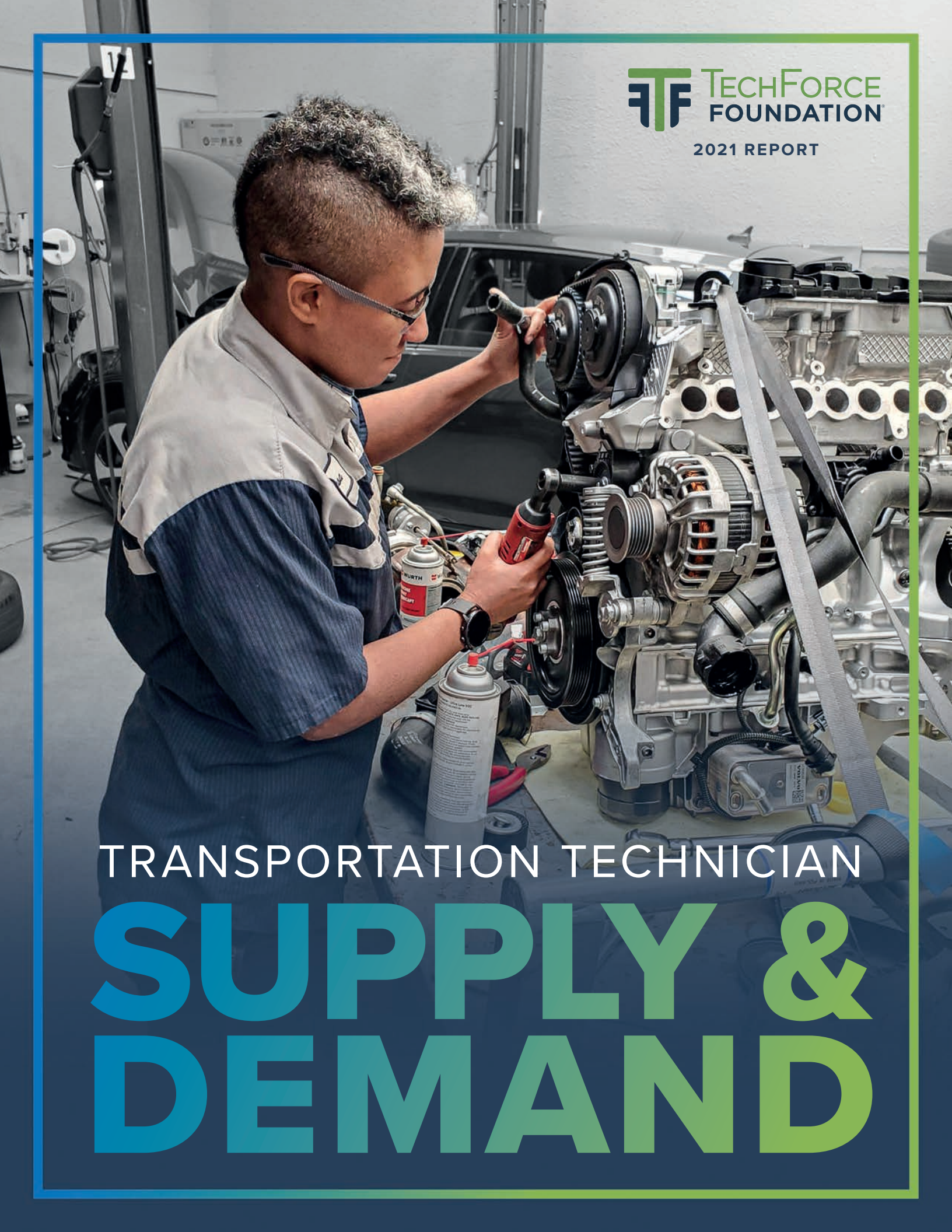


TechForce Foundation

2021 REPORT

TRANSPORTATION TECHNICIAN SUPPLY & DEMAND

Companies and organizations actively supporting students through TechForce Foundation

OVERVIEW

TechForce Foundation began the release of its Transportation Industry Technician Supply and Demand Reports in October of 2017, precipitated by the knowledge that a technician shortage had already become a serious issue for the industry.

This 2021 report[1] provides the current status for technician supply and new entrant demand, and unfortunately makes it clear that this declining trend shows no sign of abating.

While we wish nothing more than to be able to provide encouraging news that this shortage is decreasing, in fact the opposite is true. As evidenced in the charts and information below, the shortage continues, and the crisis deepens even more.

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).

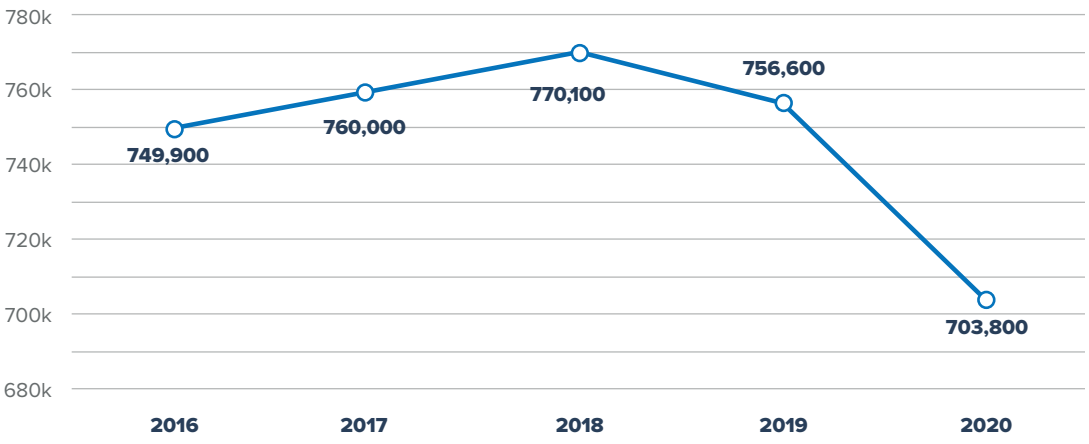
This year for the first time, we have included a projection for the impact of Electric Vehicles (EV) on the demand for technicians. There has been much discussion on what impact the changeover to EVs will have on long-term demand, due to the fact that EVs require less maintenance. While there are many influencing factors in this equation that continue to evolve, there are some basic assumptions that can be made. Perhaps the most critical factor is the comparison of maintenance and repair costs for EVs vs. those for internal combustion engine vehicles (ICE). The data we have used comes from U.S. Department of Energy, Vehicle Technologies Office, which monitors expenses for the U.S. government carpool, the largest carpool in the world.

We have also undertaken our best effort to make allowances for the impact of the COVID-19 Coronavirus pandemic when looking at projections. While the long-term social and economic consequences remain unknown, we can say with certainty that the impact is far from over. As of the writing of this report, we are in a cycle once again of increased new cases, and the Delta variant and its contagiousness is changing consumer habits. The wearing of masks is increasing, and the supply of household essentials decreasing as consumers once again feel the need to stock up, and in some cases hoard products.

