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## **Campaigning for America's Aviation Workforce**

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**United States House of Representatives Small Business Committee  
Subcommittee on Contracting and Workforce**

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Chairman Knight, Ranking Member Murphy and members of the subcommittee, thank you for inviting me to testify this morning. The Aeronautical Repair Station Association's (ARSA) members appreciate the subcommittee's willingness to examine the challenge of finding and retaining skilled technical workers in support of America's aviation system; they are encouraged that Congress is looking for ways to help and eager to get involved. The workforce difficulties of this small business-dominated industry have broader consequences for the U.S. economy, not to mention the safety of our nation's airspace.

Recruiting and retaining the next generation of aviation professionals is the most pressing strategic challenge facing the aviation maintenance community. Indeed, technical skills development is a long-term threat to the health of every industry dependent on design, construction and maintenance capabilities. For aviation businesses – large and small – the development, production, operation and maintenance of the world's safest transportation system depends on a skilled, dedicated and knowledgeable workforce that is personally invested for the long term.

### ***Industry Background***

ARSA members hold air agency, aircraft and individual certifications from U.S. and international aviation safety regulatory bodies. The core of the association's membership is independent repair stations, which hold approved maintenance organization certificates from the Federal Aviation Administration (FAA)<sup>1</sup> and other civil aviation authorities. The industry is inherently international: Many companies design, produce and perform maintenance on civil and military aviation articles for use in multiple countries. As you would expect, aviation businesses invest heavily in regulatory compliance and quality systems and must handle a constant stream of audits and oversight actions from regulators and customers in addition to their own internal control procedures.

Certificated repair stations have the authority to perform work on – and subsequently approve for return to service – civil aircraft, engines, propellers and components. Civilian approvals are so thorough and respected that Department of Defense (DoD) agencies routinely require that a company hold a certificate from the civil aviation authority in order to work on military systems.

Many facilities are specialized, utilizing small teams to efficiently perform a particular set of tasks. This specialization allows companies to get a better return on their investment in training, tools, facilities and other administrative requirements. Cost-effective and reliable maintenance services benefit aviation customers, both civilian and

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<sup>1</sup> Known as “part 145 certificates” because they are administered under [Title 14](#) of the Code of Federal Regulations (CFR) part [145](#) in the United States and similarly numbered regulations from other civil aviation authorities.

military. These efficiencies translate into cost savings and economic power while ensuring public safety and security in the United States and abroad.

Maintenance providers, manufacturers, air carriers, parts producers, educators and other service providers form a global, interconnected civil aviation industry employing more than 380,000 people and generating more than \$77 billion in direct economic impact<sup>2</sup> – and that does not consider the military aviation support system, which represents another major driver of U.S. and world financial health. The United States continues to hold a strong position in the civil aviation market: Nearly 279,000 Americans go to work every day just in the maintenance industry and generate \$47 billion in annual economic activity.<sup>3</sup>

To explore the workforce challenges facing the civil aviation maintenance industry, it is important to understand its structure. The general public might reasonably consider the aviation world to be the bastion of big business; the average passenger's entire travel or shipping experience usually involves interface with large organizations.

However, this is not an accurate representation of the business landscape for civil aviation maintenance, parts production and support services. Small businesses are the rule, rather than the exception. Of the 4,900 aviation maintenance firms worldwide, 81 percent are small and medium sized companies. At home in the United states, 85

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<sup>2</sup> Aeronautical Repair Station Association. "2018 Global Fleet & MRO Market Report." March 2018. 101. Executive summary and U.S. employment data available online via <http://arsa.org/news-media/economic-data>.

<sup>3</sup> *Id.* 107.

percent of the roughly 4,000 companies are small or medium size – that’s 3,400 businesses employing 21 percent of the total maintenance workforce.<sup>4</sup>

### ***A Hopeful Market***

There are civil aviation maintenance facilities in every state; the seven represented by subcommittee members – California, Florida, Iowa, Kentucky, New York, Pennsylvania and South Carolina – are among the leaders. Companies in those seven states employ nearly 80,000 men and women who create more than \$12 billion in direct economic activity annually.<sup>5</sup>

Not only does it contribute substantially both to the U.S. and global economy, the aviation maintenance industry is poised for growth. Projections are that the total international market for civil aircraft maintenance and parts production will surpass \$114 billion by 2028.<sup>6</sup> To reap the benefits of that expansion, employers must recruit, retain and develop their next generation of technical professionals.

