

ABS Air Safety Foundation

Manuel Maciel Ruddervator Prizes

October 15, 2021

The American Bonanza Society Air Safety Foundation Announces Increased Cash Prizes to Support the Longevity of Beech Model 35 (V-Tail) Bonanzas

The ABS Air Safety Foundation now offers \$500,000 to the first firm to certify and sell an alternative for V-Tail Bonanza ruddervator skin replacement.

The problem

Model 35 Bonanzas use a combination elevator/rudder control surface (“ruddervator”) to control pitch and yaw. Ruddervators must be kept comparatively light to avoid excessive tail-heaviness, and they require precise balance to prevent aerodynamic flutter.

Ruddervator skins are made of magnesium, which corrodes rapidly when exposed to atmosphere. They are also susceptible to damage from mishandling when the airplane is pushed into a hangar. Because of the balance requirement very few repairs are approved on ruddervators other than complete replacement of the ruddervator skin.

The Textron Aviation (Beech) factory no longer produces replacement ruddervator skins. Consequently, even minor damage or corrosion to a ruddervator may result in permanent grounding of the aircraft for lack of parts.

The challenge

Design, certify, manufacture and support ongoing kit sales of a replacement skin or complete replacement of the control surface that:

1. Meets balance and flutter protection requirements;
2. Does not adversely affect overall aircraft weight and balance; and
3. Uses readily available materials (including but not limited to magnesium, aluminum, composite or modern, long-life fabric covering);
4. At costs comparable to previously available control reskin or replacement; while
5. Addressing issues of dissimilar materials interaction and other consequences of the new design.

The purpose

The ABS Air Safety Foundation Manuel Maciel Ruddervator Prizes are designed to spur research, design, certification and ongoing sales and support of a sustainable alternative to current ruddervator skinning techniques. This supports the Foundation’s mission **to protect lives and preserve the Beechcraft fleet**, using funds donated to ABS/ASF for the specific purpose of aviation safety research.

The prizes

The ABS/ASF Manuel Maciel Ruddervator STC Prize

One prize of \$500,000* to the first commercial enterprise that:

1. Earns FAA Supplemental Type Certificate (STC) approval for ruddervator reskin or replacement for all models of Beech Model 35 Bonanza covered by Type Certificate 3A15, or all models covered by Type Certificate A-777, or both, across the airplane’s existing flight envelope without adversely restricting the airplane’s previous loading envelope;
2. Develops or aligns with a kit manufacturing, sales and support network for the ongoing production and distribution of approved kits for installation in airplanes in the field;

3. Produces no less than 100 complete kits (all materials necessary for reskin or replacement of 100 individual ruddervators), each kit available at a price no greater than 50% greater than Beech factory replacement skins or complete ruddervator replacement, as applicable, as available in July 2021.**

**ABS/ASF is soliciting donations from ABS members through for additional matching funds that may increase the value of the prize.*

***Parts cost \$9000 per ruddervator (one set of two skins) from Textron Aviation in a last, very limited production run in 2021.*

Deadline for submission of entries for the Maciel STC Prize is December 31, 2026.

The ABS/ASF Manuel Maciel Structures Engineering Prize

\$20,000 each to the first five teams from an academic or vocational aerospace engineering or aircraft structures repair program, private enterprise, or engineer(s) working privately or together, that:

1. Designs a replacement ruddervator skin or control surface replacement meeting all FAA control surface balance and flutter control criteria for at least one iteration of ruddervator design (the design varies in models produced in 1947-1949, 1950-1963, and 1964-1982), across that airplane's entire existing flight envelope, and validates that design using industry-acceptable practices;
2. Constructs and tests a full-scale ruddervator and/or Finite Element Model confirming the design using criteria in (1) above and using industry-acceptable testing practices;
3. Successfully addresses any issue of dissimilar materials interaction;
4. Submits to ABS Air Safety Foundation a detailed engineering report supporting the results of (1) and (2) above, and including a test plan for FAA certification of the design, an estimate of time and cost to complete FAA certification, and an estimated cost of the repair or replacement of one control surface assuming certification is obtained;
5. Passes a peer review process as determined by a panel of industry experts in consultation with the ABS Air Safety Foundation; and
6. Makes the final report and all results available in open source documents for free use by any firms pursuing FAA Supplemental Type Certificate approval of the design for commercial application.

Individuals or teams using open source information published by others who have previously earned the Structures Engineering Prize are not eligible for the Prize without demonstrating through the peer review process that their design is substantially different, easier to certify and/or is significantly less expensive to produce than other entries.

Deadline for submission of entries for Maciel Engineering Prizes is December 31, 2026.

Notes

This description of the ABS/ASF Maciel Ruddervator Prizes supersedes and nullifies all previous descriptions.

ABS, ABS Air Safety Foundation, et al, assumes no ownership of any data, product or other result of this prize competition, nor any liability for any data, product or service created by prize competitors.

Prizes will be awarded upon successfully meeting all award criteria. No partial prizes will be awarded.

If the winner of an Engineering Prize subsequently qualifies for the STC Prize, the total prize awarded will be the STC Prize amount.

No award for the ABS/ASF Manuel Maciel Structures Engineering Prize will be made after award of the ABS/ASF Manuel Maciel Ruddervator STC Prize. The Engineering Prizes are designed to lead to certification of a commercial kit alternative. Once the STC Prize has been awarded there is no need for additional Engineering Prize awards.

- end -