[1]This 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

As a point of reference, it may be helpful to picture total employment of auto technicians over the past 5 years. Although some reductions can be attributed to dealership consolidation, higher vehicle quality and reduced maintenance requirements, the large drop in employment is very concerning, particularly that over the past two years.



2. Demand for **Automotive New Entrant Technicians**

According to the latest BLS projections, which cover the 10-year period from 2020 to 2030, growth demand in the industry for new entrant automotive technician demand is expected to increase slightly. However, the demand created by Labor Force Exits and Occupational Transfers is quite a different picture. For example, between 2021 and 2025, only approximately 24,000 new positions are attributed to growth demand. On the other hand, nearly half a million positions will be needed during this same period for Occupational Separations.

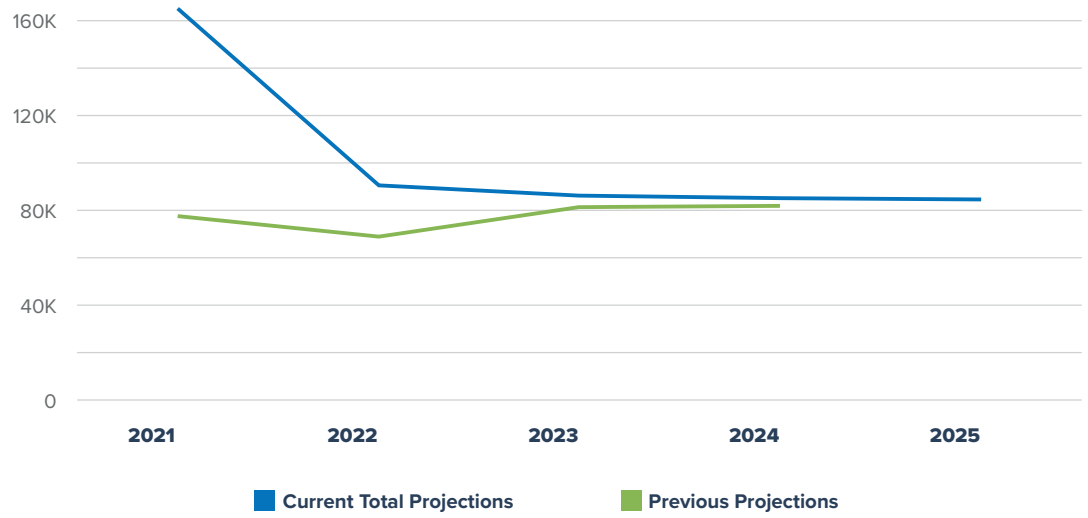
Projections (a)	2021	2022	2023	2024	2025
New Positions	4,735	563	7,411	5,868	5,100
+Replacement Positions (b)	173,673	78,795	79,521	80,096	80,596
Less reduced demand for maintenance & repair of electric vehicles (c)	(410)	(270)	(443)	(636)	(883)
Total New Entrant Demand	**177,998**	**79,088**	**86,489**	**85,328**	**84,813**
Prior New Entrant Demand	77,936	69,107	81,482	81,908	

(a) Projections assume 6.0% growth in 2021, 3.0% in 2022, 1.8% in 2023, 1.4% in 2024, and 1.2% in 2025. Estimates based on a compilation of Congressional Budget Office (CBO) and Survey of Professional Forecasters (SPF) projections, but discounted due to expected impact of COVID-19 and its Delta variant. **(b)** Replacement positions for 2021 have been adjusted to reflect the large number of unfilled positions in 2020 as well as a one-year drop from 2019 to 2020 of 7% in the total automotive technician workforce. **(c)** See Appendix A for methodology used to arrive at technician demand reductions attributed to increased adoption of EVs.

In this next chart, we compare the current automotive technician new entrant demand with our previous report released in 2020. As noted in footnote (b) directly above, here you can see the very large spike in immediate demand due to the unfilled positions in 2020, as well as the loss in 2020 of nearly 53,000 technician jobs.

Should that high demand be filled from 2021 to 2022, it is expected that the demand will then level out, much in-line with previous projections. However, it is considered very unlikely that it will be possible to fill such a large number of positions within a one-year period. The odds are that a significant number of unfilled carryover positions will remain. That being the case, our 2022 report will quite likely show that demand has not yet leveled off, and that unfilled demand will then raise the number of open positions again from 2022 to 2023.

Comparison of New Auto Tech Projections with Prior Numbers

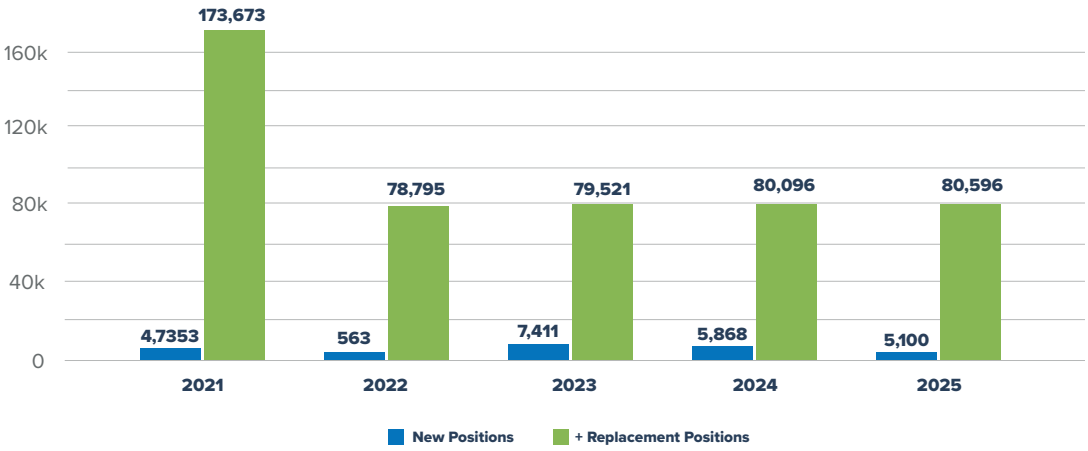


The following chart illustrates the significant difference between new entrant demand from growth vs. demand from replacement positions, created by the retirement of baby boomers as well as turnover. An additional factor to note is that the BLS Replacement Rate has increased once again. After a drop from 9.7% in the 2018 report to 8.7% in 2019, that number has now risen to 9.8% in the 2020 report.

