2012-2020 is a calculation based on actual past sales history. VIO % increase for 2021 based on projected 2021 light vehicle sales. VIO % increase for 2022-2030 based on light vehicle projected sales increase of 2.5% annually as determined in # (1)

(4) Annual light vehicles sales is a calculation based on light vehicle % of sales increase in # (5)

(5) Annual light vehicles sales from 2012-2020 based on actual past sales history. Sales for 2021 from Statista.com (Hedges

Company listed only estimated sales at time of this report). Light vehicle sales from 2022-2030 based on historical average of light vehicle sales increase from 2012 to 2019 (2020 excluded due to impact of COVID on sales) of 2.5%.

(6) Percentage of light vehicle sales attributed to BEVs are extrapolated from Boston Consulting Group report "Electric Cars Are Finding Their Next Gear" <https://www.bcg.com/publications/2022/electric-cars-finding-next-gear>

(7) See footnote #6

(8) Impact to light vehicle demand is expressed as the % of reduction that BEV vehicles will make on technician demand for a given year. For example, in 2031, once total technician demand is calculated, the # of technicians needed would then be reduced by 4.43% to arrive at a "net demand", inclusive of the impact of BEV vehicles.

APPENDIX B

Contributing Factors and Potential Solutions

The contributing factors are not new, and have been much discussed in prior Technician Supply and Demand Reports, as well as across the industry in numerous publications, conferences and conversations. Many other skilled trades face similar challenges, as new entrants into those vocations also continue to drop.

For those organizations that employ transportation technicians, they would be well-advised to take this situation very seriously and work aggressively to change it. To that point, the shortage will not be solved by looking at the hiring of a technician as a single act, in and of itself, undertaken in the moment as the need arises. Rather, we need to build a gradual awareness, curiosity and interest in these careers among our youth, cultivated over a number of years. The hiring of a new-entry technician then becomes a natural outcome. Employers who do not sit on the sidelines and leave it to others to undertake this effort, but undertake positive action themselves will reap the benefits of those actions. A long-term focus on addressing the underlying causes of why young men and women are not interested in the trade is what is needed. If substantial efforts are not made to build the beginning of the funnel, eventually nothing will be coming out the other end.

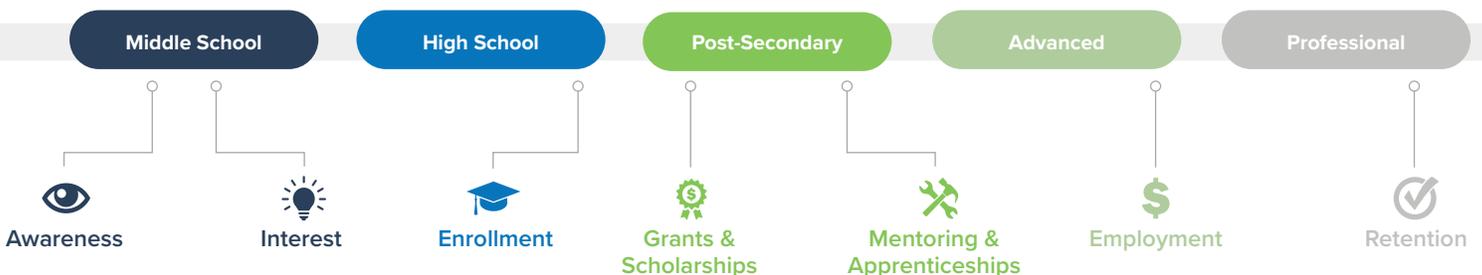
The path to reversing the downward spiral of technician supply is to:

- Focus both as individual organizations and as an industry on increasing **awareness** of the career opportunities that exist for new entrant transportation technicians. A critical component of this messaging is dispelling outdated false perceptions of technical skilled trades, and clearly communicating what it means to be a technician in today's world. This messaging is needed not only for students, but for their parents and influencers as well.
- Turn that awareness into **interest** through engagement and interaction with students, their parents and influencers, teachers, and administrators.
- Turn that interest into **enrollments** in our high school and postsecondary training programs.
- Bridge the gap between education and industry by offering **mentorships and apprenticeships** to students.
- Turn those mentorships and apprenticeships into **employees**.
- **Retain those employees** through competitive pay, good benefits and a great company culture; one focused on caring for its employees as the most valuable assets of the company.

INSPIRE

SUPPORT

CONNECT



APPENDIX C

Backgrounds of TechForce Foundation and Greg Settle

TechForce Foundation is a nonprofit, 501(c)(3) with the mission to champion all students to and through their education and into careers as professional technicians. TechForce powers the technician workforce by awarding more than \$1.5 million in scholarships and grants annually to financially-disadvantaged students; changes perceptions towards this evolving, ‘new collar’ STEM career; and provides local career exploration and workforce development programming. TechForce’s online, social network of students, working technicians, instructors, employers, industry professionals and enthusiasts committed to championing the technician workforce is the conduit through which the charity delivers its free resources, programs and career hub for the benefit of aspiring technicians. For more information, visit techforce.org. Follow us on [TikTok](#), [Facebook](#), [Instagram](#), [Twitter](#) and [LinkedIn](#).

Greg Settle, author of this report, is currently retired, but holds the position of Director Emeritus, National Initiatives for TechForce Foundation. He also serves as a contributing writer for TechForce Foundation. Mr. Settle graduated from the Automotive and Diesel Technology programs at Universal Technical Institute in Phoenix, AZ. He spent 43 years with the Mercedes-Benz brand, beginning his career as a dealership technician, and subsequently moving through roles as Shop Foreman, Service Manager, and Fixed Operations Director. After moving to Mercedes-Benz, USA he held various field representative and engineering roles before joining the MBUSA training organization. Over several years he served as National Manager of Training Operations, Manager of Retail Training, and Manager of Technical Training and Curriculum. After retiring from MBUSA, he worked at TechForce Foundation as Director of Industry Partnerships and Director, National Initiatives. Mr. Settle also served multiple terms on the Board of Directors for Automotive Youth Educational Systems (AYES) and the I-CAR Education Foundation.



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