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I. INTRODUCTION

Aviation has achieved an unprecedented level of safety for any mode of transportation. It is also one of the most heavily regulated industries in the world. In the United States, the Federal Aviation Administration (FAA) is responsible for regulating the aviation industry, including the design of aviation products, to promote safety. When accidents occur, they frequently result in litigation and may include defective design claims against aviation product manufacturers. The 2016 decision of the U.S. Court of Appeals for the Third Circuit in *Sikkelee v. Precision Airmotive Corp.*[1] underscores a fundamental challenge for practitioners and courts in aviation design defect cases: the FAA aircraft certification process is highly technical and complex, and significantly misunderstood by litigants and the courts. This has led to a misapplication of the federal preemption defense and a pressing need for better guidance on this issue, which is important to both the safety and the viability of aviation.

Sikkelee arose from a fatal crash of a Cessna 172, a single-engine piston, four-seat airplane often used in personal flying and flight training.[2] Over 43,000 172s have been produced—more than any other aircraft.[3] The specific aircraft at issue in *Sikkelee* was powered by an engine manufactured in 1969, which had been installed in the aircraft in 1998 and overhauled in 2004.[4] In 2005, the aircraft crashed shortly after takeoff, killing one of the two pilots on board.[5] The deceased pilot's wife sued seventeen defendants in the Middle District of Pennsylvania, including the engine manufacturer, alleging, *inter alia*, that the aircraft's engine was defectively designed.[6] Applying Third Cir-

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[1] 822 F.3d 680 (3d Cir. 2016), *cert. denied*, 137 S.Ct. 495 (2016).

[2] *Id.* at 685. General aviation encompasses all civilian flying—except for scheduled commercial passenger transport—including business travel, medical transport, aerial firefighting, law enforcement, flight training, search and rescue, and more.

[3] Robert Goyer, *Cessna 172: Still Relevant*, Flying (Jan. 19, 2012), https://www.flyingmag.com/aircraft/pistons/cessna-172-still-relevant [https://perma.cc/HT85-GVPR].

[4] *Sikkelee*, 822 F.3d at 685.

[5] *Id.*

[6] *Id.* The plaintiff specifically alleged a defect in the engine's carburetor, which blends air and fuel for the engine. *Id.*

cuit precedent that the Federal Aviation Act preempts the "field of aviation safety,"[7] the district court granted summary judgment for the engine manufacturer, finding that federal law preempts state standards in aviation design defect cases and that FAA certification indicated compliance with that federal standard.[8]

On appeal, however, the Third Circuit took a different view, struggling to identify a federal standard of care applicable to the alleged engine design defect.[9] That difficulty, combined with what the Third Circuit characterized as "three fundamental differences" between regulations governing in-flight operations and aircraft design regulations, led the court to distinguish design standards from the preempted field of aviation safety and decline to recognize federal field preemption for design defect claims.[10] On remand, the district court found the claims conflict preempted because of the manufacturer's inability to comply with both state and federal law, further exposing the errors of the Third Circuit's holding.[11]

This article explains how *Sikkelee* marks a significant misunderstanding of federal aviation product certification and identifies the preemptive federal standard applicable in such cases. Section II describes the comprehensive federal regulatory scheme governing aviation product design and manufacture. Section III provides a brief overview of preemption in aviation product liability cases. Section IV demonstrates how the congressionally-mandated regulatory system for aviation product design and manufacture *requires* recognition of a federal standard. Section V explains the applicable federal standard and how courts and practitioners should apply that standard, and Section VI concludes.

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[7] Abdullah v. Am. Airlines, Inc., 181 F.3d 363, 365 (3d Cir. 1999).

[8] *Sikkelee*, 822 F.3d at 686. The district court specifically found that the FAA's issuance of a type certificate indicated compliance with the federal standard. *Id.*

[9] *Id.* at 694–95; *see infra* Section III. The U.S. District Court for the Middle District of Pennsylvania found that a federal standard of care was appropriate for product liability claims but also acknowledged that the "highly technical and part-specific nature" of FAA aircraft certification regulations made it "exceedingly difficult to translate into a standard of care that could be applied to a tort claim." *Sikkelee*, 822 F.3d at 694–95.

[10] *Sikkelee*, 822 F.3d at 694.

[11] Sikkelee v. AVCO Corp., No. 4:07-CV-00886, 2017 WL 3317545, at *2 (M.D. Pa. Aug. 3, 2017) ("[T]he FAA's regulations are highly particularized, govern nearly every aspect of the regulated field, and are born from the twin aims of ensuring the safety of consumers and protecting the public.").

II. EXCLUSIVE FEDERAL CONTROL: THE REGULATION OF AVIATION PRODUCTS AND COMPONENT PARTS

Few industries are as heavily regulated by the federal government as aviation.[12] Today, the FAA is the federal agency responsible for the advancement, safety, and regulation of civil aviation in the United States.[13] Congress created the predecessor to the FAA, the Civil Aeronautics Administration, in 1938, recognizing the importance of uniform regulation in fostering the development of air commerce and aviation industry.[14] As the aviation industry and government regulation thereof grew, Congress enacted the Federal Aviation Act of 1958 to consolidate regulatory authority into a single body, the FAA,[15] and directed the FAA to promulgate safety standards, including for design and manufacture of aviation products.[16] The FAA fulfilled its regulatory mandate by creating a comprehensive system that encompasses the entire aviation realm, from the development, use, and maintenance of aviation products, to the persons in aviation operations (from dispatchers to mechanics to pilots to air traffic controllers) and the airspace in which they operate.

A. Standards for Design and Manufacturing

Congress specifically tasked the FAA with approving initial aviation product designs and subsequent design changes and monitoring products in service for potential safety hazards.[17] Accordingly, FAA regulations require federal certification of product design (type certificate), manufacturing (production certificate), and aircraft airworthiness (airworthiness certifi-

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[12] H.R. Rep. No. 103-525, pt. 2, at 6 (1994), *reprinted in* 1994 U.S.C.C.A.N. 1644, 1647 (recognizing that aviation products are regulated "to a degree not comparable to any other" industry).

[13] 49 U.S.C. §§ 106(g), 40104(a) (2012).

[14] Civil Aeronautics Act of 1938, § 601, 52 Stat. 973, 1007–08. The Air Commerce Act was passed in 1926, tasking the Secretary of Commerce with issuing rules for air traffic, licensing pilots, certifying aircraft, and operating and maintaining navigation aids. Air Commerce Act of 1926, ch. 344, § 3, 44 Stat. 568, 569–70. The Aeronautics Branch, later renamed the Bureau of Air Commerce, initially was tasked with primary authority for aviation oversight. *A Brief History of the FAA*, Fed. Aviation Admin. (Jan. 4, 2017, 4:42 PM), https://www.faa.gov/about/history/brief_history/ [https://perma.cc/CUK6-CVH9].

[15] Federal Aviation Act of 1958, Pub. L. No. 85-726, § 301(a), 72 Stat. 731, 744.

[16] *Id.* §§ 601(a), 603. The Federal Aviation Agency was later reorganized under the Department of Transportation and renamed the Federal Aviation Administration. Department of Transportation Act of 1966, Pub. L. No. 89-670, 80 Stat. 931 (codified in 49 U.S.C. § 106 (2016)).

