The 2020 Boeing Pilot and Technician Outlook projects that 763,000 new civil aviation pilots, 739,000 new maintenance technicians and 903,000 new cabin crew members will be needed to fly and maintain the global fleet over the next 20 years. The forecast is inclusive of the commercial aviation, business aviation and civil helicopter industries and assumes air traffic recovers to 2019 levels within the next few years.
Meeting the projected long-term demand will require a collective effort across the global aviation industry. As tens of thousands of pilots, technicians and cabin crew members reach retirement age over the next decade, educational outreach and career pathway programs will be essential to inspiring and recruiting the next generation.

While the current industry downturn, driven by COVID-19, has resulted in a temporary oversupply of qualified personnel, the long-term need remains robust. In recent decades, aviation has experienced external forces that have affected demand, such as 9/11, SARS and the Great Financial Crisis. Recovery has generally followed several years later, as the fundamentals driving passenger and air traffic demand remain strong.

Prior to the downturn, the commercial aviation industry was poised to experience a shortfall of qualified pilots and technicians. Analysis of new licenses and certificates issued over the past few years had indicated that the number of new personnel entering the industry was lagging demand. The short-term oversupply allows operators the opportunity to build their pipeline in anticipation of growth returning in the next few years.

Some personnel who are currently furloughed because of the market downturn will find employment in the government and business and general aviation sectors that have previously struggled with shortages amid surging commercial demand. Additionally, as commercial traffic demand returns in upcoming years, aspiring aviators will have the opportunity to fill open positions created by a combination of personnel retirements and fleet growth.

Amid challenges posed by COVID-19, the training industry has begun to adopt increasingly innovative solutions. Many providers have transitioned their offerings to online and virtual formats where possible, allowing students to continue their learning safely. Immersive technologies, adaptive learning and flexible distance learning methods are also being explored to enable optimum learning and knowledge retention. Investments in technology that are being made today will likely lead to a long-term fundamental shift in how training is conducted.

Competency-based training and assessment programs are gaining traction, which enables a shift from prescriptive, task-based training to a more holistic approach. Advances in adaptive learning capabilities, artificial intelligence and learner analytics will further personalize training to the individual student so that greater emphasis can be placed on closing knowledge gaps.

As the industry navigates the market downturn, effective training and an adequate supply of personnel remain critical to maintaining the health, safety and prosperity of the aviation ecosystem.

**Forecast Methodology**

New personnel demand is calculated based on a 20-year fleet forecast for commercial aviation aircraft with more than 30 seats, business jets and civil helicopters. Based on fleet growth, aircraft utilization, attrition rates and regional differences in crewing specific to aircraft type, Boeing’s Pilot and Technician Outlook estimates the number of new pilots, technicians and cabin crew members needed worldwide.

Slight variations to the forecast can occur on a year-over-year basis as a result of many factors, some of which include changes in regulations, crew productivity and aircraft mix. The forecast does not currently include assumptions for single-pilot commercial operations or autonomous airplanes. We continue to track the market for indications of regulatory movement and will update our forecast accordingly.
Air traffic demand and operator flight-hours have declined significantly over the past year, resulting in large numbers of pilot furloughs and layoffs. Given the current oversupply of qualified pilots, labor shortages may seem a distant memory. However, as the industry positions itself for recovery, adequate qualified pilot supply remains an important consideration as a large contingent of the workforce approaches mandatory retirement age. Positions left vacant because of retirements will need to be filled, which is likely to coincide with industry recovery, fleet growth and efforts by other operators to recruit new pilots for similar purposes.

Prior to the downturn, many airlines had begun utilizing cadet programs to recruit, develop and train aspiring pilots. It generally takes two or more years for an aspiring pilot to achieve a commercial pilot license. Aspiring aviators who begin their training today will be well positioned to take advantage of new job opportunities as the industry recovers.

As many aspects of training transition to digital formats, new opportunities to use data analytics, artificial intelligence and machine learning have emerged, which provides a more personalized and adaptive learning experience. Instruction is evolving to train pilots to proficiencies and competencies rather than a prescriptive, task-based syllabus. Continuous improvement in training technologies and methodologies will ensure pilots are effectively trained to address the most common operational risks, both now and in the future.

This photo was taken before Boeing implemented COVID-19 pandemic safeguards.
The market downturn has spurred large-scale parking of the global fleet, creating new challenges for the industry. Despite a large number of aircraft in storage, technicians continue to play a vital role in ensuring the aircraft remain airworthy. Improper or incomplete maintenance could lead to corrosion, damaged wires and other issues that lead to more extensive and expensive repairs. The need for continued maintenance of the parked fleet has mitigated the impact on technician employment worldwide.

In the near term, operators are deferring noncritical maintenance to conserve cash, which has led to a decline in maintenance, repair and overhaul (MRO) demand. This has resulted in a temporary decrease in technician demand; however, MRO demand is expected to recover as airlines bring parked aircraft back into service and regular maintenance checks resume. Talent pipeline challenges that the industry has been facing for years remain a concern as large numbers of experienced technicians approach retirement age.

While efforts continue to be made to modernize the aviation technician training curriculum and improve training outcomes, organizations have faced various challenges. The short-term impact of local jurisdictions limiting in-person instruction has served as a catalyst, driving additional investment in modernization and nontraditional instruction platforms such as virtual training. The long-term outlook for these alternative platforms is quite positive as some of the regulatory exemptions issued because of COVID-19 evolve to become industry standards.

This photo was taken before Boeing implemented COVID-19 pandemic safeguards.
While cabin crew members are most visible in their customer service role, their primary purpose is to ensure the safety of passengers. This responsibility has been further emphasized during the past year, as cabin crews have taken extra precautions to strengthen traveler confidence.

In the near term, passengers will experience a modified level of service as cabin crews focus on maintaining hygiene, safety and sanitation throughout the aircraft cabin. Training continues to focus on ensuring cabin crew members have the skills to recognize and mitigate safety risks. Advances in scenario-based training and distance learning technologies support continuous learning and prepare cabin crews for situations that may occur in the cabin.

Over the forecast period, regulatory requirements, attrition replacement and business-model differentiation will continue to drive cabin crew demand across the industry.
PILOT AND TECHNICIAN OUTLOOK BY REGION

New Personnel Demand

763,000 Pilots
739,000 Technicians
903,000 Cabin Crew Members

Commercial Aviation
2,086,000 New Personnel

Business Aviation and Civil Helicopter
319,000 New Personnel

North America
569,000
Europe
475,000
Russia and Central Asia
73,000
Latin America
145,000
Africa
72,000
Middle East
234,000
Asia-Pacific
837,000

- Pilots
- Technicians
- Cabin Crew Members
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<th>North America</th>
<th>Europe</th>
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2020–2039 values, rounded