Total New Entrant Automotive Positions Needed

Breakdown by New Growth vs. Replacement Positions

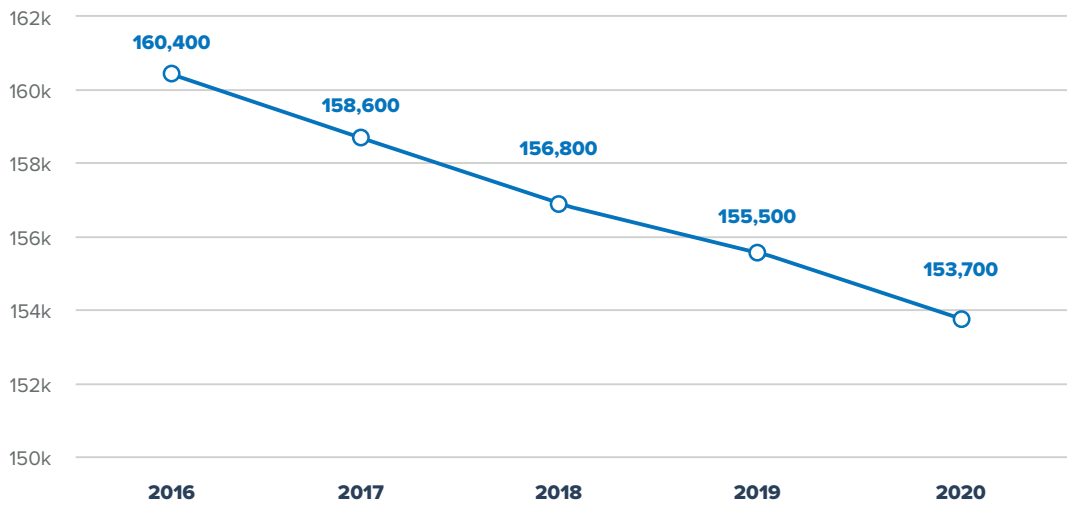
New positions are created by growth | Replacement positions are created by retirement, transfers and turnover



3. Collision Technician **Employment**

The chart below represents total industry employment of collision technicians over the past 5 years. Similar to the automotive technician field, some reductions can be attributed to consolidation within the industry. Though not as dramatic as the reduction in automotive technicians, the downward trend is nonetheless concerning and thus warrants continued monitoring.

Total Collision Technicians Employed



4. Demand for **Collision New Entrant Technicians**

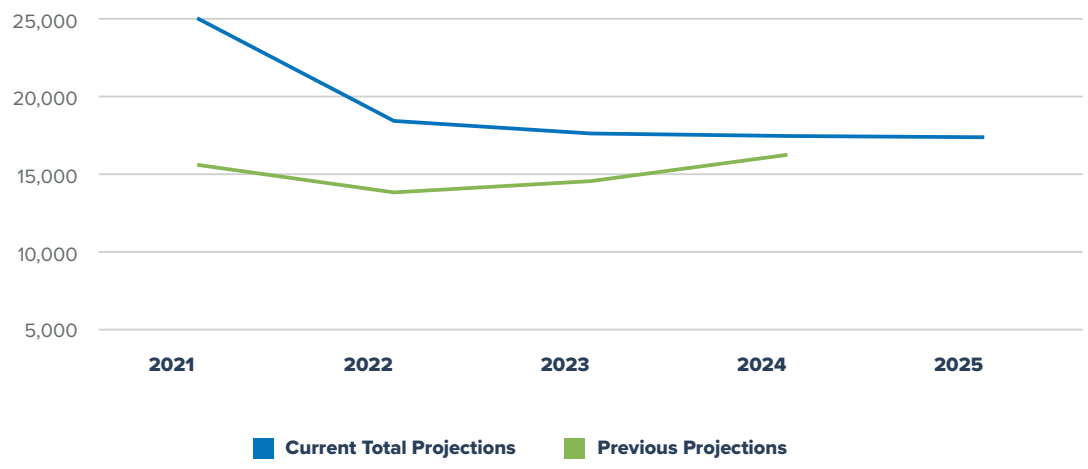
According to the latest BLS projections, which cover the 10-year period from 2020 to 2030, growth demand in the industry for new entrant collision technician demand is expected to increase by just over 0.5% per year. However, similar to the situation with automotive technicians, the lion's share of new entrant demand will be created by Labor Force Exits and Occupational Transfers. Looking at 2021 through 2025, approximately 8,000 new positions are attributed to growth demand, while nearly 88,000 come from these exits and transfers, collectively known as Occupational Separations.

Projections (a)	2021	2022	2023	2024	2025
New Positions	1,575	2,487	1,537	1,217	1,058
+Replacement Positions (b)	23,519	16,009	16,157	16,274	16,375
Total New Entrant Demand	**25,094**	**18,496**	**17,694**	**17,491**	**17,433**
Prior New Entrant Demand	15,650	13,860	14,616	16,285	

(a) Same economic projections as used for automotive projections. **(b)** Replacement positions for 2021 have been adjusted to reflect the unfilled positions in 2020 as well as the slight drop from 2019 to 2020 of 1.2% in the total collision technician workforce.

In the following chart, we compare the current collision technician new entrant demand with our previous report released in 2020. As noted in footnote (b) above, you can see the spike in immediate demand for 2021 due to the unfilled positions in 2020, as well as the loss of 1,800 collision technician jobs in 2020. Should that spike in demand be filled from 2021 to 2022, it is expected that demand will level out, though at a slightly higher level than previous projections.

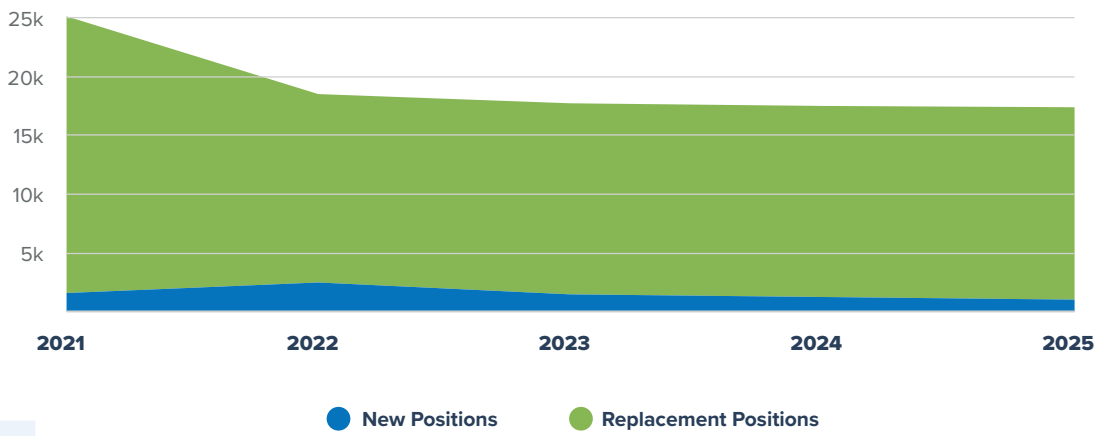
Comparison of New Collision Tech Projections With Prior Numbers



The following chart illustrates the disparity between new entrant demand from growth vs. demand from replacement positions, created by the retirement of baby boomers as well as transfers and turnover. As with automotive, the BLS Replacement Rate is rising again. After a drop from 9.6% in 2018 to 8.3% in 2019, that number is now up to 9.1% in the 2020 report.