[17] *Id.* §§ 603(a), 609.

cate), as well as govern post-certification maintenance, design modifications, and continued operational safety (continued airworthiness).[18] The primary purpose of these extensive design and manufacturing regulations is to make aircraft safe for in-air operations.[19]

The FAA approves the design of an aviation product and issues a type certificate if a manufacturer satisfies the product's certification basis and the FAA finds that the product is in a condition for safe operation.[20] The FAA establishes the certification basis for each type of certification project based on the "design features of the product to be type certificated."[21] The certification basis designates all of the applicable federal regulations and special conditions for safety that must be met to achieve type certification;[22] it essentially defines the safety standard to which a product is built and maintained.

The FAA sets the certification basis for a product after the applicant submits a formal application to the agency, which includes information about the proposed product's design, material, specifications, construction, and performance.[23] But the FAA's involvement in the design process often begins before an application is submitted and the certification basis is set. Generally, the first step in any certification project is for the FAA to conduct orientation and familiarization briefings with the type certificate applicant to, among other things, ensure that the FAA understands the proposed product.[24]

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[18] *See* 14 C.F.R. §§ 21–43 (2016).

[19] *See, e.g.*, *id.* § 21.1(b)(1) ("*Airworthiness approval* means a document, issued by the FAA for an aircraft, aircraft engine, propeller, or article, which certifies that the aircraft, aircraft engine, propeller, or article conforms to its approved design and *is in a condition for safe operation*" (emphasis added)).

[20] *Id.* § 21.21.

[21] Type Certification, FAA Order No. 8110.4C, 30–31 (Mar. 28, 2007) [hereinafter FAA Order 8110.4C] ("The certification basis is established by the FAA and agreed to by the applicant, based on a mutual understanding of the design features of the product to be certificated.").

[22] *See* 14 C.F.R. § 21.16 ("If the FAA finds that the airworthiness regulations . . . do not contain adequate or appropriate safety standards for an aircraft, aircraft engine, or propeller because of a novel or unusual design feature of the aircraft, aircraft engine or propeller, he prescribes special conditions and amendments thereto for the product."); *Id.* § 21.17.

[23] *See* Application for Type Certificate, Production Certificate, or Supplemental Type Certificate, FAA Form 8110-12 (2014). In the case of an aircraft engine, the applicant must describe the engine design features, operating characteristics, and operating limitations. 14 C.F.R. § 21.15(c).

[24] FAA Order 8110.4C, *supra* note 21, at 20.

After the application is submitted and the FAA sets the certification basis, the applicant submits a detailed certification plan to the FAA for approval.[25] The certification plan explains how the applicant will meet each requirement in the certification basis.[26] After the FAA approves the certification plan, the applicant implements it, conducts extensive engineering and flight tests and analyses, and generates reports to demonstrate compliance with all applicable requirements—a process which takes multiple years.[27]

After the applicant generates, substantiates, and documents compliance data, the FAA reviews the data and decides whether to issue a type certificate, making an independent finding of compliance for each requirement in the certification basis.[28] Finally, the applicant and the FAA establish a record of the certification process and compliance with applicable regulations and the foundation for continued airworthiness activities throughout the product's life.[29]

The FAA also requires manufacturers to obtain an FAA production certificate to assure the agency that the manufacturer can duplicate a type certificated design.[30] To obtain a production certificate, an applicant must establish, among other things, a quality system to "ensure[ ] that each product and article conforms to its approved design and is in a condition for safe operation."[31] Before issuing a production certificate, the FAA conducts a quality system audit to evaluate whether the applicant's quality system, organization, and facilities meet FAA requirements.[32]

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[25] *Id.* at 21.

[26] *Id.*

[27] *Id.* at 41–57.

[28] 14 C.F.R. § 21.21(b) (stating that an applicant is entitled to a type certificate if he submits "the type design, test reports, and computations necessary to show that the product to be certificated meets the applicable airworthiness, aircraft noise, fuel venting, and exhaust emission requirements of this subchapter and any special conditions prescribed by the FAA," and the FAA finds that the product meets all applicable requirements); *see also id.* §§ 23, 25, 27, 29, 33–36 (prescribing substantive design and performance standards for various aviation products).

[29] *See* FAA Order 8110.4C, *supra* note 21, at 57–63.

[30] 14 C.F.R. §§ 21.131–21.150.

[31] *Id.* § 21.137. Production certificate applicants (and holders) must allow the FAA to inspect their operations. *Id.* at § 21.140.

[32] *Id.* § 21.141. Once a production certificate is issued, FAA Manufacturing Inspection District Offices (MIDOs) provide continued oversight to ensure that

In addition to certifying the design and manufacture of aviation products, the FAA also certifies the airworthiness of *each aircraft*.[33] The FAA only issues an airworthiness certificate if the agency determines that the specific aircraft conforms to its FAA-approved type design and is in a "condition for safe operation."[34] To make this determination, an FAA aviation safety inspector (or authorized representative) conducts a detailed inspection of the aircraft and its records to ensure that equipment is properly installed, that it conforms to its approved type certificate, and that it operates properly.[35]

In sum, the FAA sets the safety standards for an aircraft with the certification basis, certifies that the design meets the certification basis, and certifies that both the method by which the aircraft is produced and the specific aircraft itself comply with the certification basis.

B. Standards for Safety During Operation

After the FAA certifies a specific aircraft and it begins operating, the FAA controls the continued operational safety (COS) of that aircraft for its entire service life. The purpose of the COS requirements is to ensure the aircraft continues to satisfy the original certification basis standard and control the standards to which any product design change is made. The FAA accomplishes COS in primarily three ways. First, any person who wants to perform maintenance or an alteration on an FAA-approved aircraft must be properly trained and certificated by the FAA.[36] The FAA controls the standards for the certification of mechanics and the manner in which the maintenance or alteration is performed.[37]

Second, after the FAA issues a type certificate, a manufacturer cannot deviate from that approved design without further FAA approval.[38] The FAA requires any person seeking to modify an

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production certificate holders maintain compliance with FAA regulations. *See id.* § 21.140.

[33] *Id.* §§ 21.183, 91.203. The FAA prohibits anyone from operating a civil aircraft in the United States without a valid airworthiness certificate. *Id.* § 91.203(a).

[34] *Id.* § 21.183; Airworthiness Certification of Products and Articles, FAA Order No. 8130.2H, 2-10–2-15 (Feb. 4, 2015) [hereinafter FAA Order 8130.2H].

[35] *See* FAA Order 8130.2H, *supra* note 34, at 2-15.

[36] 14 C.F.R. § 65.81. The FAA permits certificated pilots to perform specified preventative maintenance on aircraft they own or operate in certain situations, such as repairing landing gear tires. *Id.* § 43.3(g), pt. 43 app. A.

[37] *See id.* §§ 43.1–43.17, 65.71–65.107.

[38] *Id.* §§ 21.91–21.101.