According to ARSA’s own analysis, the average U.S. repair station employs 46 people. Considering this average is inflated by the few large players in the market, the typical personnel roster of an aviation maintenance provider is even smaller. While small, these businesses are not unsophisticated – they employ highly-trained workers and utilize advanced technical tools and processes. Many of these high-tech companies compete on the global stage by servicing an international customer base.

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<sup>4</sup> *Id.* 104.

<sup>5</sup> See Appendix A for complete U.S. state-by-state data.

<sup>6</sup> “2018 Global Fleet & MRO Market Assessment.” *Supra.* 4.

As of the date of this testimony, the FAA reported 4,020 part-145 certificate holders in the United States,<sup>7</sup> of which 1,497 (more than one-third) held an approval from EASA authorizing them to performed work on European-registered aircraft and components.<sup>8</sup> Any U.S. part 145 certificate holder can perform work for Canadian customers under the U.S.-Canada bilateral aviation safety agreement and many hold a number of certificates from other global aviation authorities.

### ***A Gathering Storm***

For the American industry, particularly for its many small and medium size enterprises, taking advantage of expected growth and providing services demanded by the larger economy depends entirely on the ability to develop the human capital needed to keep pace with emerging markets.

Boeing's 2018 Technician Outlook projects that North American airlines will need 189,000 new technicians to keep pace with fleet growth over the next 20 years.<sup>9</sup> Expanded to encompass all work performed on civil aircraft – not just for scheduled passenger air service – the number is much, much larger. Additionally, considering the average FAA-certificated mechanic is 51 years old and 27 percent are older than 63,<sup>10</sup> looming retirements of the aging technical population leaves an even bigger hole to fill.

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<sup>7</sup> FAA Repair Station Directory. Available online via <https://av-info.faa.gov>.

<sup>8</sup> EASA list of U.S. approval holders. Available online via <https://www.easa.europa.eu/easa-and-you/aircraft-products/continuing-airworthiness-organisations/foreign-part-145-organisations-in-us>.

<sup>9</sup> Boeing. "Pilot & Technician Outlook 2018-2037." Available online at <https://www.boeing.com/commercial/market/pilot-technician-outlook/2018-technician-outlook>.

<sup>10</sup> Aviation Technician Education Council. "Pipeline Report." December 2017. Available online at <http://www.atec-amt.org/uploads/1/0/7/5/10756256/atec-pipelinerreport-20171211.pdf>.

Work in aviation demands a high level of technical skill with a range of potential points of entry. The technicians demanded by maintenance facilities can be categorized according to the individual certification level required to perform the work:

- Mechanics individually certificated under 14 CFR part [65](#), subpart [D](#). These individuals hold either airframe (A) or powerplant (P) ratings, or both (A&P), and are commonly referred to as “A&P mechanics.”
- Repairmen endorsed by their part [121](#), [135](#) or [145](#) certificate-holding employer for certification under part [65](#), subpart [E](#).
- Non-certificated technicians performing work for or under the supervision of a certificate-holding person, including repair stations and air carriers.

According to responses to an August 2017 survey administered by ARSA, the industry’s current employment is almost evenly split between certificated *mechanics* and non-certificated technicians – together the two groups compose roughly 90 percent of employment – with the remaining portion invested in individuals holding *repairman* certificates under the endorsement of certificated employers.<sup>11</sup>

How an individual business balances its use of each group will depend on a variety of factors including expectations of the civil aviation authority, contract requirements and employer preferences. Each group plays important roles in the civil aviation maintenance environment and – as I will describe later – should be utilized in a way that progressively stimulates technician career growth and maximizes workplace skills.

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<sup>11</sup> Aeronautical Repair Station Association. “Quick Question Answered: Technician Workforce by Certification.” Aug. 31, 2018. Available online at <http://arsa.org/qq-aug2017>.

