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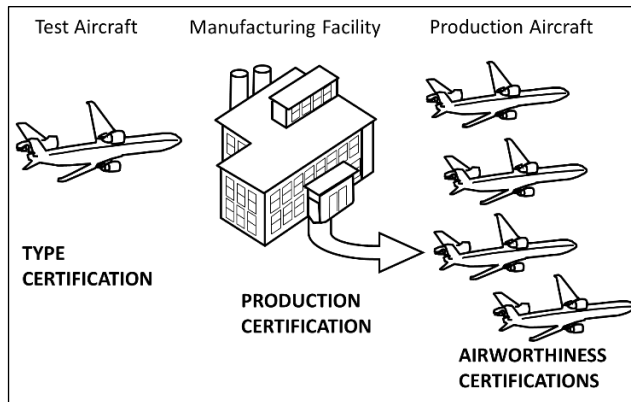
Delegation of Federal Aviation Administration Certification Authorities to Aviation Manufacturers

The Federal Aviation Administration (FAA) certifies pilots, aircraft, and aircraft components, as well as airlines and charter flight operators. It requires that aircraft and component design specifications meet safety standards and comply with regulatory requirements. Once an aircraft design is type certified, a manufacturer must demonstrate that it can reliably reproduce that aircraft type to receive production certification to build deliverable aircraft. Every aircraft manufactured must undergo examinations, inspections, and tests to determine that it conforms to the certified type design and meets airworthiness standards before it receives airworthiness certification and can begin routine operations for an airline or other operator (see Figure 1).

Airlines flight 302 in Ethiopia have raised concerns about the airplane’s flight handling characteristics and its design and certification.

Specific concerns have been raised about the 737 MAX 8’s angle of attack (AOA) sensors that measure aircraft pitch angle and its Maneuvering Characteristics Augmentation System (MCAS), an automated flight control feature that is new to the Boeing 737 MAX. As a protection against aerodynamic stall, the MCAS will point the aircraft nose down when a high AOA is detected. Concerns have been raised that erroneous or faulty AOA indications might result in repeated nose down commands that may be difficult to counteract if appropriate procedures are not closely followed.

Figure 1. Aircraft Certifications



Source: CRS.

Since its beginnings in the 1950s, FAA has allowed aircraft and aircraft component manufacturers to conduct certain certification functions on its behalf, including some type certification and production certification activities as well as most airworthiness certification activities. Recently, FAA began certifying private entities that design and build production aircraft and aircraft parts under a formal framework allowing qualified companies to conduct certification work on behalf of FAA with limited supervision and direct oversight by FAA.

737 MAX Crashes Raise Certification Concerns

While FAA’s multistep certification process has historically been held in high regard worldwide, the relationship between FAA and regulated entities engaged in aircraft and aircraft component manufacturing has been brought into question following two crashes involving Boeing 737 MAX 8 aircraft within two years of the model’s initial entry into operational service in May 2017. Initial findings regarding the October 29, 2018, crash of Lion Air flight 610 in Indonesia, and the March 10, 2019, crash of Ethiopian

Interest in the design approval of the MCAS system and the overall certification process for the 737 MAX have centered on the extent to which FAA was directly involved in the certification process, the certification activities that were delegated to Boeing, and the extent to which development and certification schedules and deadlines influenced certification evaluations, tests, and inspections. Additionally, questions have been raised about the results of systems safety analyses of flight control systems and risk assessments of AOA and MCAS system failures. On March 19, 2019, Secretary of Transportation Elaine Chao requested that the Department of Transportation Office of Inspector General (DOT OIG) conduct an audit of the certification process for the Boeing 737 MAX 8 aircraft.

FAA Delegation Authority

49 U.S.C. §44702(d) authorizes FAA to delegate certain certification functions to private entities, including aircraft and aircraft component manufacturers and aircraft repair facilities. Since 1956, this authority has been used to allow private companies to carry out various examinations, tests, and inspections needed to issue initial airworthiness certificates for production aircraft and aircraft engines upon manufacture. FAA has generally taken a more active role with respect to initial certification of newly designed aircraft types, new variants of those aircraft types, and new aircraft components. However, some elements of examination, testing, and inspection have historically been delegated to design and manufacturing organizations under FAA supervision and oversight.

Organization Designation Authorization (ODA)

In 2003, P.L. 108-176 directed FAA to develop a process for issuing “design organization certificates.” The resulting Organization Designation Authorization (ODA) process, which FAA created in 2005, provides the framework under which approved organizations are delegated certain certification responsibilities on behalf of FAA. ODA

responsibilities may include authority to issue airworthiness certifications, production certifications, and type certifications, which are granted separately to specific ODA certificate holders. Specifically, 49 U.S.C. §44704 allows FAA to rely on ODA holders to certify compliance for type certification of aircraft, aircraft engines, propellers, aircraft instruments and equipment, and certifications to mass-produce and issue airworthiness certificates for production aircraft and aircraft components.