FAA-approved design—in a way that would appreciably affect the weight, balance, structural strength, reliability, operational characteristics, or other characteristics affecting the product's airworthiness—to obtain a supplemental type certificate (STC).[39] With an STC, the FAA approves not only a modification to an approved design, but also how that modification affects the original design, which is incorporated by reference. To obtain approval for complex design modifications, an applicant must follow the original design approval process, including satisfying a certification basis standard set by the FAA specifically for that design modification.[40]

Third, the federal regulatory framework provides the FAA with the responsibility *and authority* for changing an FAA-approved design to correct a safety issue. To carry out this obligation, the FAA has mechanisms to continually evaluate the safety of in-service, certified aviation products. The FAA monitors these products throughout their service lives utilizing the Monitor Safety/Analyze Data (MSAD) process. To facilitate FAA monitoring, type certificate holders are obligated to report product failures, malfunctions, and defects to the FAA.[41] The FAA also collects data on in-service, certified products through its involvement in the investigation of aircraft accidents, a responsibility exclusively within federal control.[42] During the MSAD process, the FAA tracks and assesses this in-service fleet

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[39] *Id.* Even minor changes to type certificated designs that do not appreciably affect airworthiness require FAA approval. *Id.* § 21.93(a) ("A 'minor change' is one that has no appreciable effect on the weight, balance, structural strength, reliability, operational characteristics, or other characteristics affecting the airworthiness of the product."); *id.* § 21.95. Any design change that has any appreciable effect on airworthiness requires an approval process similar to the type certification process. *Id.* § 21.97; Applicant's Showing of Compliance and Certifying Statement of Compliance, Advisory Circular No. 21-51, Fed. Aviation Admin, at 1–2 (Sept. 28, 2011).

[40] 14 C.F.R. §§ 21.111–21.120.

[41] *Id.* § 21.3.

[42] Unlike motor vehicle accidents, which are investigated by state and local authorities, Congress created an independent federal agency, the National Transportation Safety Board (NTSB), and gave the NTSB sole authority over aviation accident investigations. 49 U.S.C. § 1131 (2012); *see also* 49 C.F.R. § 800.3(a)(1) (2016) (requiring the NTSB to investigate every civil aviation accident in the United States); *id.* § 831.2(a). The NTSB has complete discretion over who participates in an aircraft accident investigation, except for the FAA (and the Coast Guard), which is, by law, automatically designated a participant "when participation is necessary to carry out the duties and powers of the Secretary [of Transportation]"—that is, a safe and efficient aviation system. 49 U.S.C. § 1132(c); 49 C.F.R. § 831.11(a).

data on aviation products, evaluates the risk posed by each identified hazard, and determines corrective actions to mitigate safety issues.[43] In selecting a corrective action, the FAA is required to evaluate effectiveness, costs, timeliness of implementation, and complexity.[44]

If the FAA becomes aware of an unsafe condition through inspections, reports, accident data, or any other manner, and it determines that the condition is likely to exist or develop in other products of the same design, the FAA issues an "airworthiness directive" to correct the unsafe condition for *in-service* aircraft.[45] Airworthiness directives are "legally enforceable rules" subject to notice and comment by industry stakeholders, including manufacturers and aircraft owners and operators.[46] Owners and operators must comply with airworthiness directives for their aircraft to be considered airworthy and operate legally in the United States.[47]

If the FAA finds that correcting the unsafe condition requires a design change for *future* aircraft produced under the type certificate, the type certificate holder still must submit appropriate design changes to the FAA *for review and approval*.[48] These design changes will necessitate a modification to the product's original certification basis and require the type certificate holder to demonstrate compliance with such standard.[49] The FAA may also at any time re-inspect a product and amend, modify, suspend, or revoke any part of a certificate if it decides that the action is required in the interest of air safety.[50]

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[43] Monitor Safety/Analyze Data, FAA Order No. 8110.017A, 1, 8 (Oct. 1, 2012). MSAD is "designed to promote . . . data-driven, risk-based" continued operational safety decision-making to support aviation products throughout their life cycles. *See generally id.* at i. Through this process, the FAA conducts a risk analysis, which requires an FAA engineer to "objectively characterize[ ] hazards for probabilities and severity, and determine[ ] the risk posed by each hazard associated with a given safety issue." *Id.* at 8. This risk analysis is followed by a causal analysis and the evaluation and selection of a corrective action.

[44] *Id.* at 21.

[45] 14 C.F.R. § 39.5.

[46] *Id.* § 39.3; FED. AVIATION ADMIN., ADVISORY CIRCULAR NO. 39-7D: AIRWORTHINESS DIRECTIVES 1–2 (2012).

[47] 14 C.F.R. §§ 39.7, 39.9. To ensure compliance, the FAA is empowered to investigate and penalize regulatory violations, including issuing civil penalties, seizing aircraft, and taking actions against FAA certificates. *See id.* §§ 13.1–13.401.

[48] *Id.* § 21.99.

[49] *Id.* §§ 21.99, 21.113, 21.115.

[50] *See* 49 U.S.C. § 44709; 14 C.F.R. § 21.181.

In short, the FAA's exclusive control over continued operational safety of certified aviation products ensures that products meet the safety standards of original certification basis throughout their service lives and allows the FAA to establish the standards to which any product is modified.

III. PRODUCT LIABILITY PREEMPTION LITIGATION: A BRIEF OVERVIEW

In aviation product liability cases, the FAA has consistently stated that "[t]he structure of the Federal Aviation Act confirms the federal government's occupation of the field of substantive safety standards by establishing an all-encompassing federal regulatory framework and directing the Secretary to issue regulations setting safety standards for every facet of air safety and aircraft design."[51] Until the Third Circuit's decision in *Sikkelee*, courts appeared increasingly receptive to the defense of federal preemption in aviation design defect cases.

Initially, in *Cleveland v. Piper Aircraft Corp.*, the U.S. Court of Appeals for the Tenth Circuit held that the Federal Aviation Act does not preempt state design defect claims against an aircraft manufacturer.[52] Seven years later, however, the Tenth Circuit

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[51] Letter Brief of Amicus Curiae for the Dep't. of Transp. and Fed. Aviation Admin. at 7, Sikkelee v. Precision Airmotive Corp., 822 F.3d 680 (3d Cir. 2016) (No. 14-4193), 2015 WL 5665724. The FAA also advanced this position in an amicus brief filed in *Cleveland* stating, "As an initial matter, the very nature of the regulated field—the prescription of safety standards for aircraft moving in or affecting interstate commerce—is so inherently federal in character that state law must give way or risk interfering with the discharge of a uniquely federal function. A plane's utility arises out of its ability to traverse great distances at great speeds. That utility would be seriously impaired if a plane were subject to different and potentially conflicting standards whenever it crossed a state boundary." Brief for the United States as Amicus Curiae at 9, Cleveland v. Piper Aircraft Corp., 985 F.2d 1438 (10th Cir. 1993) (No. 91-2065), 1992 U.S. 10th Cir. Briefs LEXIS 1.

[52] Cleveland v. Piper Aircraft Corp., 985 F.2d 1438, 1442 (10th Cir. 1993) ("Congress did not intend to occupy the field of airplane safety to the exclusion of the state common law."). The facts of *Cleveland* are as follows: The pilot plaintiff modified the tandem seat of a tail wheel aircraft by removing the front pilot's seat. *Id.* at 1441. The owner of the airport from which the pilot plaintiff intended to fly closed the airport out of concern for the safety of the pilot plaintiff's operation and parked his van on the runway to prevent the pilot plaintiff from taking off. *Id.* The pilot plaintiff was seriously injured when he attempted to takeoff and struck the van. *Id.* His estate sued the aircraft manufacturer, and the jury determined that the manufacturer had negligently designed the aircraft without adequate visibility from the rear seat and without providing a rear shoulder harness. *Id.*

revisited the question in *US Airways, Inc. v. O'Donnell* and concluded, contrary to its earlier decision, that "the comprehensive regulatory scheme promulgated pursuant to the FAA evidences the intent for federal law to occupy the field of aviation safety exclusively."[53] In doing so, the court cited several circuit court cases following the Third Circuit's influential holding in the 1993 case *Abdullah v. American Airlines, Inc.*[54]

