



Testimony

Before the Subcommittee on Aviation,
Committee on Transportation and
Infrastructure, House of Representatives

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AVIATION MAINTENANCE

Additional Coordination and Data Could Advance FAA Efforts to Promote a Robust, Diverse Workforce

Statement of Heather Krause, Director,
Physical Infrastructure

Chairman Larsen, Ranking Member Graves, and Members of the Subcommittee:

Thank you for the opportunity to discuss our work on the aviation maintenance workforce. The FAA Reauthorization Act of 2018 included a provision for us to examine different aspects of this workforce, including how government, industry, and educational institutions coordinate to support workforce growth.¹ Each year, hundreds of millions of passengers rely on airlines to get them safely to their destination, rendering public confidence in safety critical to the aviation industry.

The Federal Aviation Administration (FAA) requires that only mechanics who are “certificated” by the FAA approve aircraft for return to service. A sufficient supply of qualified aviation maintenance workers, including FAA certificated mechanics and repairmen, is necessary for repairing aircraft and maintaining a safe and robust aviation system.² Changes in aviation industry technology are ongoing and are expected to continue at a rapid pace, which has implications for the training of these workers. In addition, FAA and the aviation industry anticipate that the demand for air travel will grow in coming years. Federal and aviation industry stakeholders have expressed concern over the capacity of the aviation maintenance workforce to meet projected needs due to retirements, attrition, fleet growth, and the growing demand for air travel. Yet federal data limitations make it difficult to determine certain employment characteristics for this workforce and the curriculum requirements for the aviation maintenance technician (AMT) schools that train certificated mechanics are decades old.

My testimony today is based on our report that issued last week, *Aviation Maintenance: Additional Coordination and Data Could Advance FAA Efforts to Promote a Robust, Diverse Workforce*.³ Accordingly, this testimony addresses (1) what federal data reveal about the

¹Pub. L. No. 115-254, § 624, 132 Stat. 3186, 3405.

²The requirements for becoming a certificated mechanic are prescribed in 14 C.F.R. part 65, subpart D, §§ 65.71 - 65.95, and for a certificated repairman in 14 C.F.R. part 65, subpart E, §§ 65.101 - 65.107. We use the term “repairmen” to include both men and women.

³GAO, *Aviation Maintenance: Additional Coordination and Data Could Advance FAA Efforts to Promote a Robust, Diverse Workforce*, [GAO-20-206](#) (Washington, D.C.: Feb. 6, 2020).

characteristics of the aviation maintenance workforce, (2) how selected federal agencies and other key stakeholders provide support and coordinate to develop the skills of this workforce, and (3) FAA's progress in updating the curriculum and testing standards for mechanics. We also issued a report in 2014 that covered similar topics.⁴ In addition, we have ongoing work on the aviation and aerospace workforce of the future, which focuses on airline pilots, aerospace engineers, and aircraft mechanics and includes information on worker supply and demand and the potential effects of emerging technology on these professions.⁵

To develop the findings and recommendation for our recently issued report, we analyzed relevant FAA and Bureau of Labor Statistics (BLS) data; interviewed agency officials from FAA and the Departments of Labor (DOL), Education (Education), Defense (DOD), and Veterans Affairs (VA) as well as key stakeholders including employers, AMT schools, and industry associations; and reviewed relevant federal laws, regulations, and FAA documents, such as FAA's 2019-2022 strategic plan. Additional information on our scope and methodology is available in our report. Our work was performed in accordance with generally accepted government auditing standards.

Background

Aviation Maintenance Workforce

Different aviation industry employers have distinct workforce needs and may require workers with specific skillsets depending on the type of work performed. The workforce includes FAA-certificated mechanics and repairmen, as well as non-certificated workers.

- **FAA-certificated mechanics** inspect, service, and repair aircraft bodies (airframe) and engines (powerplant), and only they can approve an aircraft for return to service. It can take between 1 and 3 years to obtain the required education or training to become certificated.

⁴GAO, *Aviation Workforce: Current and Future Availability of Aviation Engineering and Maintenance Professionals*, [GAO-14-237](#) (Washington, D.C.: Feb. 28, 2014).

⁵The FAA Reauthorization Act of 2018 included another provision for us that relates to this workforce that will result in a separate, forthcoming report. Work in this area is ongoing. Pub. L. No. 115-254, § 622, 132 Stat. 3186, 3404.

