

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Materials Laboratory Division
Washington, D.C. 20594



June 30, 2022

MATERIALS LABORATORY FACTUAL REPORT

Report No. 22-048

A. ACCIDENT INFORMATION

Place : Pembroke Pines, FL
Date : December 17, 2020
Vehicle : Socata TB10, N5547Y
NTSB No. : ERA21LA080
Investigator : Timothy Monville (AS-ERA)

B. COMPONENTS EXAMINED

Left and right rear seat belt buckles

C. DETAILS OF THE EXAMINATION

The left and right rear seat belt buckles were submitted after the pilot reported noticing a front seat and rear seat passenger were both still inside the aircraft struggling to get their seatbelts off following the aircraft crash. The aircraft suffered a post-crash fire, and the non-metallic components of the seat belt assemblies were consumed.

Views of the left and right seat belt buckles are shown in Figures 1 and 2, respectively. The left buckle had the link connector (male portion of the assembly) still engaged within the buckle (female portion of the assembly); the right buckle was submitted without an assembled link connector. Both buckles had darkened due to fire exposure and were coated with melted aluminum from the burned aircraft structure.

Because the melted aluminum fused the components of the buckles together, the buckles could not be mechanically manipulated without possible destruction of the internal components. Consequently, the angle at which the link connector became disengaged from the buckle, or the force required to open the buckle could not be reliably measured and compared to specifications.

The overall length, width, and height dimensions of both left and right buckles met the manufacturer's specifications.

The left buckle was x-rayed to examine the internal components. X-ray images of the buckle are shown in Figures 3 and 4. The link connector appeared to align normally with the internal clips (blue dashed circles, Figure 3). The amount of rotation of the link connector within the buckle also appeared normal and would not be expected to interfere with unlatching.

The locking of the link connector to the buckle is accomplished using two internal springs, one torsion spring and one compression spring. The yellow arrows in Figure 3 point to the torsion spring, which was in the correct location and configuration, and appeared undamaged. A closer x-ray at higher power revealed the presence of the compression spring between the cover and the locking dog (yellow arrows, Figure 4), which also appeared undamaged.

In summary, the components of the left rear seat belt buckle appeared to all be present and assembled correctly, with no obvious visual damage. Consequently, there appeared to be nothing mechanically wrong with the buckle or connector link that would have precluded normal unlatching and operation.

Adrienne V. Lamm
Materials Engineer



Figure 1: Macro photos of the left rear seat belt buckle with the link connector still engaged. The views are rotated 90 degrees from each other, top to bottom.



Figure 2: Macro photos of the right rear seat belt buckle that did not have a link connector still engaged. The views are rotated 90 degrees from each other, top to bottom.