Abdullah involved allegations of negligence on the part of a commercial airline flight crew for failing to take reasonable precautions to avoid turbulence and failing to give passengers adequate warnings about the turbulence.[55] The Third Circuit held that "the FAA and relevant federal regulations establish complete and thorough safety standards for interstate and international air transportation . . . that . . . are not subject to supplementation by, or variation among, jurisdictions."[56] Significantly, the court stated that "[i]t follows from the evident intent of Congress that there be federal supervision of air safety and from the decisions in which courts have found federal preemption of discrete, safety-related matters, that federal law preempts *the general field of aviation safety*."[57] The Third Circuit cited, *inter alia*, the Supreme Court's decision in *City of Burbank v. Lockheed Air Terminal Inc.*, in which the Court recognized Congress consolidating control of aviation in the FAA as indicative of intent to federally preempt the field of aviation safety.[58]

Subsequently, the Third Circuit reaffirmed and clarified its position in *Elassaad v. Independence Air, Inc.*, recognizing that the Federal Aviation Act "directs the FAA to issue regulations in keeping with two safety-related goals . . . such as by prescribing standards for the construction and maintenance of aircraft . . . ."[59] The court further explained, "most of the regulations adopted pursuant to the Aviation Act concern aspects of safety that are associated with flight. For example, the regulations de-

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[53] US Airways, Inc. v. O'Donnell, 627 F.3d 1318, 1327 (10th Cir. 2010).

[54] 181 F.3d 363 (3d Cir. 1999).

[55] *Id.* at 365.

[56] *Id.* ("[W]e hold that federal law establishes the applicable standards of care in the field of air safety, generally, thus preempting the entire field from state and territorial regulation."). *Id.* at 367.

[57] *Id.* at 371 (emphasis added).

[58] City of Burbank v. Lockheed Air Terminal Inc., 411 U.S. 624, 638–40 (1973) (concerning airspace management and its relationship with noise regulation).

[59] Elassaad v. Independence Air, Inc., 613 F.3d 119, 128 (3d Cir. 2010) (citing 49 U.S.C. § 44701(c), (a)).

tail certification and 'airworthiness' requirements for aircraft parts."[60]

Following *Abdullah*, three federal circuit courts—in addition to the Tenth—issued decisions citing *Abdullah* and suggesting a favorable impression of preemption for aviation product design standards. In *Witty v. Delta Air Lines, Inc.*, the Fifth Circuit answered the preemption question more narrowly than the Third Circuit, but cited airworthiness standards among regulations issued by the FAA "[p]ursuant to its congressional charge to regulate air safety."[61] In *Greene v. B.F. Goodrich Avionics Systems, Inc.*, the Sixth Circuit expressly agreed with the Third Circuit's reasoning in *Abdullah* "that federal law establishes the standards of care in the field of aviation safety and thus preempts the field from state regulation."[62] And in *Montalvo v. Spirit Airlines*, the Ninth Circuit cited airworthiness standards among regulations established with "a preemptive intent to displace all state law on the subject of air safety."[63]

With *Sikkelee*, the Third Circuit abrogated *Abdullah*, limiting the preempted field of aviation safety to "in-air operations," which the court determined does not include aircraft design standards.[64] In reaching this conclusion, the Third Circuit purported to identify "three fundamental differences between the regulations at issue in *Abdullah* and those concerning aircraft design," stating that the latter: (1) do not contain a general standard of care; (2) are not as comprehensive; and (3) lack a provi-

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[60] *Id.*

[61] Witty v. Delta Air Lines, Inc., 366 F.3d 380, 384 (5th Cir. 2004); *see also id.* at 385 (citing Abdullah v. American Airlines, Inc., 181 F.3d 363 (3d Cir. 1999)).

[62] Greene v. B.F. Goodrich Avionics Sys., 409 F.3d 795 (6th Cir. 2005).

[63] Montalvo v. Spirit Airlines, 508 F.3d 464, 472 (9th Cir. 2007); *see also id.* at 473 (reviewing *Abdullah*, 181 F.3d 363). In *Estate of Becker v. AVCO Corp.*, the Supreme Court of Washington found that the Ninth Circuit narrowed its holding in *Montalvo* when it ruled preemption did not bar the product liability suit of a woman who fell down a flight of airstairs. Estate of Becker v. AVCO Corp., 387 P.3d 1066, 1070–71 (Wash. 2017). The Ninth Circuit held that the FAA had not "comprehensively regulated" airstairs, and, therefore, did not intend to preempt state law. Martin v. Midwest Express Holdings, Inc., 555 F.3d 806, 812 (9th Cir. 2009). The claim and decision parallels the Third Circuit's holding in *Elassaad. Elassaad*, 613 F.3d at 128. Whereas aircraft disembarkation may not be related to in-flight safety and thus not necessarily the subject of comprehensive FAA regulation, aircraft design and manufacture are *inherent* to in-air safety and are regulated as such. *Id.*

[64] Sikkelee v. Precision Airmotive Corp., 822 F.3d 680, 689, 694–95 (3d Cir. 2016), *cert. denied*, 137 S. Ct. 495 (2016).

sion analogous to 14 C.F.R. § 91.13, a regulation prohibiting careless or reckless piloting.[65]

Despite the court's assertion that *Sikkelee* is consistent with prior precedent, the decision is difficult to square with *Abdullah* and *Elassaad*, let alone the Federal Aviation Act and the FAA's regulations. The primary purpose of aircraft design and manufacturing regulations is *to make aircraft safe for in-air operations*; how can they be excluded from preemption?[66] How can the regulations requiring a pilot to determine the airworthiness of an aircraft—cited in *Sikkelee*—relate to the preemptive field of in-flight safety, but the regulations specifying substantive design standards for airworthiness do not?[67] Further, the court distinguished "regulations governing in-flight operations"—which the court explained as prescribing "rules governing the operation of aircraft"—from design and manufacturing regulations, which the court stated merely establish "procedures for manufacturers to obtain certain approvals and certificates from the FAA."[68] This distinction ignores the fact that the regulations explicitly contain "[r]ules governing applicants for, *and holders of*, any approval or certificate."[69] Contrary to the court's finding, the design and manufacturing regulations clearly contain not only procedural requirements, but also substantive standards for the design, manufacture, and performance of certified products.

Despite the inconsistencies in the decision, the Supreme Court of Washington reversed a lower court decision that found

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[65] *Id.* at 694–95; 14 C.F.R. § 91.13 (2016) provides:

> (a) Aircraft operations for the purpose of air navigation. No person may operate an aircraft in a careless or reckless manner so as to endanger the life or property of another.
>
> (b) Aircraft operations other than for the purpose of air navigation. No person may operate an aircraft, other than for the purpose of air navigation, on any part of the surface of an airport used by aircraft for air commerce (including areas used by those aircraft for receiving or discharging persons or cargo), in a careless or reckless manner so as to endanger the life or property of another.

[66] *See, e.g.*, 14 C.F.R. § 21.1(b)(1) ("*Airworthiness approval* means a document, issued by the FAA for an aircraft, aircraft engine, propeller, or article, which certifies that the aircraft, aircraft engine, propeller, or article conforms to its approved design and is in a condition for safe operation." (emphasis added)).

[67] The Third Circuit specifically identifies a pre-flight duty among the preemptive regulations, which requires a pilot to determine an aircraft is airworthy prior to flight. *Sikkelee*, 822 F.3d at 694. Accordingly, the court could not have intended the preempted field to be limited solely to regulations governing aircraft in flight.