Federal Data Reveal Some Demographic and Employment Information on Certificated Mechanics and Repairmen

- **FAA-certificated repairmen** service aircraft components and must be recommended for certification by their employer to perform specific tasks such as welding or painting. It can take more than a year to obtain the required experience or training to become certificated. A repairman certificate is only valid at the employer for which it was issued.⁶
- **Non-certificated aviation maintenance** workers include individuals who are supervised by certificated mechanics or repairmen in performing repair work.

Existing federal data shed light on key workforce characteristics such as the number of FAA-certificated mechanics and repairmen, their age, sex, and education. Specifically:

- As of December 2018, about 295,000 individuals held a mechanic certificate and about 35,000 held a repairmen certificate.⁷
- The median age of FAA-certificated mechanics and repairmen was 54 years old, according to our analysis of FAA data.⁸
- Three percent of all aviation maintenance certificate holders were women as of December 2018.
- Attending AMT school was the most common pathway certificated individuals used to qualify for the FAA tests to become mechanics.⁹

Existing federal data also provide some information on employment characteristics such as the supply of certificated workers. Specifically, FAA certificated about 8,600 mechanics and repairmen on average each year for 2014 through 2018 (see fig. 1). BLS data project an annual average of 11,800 job openings in the United States from 2018-2028 for aircraft mechanics and service technicians due to growth and

⁶14 C.F.R. § 65.103(a). Certificated repairmen must meet FAA practical experience or formal training requirements. 14 C.F.R. § 65.101(a)(5).

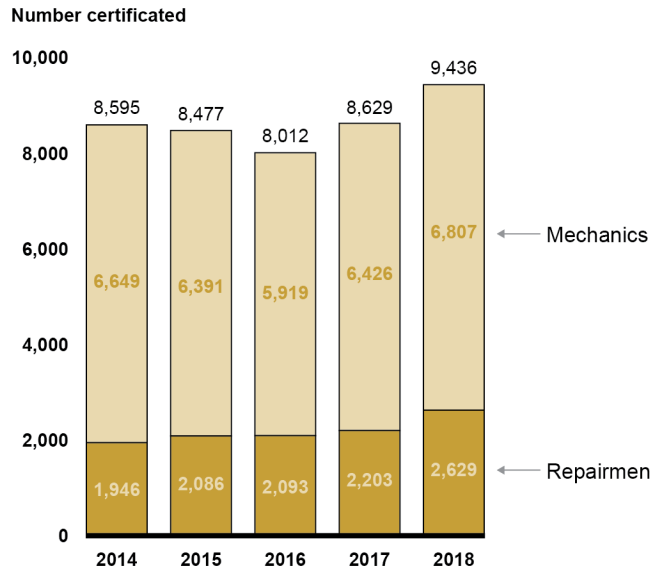
⁷We limited the scope of our analysis to those individuals less than 90 years old who were issued a plastic certificate by FAA, which is required for certificated workers to exercise their privileges after March 31, 2013. See 14 C.F.R. §§ 63.15(d) and 65.15(d). FAA began issuing plastic certificates in July 2003.

⁸BLS reported the median age of the overall workforce in 2018 was 42 years old.

⁹Of the 25,543 mechanics FAA certificated from 2015 through 2018, 62 percent completed AMT school; 28 percent qualified based on civilian practical work experience; and 10 percent qualified based on military training and experience. FAA officials told us they began collecting data on the military pathway in 2015 at the request of DOD.

replacement, which include job openings for certificated and non-certificated workers.

Figure 1: Number of Mechanics and Repairmen Newly Certificated by the Federal Aviation Administration (FAA) Each Year, 2014-2018



Source: GAO analysis of FAA data. | GAO-20-421T

There are, however, certain limitations to existing federal data. For example, neither FAA nor BLS collects data on the race or ethnicity of certificated individuals.¹⁰ In addition, FAA officials said the number of certificated individuals likely overestimates the number of them working in the aviation industry. It is unknown how many of the approximately 330,000 certificate holders are retired, deceased, or working in other industries.¹¹ Furthermore, BLS data indicate 136,900 individuals were employed in the aircraft mechanics and service technicians occupation in

¹⁰BLS publishes employment data by race and ethnicity for the aircraft mechanics and service technicians occupation, which includes both certificated and non-certificated aviation maintenance workers.

¹¹The database that stores certificate holder information maintains records on individuals unless FAA is informed of their death.

