

## ABS Air Safety Foundation Manuel Maciel Aviation Research Prize

April 30, 2019

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

#### The problem

The grade of magnesium used for ruddervator (pitch/yaw) flight control skinning in Beech Model 35 (V-tail) Bonanzas is very costly and difficult to source. Magnesium corrodes rapidly when exposed to atmosphere, and the need to reskin ruddervators is fairly common—there are currently no approved repairs to even very light damage or corrosion to magnesium ruddervators except for complete control surface reskin. Because of their unique characteristics ruddervators require precise balance and aerodynamic flutter properties. Ruddervators must be kept comparatively light to avoid excessive aircraft tail-heaviness.

#### The challenge

Engineer a replacement skin or complete replacement control surface that meets balance and flutter protection requirements, that does not adversely affect overall aircraft weight and balance, and that uses readily available materials (more readily sourced magnesium, aircraft aluminum, composite and/or modern, long-life fabric covering), at costs comparable to existing control reskin or replacement, while addressing any issue of dissimilar materials interaction.

#### The purpose

The ABS Air Safety Foundation Manuel Maciel Aviation Research Prize is held to spur research and certification of 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.

#### Technical data

Prize participants will use the following technical data and resources:

- FAA Type Certificate A-777 (1947-1956 Beech 35 Series Bonanza)
- FAA Type Certificate 3A15 (as applicable to 1957-1982 Beech 35 Series Bonanza)
- 14 CFR 21 Certification Procedures for Products and Articles
- 14 CFR 23 Airworthiness Standards: Normal Category Airplanes
- 14 CFR 43 Maintenance, Preventive Maintenance, Rebuilding and Alteration
- Textron Aviation (Beechcraft) Maintenance Manuals and Illustrated Parts Catalogs for 1947-1982 35 Series Bonanzas
- Industry accepted data, documents, equipment, tooling and other resources used in aerospace engineering
- Additional resources and equipment as referenced in any of the above sources

#### Funding

The ABS Air Safety Foundation Manuel Maciel Aviation Research Prize is funded by the Manuel Maciel bequest for aviation safety research. Maximum combined prize payout is \$200,000.

## The prizes

### The ABS/ASF Manny 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 or significantly less expensive to produce than other entries.

Deadline for submission of entries for Structures Engineering Prizes is June 1, 2023.

### The ABS/ASF Manny Maciel Ruddervator STC Prize

One prize of \$100,000 to the first commercial enterprise that earns FAA STC approval for ruddervator reskin or replacement valid for all models of Beech Model 35 Bonanza covered by Type Certificate A-777, or all models of Beech Model 35 Bonanza covered by Type Certificate 3A15, or both, across the airplane's existing flight envelope without adversely restricting the airplane's current loading envelope, and has available for purchase at least five complete modifications kits or finished control surface units at a price no more than 20% greater than traditional magnesium skin replacement or complete control surface replacement, as applicable, as available in December 2018.

Deadline for submission of entries for the STC Prize is December 31, 2025.

### Notes

ABS, ABS Air Safety Foundation, et al, assumes no ownership of any data, product or other result of this prize completion, and no 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.