[68] *Id.*

[69] 14 C.F.R. § 21.1(a)(2) (emphasis added).

preemption in a similar case, *Estate of Becker v. AVCO Corp.*, and adopted the Third Circuit's reasoning and conclusion.[70] It is unclear whether other circuits will also follow the Third Circuit's lead. To date, the U.S. Supreme Court has declined to weigh in. In November 2016, the Court rejected a petition for certiorari in *Sikkelee*, which was supported by trade associations representing both manufacturers and pilots.[71] In August 2017, however, the district court issued an opinion in *Sikkelee* on remand and held that the state tort claims are conflict preempted.[72] The district court's detailed explanation of the volume and application of governing FAA regulations undermines the Third Circuit's conclusions. The court explained:

> [B]ecause our Court of Appeals has held that the FAA regulations do not field preempt related state tort claims, Plaintiff suggests that there must be some universe of claims that survives conflict preemption as well—that conflict preemption cannot effectively accomplish in one particular case what field preemption would have done in all cases. I am not so uneasy about the opposite proposition. Nothing in *PLIVA* and *Bartlett* suggests that field preemption and conflict preemption cannot be coextensive or that conflict preemption may only apply to a lesser universe of claims than field preemption otherwise might have.[73]

Although the district court's conflict preemption finding was correct, the rationale used could have equally supported a finding of field preemption.[74]

IV. A FEDERAL STANDARD OF CARE IS NECESSARY

Aviation is, by its very nature, a uniquely federal industry; the very purpose of aircraft is to transcend state boundaries. As Congress recognized, the interstate nature of aviation necessitates uniform regulation across states. The FAA's certification process provides the uniformity and predictability necessary for the transportation infrastructure of the United States. It has also proven highly successful: the U.S. aviation industry is the safest, largest, most diverse, and most technologically innovative in the

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[70] Estate of Becker v. AVCO Corp., 387 P.3d 1066, 1071–72 (Wash. 2017).

[71] Both General Aviation Manufacturers Association (GAMA) and Aircraft Owners and Pilots Association (AOPA) filed amicus briefs.

[72] Sikkelee v. AVCO Corp., No. 4:07-CV-00886, 2017 WL 3317545, at *36 (M.D. Pa. Aug. 3, 2017).

[73] *Id.* at *43 n.25.

[74] *Id.* at *25 (quoting PPL Energyplus, LLC v. Solomon, 766 F.3d 241, 253 (3d Cir. 2014) (finding field preemption)).

world. According to NTSB accident data, 2015 had the lowest number of fatal general aviation accidents and the fewest fatalities on record in the United States.[75]

Under the Supremacy Clause of the U.S. Constitution, federal law impliedly preempts state law or regulation when "the pervasiveness of the federal regulation precludes supplementation by the States, [or] where the federal interest in the field is sufficiently dominant."[76] The FAA's regulatory framework requires federal field preemption to achieve Congress's safety goals; it cannot coexist with supplementation by or variation among local safety standards.[77] Conflict preemption only can resolve state standards in conflict with federal requirements, not different safety standards across states.[78] There is no dispute that common law product liability actions impose state-law duties on defendant manufacturers, amounting to affirmative regulation thereof.[79] States have a wide variety of different tests for determining design defects, which conflict preemption will *not* harmonize. Without uniform, exclusive federal control, manufacturers could be subject to varying design directives in different states. If a manufacturer does not modify a design in accordance with a state product liability decision, the manufacturer risks further liability in that state. And because manufacturers have little to no control over where their products go after they are sold, manufacturers are potentially exposed to liability in all U.S. jurisdictions, which could mean fifty different state design standards.

Aircraft transcend not only state, but international borders. Internationally, FAA regulations are considered the gold standard; foreign aviation authorities have long looked to FAA regulations when establishing their rules. The FAA also has longstanding bilateral agreements with foreign civil aviation authorities recognizing reciprocal airworthiness certification of

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[75] Press Release, Nat'l Transp. Safety Bd., NTSB 2015 Aviation Statistics Show General Aviation Accidents Continue to Decline (Sept. 22, 2016), https://www.ntsb.gov/news/press-releases/Pages/PR20150922.aspx [https://perma.cc/8JU5-GLBZ].

[76] Schneidewind v. ANR Pipeline Co., 485 U.S. 293, 300 (1988); U.S. CONST. art. VI, cl. 2.

[77] *Schneidewind*, 485 U.S. at 300.

[78] English v. Gen. Elec. Co., 496 U.S. 72, 79 (1990).

[79] Cipollone v. Liggett Group, Inc., 505 U.S. 504, 522 (1992) (State common-law damages actions operate to require manufacturers to comply with common-law duties.); Riegel v. Medtronic, Inc., 552 U.S. 312, 328–29 (2008) ("General tort duties of care . . . 'directly regulate' the device itself, including its design.").

products to achieve regulatory harmonization in the interest of safety and innovation.[80] Variable state standards could impede the ability of the United States to comply with these agreements, or the willingness of foreign authorities to enter into them.

State standards not only jeopardize the viability of the aviation industry, but also may compromise, rather than enhance, safety overall. As described in detail above, the FAA enforces its design standards through a highly technical and complex certification process overseen and administered by expert engineers.[81] The fundamental aspect of any aviation design defect action is a retrospective analysis of an FAA-approved design after an accident. State standards developed through litigation allow the FAA's comprehensive system for approving and maintaining the safety of certificated products to be second-guessed by expert witnesses, judges, and jurors on a case-by-case basis through the narrow prism of tort law. The jury, instead of the FAA, is effectively asked to become the determinant of aviation safety and to make that safety determination based on how one specific accident might have been prevented. In contrast to the jury's narrow perspective, the FAA makes holistic safety assessments through its type certification and continuing airworthiness activities, processes that allow for stakeholder input and consider the broader economic and safety effects on aviation to leverage the expertise not only of the agency, but also the industry.[82]

Further, the FAA's control over product design is so pervasive that changing an approved design to comply with state-law duties will require the FAA's permission.[83] Even if the FAA did not require approval for a state-required change, a manufacturer would still be in the impossible position of having to satisfy conflicting state-law duties. In short, Congress tasked the FAA with determining whether a design is safe and when and how an unsafe condition must be eliminated, and the imposition of state law standards stands in opposition to the FAA's responsibility and execution thereof.

Congress clearly tasked the FAA with regulating the design and safety of aviation products. Both the courts in *Sikkelee* and *Becker* emphasized that in establishing the FAA's authority to

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[80] Fed. Aviation Admin., Bilateral Agreements Overview (May 2, 2008), https://www.faa.gov/aircraft/air_cert/international/bilateral_agreements/overview/ [https://perma.cc/52MF-7GFL].

[81] *See generally* 14 C.F.R. pt. 23; FAA Order 8110.4C, *supra* note 21.

[82] *See generally* 14 C.F.R. pt. 23; *id.* § 11.5; FAA Order 8110.4C, *supra* note 21.