The general capabilities required to perform work in aviation can be transferred into any hands-on industry. ARSA's members and its colleagues at the Aviation Technician Education Council (ATEC)<sup>12</sup> report employees and students regularly seek opportunities in other sectors including automotive, heavy equipment, non-aviation manufacturing and even amusement parks. The demands of aviation and the flexibility of other, less-regulated industries increase the challenge to aerospace businesses in retaining experienced workers and attracting new entrants. According to ATEC, only 60 percent of students complete the oral, written and practical exams required to achieve FAA certification as a mechanic;<sup>13</sup> in many cases the remaining 40 percent find an easier transition into other employment.

In addition to the skills demanded of potential applicants – either in the form of specialized technical capabilities or FAA-imposed certification requirements – repair stations must invest in training. ARSA survey respondents indicated the average non-certificated technician needs 14 months of development to grow into a profitable, independent employee and certificated mechanics need nine months.<sup>14</sup> While those figures were moderated by several reported quick-turnarounds for each type of technician, multiple respondents indicated a full two years (24 months, the longest period that could be entered via the survey mechanism) were needed to produce a useful technician regardless of their certification. In addition to the time required to

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<sup>12</sup> ATEC represents aviation maintenance technician schools certificated by the FAA to educate potential part 65 mechanics.

<sup>13</sup> "Pipeline Report." *Supra*.

<sup>14</sup> Aeronautical Repair Station Association. "Quick Question Answered: Time to Onboard a New Technician." May 16, 2017. Available online at <http://arsa.org/qq-april17>.

complete the initial onboarding and on-the-job education required to make a technician productive, repair stations must then administer comprehensive training programs in order to remain compliant with FAA air agency certificate requirements as well as keep their personnel current on needed skills and capabilities.

Alarms regarding workforce development and personnel retention have been sounding for years, continually illustrating a stark duality between expanding markets and the challenge of finding qualified technical talent. Half of the respondents to ARSA's most-recent member survey reported increased profitability in the last two years and two-thirds expected revenues and markets to grow in the coming year. Employment demand was also strong: 98 percent expected to add to or maintain the current size of their workforce, which would require hiring for new positions, filling vacancies or both.<sup>15</sup>

However, eighty-two percent of respondents reported difficulty finding qualified technical workers (37 percent reported "a lot of difficulty"), with more than 1,000 technician vacancies across the responding companies. Project that number across ARSA's membership and we end up with more than 2,500 unfilled technical positions. Based on annual revenue data, ARSA members will forego between \$333.5 million and \$642.5 million in revenue this year because of unfulfilled and more likely unfulfillable technical workforce positions.<sup>16</sup>

ARSA does not represent every civil aviation maintenance provider, so the actual revenue loss associated with unfilled technical workforce positions is significantly

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<sup>15</sup> Aeronautical Repair Station Association. "ARSA Survey Shows Industry Poised for Growth, Facing Technician Shortage Headwind." April 24, 2018. Available online at <http://arsa.org/survey2018>.

<sup>16</sup> *Id.*



higher. In a 2017 analysis, the association projected that the civil aviation maintenance industry's vacancy rate costs U.S. businesses \$1.95 billion in lost opportunity and foregone revenue each year.<sup>17</sup>

In its 2018 survey, ARSA allowed its members to illustrate the practical effect of the workforce gap. Eighty percent reported the shortage increases time to complete work for customers, 28 percent have not added new capabilities, 20 percent have turned down work and 11 percent have decided against expanding facilities.<sup>18</sup> Those results underscore how personnel issues ripple through the industry and impact growth in communities around the globe.

Given these challenges, workforce development has become the single most pressing issue facing the aerospace maintenance community.<sup>19</sup> This fact was personally illustrated for me during attendance at *Aviation Week's* April 2018 MRO Americas. The event is a premier North American convention for the maintenance, manufacturing and parts production sectors of the civil and military aviation community. This year, workforce and technician training issues were raised even in places where they were not the defined subject or focal point.

The best example came in a panel session on "Capacity and Pricing" moderated by Jim Clarke, vice president of planning and performance for ARSA-member HAECO Americas, and featuring a number of senior industry executives from around the world.