Comparison of New vs. Replacement Collision Positions

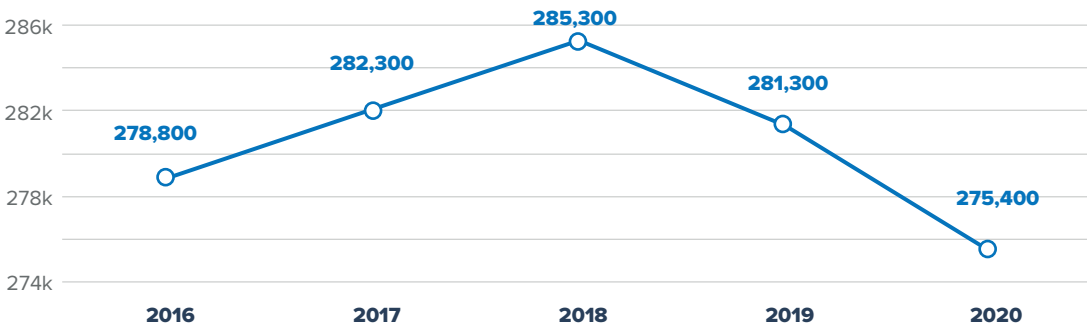
New positions are created by growth | Replacement positions are created by retirement, transfers and turnover



5. Diesel **Technician Employment**

The chart below represents total industry employment of diesel technicians over the past 5 years. After peaking in 2018, this number has now dropped for two consecutive years for a total reduction in the workforce of 3.5%. Though not a particularly large drop by percentage points, it is nonetheless concerning as diesel technician growth demand is forecast to be greater than either the automotive or collision sectors.

Total Diesel Technicians Employed



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6. Demand for **Diesel New Entrant Technicians**

According to the latest BLS projections, which cover the 10-year period from 2020 to 2030, growth demand in the industry for new entrant diesel technician demand is expected to increase by a little under 1% per year. As previously mentioned, this is higher than automotive or collision growth. Looking at 2021 through 2025, nearly 25,000 new diesel positions will come from growth in the sector, while 163,000 will be attributed to Occupational Separations.

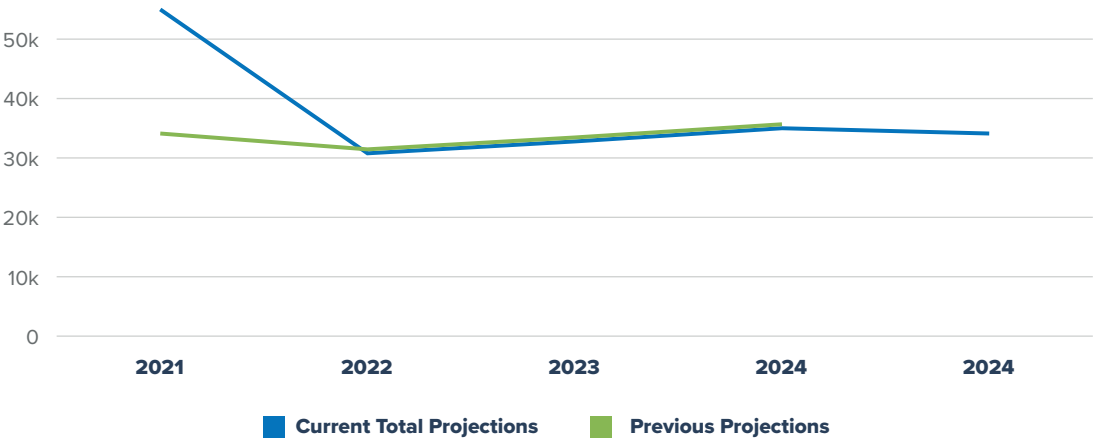
Projections (a)	2021	2022	2023	2024	2025
New Positions	5,937	3,028	4,587	6,208	4,749
+Replacement Positions (b)	48,977	27,827	28,244	28,809	29,241
Total New Entrant Demand	**54,914**	**30,855**	**32,831**	**35,017**	**33,990**
Prior New Entrant Demand	34,093	31,466	33,452	35,650	

(a) Projections assume 2.0% growth in 2021, 1.0% in 2022, 1.5% in 2023, 2.0% in 2024, and 1.5% in 2025 **(b)** Replacement positions for 2021 have been adjusted to reflect the unfilled positions in 2020 as well as a one-year drop from 2019 to 2020 of 2% in the total diesel technician workforce.

In a very similar situation to the automotive sector, diesel new entrant demand shows a large spike in 2021, and the reasons for it are similar. Over 21,000 unfilled positions remain from 2020, as well as an additional loss of nearly 6,000 diesel technician jobs. When you add in the jobs that will be vacated in 2021 by retirements, turnover and transfers you are looking at a demand of nearly 55,000 positions for the year.

Following that one-year peak, demand levels out, and returns in-line with previous projections. However, as with automotive, it must be considered very unlikely that it will be possible to fill such a large number of positions in such a short period of time. Therefore, we believe a significant number of unfilled carryover positions will remain, increasing the number of open positions again from 2022 to 2023.

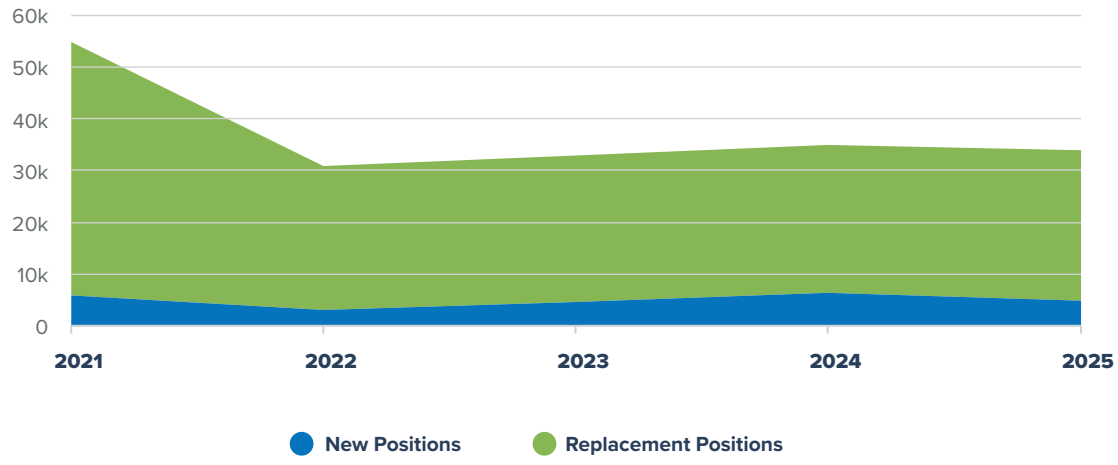
Comparison of New Diesel Tech Projections vs. Prior Numbers



The following chart compares new diesel entrant demand from growth vs. demand created from replacement positions. Continuing the trend seen in automotive and collision, the bulk of the demand continues to come from replacement positions. The BLS Replacement Rate rose from 9.3% in 2018 to 9.6% in 2019, but has dropped back to 9.1% in 2020.