[83] *See* 14 C.F.R. §§ 21.91–21.101.

regulate aviation products, Congress instructed the FAA to issue the minimum standards required in the interest of safety, evincing an intent for the FAA's regulations to be *minimum safety standards* that states can supplement with additional requirements.[84] This, however, overlooks key qualifying phrases in the statute—"minimum standards required in the interest of safety" and "necessary for safety"—that is, minimum standards required in the interest of safety and minimum standards necessary for safety.[85] The Federal Aviation Act gives the FAA "plenary authority" to "[m]ake and enforce safety regulations governing the design and operation of civil aircraft" in order to ensure the "maximum possible safety and efficiency."[86]

In the Federal Aviation Act, Congress expressly directed the FAA to issue whatever standards may be necessary to "promote safety of flight of civil aircraft in air commerce"[87]—but not to issue *more than what is required for safety*. The text and the legislative history make clear that Congress's intent was to strike a balance between regulation necessary for safety and facilitating growth of the industry. The word "minimum" was intended to limit unduly burdensome regulation, not to accommodate supplemental state regulation. There is no indication that the federal standards are "minimums" in relation to state laws, or that the federal regulations do not establish an acceptable level of safety. Congress's intent requires exclusive federal control to achieve a safe and efficient aviation system.

V. UNDERSTANDING AND APPLYING THE FEDERAL STANDARD OF CARE

A. The Certification Basis Establishes the Federal Design Safety Standard

The *Sikkelee* and *Becker* decisions exemplify how courts struggle to identify the federal safety standards for aircraft manufacture and design, and thus misapply the federal preemption defense because they do not understand how aviation product design is

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[84] 49 U.S.C. § 44701(a) (2012); Sikkelee v. Precision Airmotive Corp., 822 F.3d 680, 694 (3d Cir. 2016), *cert. denied*, 137 S. Ct. 495 (2016); Estate of Becker v. AVCO Corp., 387 P.3d 1066, 1070 (Wash. 2017); *see also* Federal Aviation Act of 1958, Pub. L. No. 85-726, § 601(a), 72 Stat. 731, 775.

[85] 49 U.S.C. § 44701(a).

[86] H.R. Rep. No. 85-2360, at 2, 7 (1958), *as reprinted in* 1958 U.S.C.C.A.N. 3741, 3741–42, 3747.

[87] Federal Aviation Act of 1958, Pub. L. No. 85-726, § 601(a)(1), 72 Stat. 731, 775; *see also* 49 U.S.C. § 44701(a).

governed. This is likely due to the complex and highly technical nature of FAA design and manufacturing regulations, and concern over not providing plaintiffs a mechanism to recover after accidents. In *Sikkelee*, the court concluded that the "highly technical and part-specific nature" of the FAA's aircraft design regulations made them "exceedingly difficult to translate into a standard of care that could be applied to a tort claim."[88] The court emphasized that it could not identify a regulation that "sounds in common law tort."[89]

The Third Circuit is correct in concluding that there is not one common tort-like regulation that sets the design safety standard for an aviation product. The FAA's design safety standard for a product is actually the certification basis, which consists of (1) all the applicable airworthiness regulations (e.g., materials; workmanship; construction; testing; structural characteristics; flight performance; systems and equipment; operating procedures and limitations; markings and placards; and flight and maintenance manuals); and (2) any necessary "special conditions" prescribed by FAA through rulemaking.[90] The FAA issues special conditions if the agency finds that the existing airworthiness regulations "do not contain adequate or appropriate safety standards . . . because of a novel or unusual design feature of the aircraft."[91] Special conditions address capabilities and characteristics of a product not yet addressed by existing FAA regulations and establish a level of safety equivalent to that established by the regulations such that "no feature or characteristic makes [the product] unsafe" for the certification requested.[92]

As the district court in *Sikkelee* recognized, "[a] type certificate confirms that the aircraft or its component is properly designed."[93] To obtain a type certificate, an applicant must demonstrate to the FAA compliance with the certification basis.[94] For each airworthiness standard, the FAA outlines or agrees to extensively detailed technical requirements on *how* the applicant

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[88] *Sikkelee*, 822 F.3d at 695; *see also Estate of Becker*, 87 387 P.3d at 1070.

[89] *Sikkelee*, 822 F.3d at 695.

[90] 14 C.F.R. § 21.17(a); *see, e.g. id.* pt. 23.

[91] 14 C.F.R. § 21.16.

[92] *Id.* § 21.21(b)(2).

[93] Sikkelee v. AVCO Corp., No. 4:07-CV-00886, 2017 WL 3317545, at *3 (M.D. Pa. Aug. 3, 2017).

[94] 14 C.F.R. §§ 21.17(a), 21.20.

will demonstrate compliance (e.g., design, testing).[95] The FAA must find

> [u]pon examination of the type design, and after completing all tests and inspections, that the type design and the product meet . . . the applicable airworthiness requirements . . . or that any airworthiness provisions not complied with are compensated for by factors that provide an equivalent level of safety; and . . . [f]or an aircraft, that no feature or characteristic makes it unsafe for the category in which certification is requested.[96]

Each type certificate holder is issued a "type certificate data sheet" (TCDS), which contains a "certification basis" section defining the applicable regulations, amendments, special conditions, and other requirements that the holder must satisfy to obtain the type certificate.[97]

An example can more clearly illustrate how the certification basis establishes the federal safety standard for product design. The Cirrus Vision SF50 aircraft is a single-engine, very light jet aircraft which recently received a type certificate from the FAA in 2016.[98] The certification basis for the SF50 is comprised of regulations from 14 C.F.R. part 23, which consists of airworthiness standards for aircraft weighing less than 12,500 pounds, and four special conditions.[99] One Part 23 standard, § 23.1306, required the manufacturer, Cirrus Aircraft, Inc. (Cirrus), to demonstrate to the FAA that each of the SF50's electrical and electronic systems were designed and installed such that the system's function was "not adversely affected during and after the time the airplane is exposed to lightning," and can "automatically recover[ ] normal operation of that function in a timely

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[95] *Id.* § 21.20(a). Although new FAA rules are moving away from specific, prescriptive requirements for certain products and toward more performance-based standards, the certification basis still establishes the level of performance that must be achieved, and the means of compliance must still be acceptable to the FAA. Revision of Airworthiness Standards for Normal, Utility, Acrobatic, and Commuter Category Airplanes, 81 Fed. Reg. 96,572, 96,574 (Dec. 30, 2016) ("The standards will maintain or increase the level of safety associated with the current part 23, while also facilitating the adoption of new and innovative technology in general aviation (GA) airplanes."). The FAA still sets the safety standard.

[96] 14 C.F.R. § 21.21.

[97] FAA Order 8110.4C, *supra* note 21, at 75.

[98] *See* Fed. Aviation Admin., Type Certificate Data Sheet No. A00018CH (Rev. 3) (Aug. 21, 2017), http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgMakeModel.nsf/MainFrame?OpenFrameset [https://perma.cc/Z5RH-AQXA].

[99] *Id.*

manner."[100] The method of how Cirrus demonstrates (e.g., design, testing) to the FAA that the SF50 meets the requirements of § 23.1306 must either be established or agreed to by the FAA.[101] This critical part of the process—the intricate means of demonstrating compliance—is an additional layer through which the FAA establishes design safety, although generally not discussed by courts. That is, the FAA type certification process is so comprehensive that the agency not only makes a determination about whether safety objectives are met, but first makes a determination about whether the means for demonstrating compliance with safety objectives are appropriate.

The SF50 example also provides an opportunity to better understand special conditions. One of the four special conditions in the SF50 certification basis related to the aircraft's proposed "whole airplane parachute recovery system."[102] Finding that it constituted a "novel or unusual design feature," the FAA published a notice of proposed special conditions for the parachute system that "contain[ed] the additional safety standards that the Administrator consider[ed] necessary to establish a level of safety equivalent to that established by the existing airworthiness standards."[103] After reviewing public comments, the FAA later finalized a range of requirements that Cirrus had to satisfy in order to obtain a type certificate.[104] In issuing a type certificate, the FAA confirmed that the SF50 aircraft met the federal safety design standard, or certification basis, and no feature or characteristic made it unsafe.