The statute, however, specifies that FAA is to include in an ODA holder's certification specific terms that it requires of the organization in the interest of public safety. Those terms are specified through the ODA certification process detailed in FAA Order 8100.15B, *Organization Designation Authorization Procedures*. In addition to stating the required qualifications for ODA certification, the order outlines processes and expectations regarding FAA oversight and inspections of the ODA certificate holder. Congress has generally supported FAA's ODA framework, and the FAA Reauthorization Act of 2018 (P.L. 115-254) included language intended to reduce certification delays and reduce restrictions on ODA holders, in part, by establishing a central ODA policy office, assessing ODA staffing needs, and developing additional tools to help target ODA oversight activities.

FAA's Integrated Oversight Philosophy

The ODA framework, which has evolved since its inception, is predicated on the broader FAA Integrated Oversight Philosophy, an approach to safety oversight activities that relies heavily on risk-based strategies for allocating FAA oversight resources. This approach relies on regulated entities, including manufacturers and airlines, adopting comprehensive safety management systems that continuously collect and analyze safety data and provide mechanisms for voluntary reporting of safety concerns. FAA, in turn, uses these data and safety reports to target its oversight based on its own risk assessments.

Challenges to FAA Design and Manufacturing Oversight

FAA faces a number of challenges that may limit its ability to adequately oversee aircraft design and manufacturing processes and delegated functions carried out by ODA holders. These challenges include limited staffing resources, subject-matter complexity, globalization of the aircraft manufacturing supply chain, and the impact of budget uncertainties on federal oversight operations.

FAA's annual budget for aircraft certification services totals about \$240 million, which covers a staff of about 1,350 employed at 13 aircraft certification offices, 19 manufacturing inspection district offices, four manufacturing inspection satellite offices, a certificate management office, a certification program management section at FAA headquarters, and two international offices. FAA's largest aircraft certification office, located in Seattle, WA, and primarily dedicated to overseeing Boeing, has a staff of about 40 employees. Overall, FAA's aircraft certification service oversees about 1,600 manufacturers, of which slightly more than 80, including Boeing, are ODA holders. Eighteen of those ODA holders have authority to perform production certification activities, and 11 have authority to conduct type certification work on behalf of

FAA. Boeing, for example, has authority to do both type certification and production certification work, in addition to airworthiness certification on behalf of FAA. A 2015 DOT OIG audit found that FAA lacked a comprehensive process for determining aircraft certification service staffing needs for effective ODA oversight and other certification activities, and language in P.L. 115-254 requires FAA to assess its ODA oversight staffing needs.

Modern aircraft are significantly more complex than aircraft manufactured decades ago. Importantly, flight control systems are now highly automated and rely on complex electronic components and software. In the course of certification, FAA or its designees must evaluate whether these systems will work safely and reliably, and also determine what training pilots will need to safely operate these aircraft and interact with these automated systems. Both aircraft systems and structural tests rely heavily on computer modeling and simulation, and, like the aircraft themselves, manufacturing facilities have incorporated greater automation, which must be evaluated before granting production certification. This all requires FAA certification staff to have highly specialized skills and training.

Additionally, globalization of the supply chain for aircraft components creates geographic and geopolitical challenges for FAA oversight. In 2015, the DOT OIG found that much of the certification work conducted at aircraft supplier facilities, about a quarter of which were located overseas, was carried out by ODA holder employees with little or no FAA oversight. FAA has stepped up oversight of priority international suppliers, but given the size of the industry, it continues to rely heavily on ODA holders and foreign regulators.

Another factor potentially affecting FAA involvement is the continuing uncertainty of federal budgets, which has resulted in temporary shutdowns. While delegated entities can continue certification work during a government shutdown, certification activities that depend on FAA action may be delayed during a shutdown, which could cause delays in product development timelines and certification schedules. In 2007, FAA requested authority to charge fees for certification activities similar to fee structures that exist for other government approval and inspection functions such as drug testing, medical device certification, and food and agricultural product inspections. FAA certification fees have not been authorized by Congress.

Instead, FAA has historically relied on its delegation authority and the ODA program. While Congress has generally supported this approach, safety concerns are prompting debate on whether FAA has become too reliant on manufacturers in the certification process. However, efforts to reduce this reliance may be difficult to reconcile with initiatives to streamline the certification process.

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