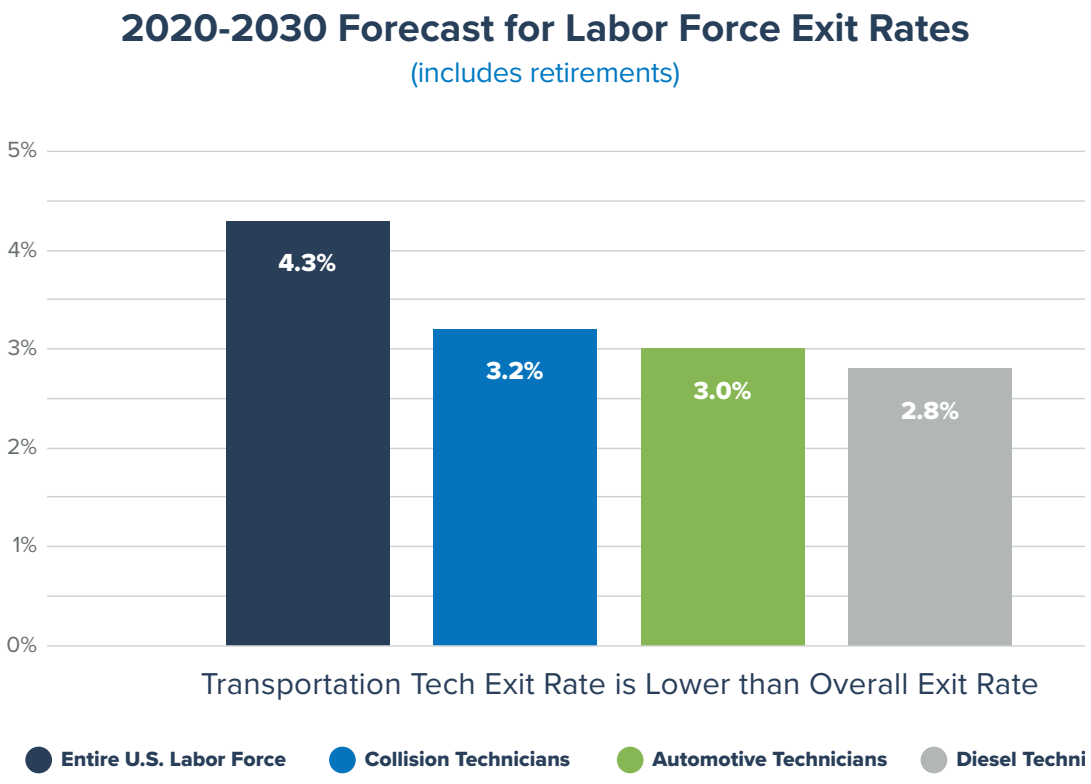
Comparison of New vs. Replacement Positions

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



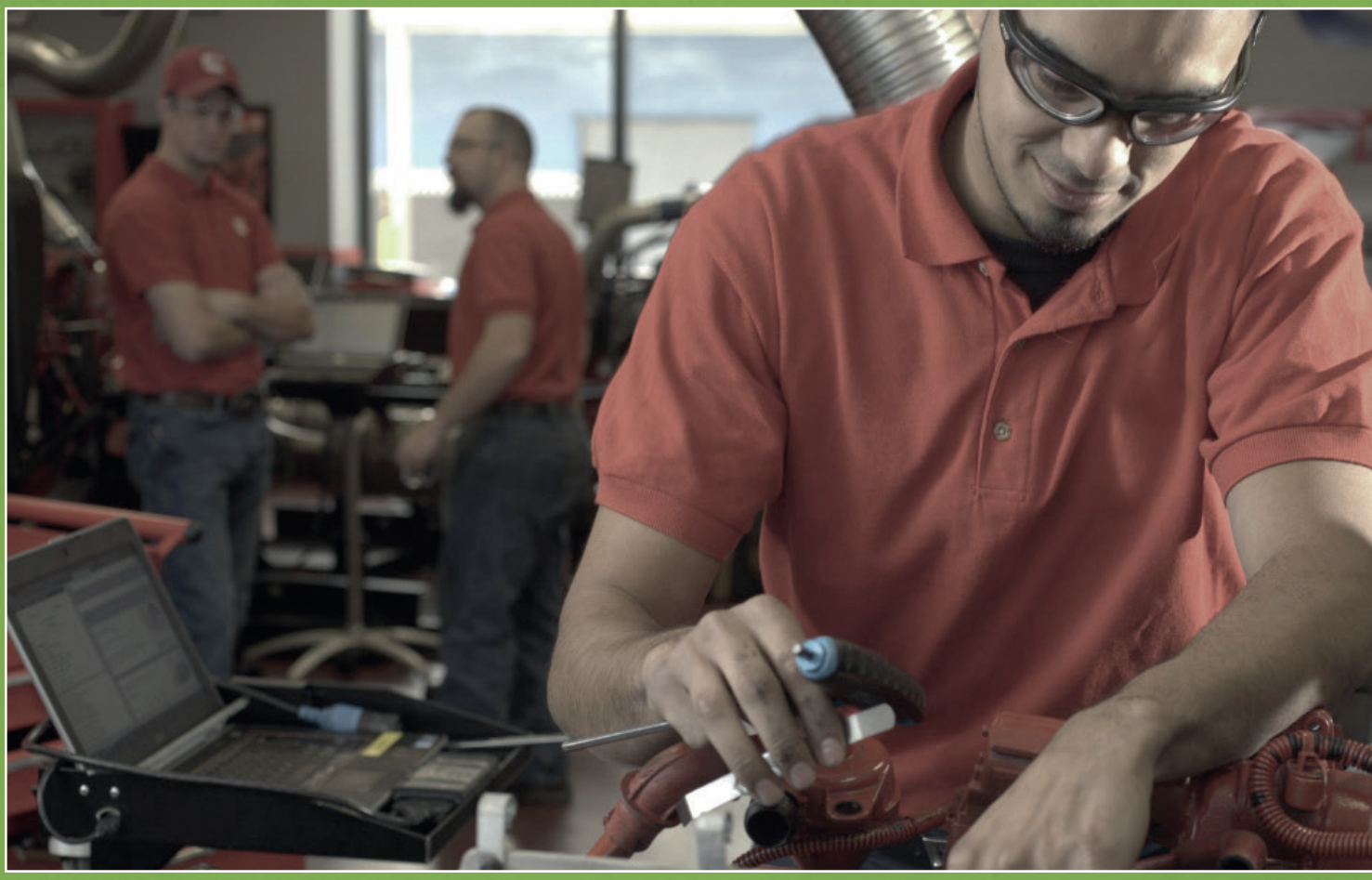
Graying of the Technician Workforce

There seems to be a commonly-held belief that the transportation technician field has an older-than-average, aging workforce with a critical number of technicians either retiring or near retirement. While it is true that the U.S. in general does have an aging workforce, it is not true that there are a higher-than average number of technicians retiring. In fact, the opposite is the case. When looking at the automotive, diesel and collision fields, workers are actually retiring at a lower rate than in the overall U.S. workforce.



TECHNICIAN **SUPPLY**

This report provides completion data for automotive, collision and diesel technicians for the 2019-2020 school year from IPEDS. For information on the value and limitations of these numbers, please see the footnotes referenced on page 1 of this report.