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[100] 14 C.F.R. § 23.1306(a). Further examples of design standards in Part 23 applicable to the SF50 airplane include § 23.143(a) (requiring that the "airplane must be safely controllable and maneuverable during all flight phases") and § 23.603 (specifying the "suitability and durability of materials used for parts" and mandating that "[w]orkmanship must be of a high standard").

[101] Aircraft Electrical and Electronic System Lightning Projection, Advisory Circular No. 20-136B, Fed. Aviation Admin., (Sept. 7, 2011). Although a regulatory change has modified the lightning protection standard, the fundamental process of having the FAA outline or approve the means of complying with the standard remains in effect.

[102] Special Conditions: Cirrus Design Corporation, Model SF50; Whole Airplane Parachute Recovery System, 81 Fed. Reg. 14,801, 14,801 (Mar. 18, 2016).

[103] *Id.*

[104] *Id.* at 14,803; Special Conditions: Cirrus Design Corporation, Model SF50; Whole Airplane Parachute Recovery System, 81 Fed. Reg. 45,965, 45,967–68 (July 15, 2016) (final special conditions).

B. Why the Certification Basis Establishes a Federal Design Safety Standard

Understanding that the certification basis establishes the federal standard of care provides manufacturers and plaintiffs with clarity and predictability as to their tort law duties and claims, while not obviating manufacturer liability for product designs. First, the certification basis places the focus of litigation on the product design standard established by the FAA, fulfilling Congress's interest in ensuring the FAA's central, uniform, and exclusive control of aviation safety. This provides manufacturers and pilots with consistent and reliable aircraft design standards—benefits of which are passed along to the consumers in the form of lower product costs. It also provides clarity on when plaintiffs may be justly compensated in aviation product liability cases. Importantly, the certification basis design standard is promulgated through the rulemaking process, which requires the FAA to consider input from all interested stakeholders, including manufacturers, pilots, aircraft owners, and other members of the public, before issuing a final rule.[105] In this way, the certification basis is created with stakeholder input, providing a legal design duty that leverages broad expertise and balances diverse interests.

Second, the certification basis encompasses the *broad concept of design safety*. In *Sikkelee*, the Third Circuit concluded that the FAA's aviation product design regulations were not "comprehensive" and preemptive because they did not contain a catch-all "standard of care" that "could be used to evaluate conduct not specifically prescribed by the regulations."[106] Citing *Abdullah*, the Third Circuit relied on and referenced 14 C.F.R. § 91.13, which prohibits any person from operating "an aircraft in a careless or reckless manner so as to endanger the life or property of another."[107]

The Third Circuit described § 91.13 as "the overall concept that aircraft may not be operated in a careless or reckless manner."[108] In so holding, the Third Circuit seems to have imposed a new prerequisite for finding preemption; specifically, that the regulatory scheme must contain an explicit tort-like standard,

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[105] 14 C.F.R. §§ 11.5, 21.16.

[106] Sikkelee v. Precision Airmotive Corp., 822 F.3d 680, 695 (3d Cir. 2016), *cert. denied*, 137 S. Ct. 495 (2016).

[107] *Id.*

[108] *Id.* at 689.

or, in the absence of a specific regulation, a general description of the safety standard. Field preemption, however, is not premised on any particular regulation or specific phraseology, but rather congressional intent to occupy the field.[109] Although the procedures and standards for certifying aviation products do not contain one specific regulation that prohibits a manufacturer from designing an aircraft in a careless or reckless manner, the comprehensive regulatory framework for aviation product certification prohibits designing and manufacturing in a careless or reckless manner. The regulations require manufacturers to demonstrate and certify compliance with specific requirements that establish safe product design.[110] Even the Third Circuit recognized that a type certificate "arguably reflects nationwide standards for the manufacture and design of . . . parts."[111]

Third, the certification basis establishes a comprehensive safety standard for the *entire certified product*. The type design approved by the FAA includes specifications of the aircraft and each of its component parts.[112] Although a specific aspect of that type design may not be expressly mentioned in a regulation, that does not mean it is outside the scope of the certification basis.[113] For example, 14 C.F.R. part 23 outlines standards for an aircraft's fuel system, such as "[e]ach fuel system must be constructed and arranged to ensure fuel flow at a rate and pressure established for proper engine and auxiliary power unit functioning under each likely operating condition."[114] The FAA has chosen to regulate certain aspects of the individual components of fuel systems by establishing certain performance standards for the functionality of the fuel system overall. The FAA's decision to not issue regulations or impose additional "special conditions" on any particular aspect of the fuel system, other than the fuel system's safety and reliability as a whole, is a deliberate decision from the federal government. A decision from the FAA to not require testing or detailed analysis on a specific component

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[109] Oneok, Inc. v. Learjet, Inc., 135 S. Ct. 1591, 1595 (2015) ("Congress may have intended 'to foreclose any state regulation in the *area*,' irrespective of whether state law is consistent or inconsistent with 'federal standards.'").

[110] 14 C.F.R. § 21.21 (2016).

[111] *Sikkelee*, 822 F.3d at 694.

[112] 14 C.F.R. § 21.31.

[113] *See Sikkelee*, 822 F.3d at 694–95 ("Rather, many are in the nature of discrete, technical specifications that range from simply requiring that a given component part work properly . . . to prescribing particular specifications for certain aspects (and not even all aspects) of that component part.").

[114] 14 C.F.R. § 23.951.

or design feature does not mean that a state jury may impose its own standards for that component or design feature. And any effort from state law to fill an FAA-intended void through the imposition of common law duties would frustrate and obstruct the objectives of both Congress and the FAA.[115]

C. How Courts Should Apply the Certification Basis in Practice

Despite federal control over the initial design of aviation products and changes to that design, product liability claims often focus on potential alternative designs for the aviation product.[116] To understand how applying the certification basis as the federal standard of care works in practice, it is illustrative to understand what happens in a case when a court does *not* apply the federal standard of care.

Depending on the applicable state tort framework, plaintiffs may bring design defect claims against an aviation product manufacturer under negligence or strict liability theories. For negligence claims, a jury typically considers expert testimony as to the applicable standard of care for the product's design and as to whether the manufacturer breached that standard.[117] Under a strict liability theory, most American jurisdictions apply the risk-utility standard for determining the existence of a design defect for an aviation product:[118] A defective condition exists "if a 'reasonable person' would conclude that the probability and seriousness of harm caused by the product outweigh the burden or costs of taking precautions."[119]

Under either framework, the product must be defective to sustain a claim for liability, thereby incorporating a concept of duty.[120] Any design involves compromise—decisions that were weighed and tested through the certification process. Given the

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[115] Crosby v. Nat'l Foreign Trade Council, 530 U.S. 363, 372–73 (2000) (finding preemption where state law stood "as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress").

[116] *See, e.g.*, Tincher v. Omega Flex, Inc., 104 A.3d 328, 389 (Pa. 2014).

[117] *See, e.g.*, Salerno v. Innovative Surveillance Tech., Inc., 932 N.E.2d 101, 112 (Ill. 2010) ("Because products liability actions involve specialized knowledge or expertise outside of a layman's knowledge, the plaintiff must provide expert testimony on the standard of care and a deviation from that standard to establish either of these propositions.").