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<sup>17</sup> Aeronautical Repair Station Association. "Skills Gap Could Cost Repair Stations \$1.95 Billion in Revenue, Survey Finds." May 12, 2017. Available online at <http://arsa.org/survey2017>.

<sup>18</sup> "ARSA Survey Shows..." *Supra*.

<sup>19</sup> *Id.*

The panelists focused almost entirely on people and how having the right personnel – rather than market factors, physical infrastructure or business matters – was the key to successful capacity and workload management in the aviation maintenance world.

Clarke summarized the points of his colleagues: “Capacity is not showing in your hangar footprint, but in the number of people that you have and their capabilities and skills.” His point struck home and is true beyond the hangar to every component shop or technical facility.

Despite the current crisis, the worst is yet to come. Some experts believe the aviation maintenance industry is not yet experiencing a true “shortage” of talent: The available supply of technicians will not officially be insufficient for demand until 2022; by 2027 the number of available technicians will fall nine percent short of what is required by industry.<sup>20</sup> With employers already struggling to grow the aviation workforce and true deficits supposedly still four years away, the aviation community is facing a gathering storm.

### ***A Concerted, Connected Campaign***

At a Department of Transportation/FAA-administered workforce event this September, an agency presenter noted how previous efforts and investments in workforce development failed to solve larger structural issues. The industry had seen no consistent results because there were many independent efforts rather than a concerted, connected campaign to improve the entire aviation community's access to

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<sup>20</sup> “2018 Global Fleet & MRO Market Assessment.” *Supra.* 109.

critically needed skilled professionals. Everyone inventing their own wheel, as he put it, couldn't produce a unified effect.

The industry is rife with small, limited examples of successful programs – from high school curricula designed to attract young students, to STEAM-related events like robotics competitions and other showcases, to marketing outreach and “industry days” where aviation employers open doors to the general public. What can be done to bring these many different efforts – everyone’s independently-invented “wheel” – into a centrally-focused mission?

ARSA has been working with a broad coalition of interests to address the problem. While not all of these efforts are within the jurisdiction of the Small Business Committee, it is worth a brief review of the general areas of need in order to understand the situation and form viable solutions.

Internally, the maintenance industry needs to embrace its ability to attract talented individuals with various experience and skills and then establish pathways to technical, managerial and leadership roles. For too long, repair stations and other corporate certificate holders have focused heavily on individually-certificated personnel – those A&P mechanics I mentioned before – at the expense of growing deep benches of talent in other roles. We fail to fully utilize employer-endorsed repairman certificates and non-certificated technicians and thus never develop robust pathways for new entrants to become career professionals.

To meet technical demands for developing, producing and maintaining both old and new aircraft, training institutions need curricula that are responsive to the general

needs of the industry as well as the specific community-centered demands of a local aerospace market.

Mechanic education and certification is still in the dark ages; the aforementioned aviation maintenance technician schools have been laboring under the exact same curriculum standards mandated by the FAA for more than 50 years. Students are subjected to strict 1,900-hour requirements based upon wood, dope and fabric techniques required to maintain a basic general aviation aircraft – or the Wright Flyer. In order to offer education on an advanced fuel-control system or modern electrical components, an FAA-certificated technical school must seek exemptions from current regulations or require students and teachers to invest time beyond the approved curriculum.

By transitioning to competency-based standards rather than remaining stubbornly committed to antiquated seat-time requirements, the education industry will be able to instill basic knowledge of aviation systems and tailor specific skills to the demands of modern, high-technology aircraft, while still being able to target older aircraft designs and systems if required.

In addition to improving academic institution certification requirements, ARSA is pursuing transparency and open access to FAA training and improvement of public information resources related to aviation technical careers and opportunities. The association and its industry allies provided improvements to the government's management of employment data related to aviation maintenance and service

technicians – as the Bureau of Labor Statistics identifies this class of professionals – and federal projections of the “outlook” for prospective entrants into the labor market.

