



The Future of FAA Type Certification

What is needed in the future?

- **Most critically, FAA delegation must survive and thrive.** Even now the FAA is outnumbered by several orders of magnitude by aviation industry growth That will not change in the future as technology advances. In fact, it's likely to accelerate with the surge of Advanced Air Mobility (AAM) manufacturers coming over the horizon.
- The public expects manufacturers to continually perform at the highest levels of integrity and professionalism which will also earn and maintain the FAA's trust. Products must operate as safely as possible. Fleet reliability and operational safety must be rigorously tracked, with full disclosure of problems and solutions to the FAA.
- FAA Delegation relies on manufacturer's safety competence.
 - This includes not just AAM/ Aircraft/ Engine OEMs, but also suppliers, and every STC and TSO holder.
- AAM manufacturers are nimble and technology continues to evolve rapidly. At Kilroy Aviation we're constantly "coaching" our AAM clients on the need to lock in a design after conformity; modifications or new & pretty hardware have to wait until after TC. Software is especially difficult to freeze. The FAA must support this while maintaining a regulatory framework and surveillance tools that ensure an appropriate level of safety. Not many clients have active TC projects (yet) so we're acting preemptively.
- Artificial Intelligence looms, the industry will have difficulty integrating AI into the very conservative regulatory structure.
- Technology that develops the vehicles must also be leveraged to develop an integrated system that will ensure safe operations for all. For example, common "terminals" should be considered. The FAA must also plan and manage navigation and airspace standards for AAMs.

Challenges

- **Zero tolerance for accidents.** Echoes of recent major accidents have shaken the public & political trust in the FAA, at the time when that trust is very badly needed.
- **Delegation.** A powerful form of delegation, Certified Design & Production Organization (CDPO), was enacted into federal law in the FAA Modernization and Reform Act of 2012, then repealed by the Aircraft Safety and Certification Reform Act of 2020. These two events, less than ten years apart, are evidence of the challenges we face from a skeptical public. The current environment is unlikely to support expanding FAA delegation policy or regulations. Although we may have to work with what we have, the current system still allows for significant leverage through delegation.
- **FAA Expertise.** New technology and the surge of new AAM manufacturers will present a significant increase in the FAA certification workload because they will resist delegation so they can learn how to deal with a very innovative industry. That light at the end of the tunnel actually IS a train.
- **FAA Size and Focus.** The FAA is too small to "police" the entire industry, review all reports, witness all tests and inspect every part on every product or article. A flood of fresh applicants, inexperienced in certification, has already created concern. The Task Force might consider how we can ease those concerns while helping new manufacturers work through the certification process as effectively as possible.
- **Potentially Slow Progress.** The FAA is not "spring loaded" to react quickly when change is required. Developing new regulations, policies and processes must be a deliberative process, meaning one must



be very patient when dealing with the FAA. Many have tried to help the FAA move more quickly, many have failed.

- **Bump In The Road.** A recent significant FAA reorganization has (temporarily) hampered FAA responsiveness, especially in the area of AAM.
- **Diverse FAA Stakeholders.** The AIAA Task Force charter is specific to type certification, with production certification closely trailing because both are “owned” by the FAA Aircraft Certification Service (AIR) and typically run parallel paths. There are several additional major stakeholders such as Air Traffic & Flight Standards whose needs will be significantly amplified as we evolve into remotely piloted and autonomous aircraft. Any AAM strategy must consider those needs.
- **Newcomers to Certification.** Many AAM manufacturers are new to certification.
 - AAM is led by hard chargers who consider themselves to be “disrupters”. FAA does not respond well to that approach. Slow & steady wins the race. Well, steady anyway.
 - A “Great Shake-Out” in the AAM world is likely, simply because there are so many similar designs and the costs of type & production certification can be staggering.
 - Many new AAM manufacturers are new to the complexities of certification.
- **Safety.** Every mode of transportation has had its first major accident, which became a test of its ability to grow, add value to the system and increase convenience to the public. The AAM industry will be no exception.
- **Accountability.** An AAM manufacturer will be accountable for the Continued Operational Safety (COS) of their products from cradle to grave, until the last aircraft is taken to the scrap yard. COS is THE first FAA priority. There is a huge & diverse fleet out there, the FAA is accountable to the public for safety throughout the system.
- **Subject Matter Experts.** There are very few deeply experienced practitioners in aircraft certification. The surge of FAA applicants may strain availability of high integrity experts.

What opportunities and levers do we have?

