



PFR-043 Title: Damaged threads in FGB frangibolt ring

Assembly : Mag Booms	SubAssembly : FGB
Component : Frangibolt ring	
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Failure Occurred During (Check one ✓)

☐ Functional test ☒ Qualification test ☐ S/C Integration ☐ Launch operations

Environment when failure occurred:

☐ Ambient ☒ Vibration ☐ Shock ☐ Acoustic
☐ Thermal ☐ Vacuum ☐ Thermal-Vacuum ☐ EMI/EMC

Problem Description

(In this section it is important to document the specific symptoms which exhibited the problem. In the event we see it happen again, we would like to know as much as possible.)

After completing vibration qualification of the FGB on 3/2/05, the booms were put in thermal vacuum testing on 3/29/05 - 4/1/05. During the hot deploy phase (50C), it was discovered that the FGB boom did not deploy. Inspection found that the titanium frangibolt had lost its preload. Removal of the frangibolt found that it was undamaged but threads in the bronze frangibolt rings had stripped.

Analyses Performed to Determine Cause

(How do we know how the failure happened? Was it a bad part, bad handling, what?)

Sufficient threads (10 -11) had been used to engage the frangibolt (#8). The damage had probably occurred during re-tapping of the threads after extraction of a frangibolt that had become accidentally stuck. The machinist had re-tapped the threads because the threads had to be cleaned up after extraction.

Corrective Action/ Resolution

(How do we fix the unit? And how do we make sure it doesn't happen again?)

The qualification test sequence is modified to include a deployment functional test after vibration and before thermal vacuum testing.

A steel heli-coil was installed in the FGB frangibolt ring. This will be replaced in the future by a phosphor bronze heli-coil.

The FGB boom with the heli-coil in the frangibolt ring was tested in vibration on 4/25/05 (T Tan) at qualification levels. The frangibolt did not lose its preload and there was no damage to the threads in the frangibolt ring.

Acceptance:

MAM: Ron Jackson _____ ; MSE: Ellen Taylor _____

PM: Peter Harvey _____ ; Cognizant Engineer _____

Date of Closure _____