For its part, Congress has opened its eyes and is beginning to offer help. ARSA has been working for more than a year through the FAA reauthorization process to address the technician shortage. While not every association-proposed policy survived the countless rounds of negotiations it took to produce the current bill, when you vote to reauthorize the FAA you will be helping the government take significant but measured steps to invest in the aviation workforce.

In addition to a Government Accountability Office study of the technician workforce, which will provide more insight into what’s happening in the market, ARSA led a coalition of more than 35 national and state aviation organizations, labor groups and companies to create a new grant program that would support efforts to train maintenance professionals, help veterans transition to civilian careers and recruit new technicians. These initiatives and others are together under the bill’s workforce title (Title VI), which demonstrates the clear understanding of Congress that we have a shared responsibility to grow the next generation of aviation professionals. When you vote for the bill on the House floor, you will be doing just that.

What’s important about the grant program<sup>21</sup> is not necessarily the financial resources it will allocate, but the collaboration it will incentivize. In order to be eligible, aviation schools and businesses would have to partner and collaborate with unions and

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<sup>21</sup> Before inclusion in the FAA reauthorization process, bills “To establish an aviation maintenance workforce development pilot program” were introduced in the House and Senate. See [H.R. 5701](#) and [S. 2506](#).

governmental entities to request and receive grants. This industry-sector partnership has become the standard for skills education and technical development programs; the state and local-level specialization produced by such collaboration was a fundamental reform of the “Strengthening Career and Technical Education for the 21<sup>st</sup> Century Act” ([H.R. 2353](#)), which was signed into law in July 2018 after a years-long effort to reauthorize federal investment in career technical education programs.<sup>22</sup>

On behalf of the small businesses behind the civil and military aerospace industry, this committee is in a unique place to help by leveraging collaboration and partnership. Small aviation businesses have limited size and reach, tight margins and heavy regulatory burdens; they need assistance developing relationships and resources in order to obtain and maintain a technical workforce capable of harnessing sustained economic growth. By providing points of connection through the Small Business Administration between technical education institutions, supportive industry groups and other stakeholders, Congress can provide venues for growth, lessons learned and career development between and among repair stations and other aviation businesses.

Thank you for addressing this important issue and allowing ARSA to present the aviation maintenance industry’s perspective. We look forward to working with you and your colleagues in a bipartisan manner to pursue solutions that will help U.S. companies capitalize on the significant opportunities in this growing global economy.

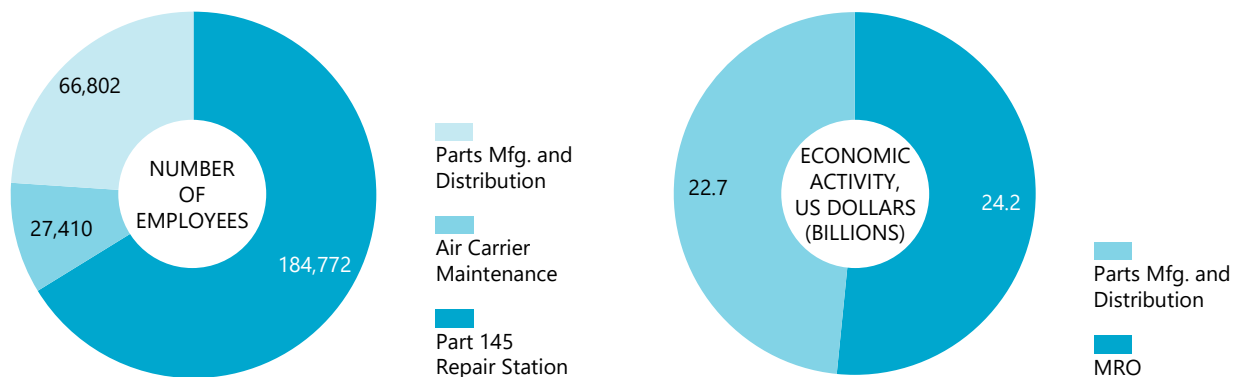
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<sup>22</sup> Aeronautical Repair Station Association. “Congress Caps Years-Long Effort on Skills Education.” July 31, 2018. Available online at <http://arsa.org/technical-workforce-development>.