2018, but it is not clear how many of those jobs were filled by FAA-certificated workers.¹²

There are also limitations to determining employment characteristics such as pay for certificated workers, specifically. BLS publishes some data on pay for aircraft mechanics and service technicians, such as average hourly and annual wages. However, the occupational classification system BLS and other federal statistical agencies use for aircraft mechanics and service technicians does not distinguish between FAA-certificated and non-certificated workers, making it difficult to determine employment characteristics such as pay for certificated workers, specifically.¹³ This is in part because workers are classified by the work they perform and not necessarily by certification or education, according to occupational classification system principles. BLS officials said they collected wage and employment data for certificated workers separate from non-certificated workers in employer surveys conducted between 2000 and 2012, but stopped collecting these data in part because employers inconsistently reported them.¹⁴

Employers we interviewed, including air carriers and repair stations, had differing perspectives on potential growth in demand for aviation maintenance workers; some said they were experiencing difficulty finding enough workers to meet their needs, while others said they were not experiencing difficulty. Employers we interviewed for our 2014 report also expressed varying levels of difficulty filling vacancies and recruiting individuals for certain aviation professions, including aviation maintenance workers. Small and medium-sized employers in particular

¹²See <https://www.bls.gov/emp/tables/occupational-projections-and-characteristics.htm> (accessed December 13, 2019).

¹³Certain industry groups petitioned the Standard Occupational Classification Policy Committee (SOCPC) to change the SOC framework as part of the 2018 update to differentiate between certificated and non-certificated workers. The SOCPC did not recommend any changes to the classification of aircraft mechanics and service technicians or avionics technicians. In its response to comments, the SOCPC stated that workers are classified based on work performed, and that it must be able to collect and report data for a detailed occupation for it to be included.

¹⁴See *An Examination of the Employment and Wages of FAA-certified and FAA-noncertified Aircraft Mechanics and Service Technicians, 2001*. This study found that FAA-certified aircraft mechanics and service technicians earned more than noncertified workers, and that about 80 percent of aircraft mechanics and service technicians employed by private industry were FAA-certified.

cited some challenges to hiring due to the wage they offered.¹⁵ Some stakeholders we interviewed for our recent report voiced concerns about the potential for a labor shortage. In addition to these views, two of the three selected labor market indicators (unemployment rate and wage earnings) we reviewed from 2013 through 2018 were consistent with difficulties in hiring aircraft mechanics and service technicians, while the other indicator (employment) was not.¹⁶

Government and Industry Programs Support the Workforce, but FAA Lacks Information That Could Advance Its Workforce Development Efforts

Several federal agencies such as DOD, DOL, VA, Education, and the Department of Transportation administer grants or programs that support individuals pursuing aviation maintenance careers or facilitate coordination among different stakeholders to support them. For example:

- **DOD’s Military Services’ Credentialing Opportunities On-Line (COOL) program.** This program provides funding for service members to obtain professional credentials related to their military training and helps them translate their military experience into civilian occupations.
- **DOL’s Registered Apprenticeship Program.** DOL awards grants to support Registered Apprenticeship Programs— employer-driven training opportunities that combine on-the-job learning with related classroom instruction. The program facilitates coordination among different stakeholders such as industry, states, and educational institutions to support apprenticeships and employment opportunities.

In addition, FAA established an Aviation Workforce Steering Committee in February 2019, in part to coordinate efforts across FAA to address various workforce related provisions included in the FAA Reauthorization Act of 2018.¹⁷ Additional examples of federal grants or programs that support this workforce can be found in our report. The report also includes examples of states, industry employers, and AMT schools coordinating or partnering to support the workforce including developing career grants and military pathway programs.

Despite some of FAA’s recent efforts in support of this workforce, we found that FAA does not routinely analyze, collect, or coordinate with other stakeholders on certain data related to workforce development.

¹⁵[GAO-14-237](#).

¹⁶For more information, see [GAO-20-206](#).

¹⁷Pub. L. No. 115-254, 132 Stat. 3186.

FAA's strategic plan includes an objective on promoting the development of a robust aviation workforce, and its Aviation Workforce Steering Committee charter emphasizes providing diverse populations, including youth, women, and minorities, with clear pathways into aviation careers to expand the talent pool from which both government and industry may recruit.¹⁸ However, neither the strategic plan nor the steering committee charter provides specific information on how FAA plans to select and measure any efforts it undertakes related to these objectives. Without routinely analyzing its own data or leveraging others' data, FAA may not have certain information it needs to track or ensure progress toward its workforce development goals.