1. Postsecondary **Automotive Completions**

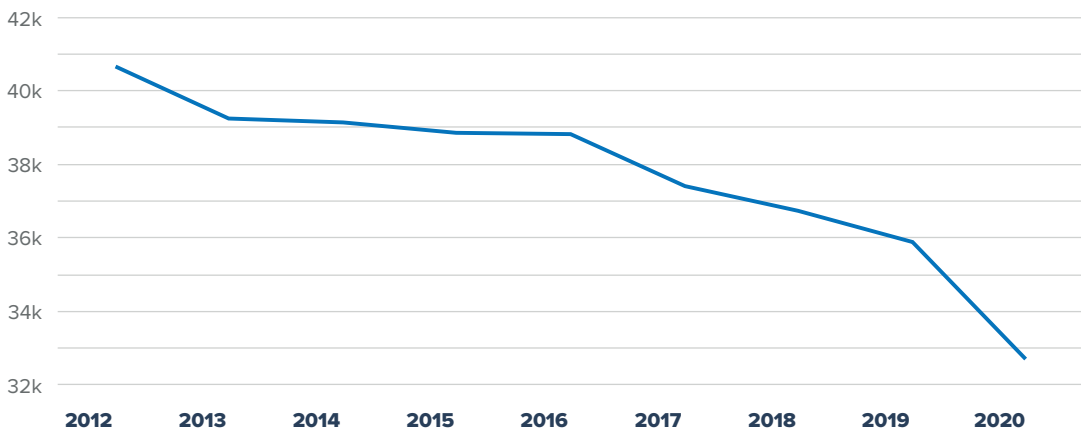
Automotive completions dropped from 37,413 in 2017 to 36,742 in 2018. Then dropped again to 35,890 in 2019, and all the way down to 32,715 in 2020. This extends the downward trend that began in 2012 and continues to this day. This trend shows no signs of reversing itself, and should be of great concern to the automotive industry.

Postsecondary Automotive Completions by Sector 2019-20 (a)		
Sector	**#Institutions**	**Auto Completions**
Public, 4-year or above	92	4,135
Public, 2-year	554	18,830
Public, less-than 2-year	68	777
Total Public	**714**	**23,742**
Private not-for-profit, 4-year or above	11	529
Private for-profit, 4-year or above	2	119
Private not-for-profit, 2-year	6	122
Private for-profit, 2-year	34	6,143
Private not-for-profit, less-than 2-year	3	44
Private for-profit, less-than 2-year	27	2,016
Total Private	**83**	**8,973**
Grand Total	**776**	**32,715**

(a) Source: IPEDS database. Completions from first major, Automobile/Automotive Mechanics 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

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

Auto Tech Postsecondary Completions | 2012 to 2020



In 2020, the 10 largest providers of postsecondary automotive completions were:

Top 10 Postsecondary Automotive Providers 2020 (a)	
Institution	**# Completions**
Front Range Community College	675
Dallas College	636
Universal Technical Institute of Arizona Inc	513
Universal Technical Institute-Dallas Fort Worth	487
Jefferson Community and Technical College	482
NASCAR Technical Institute	458
Ivy Tech Community College	422
Universal Technical Institute of California Inc	413
Universal Technical Institute of Northern California Inc	411
Universal Technical Institute of Texas Inc.	402

(a) Omits Mech-Tech which is based in Puerto Rico. Mech-Tech had 402 automotive completions in 2020.

2. Postsecondary Collision Completions

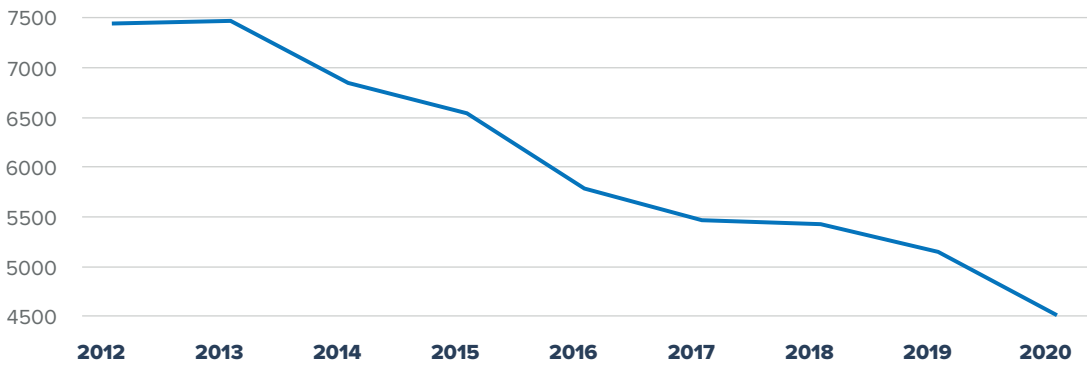
Collision completions continued the downward trend in place since 2012. Completions dropped from 5,564 in 2017 to 5,426 in 2018. Then again from 5,141 in 2019 to 4,504 in 2020, over a 12% decrease in just one year.

Postsecondary Automotive Completions by Sector 2019-20 (a)		
Sector	**#Institutions**	**Collision Completions**
Public, 4-year or above	36	539
Public, 2-year	223	2,728
Public, less-than 2-year	27	193
Total Public	**286**	**3460**
Private not-for-profit, 4-year or above	4	27
Private for-profit, 4-year or above	1	2
Private not-for-profit, 2-year	1	10
Private for-profit, 2-year	17	801
Private for-profit, less-than 2-year	5	204
Private for-profit, less-than 2-year	27	2,016
Total Private	**28**	**1044**
Grand Total	**314**	**4504**

(a) Source: IPEDS database. Completions from first major, Automobile/Automotive Mechanics 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

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

Collision Tech Postsecondary Completions | 2012-2020



In 2020, the 10 largest providers of postsecondary collision completions were

Top 10 Postsecondary Collision Providers 2020 (a)	
Institution	**Collision Completions**
Forsyth Technical Community College	112
Universal Technical Institute of Texas Inc.	106
Lincoln College of Technology-Nashville	101
Pikes Peak Community College	94
Automeca Technical College-Bayamon	90
Universal Technical Institute-Southern California	77
Lincoln College of Technology-Denver	71
Automeca Technical College-Aguadilla	68
Ohio Technical College	66
Universal Technical Institute of Northern California Inc.	62

(a) Omits Mech-Tech which is based in Puerto Rico. Mech-Tech had 67 collision completions in 2020.