## US EMPLOYMENT AND ECONOMIC IMPACT

The US civil aviation maintenance industry employs nearly 279,000 workers and generates \$47 billion in economic activity. The MRO segment accounts for 76 percent of these employees with more than 212,000 workers. Companies that are certificated by the FAA under part 145 are the largest employers with just under 185,000 employees. The remaining 27,000 MRO workers are employed by air carriers involved in civil aviation. Parts manufacturing and distribution, accounts for the remaining 24 percent of employment with close to 67,000 employees. Despite employing three-quarters of workers, MRO accounts for 52 percent of the economic activity or \$24.2 billion while the 24 percent working in parts manufacturing and distribution generate 48 percent or \$22.7 billion.

EXHIBIT 1: 2018 US CIVIL AVIATION EMPLOYMENT AND ECONOMIC IMPACT

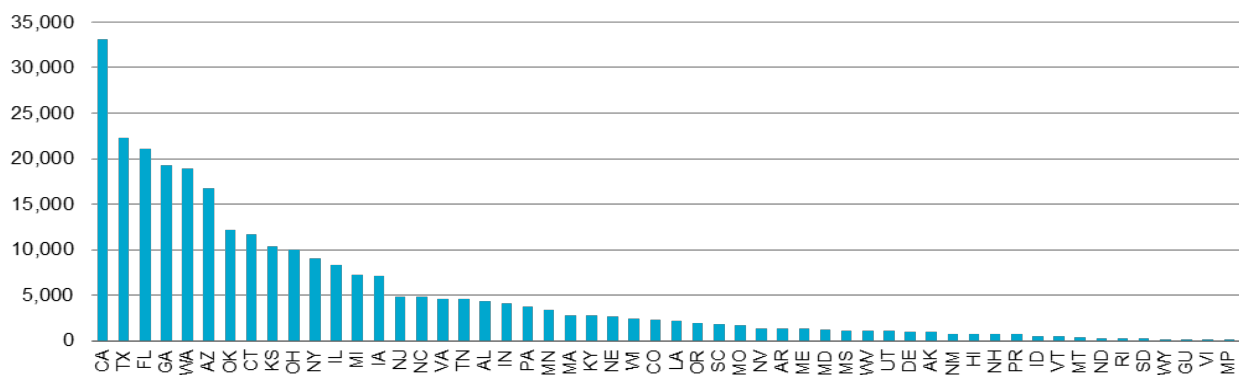


Source: BLS, FAA, Oliver Wyman Analysis

At the state level, Oliver Wyman estimates that California, Texas, Washington, Florida and Georgia represent just over a combined 41 percent of the total US civil aviation maintenance employment with close to 115,000 employees; the top ten states represent 63 percent of total US employment.