- Major investments from Mega-Corporations will push political support, which might in turn push the FAA to move more quickly, increase the roles of designees - but ONLY if the trust is there.
- The positive environmental impact of AAMs is forecast to be significant (But let’s not forget environmental problems such as mining for raw materials).
- A **piloted** eVTOL may literally be considered “just another aircraft”, which will be very helpful. Special considerations will be required, however, for new technology & flight modes (ex: powered lift, special conditions, equivalent levels of safety, exemptions, etc). The benefits arise because the FAA certification processes and stakeholders are unchanged when a pilot is aboard.
 - Challenge: Removing the pilot for remote pilot or autonomous operation will require participation from FAA Flight Standards and Air Traffic, perhaps others. The increased participation will NOT be linear.
 - AAMs are likely to evolve from pilots to → operators to → observers to → automated.
 - Public acceptance of new technology will grow slowly (ex: elevators evolving from required operators to today’s fully automated lifts), which circles back to the criticality of safety.
 - <https://www.autosuccessonline.com/elevator-operators-can-show-us-the-path-to-digital-retailing/>.
- June 19, 1984, the Supreme Court decided in favor of the FAA in two lawsuits claiming the FAA had failed to “guarantee” the safety of two airplane modifications, both were involved in fatal accidents. In the SCOTUS decision, we find these quotes:
 - “Under this certification process, the duty to ensure that an aircraft conforms to FAA safety regulations lies with the manufacturer and operator, while the FAA retains responsibility for policing compliance.”
 - “The FAA has a statutory duty to promote safety in air transportation, not to insure it.”



- “With fewer than 400 engineers, the FAA obviously cannot complete this elaborate compliance review process alone.” Note: that was in 1984, the actual engineer count today is approaching 800, which is still pitifully small.
 - Source: <https://supreme.justia.com/cases/federal/us/467/797/case.html>
- Deep knowledge of the SCOTUS decision clarifies the relative responsibilities of manufacturers & operators vs the FAA in stark terms. The famous 3-legged stool relationship founded on these terms allows all parties to understand where lines must be drawn.
- A lessons learned exercise from recent accidents and Congressional actions may do the Task Force a world of good. In the wake of the Boeing MAX accidents, delegation and undue influence were both exposed to enormous pressure and oversight. Some benefit may arise from that, however, because systemic weaknesses have certainly been exposed, and we should take advantage. In other words, Lemons → Lemonade.

Some Closing Thoughts

The AIAA Certification Task Force charter is to find a path that will enhance and demystify the FAA type certification process while continuing to maintain the level of system safety that we have taken for granted over many decades now. A “bow wave” of AAM applicants is headed for the FAA at breakneck speed, and many of them enjoy the support of transportation and tech giants such as Boeing, Airbus, Daimler, Intel and Toyota, just to name a few. That might easily lead to political pressure on the FAA, but that organization is particularly skilled at resisting change, which is NOT to say they won’t embrace the AAM industry. Many of my FAA friends and ex-coworkers are excited at what’s coming our way, even though it may look like a runaway freight train.

There will be headwinds as we move forward with our Task Force charter. Enhanced delegation might be a natural target, but recent events have turned that into a hot stove that still burns FAA fingers. We will be unable to help the FAA respond to industry needs unless we understand their current culture and mindset, and we cannot ignore the pressure from Congress. The FAA will be urged to move the AAM industry along while they still feel the sting of allowing “the fox to guard the henhouse.” One of the more difficult Task Force challenges will be to find ways to provide effective guidance and support to these new, eager AAM designers as they approach the FAA with new designs that have unique technologies and operating characteristics.

The entire aviation world took a hit when 346 lives were lost in two tragic accidents. The echoes from those accidents will last quite a while, and despite all that, we might expect the FAA to openly welcome the AAM industry. Those echoes include increased emphasis on the Systems Safety Process and the Human Factors Safety Process, which can be powerful safety tools that we should include in our deliberations. Both were specifically noted in the “Aircraft Safety and Certification Reform Act of 2020”

- <https://www.congress.gov/bill/116th-congress/senate-bill/3969/text>

In my career I’ve found that FAA trust is based on two simple words: **Performance & Integrity**

- **Performance:** Be the very best at what you do, watch what you do at every turn to assure you are performing at the highest level
- **Integrity:** When you find an error, TELL ON YOURSELF, conduct appropriate root cause and corrective action (RCCA). Double, triple check to assure corrective action has taken root. Then, back to performing at the highest level.

It’s like breaking rocks. It’s simple but not necessarily easy.