We identified several areas in which improved data analysis, collection, or coordination could assist FAA in measuring progress and understanding how to target its resources in support of its workforce related objectives. For example, FAA could use the demographic or pathway data it already collects to identify patterns or relationships (such as the trend in female certificate holders by pathway), which could be useful information as FAA aims to increase opportunities for women to pursue aviation maintenance careers. FAA could also use existing AMT school data (such as enrollment or mechanic test pass-rate data) to analyze nationwide trends or aggregate information across AMT schools to better understand the AMT school pathway as a whole.

In our 2020 report that issued last week, we recommended that the Aviation Workforce Steering Committee, as part of its ongoing efforts, take steps to use existing FAA data and coordinate with other federal agencies to identify and gather the information it needs to measure progress and target resources toward its goal of promoting a robust, qualified, and diverse aviation maintenance workforce. FAA agreed with our recommendation.

¹⁸FAA Strategic Plan, FY 2019-2022.

Revisions to FAA's Decades-Old Mechanic Curriculum Requirements and Its Mechanic Testing Standards Are Ongoing

Even as FAA's strategic plan states the agency's focus on promoting the development of a skilled aviation maintenance workforce to integrate new technologies, the agency has acknowledged that the current curriculum requirements for AMT schools and mechanic testing standards are outdated.¹⁹ FAA officials, employers, and AMT School officials we interviewed said the current curriculum requirements do not emphasize commonly used modern aircraft technologies, such as avionics and composite materials. Over the years, FAA has attempted several times to revise curriculum requirements for AMT schools through the rulemaking process, and efforts to revise these requirements are ongoing through this process. FAA is also currently updating the testing standards for mechanics.

FAA officials have noted several challenges to updating the curriculum requirements including competing demands at the department level and the extent of comments FAA has received from stakeholders in response to proposed changes. In October 2015, FAA published a notice of proposed rulemaking (NPRM) with the stated goal of updating the existing AMT school curriculum.²⁰ FAA issued a supplemental NPRM in April 2019 that expanded the scope of the NPRM it issued in October 2015.²¹ Comments on the supplemental NPRM were due in June 2019. As of October 2019, FAA officials said they were in the process of reviewing the comments. FAA officials told us that a final rule will be published some time toward the end of 2020.

In a separate effort outside of the rulemaking process, FAA is currently updating the testing standards for mechanics.²² FAA has acknowledged

¹⁹While FAA officials said there is no certification renewal requirement for mechanics, several of the employers we interviewed said they provide training to their employees. In addition, certificate holders with inspection authority are subject to certain renewal requirements. 14 C.F.R. §§ 65.91 - 65.95. Furthermore, FAA officials said AMT schools may include curriculum beyond that which is required.

²⁰80 Fed. Reg. 59,674, 59,675 (Oct. 2, 2015).

²¹Aviation Maintenance Technician Schools, 84 Fed. Reg. 15,533 (April 16, 2019).

²²Testing standards are not in regulation and therefore changes to them do not need to go through the rulemaking process. FAA's ongoing effort to update the mechanic testing standards began in 2015 and is part of a broader effort to update the testing standards for different types of FAA certifications. FAA has already updated the testing standards for several FAA certifications.

that current mechanic testing standards are also outdated.²³ As a result, aviation stakeholders have stated the mechanic tests include outdated or irrelevant questions. For example, the practical test may include projects on wood airframes and fabric coverings, which are not common to modern commercial aircraft.

An FAA official noted that any delay in finalizing the rule would likely result in a corresponding delay to finalizing the testing standards. Delaying the release of the updated mechanic testing standards could result in the prolonged use of outdated or irrelevant questions on the mechanic tests. FAA officials said that once finalized and implemented, the updated curriculum requirements for AMT schools and the mechanic testing standards for individuals should be mostly aligned.²⁴

Chairman Larsen, Ranking Member Graves, and members of the Subcommittee, this completes my prepared remarks. I look forward to answering any questions you may have.

GAO Contact and Staff Acknowledgments

If you or your staff have any questions about this statement, please contact me at (202) 512-2834 or krauseh@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Individuals making key contributions to this testimony were Betty Ward-Zukerman, Assistant Director, Vashun Cole, Chelsa Gurkin, Ellie Klein, Meredith Moore, Justin Reed, Andrew Von Ah, and Chris Woika.

²³The Practical Test Standards (PTS) are the current testing standards for mechanics and include information that may help individuals prepare for the practical and oral tests. There are three tests—written, oral, and practical. Currently, there are no published knowledge test standards. FAA is switching from the PTS to the Airman Certification Standards.

²⁴FAA officials stated the anticipated effective date of the updated curriculum requirements for AMT schools would be anywhere from 1 to 3 years after the publication of the final rule.

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