EXHIBIT 2: 2018 US CIVIL AVIATION EMPLOYMENT AND ECONOMIC IMPACT

### NUMBER OF EMPLOYEES



Source: BLS, FAA, Oliver Wyman Analysis



EXHIBIT 3: 2018 US CIVIL AVIATION EMPLOYMENT AND ECONOMIC IMPACT

State	Aviation Maintenance Industry Employment				Aviation Maintenance Industry Economic Activity		
	Maintenance, Repair and Overhaul (MRO)		Parts Manufacturing/ Distribution	Total Employment	Maintenance, Repair and Overhaul (MRO)	Parts Manufacturing/ Distribution	Total Economic Activity
	FAA Repair Station	Air Carrier					
AK	467	551	9	1,027	\$115,999	\$3,060	\$119,060
AL	4,271	5	27	4,303	\$487,243	\$9,181	\$496,424
AR	1,269	50	60	1,379	\$150,298	\$20,402	\$170,699
AZ	6,147	783	9,809	16,739	\$789,662	\$3,335,321	\$4,124,983
CA	24,944	2,793	5,439	33,176	\$3,160,583	\$1,849,405	\$5,009,988
CO	1,421	827	15	2,263	\$256,156	\$5,100	\$261,256
CT	4,710	-	6,997	11,707	\$536,696	\$2,379,166	\$2,915,863
DE	946	-	82	1,028	\$107,795	\$27,882	\$135,677
FL	17,878	2,199	967	21,044	\$2,287,740	\$328,806	\$2,616,545
GA	16,774	1,132	1,420	19,326	\$2,040,358	\$482,838	\$2,523,196
GU	17	34	-	51	\$5,811	-	\$5,811
HI	205	578	8	791	\$89,222	\$2,720	\$91,942
IA	2,715	4	4,399	7,118	\$309,825	\$1,495,777	\$1,805,603
ID	485	18	33	536	\$57,316	\$11,221	\$68,537
IL	3,871	3,002	1,427	8,300	\$783,167	\$485,218	\$1,268,385
IN	2,572	412	1,153	4,137	\$340,022	\$392,051	\$732,072
KS	5,408	142	4,883	10,433	\$632,413	\$1,660,350	\$2,292,763
KY	823	1,942	44	2,809	\$315,067	\$14,961	\$330,028
LA	1,837	139	185	2,161	\$225,162	\$62,905	\$288,067
MA	2,105	478	266	2,849	\$294,328	\$90,447	\$384,775
MD	430	181	587	1,198	\$69,622	\$199,596	\$269,218
ME	1,217	-	128	1,345	\$138,675	\$43,523	\$182,198
MI	4,208	474	2,506	7,188	\$533,506	\$852,107	\$1,385,613
MN	2,616	433	356	3,405	\$347,428	\$121,049	\$468,478
MO	1,446	253	22	1,721	\$193,598	\$7,481	\$201,079
MP	7	-	-	7	\$798	-	\$798
MS	1,010	-	138	1,148	\$115,088	\$46,924	\$162,011
MT	405	-	18	423	\$46,149	\$6,120	\$52,270
NC	3,655	832	381	4,868	\$511,286	\$129,550	\$640,836
ND	201	-	98	299	\$22,904	\$33,323	\$56,226
NE	1,404	-	1,284	2,688	\$159,983	\$436,594	\$596,578
NH	750	-	33	783	\$85,461	\$11,221	\$96,682
NJ	3,854	598	445	4,897	\$507,298	\$151,312	\$658,610
NM	743	6	47	796	\$85,347	\$15,981	\$101,329
NV	664	624	115	1,403	\$146,765	\$39,103	\$185,868
NY	5,176	1,206	2,716	9,098	\$727,218	\$923,512	\$1,650,730
OH	6,686	184	3,142	10,012	\$782,825	\$1,068,364	\$1,851,188
OK	11,455	188	518	12,161	\$1,326,700	\$176,134	\$1,502,834
OR	1,569	246	115	1,930	\$206,816	\$39,103	\$245,919
PA	2,706	978	113	3,797	\$419,785	\$38,423	\$458,208
PR	655	45	-	700	\$79,764	-	\$79,764
RI	249	-	44	293	\$28,373	\$14,961	\$43,334
SC	1,758	36	10	1,804	\$204,423	\$3,400	\$207,823
SD	67	-	168	235	\$7,635	\$57,124	\$64,759
TN	2,273	1,673	595	4,541	\$449,640	\$202,316	\$651,956
TX	15,909	2,524	3,871	22,304	\$2,100,409	\$1,316,243	\$3,416,652
UT	377	287	454	1,118	\$75,662	\$154,372	\$230,034
VA	1,562	737	2,313	4,612	\$261,967	\$786,482	\$1,048,449
VI	11	-	-	11	\$1,253	-	\$1,253
VT	186	-	294	480	\$21,194	\$99,968	\$121,162
WA	9,174	788	8,920	18,882	\$1,135,153	\$3,033,038	\$4,168,190
WI	2,342	28	93	2,463	\$270,057	\$31,622	\$301,680
WV	1,091	-	38	1,129	\$124,318	\$12,921	\$137,239
WY	51	-	17	68	\$5,811	\$5,780	\$11,592
<b>Total</b>	<b>184,772</b>	<b>27,410</b>	<b>66,802</b>	<b>278,984</b>	<b>\$24,177,774</b>	<b>\$22,714,460</b>	<b>\$46,892,234</b>

Source: BLS, FAA, Oliver Wyman Analysis