

LEONARDO M-345 TRAINER AIRCRAFT: EASIER INSTALLATION IN LESS TIME WITH DURABLE, LIGHTWEIGHT SEALANTS FOR INCREASED THROUGHPUT

Situation

Operators of the M-345 trainer aircraft needed a durable, lighter weight sealant that can be installed in less time and better protects aircraft structures from corrosion.

Challenge

Leonardo M-345 operators had to periodically re-open most of the fuselage panels in 42 locations for inspection and maintenance. The front windshield, which is the fixed area of the canopy, needed to be replaced due to typical damage from scratches on the transparencies caused by operation or to replace cockpit instrumentation eventually.

Each time the front windshield was re-opened, operators also inspected the polysulfide wet sealants for any leakage. The wet sealant had to be removed each time because it was stuck to the windshield. Repairing or replacing the two-component FIP sealant requires qualified operators, more installation steps that are messy, and extra time for curing. The entire process has to be repeated each time the sealant is repaired or replaced — causing rework, extra labor, delays in getting the aircraft back into service, and replacement costs.



Image courtesy of Leonardo

“GORE® SKYFLEX® Aerospace Materials have simplified our production and maintenance process, considerably reducing the installation and repair time of panels and the windshield. In this way, Gore’s tape has contributed to reducing the cost of ownership of the aircraft.”

**– Diego Tolio, Leonardo Aircraft,
Production Engineering Specialist**

GORE® SKYFLEX® Aerospace Materials

Case Study

Solution

Gore worked closely with Leonardo operators to install GORE® SKYFLEX® Aerospace Tapes, 700 Series, on the windshield prototype, and 42 fuselage panels (Figures 1 and 2). The windshield and panel surfaces were cleaned prior to installation. Gore's dry tape was applied in only 3 steps with no mixing, masking, or curing required. The entire process took approximately 4 hours to complete.

In comparison, it took operators up to 50 hours to complete the entire process using polysulfide wet sealants — including mixing, masking, and applying the wet sealant in 9 steps and waiting for the sealants to cure for at least 24 hours.

Figure 3 shows the cumulative time required to install both dry and wet sealants for multiple panel removals.

During the last panel removal, it took operators 10 hours to replace the polysulfide wet sealant. However, it took operators significantly less time, only 65 minutes, to replace the 700 Series of GORE® SKYFLEX® Aerospace Tapes.

In addition, Gore's 700 Series is more durable and robust to reliably protect against corrosion and chafing on the windshield and fuselage panels whenever they are periodically opened and closed. The lower-density construction of Gore's dry tape used to seal the 42 panels weighs only 0.84 kilograms (kg) in comparison to the estimated quantity of polysulfide wet sealant used for the same area that weighs 1.9 kg. Therefore, Leonardo can save approximately 50% in weight using Gore's 700 Series, which translates to more payload on the M-345.

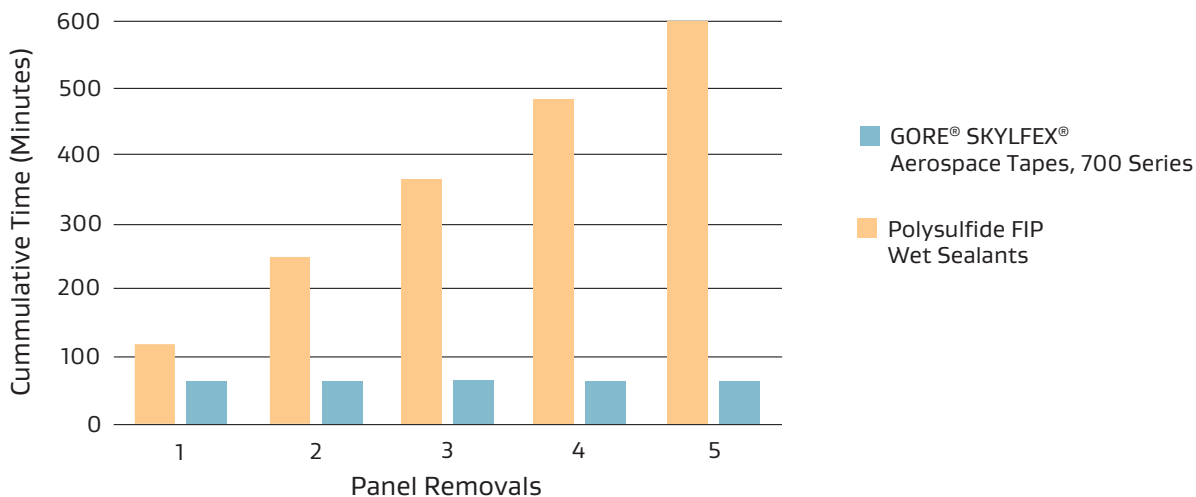


Figure 1: GORE® SKYFLEX® Aerospace Tapes, 700 Series installed on the front fuselage.



Figure 2: GORE® SKYFLEX® Aerospace Tapes, 700 Series installed on the center fuselage.

Figure 3: Comparison of Installation Time per Panel



Conclusion

Installation trials on prototypes of the windshield and fuselage panels using GORE® SKYFLEX® Aerospace Tapes, 700 Series, proved that operators of the Leonardo M-345 aircraft could reduce overall application to only 3 steps compared to polysulfide wet seals that took 9 steps. Also, Leonardo could reduce total installation time to only 4 hours, which is 46 hours less than it took operators to install the wet sealant.

Overall, the trials proved that operators could quickly and easily install Gore's non-curing tapes without any specialized training or certification. In comparison, the polysulfide wet seals had to be installed by qualified operators, and the seals took 24 hours to cure completely. Watch an animation that compares both processes at youtube.com/watch?v=DkQaW9SS10I.

Gore's dry, lightweight tapes also save approximately 50% in weight, which means more payload on the M-345 and improved power-to-weight ratio. Moreover, these tapes are proven to provide durable protection against corrosion and chafing.

All of this translates to easier application, fewer steps, reduced installation time, faster maintenance, increased throughput, more payload, and reduced overall costs. As a result, Leonardo is evaluating the 700 Series of GORE® SKYFLEX® Aerospace Tapes as a reliable alternative to polysulfide FIP wet seals used on other Leonardo aircraft models.

Proven Performance with Diverse Portfolio

Proven by more than 20 years of successful applications, GORE® SKYFLEX® Aerospace Materials solve many sealing and surface protection challenges in civil and defense aircraft. They are available in a variety of form-in-place (FIP) tapes and die-cut gaskets in various sizes. Gore's tapes and gaskets provide design engineers, manufacturers, and operators with many benefits that simplify aircraft assembly, and increase availability and throughput, including:

- reliable and predictable surface protection, sealing and gap filling with highly-conformable materials
- durable protection against mechanical forces, extreme temperatures, aggressive fluids, and other environmental hazards
- supports design goals for manufacturing with dry materials
- easier and faster installation from single-component, non-curing materials
- less replacement and re-work of seals by maintaining performance over multiple open/close cycles for reduced life-cycle costs
- low environmental impact and improved safety with non-hazardous materials
- no operator certification or special handling of materials required



GORE® SKYFLEX® Aerospace Tapes, 700 Series

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