3. Postsecondary Diesel Completions

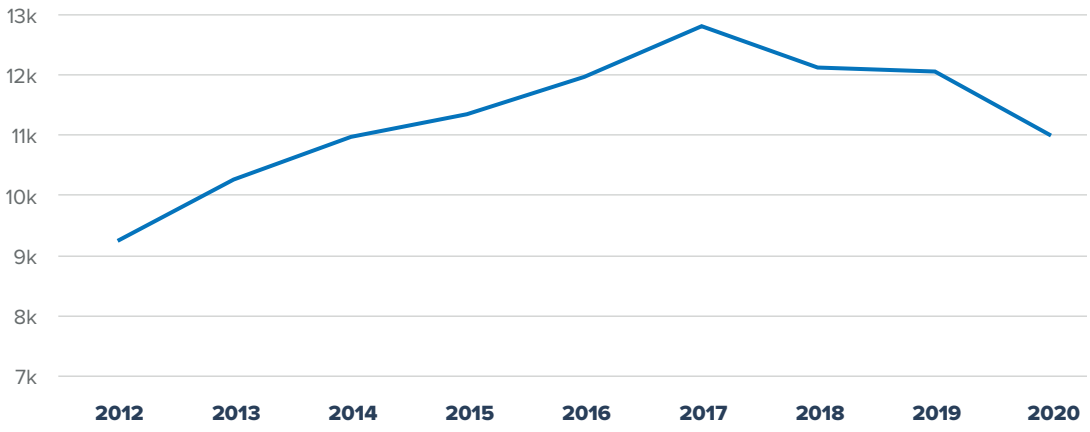
Diesel completions had been on an upward trend until 2017, when they totaled 12,807. However, they then dropped to 12,112 in 2018, and that decrease has continued. There were 12,045 completions in 2019 and only 10,989 in 2020. This is especially concerning as up until 2017, the diesel sector was the only one of the three transportation sectors studied in this report for which student completions were on the increase.

Postsecondary Diesel Completions by Sector 2019-2020 (a)		
Sector	**#Institutions**	**Diesel Completions**
Public, 4-year or above	46	972
Public, 2-year	227	6,355
Public, less-than 2-year	32	384
Total Public	**305**	**7711**
Private not-for-profit, 4-year or above	3	335
Private for-profit, 4-year or above	2	152
Private not-for-profit, 2-year	4	165
Private for-profit, 2-year	25	2342
Private for-profit, less-than 2-year	1	11
Private for-profit, less-than 2-year	9	273
Total Private	**44**	**3278**
Grand Total	**349**	**10,989**

(a) Source: IPEDS dtabase. Completions from first major, Automobile/Automotive Mechanics 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

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

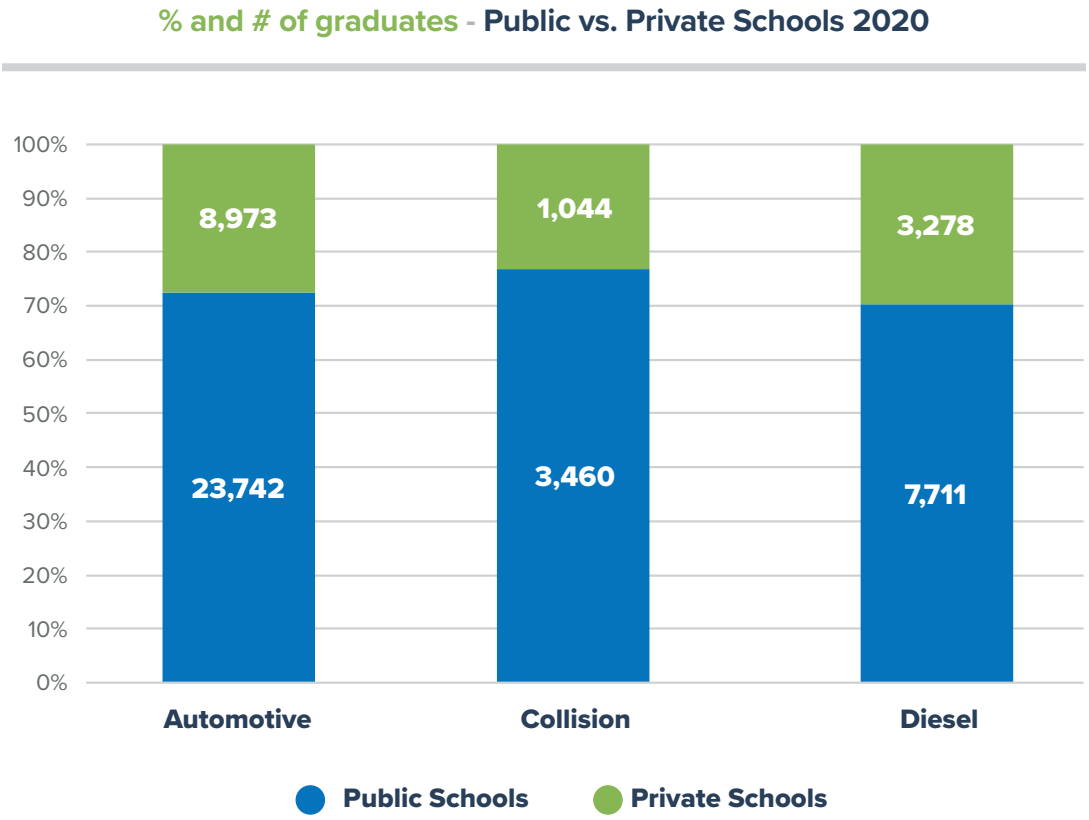
Diesel Tech Postsecondary Completions | 2012-2020



In 2020, the 10 largest providers of postsecondary diesel completions were:

Top 10 Postsecondary Diesel Providers 2020	
Institution	**Collision Completions**
Universal Technical Institute of Arizona Inc	294
University of Northwestern Ohio	285
Texas State Technical College	216
Ashland Community and Technical College	199
Universal Technical Institute-Dallas Fort Worth	167
Maysville Community and Technical College	165
Elizabethtown Community and Technical College	162
Gateway Community and Technical College	154
Lincoln College of Technology-Nashville	153
St Philip's College	153

The following chart shows the distribution of graduates (completions) between public schools and private schools in 2020.



CONCLUSION

The overall situation with supply vs. demand of transportation technicians continues to deteriorate, and there are no indications on the horizon that this trend will reverse itself. 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.

