

TLW2170
INTERIM PROGRESS REPORT A
40X X-MARK PRO TRIGGER FRACTURE
40X XMP DAT (S/N: TA#12)
Endurance Testing Measurement / Accidental Impact

DESCRIPTION

A trigger failure occurred during the measurement routine of the endurance testing portion of the DAT for the 40X X-Mark Pro fire-control conducted on March 28, 2007. Trigger assembly #12 (TA#12) was accidentally impacted against the measurement fixture which precipitated a failure of the trigger by fracture. At the time of failure, TA#12 had 500 rounds fired and was being utilized in test firearm A12. The measurements were being conducted by J. Ronkainen (Staff Engineer) using the optical comparator. When the trigger assembly was removed from the fixture, the trigger impacted the T-slot table fixturing of the optical comparator. This impact resulted in the fracture of the trigger. Figure 1 presents an image of the failed trigger assembly.

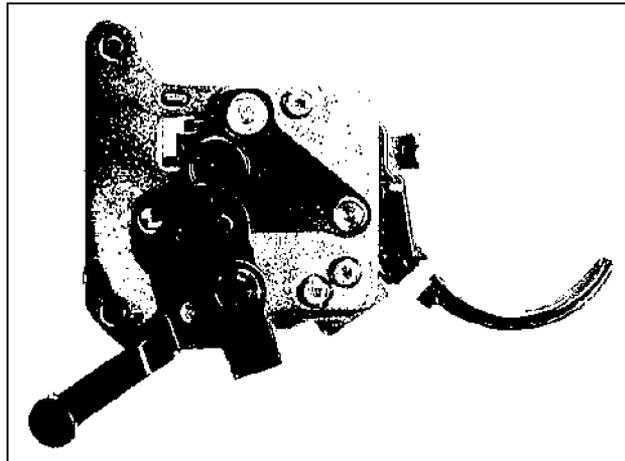


Figure 1. The failed TA#12 test sample.

SUMMARY AND RECOMMENDATIONS

The failure was a result of the impact of the trigger coupled with the geometry of the welded boss on the trigger. The welded boss created a notch that acted as a stress riser, at which the fracture initiated. In the production version, this weld will not be present; instead, the boss will be molded into the MIM trigger geometry without the presence of a notch. It should be noted also that the loading conditions which resulted in the failure are **NOT** typical of normal usage conditions for the trigger assembly. Most likely, this type of impact would not happen in the field due to the presence of the trigger guard on the assembled rifle.

ACTIONS TAKEN

TA#12 was removed from the DAT testing protocol. The DAT test was continued with TA#13 substituted for TA#12 for the remainder of the endurance testing. No other changes are planned for the remainder of the DAT. The failed trigger assembly was returned to J. Ronkainen.

FINDINGS

Figure 2 presents an image of the fracture surface of the trigger bow with the fracture initiation site identified. The fracture initiated at the outside surface of the screw boss at a notch created by the intersection of the weld bead and the trigger adjustment screw boss. Figure 3 presents a side-view image of the failed trigger at the fracture initiation site location. This image provides an illustration of the notch created between the weld bead and the trigger adjustment screw boss. In the production design, the trigger adjustment screw boss will be molded into the trigger geometry and the weld bead will not be required. This will eliminate the potential of a notch existing and minimize any stress risers at this location on the trigger.

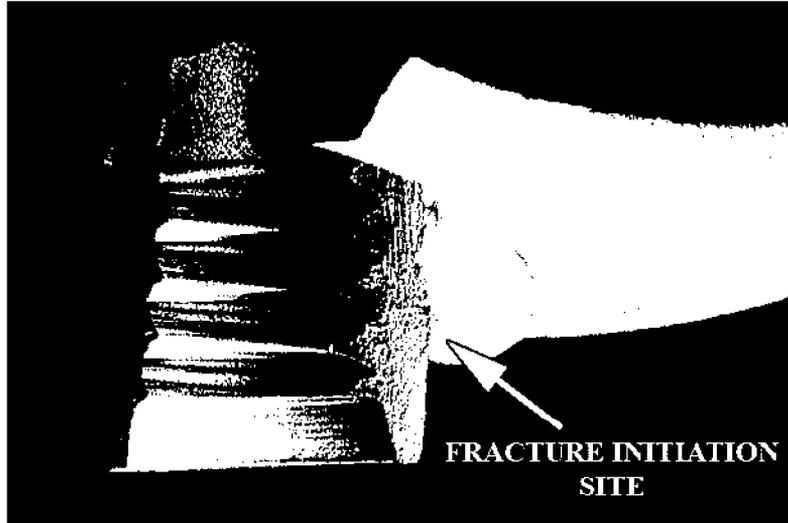


Figure 2. The fracture surface of the failed trigger showing the location of the fracture initiation.

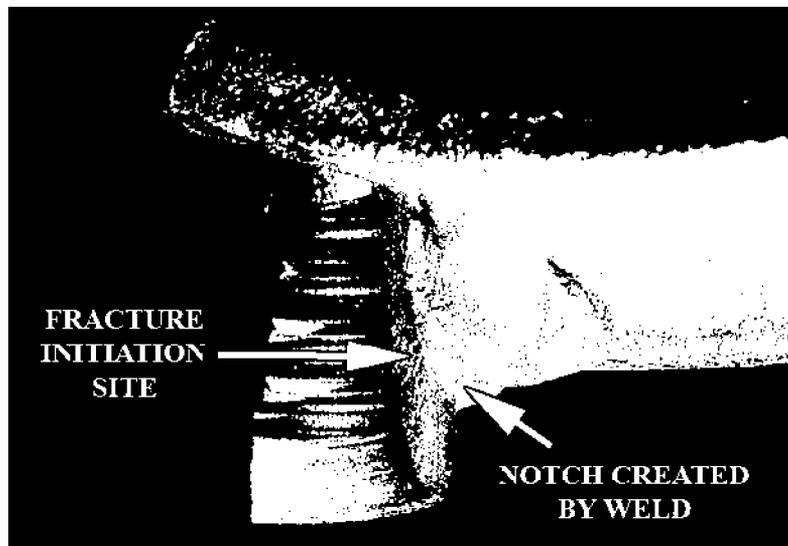


Figure 3. A side-view of the fractured trigger showing the location of the fracture initiation site relative to the notch created between the weld bead and the trigger adjustment screw boss.