

# From STC to PMA

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**W**hen Rick Discher, EAA 617514, set out to make a better pair of skis for his Maule M-4, little did he know that it would lead to becoming an approved manufacturer of aircraft parts. Like Rick, you may have an idea of a widget that would enhance the performance, appearance, safety, or expense of your favorite aircraft. To use your widget, you must first obtain a supplemental type certificate (STC) from the Federal Aviation Administration (FAA). This document certifies the continued safe operation of the modified aircraft, engine, or propeller using your product.

Typical STCs include more powerful engine installations, short takeoff and landing (STOL) kits, conversion of generator-based electrical systems to alternators, stronger landing gear legs, and approval for the use of auto fuel. The process to obtain an STC can be short or lengthy, depending on the complexity of the modification, engineering documentation, and flight testing, if required. There are four basic steps:

- An FAA review of your application and related data;
- Inspection and test of the individual components and subassemblies of your widget;
- Inspection and testing of the complete assembly, including any modifications to your aircraft/engine/propeller required by its installation; and
- Issuance of the STC.

Once the STC is issued, all that is left to do is go flying, of course, but the modified part may only be used on the exact type, make, and model of aircraft/powerplant/propeller for which the STC has been issued. As the owner of the STC, you can also charge other people who wish to make use of your STC. (However, that you are still not authorized to produce your widgets and sell them to others; more on that later.)

For instance, an engine upgrade for a Cessna 170's original Continental C-145 engine to an O-300 requires an STC. The FAA provides a database that can be used to locate all appropriate STCs of this kind. Searching "STC by Make" quickly displays a list of all registered STCs for the C-170B, revealing that STC SA01837SE covering this conversion was reissued to the International Cessna 170 Association on May 7, 2008. To obtain the rights to use this STC, you have to contact the owner and pay for all of the documentation and, in some instances, parts required to make the same modification to your airplane. The type certificate issued to your airplane (or powerplant or propeller) will be amended to reflect the change.

To create your own STC, you need to submit an application to the FAA, along with supporting documentation, not unlike that necessary when filing a patent. Being issued an STC, however, does not entitle you to exclusive rights to the invention if you have not filed a patent for it. For instance, there are at least four different STOL modifications offered as STCs for the C-170. All are of roughly similar design, and all attempt to improve low-handling and short-field performance. If you feel that your idea is worth patenting, by all means do it. New electronic filing procedures with the U.S. Patent Office make this fairly easy, and the government has made good progress in recent years in reducing the cost and time it takes to issue new patents.

Unless you have the requisite degrees and experience to do the engineering work and testing expected by the FAA, it makes sense to hire a designated engineering representative (DER) and possibly a designated airworthiness representative (DAR) to help you in your application. The FAA makes it easy to find appropriate DERs and DARs who are highly qualified professionals with day jobs in the aviation industry. You'll need a consultant DER who, according to the FAA, is "an individual appointed to act as an independent (self-employed) DER to approve or recommend approval of technical data to the FAA." DERs are versed in a number of technical disciplines that include acoustical engineering, engine engineering, flight analyst, flight testing, powerplant engineering, propeller engineering, radio engineering, structural engineering,

and system and equipment engineering. You can find DERs through the FAA's Consultant DER Directory. If you're not sure which DER or DAR is appropriate, the FAA's local aircraft certification office (ACO) can provide guidance.

## BECOMING AN AIRPLANE PARTS MANUFACTURER

Rick was so happy with the performance of his skis on the Maule that he decided to manufacture them for others. For each aircraft on which his skis were to be installed, a separate STC was necessary. But this still did not authorize Rick to become a manufacturer of aircraft parts. For this, he needed to gain parts manufacturer approval, or PMA, status.

While the work required for an STC assures the further safe operation of an existing certificated aircraft modified by the STC, the process to gain PMA status is meant to guarantee to others that the materials and processes used in the manufacture of the product—as well as the system used to keep track of the history of each and every component of the widget (how, when, and by whom it was made)—follow strict standards established by the FAA.



To obtain PMA status you first have to obtain technical standards order (TSO) compliance for the materials you will use and establish a fabrication inspection system (FIS) for your manufacturing processes. For any product it has in the field, the company must maintain a file on when it was made, who was involved, what batch of materials was used, and who supplied them. This allows the company to quickly resolve any issues, as well as make sure mistakes are not repeated.

From start to finish, it took six years to gain PMA status and the first STC for Rick's skis. While the work and documentation required for an STC and PMA is significant, it all has a purpose: to maintain the excellent safety record that certificated aircraft and powerplants enjoy.

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## GLOSSARY

**Supplemental Type Certificate (STC)** - a document issued by the Federal Aviation Administration approving a product (aircraft, engine, or propeller) modification. The STC defines the product design change, states how the modification affects the existing type design, and lists serial number at which it becomes effective. An STC is required whenever modifications are to be made to a certificated airframe, powerplant, or propeller.

**Designated Engineering Representative** - an individual, appointed in accordance with 14 CFR § 183.29, who holds an engineering degree or equivalent, possesses technical knowledge and experience, and meets the qualification requirements of Order 8100.8. DERs provide developers of STCs with qualified engineering know-how and flight-testing services. The FAA Consultant DER Directory provides a list of consultant DERs by state and technical discipline.

**Designated Airworthiness Representative** - an individual appointed in accordance with 14 CFR § 183.33 who may perform examination, inspection, and testing services necessary to the issuance of certificates.

**Parts Manufacturer Approval** - a combined design and production approval for modification and replacement parts. It allows a manufacturer to produce and sell these parts for installation on type-certificated products. Materials, processes, appliances, and other parts are approved by other means like a technical standards order or in conjunction with a type certificate.

**Technical Standards Order** - a minimum performance standard for specified materials, parts, and appliances used on civil aircraft. When authorized to manufacture a material, part, or appliance to a TSO standard, this is referred to as TSO authorization. Receiving a TSO authorization is both design and production approval. Receiving a TSO authorization is not an approval to install and use the article in the aircraft. It means that the article meets the specific TSO and the applicant is authorized to manufacture it.

**Fabrication Inspection System** - Each holder of a parts manufacturer approval shall establish and maintain a fabrication inspection system that ensures that each completed part conforms to its design data and is safe for installation on applicable type-certificated products. The FIS allows the manufacturer to trace all details regarding the materials and processes used to produce its products, including all their components.



## REFERENCES

Trick Air Snow Skis [www.TrickAir.com](http://www.TrickAir.com)

U.S. Patent Office [www.uspto.gov/](http://www.uspto.gov/)

STC Application Process [www.FAA.gov/aircraft/air\\_cert/design\\_approvals/stc](http://www.FAA.gov/aircraft/air_cert/design_approvals/stc)

STC Searchable Database [www.AirWeb.FAA.gov/regulatory\\_and\\_guidance\\_library/rgstc.nsf/](http://www.AirWeb.FAA.gov/regulatory_and_guidance_library/rgstc.nsf/)

DER Directory [www.FAA.gov/other\\_visit/aviation\\_industry/designees\\_delegations/](http://www.FAA.gov/other_visit/aviation_industry/designees_delegations/)

DAR Directory [www.FAA.gov/other\\_visit/aviation\\_industry/designees\\_delegations](http://www.FAA.gov/other_visit/aviation_industry/designees_delegations)

PMA Process [www.FAA.gov/aircraft/air\\_cert/design\\_approvals/pma/](http://www.FAA.gov/aircraft/air_cert/design_approvals/pma/)