[118] *See, e.g.*, *Tincher*, 104 A.3d at 389.

[119] *See, e.g.*, *id.*

[120] Sikkelee v. AVCO Corp., No. 4:07-CV-00886, 2017 WL3317545, at *37 (M.D. Pa. Aug. 3, 2017).

complexity of aviation products and the fact that litigation tends to focus on one small aspect of the product, there are virtually unlimited claims which may be raised by a plaintiff and his or her experts about alternate designs that would redress an alleged defect and purportedly make the product "safer" under the circumstances. The expert's review is not constrained by the FAA's airworthiness standards and involves a narrow concept of safety based primarily on the specific accident. There is no way to know that an expert's hypothetical alternative design would even achieve FAA certification, or would be safer overall in practice.

But when a jury verdict is rendered, the finding effectively means that, contrary to the FAA's determination, in the applicable state, the product design is *not* safe for operation. The court effectively supplants the role of the FAA and approves an alternate design outside the aviation product certification process. If a jury imposes liability, the manufacturer must comply with the resultant duty of care by modifying the design, which might not be technically feasible or consistent with FAA airworthiness standards, or risk future liability.[121] The FAA's approval, however, is required for any modification to design, and such approval is not routinely granted.[122] If the manufacturer chooses not to comply with the state-determined duty of care and change its design, or cannot by virtue of the FAA's refusal to approve the design change, then the manufacturer remains at risk. This process not only creates costly disputes between plaintiff and defense expert witnesses over the applicable standard of care to apply for design defect claims, but also creates significant uncertainty for manufacturers over the standards by which they are measured.

Recognizing the certification basis as a manufacturer's legal design duty eliminates many of these problems by integrating aircraft design complexity and the FAA's highly technical certification process into state tort liability frameworks. Applying the certification basis as the federal standard of care eliminates the argument that a manufacturer should have done something different from what the FAA considered and required for the product to be deemed safe. It prevents a retrospective redesign of the

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[121] Cipollone v. Liggett Group, Inc., 505 U.S. 504, 522 (1992); Riegel v. Medtronic, Inc., 552 U.S. 312, 328–30 (2008).

[122] 14 C.F.R. §§ 21.93(a), 21.95, 21.97(a), 21.101, 21.113; FAA Order 8110.4C, *supra* note 21, at 87.

product through the proposal of hypothetical and ambiguous alternative designs.

The certification basis does not displace a state tort framework with framework, rather, it provides the federal design safety standard for that framework.[123] Thus, it applies regardless of whether a claim is common law negligence or strict liability. Under a negligence framework, a plaintiff must demonstrate the manufacturer is at fault for the defect.[124] In strict liability, damages may be imposed without a demonstration of fault; the manufacturer is liable if the product has a defect causally linked to the injury.[125] The certification basis is the federal standard of care in negligence actions and the standard by which the fact finder determines the existence of a defect in strict liability cases.

Accordingly, a plaintiff could still bring design defect claims under theories of negligence and strict liability. In response to a plaintiff's complaint, a manufacturer's product type certificate and TCDS would constitute prima facie evidence that no *product defect* exists because the FAA only issues a type certificate after the agency determines that the certification basis has been met. The burden then shifts to the plaintiff to demonstrate the manufacturer failed to comply with the product's certification basis, thus focusing on whether the product met the FAA's design safety standard, rather than expert witness testimony about alternate designs not governed by the applicable certification basis. Design claims, and the concept of safety grounding them, are based on legislative principles and regulatory standards, rather than inconsistent and unpredictable standards.

Importantly, the certification basis approach preserves a number of methods for holding a manufacturer accountable. The Third Circuit seemed particularly bothered with type certifica-

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[123] Utilizing the federal safety design standard is equally consistent with the General Aviation Revitalization Act (GARA) of 1994, Pub. L. No. 103-298, 108 Stat 1552 (codified as 49 U.S.C. § 40101). GARA is a statute of repose which bars civil actions against a manufacturer after eighteen years but does not address the standard of care in aviation product liability actions in any form. *See id.* Nor was GARA intended to impact federal regulation of air safety. *See, e.g.*, H.R. REP. NO. 103-525(II), at 3 (1994) (stating that GARA was to establish a "time limitation[ ] on certain civil actions against aircraft manufacturers").

[124] Calles v. Scripto-Tokai Corp., 864 N.E.2d 249, 263 (Ill. 2007) ("The key distinction between a negligence claim and a strict liability claim lies in the concept of fault.").

[125] *See, e.g.*, Hinckley v. La Mesa R.V. Center, Inc., 158 Cal. App. 3d 630, 642–44 (Cal. Ct. App. 1984).

tion preempting a state claim, expressing concern that this would result in "the mere issuance of a type certificate exempt[ing] designers and manufacturers of defective airplanes from the bulk of liability for both individual and large-scale air catastrophes."[126] Plaintiffs have also criticized the preemption defense on grounds that much of the certification work is performed by manufacturers through the organization designation authorization (ODA).[127] Although ODAs may have more stringent standards than the FAA, with a certification basis standard, a plaintiff would be permitted to present evidence of the manufacturer's design not satisfying the applicable certification basis, notwithstanding the presentation of a type certificate and TCDS.[128] Moreover, plaintiffs also retain the right to raise manufacturing defect and failure to warn claims.

VI. CONCLUSION

Understanding and properly applying the federal preemption defense in aviation product liability actions has never been more essential. In less than 120 years, aviation has grown from the Wright brothers' first-powered flight to over 87,000 flights per day in the United States. In 2014 alone, civil aviation accounted for $1.6 trillion in total economic activity in the United States.[129] The industry continues to face new challenges, from supersonic flight to commercial space transport to unmanned aerial systems. The FAA is tasked with the advancement, safety, and regulation of civil aviation in the United States. The agency's role in regulating the safety of aircraft continues to grow as the entire industry continues to expand and diversify into other means of air travel outside of traditional, fixed-wing aircraft. That means the potential applications of the preemption defense in the aviation product context equally expands.

Courts and practitioners must understand the FAA's comprehensive aircraft certification process to ensure they can properly

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[126] Sikkelee v. Precision Airmotive Corp., 822 F.3d 680, 696 (3d Cir. 2016), *cert. denied*, 137 S. Ct. 495 (2016).

[127] *Id.* at 708; U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-11-14, AVIATION SAFETY: CERTIFICATION AND APPROVAL PROCESSES ARE GENERALLY VIEWED AS WORKING WELL, BUT BETTER EVALUATIVE INFORMATION NEEDED TO IMPROVE EFFICIENCY 20 (2010).

[128] *Air Traffic*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., https://sos.noaa.gov/datasets/air-traffic/ [https://perma.cc/459W-SUFJ].

[129] FED. AVIATION ADMIN., THE ECONOMIC IMPACT OF CIVIL AVIATION ON THE U.S. ECONOMY 5 (2016).

identify and apply the product's certification basis as the preemptive federal standard applicable in aviation product liability actions. Utilization of the certification basis design standard will provide manufacturers and pilots with more reliable and consistent aircraft design standards, allow the public and other stakeholders to provide input on the acceptable level of safety for aviation products, and balance the interests arising after an aviation product causes injury. And most importantly, the certification basis standard fulfills Congress's intent in ensuring the FAA's exclusive and uniform control over aviation safety, thereby enabling the FAA to continue advancing the aviation industry long into the future.