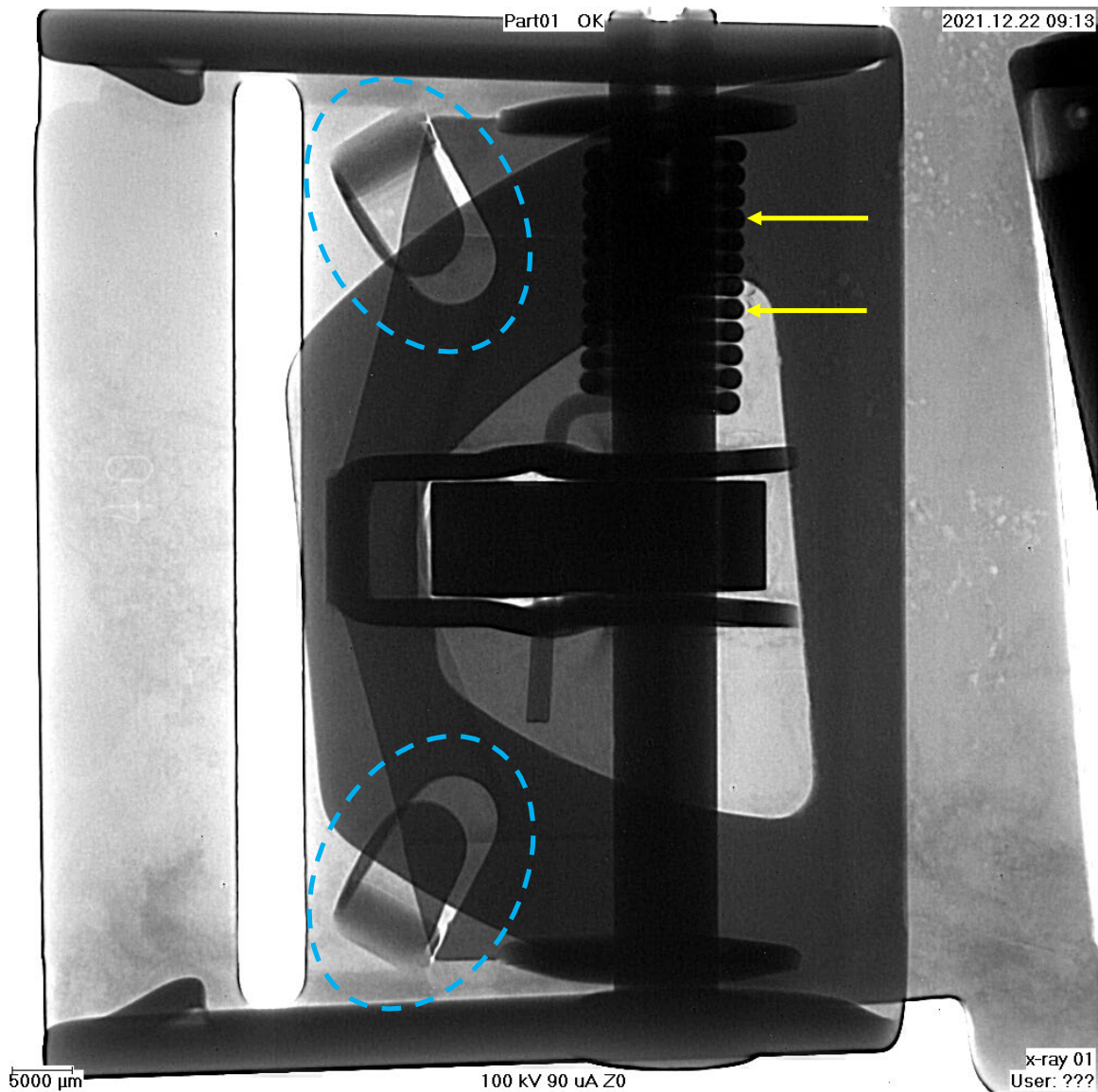


Figure 3: X-ray image showing the left rear seat belt buckle with the link connector still engaged. The blue dashed circles highlight the internal clips. The yellow arrows point to the internal torsion spring.

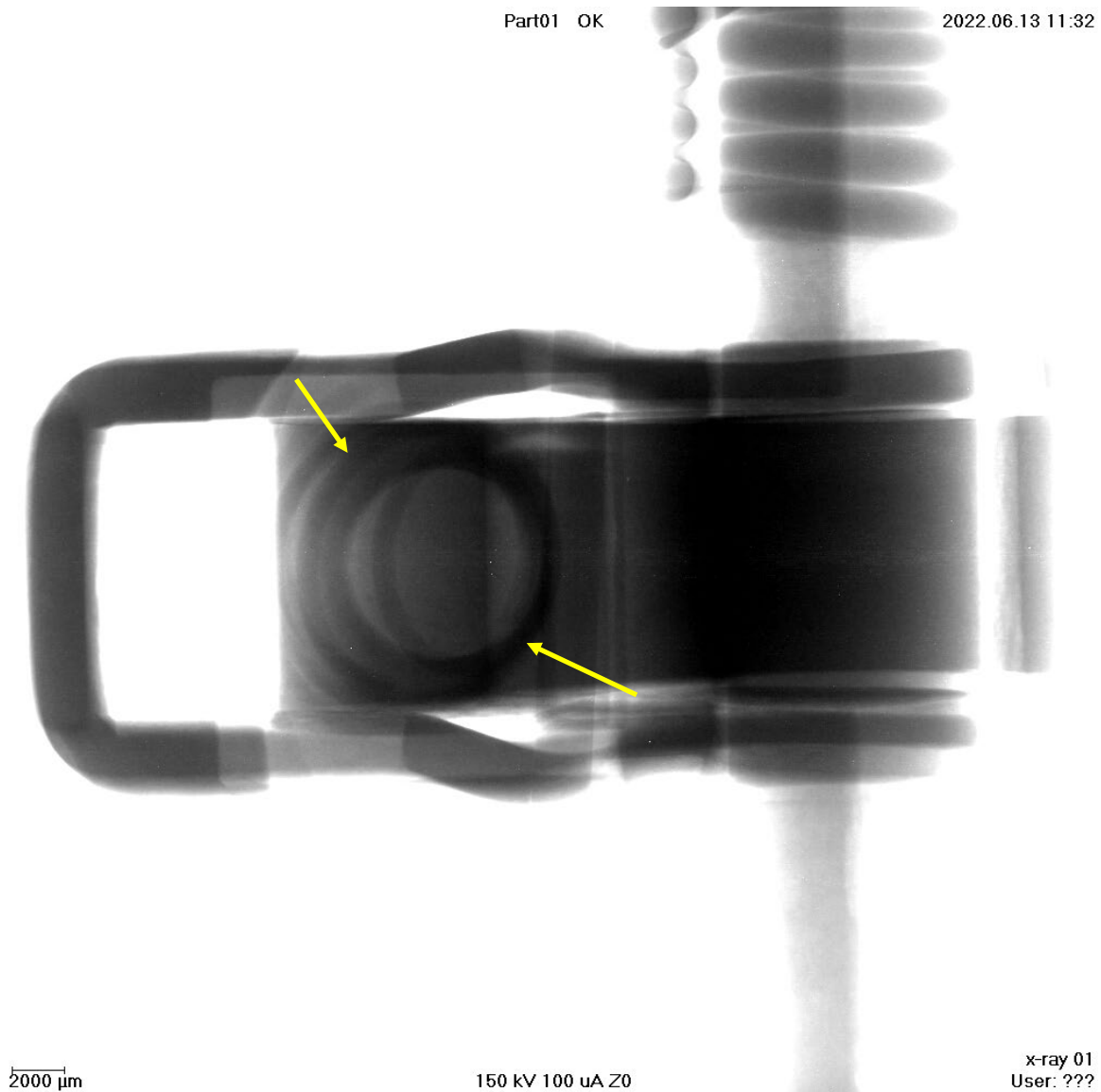


Figure 4: X-ray image showing a close-up of the locking dog in the center of the left rear seat belt buckle. The yellow arrows point to the internal compression spring.