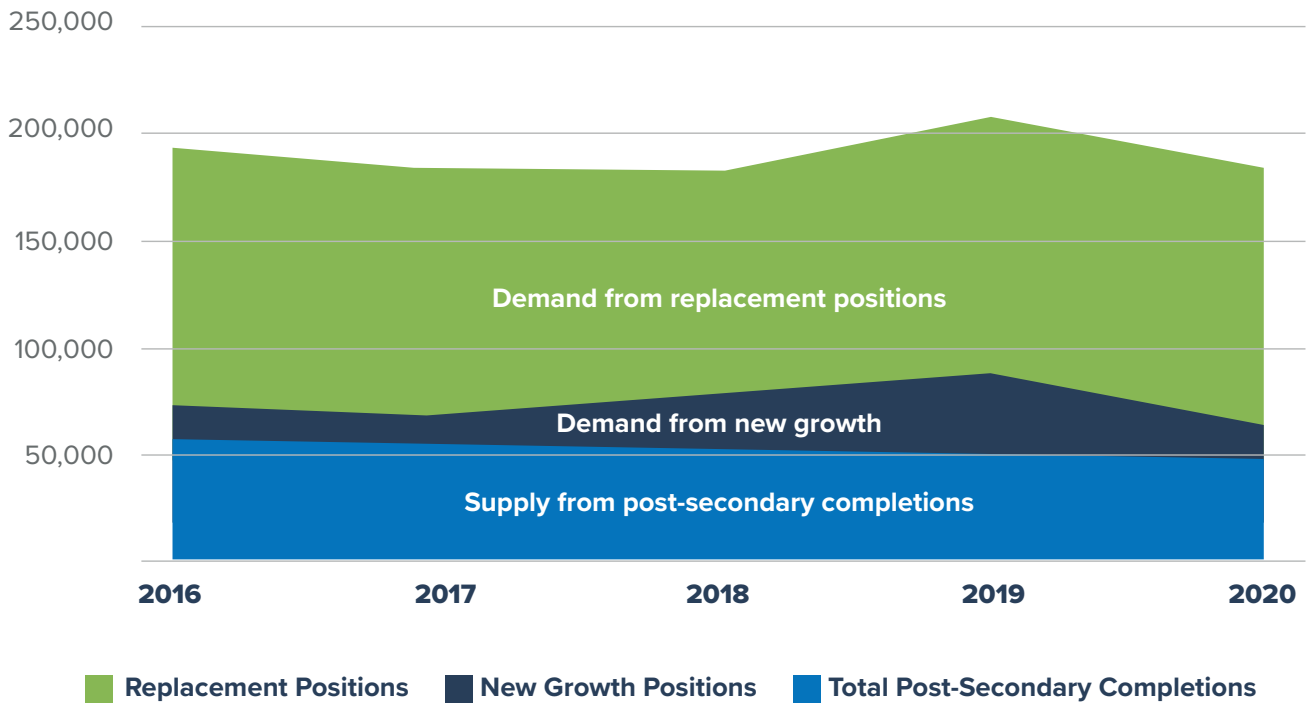
For those organizations that employ transportation technicians, they would be well-advised to take this situation very seriously and work aggressively to change it. To that point, the shortage will not be solved by looking at the hiring of a technician as a single act, in and of itself, undertaken in 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.

Auto-Diesel-Collision New Entrant Tech Positions

SUPPLY VS. DEMAND



QUICK FACTS

797,530

AUTO/DIESEL/COLLISION TECHNICIANS NEEDED

between 2021 and 2025

WELL OVER

500000

NEW ENTRANT AUTOMOTIVE TECHS

Needed between 2021 and 2025

NEARLY

1000000

NEW ENTRANT COLLISION TECHS

Needed between 2021 and 2025

NEARLY

190000

NEW ENTRANT DIESEL TECHS

Needed between 2021 and 2025

APPENDIX A

Methodology to determine technician demand reductions attributed to Electric Vehicles

Electric vehicles (EV), albeit through a number of variants in propulsion methods, are the wave of the future. Very few would dispute that. Consequently, when it comes to the discussion of transportation technician demand, the question arises as to what impact they will have on that demand over the years. It is known that EVs require less repair and maintenance than internal combustion engines (ICE), but how much less? Additionally, how many EVs can we expect to be in service, and over what period of time? The critical question of course, is how we plan for the impact of EVs when projecting technician demand.

To address the question of how much less repair and maintenance EVs require, we looked at the results of a recent 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.

Having an estimate of maintenance cost savings, the next question was what number of new BEV vehicles can we expect to enter the marketplace. There are many factors that affect this, including the wide availability of charging stations nationwide, vehicle range, vehicle cost comparison to ICE vehicles, consumer adoption and government subsidies, just to name a few. Nonetheless, there are estimates and we looked to those of IHS Markit, a well-respected international firm that provides vehicle market estimates. IHS Markit is estimating US BEV sales at 25-30% of the new car market in 2030.[1] For our estimates, we used 30%.

Finally, it was important to factor in the 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 2020-2030 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 at least provide a basic understanding of the key factors.

[1] Global electric vehicle sales grew 41% in 2020, more growth coming through decade: IEA https://ihsmarkit.com/research-analysis/global-electric-vehicle-sales-grew-41-in-2020-more-growth-comi.html

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	# of Light Vehicle Sales that are BEV (6)	% of Light Vehicle Sales that are BEV (7)	# of Cumulative BEV Vehicles in VIO	% of Cumulative BEV Vehicles in VIO	Impact to Light Vehicle Technician Demand (8)
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 (proj.)	289,500,000	1.01	16,600,000	14.71%	5.73%	581,000	3.50%	1,650,425	0.57%	0.23%
2022 (proj.)	290,800,000	1.00	17,015,000	2.50%	5.85%	850,750	5.00%	2,501,175	0.86%	0.34%
2023 (proj.)	295,600,000	1.02	17,440,375	2.50%	5.90%	1,308,028	7.50%	3,809,203	1.29%	0.51%
2024 (proj.)	300,400,000	1.02	17,876,384	2.50%	5.95%	1,787,638	10.00%	5,596,842	1.86%	0.74%
2025 (proj.)	305,300,000	1.02	18,323,294	2.50%	6.00%	2,382,028	13.00%	7,978,870	2.61%	1.03%
2026 (proj.)	310,400,000	1.02	18,781,376	2.50%	6.05%	3,192,834	17.00%	11,171,704	3.60%	1.43%
2027 (proj.)	315,400,000	1.02	19,250,911	2.50%	6.10%	3,850,182	20.00%	15,021,886	4.76%	1.89%
2028 (proj.)	320,600,000	1.02	19,732,184	2.50%	6.15%	4,538,402	23.00%	19,560,288	6.10%	2.42%
2029 (proj.)	325,900,000	1.02	20,225,488	2.50%	6.21%	5,258,627	26.00%	24,818,915	7.62%	3.02%
2030 (proj.)	331,200,000	1.02	20,731,125	2.50%	6.26%	6,219,338	30.00%	31,038,253	9.37%	3.71%

(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 based on current YTD sales. 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 IHS Markit estimates on BEV projected 2021–2030 sales.

(7) Percentage of light vehicle sales attributed to BEVs is based on IHS Markit estimates of 25% to 30% of new vehicles sold being BEV by 2030. We have used 30% in our estimates.

(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 2030, once total technician demand is calculated, the # of technicians needed would then be reduced by 3.71% to arrive at a "net demand", inclusive of the impact of BEV vehicles.

APPENDIX B

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 technical education and into careers as professional technicians. The Foundation distributes more than $1.5 million in scholarships and grants annually, thanks to its generous corporate sponsors and donors, and spearheads an industry-wide workforce development initiative to help encourage and support more young people to pursue the vehicle technician profession. For more information, visit www.techforce.org. Follow on Facebook, Instagram, Twitter and Linkedin.

One of TechForce Foundation's strategies designed to help solve the tech shortage is its new social network (JoinTechForce.org). Built to inspire and support tomorrow's workforce of technicians, it is the first and only social network designed and gamified exclusively for professional technicians and tech students. They use it to connect with each other, employers and schools. The transportation community is supporting it with content and using it to learn, connect, find scholarships and events, explore job opportunities while competing for prizes and leaderboard status.

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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TechForce Foundation is a 501(c) (3) nonprofit with the mission to champion all students to and through their education and into careers as professional technicians.