**GORE® SKYFLEX® Aerospace Materials**
Case Study

# AH-64 APACHE HELICOPTERS: EFFECTIVELY SEAL AND PROTECT STRUCTURES TO PREVENT CHAFING DAMAGE WITH RESILIENT TAPES

## Situation

Operators of the AH-64 Apache helicopters at the US Army wanted a durable material that prevents chafing damage caused by the abrasion of the aircraft's panels against the airframe structure during daily operations.

## Challenge

Traditional anti-chafe materials have proven ineffective over time in preventing damage from continuous vibration inherent to rotary wing aircraft. As a result, US Army operators noticed the primer on the tail boom structure was worn away to uncover bare metal, exposing the structure to corrosion. More extensive damage reflects significant chafing and fretting wear requiring maintenance and repair of the helicopter structure (Figures 1 and 2).

## Solution

Working with US Army technicians, Gore engineers applied GORE® SKYFLEX® Aerospace Tapes, 730 Series between the panels and structure of an AH-64 Apache helicopter. First, the structure was cleaned prior to installation. Then, Gore's 730 Series was applied to the upper (PN: 7-311122616-601), middle (PN: 7-3111122622-55), and lower (PN: 7-3111122622-53) rib assemblies. The total preparation time and tape application took approximately 75 minutes (Figures 3 and 4). However, future tape applications should require less installation time.

"Our durable tapes have been proven through tests and operational use to mitigate vibration effects over prolonged intervals. By installing our tapes, the Army can drastically reduce their need to repair or replace aircraft structures. Any operator using GORE® SKYFLEX® Aerospace Tapes in this application is likely to reduce labor, downtime and lifecycle costs for greater aircraft availability."

– Ross Livington, Gore Product Specialist

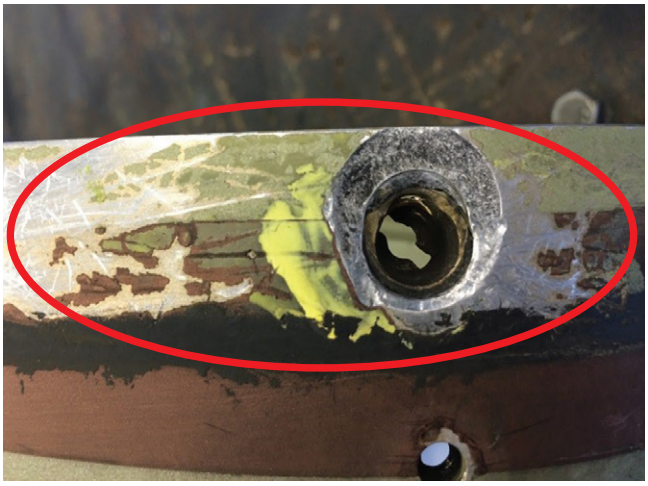

Figure 1: Typical example of chafing damage on tail boom structure around the fastener receptacle.

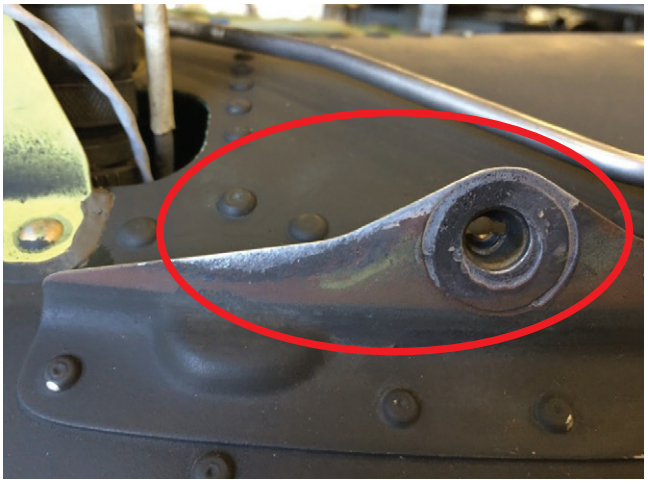

Figure 2: Typical example of fretting damage on tail boom structure around the fastener receptacle.

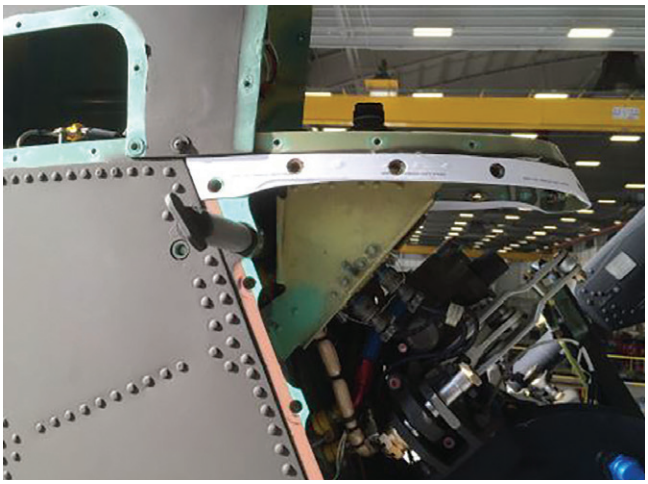

Figure 3: GORE® SKYFLEX® Aerospace Tapes, 730 Series installed on upper rib assembly.

Figure 4: GORE® SKYFLEX® Aerospace Tapes, 730 Series installed on lower rib assembly.

Next, they conducted extensive flight testing through normal operational use. Results showed that Gore's ePTFE (expanded polytetrafluoroethylene) tape effectively sealed and protected the underlying aircraft structure after more than 482 flight hours (Figures 5–7). GORE® SKYFLEX® Aerospace Tapes, 730 Series 2 provided a durable, low-friction barrier that absorbed the effects of continuous vibration, therefore reducing chafing damage in the area surrounding the fastener receptacles and panel attachment interface. Likewise, installing Gore's tapes to comparable airframe structures should deliver similar results.

Figure 5: GORE® SKYFLEX® Aerospace Tapes, 730 Series removed from test aircraft.


Figure 6: GORE® SKYFLEX® Aerospace Tapes, 730 Series installed on test aircraft reveals frictional stress absorbed by material.

Figure 7: No tape installed on control aircraft, reflecting wear on unprotected surface.

## Conclusion

Extensive testing proved how effectively Gore's 730 Series provided a sacrificial protective barrier by reducing friction and protecting the underlying helicopter structure from damage. During normal operational use, damage to the structure is to be expected in some places. However, installing reliable tapes that can withstand mechanical forces such as vibration over a longer period can minimize the effects and prevent chafing damage. Protection can be restored by replacing only the damaged tape areas, leaving the undamaged tape in place, thus providing a more cost-effective solution than structural repair or replacement.

GORE® SKYFLEX® Aerospace Tapes, 730 Series offers the potential to significantly reduce the need to repair or replace structural damage from vibration-related chafing on the AH-64 Apache helicopter. Ultimately reducing labor, aircraft downtime and lifecycle costs.

## 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 military 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, 730 Series

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