

## Item #7 – Ensure your process for identifying delta FAIs for any change affecting form, fit or function is effective

### Example #1

#### Process Improvement affected Fit, Form and Function

A Boeing supplier, in pursuit of operational efficiency, adopted process changes that amended the sequence in which automated fastening machines drill holes and install fasteners in fuselage skin panel assemblies. The changes implemented violated a specific flagnote on the engineering drawing specifying the order and sequence of drilling determinant assembly holes and installation of the corresponding fasteners. The result was elongated holes being introduced into panel assemblies. As part of the process, fasteners were automatically installed inadvertently concealing the condition. Also contributing to the condition was a misaligned camera on the automated fastening machine which affected the supplier's ability to verify hole position. While performing rework on an unrelated defect, Boeing discovered the elongated condition.



### Summary

The investigation determined that the scope of the escape potentially spanned dozens of aircraft in the Boeing production system resulting in significant disruption to factory operations and rework. The escape also resulted in a formal compliance violation from the FAA to Boeing. In this instance, the supplier failed to perform a detailed analysis of the process changes implemented to determine if a delta or partial FAI was warranted. The supplier also failed to perform a delta FAI to verify hole requirements were met following implementation of the process change thereby assuring that fit, form and/or function were not affected. Had a Delta FAI been performed, the violation of the flagnote requirements would have been identified and corrected within the supplier's QMS.

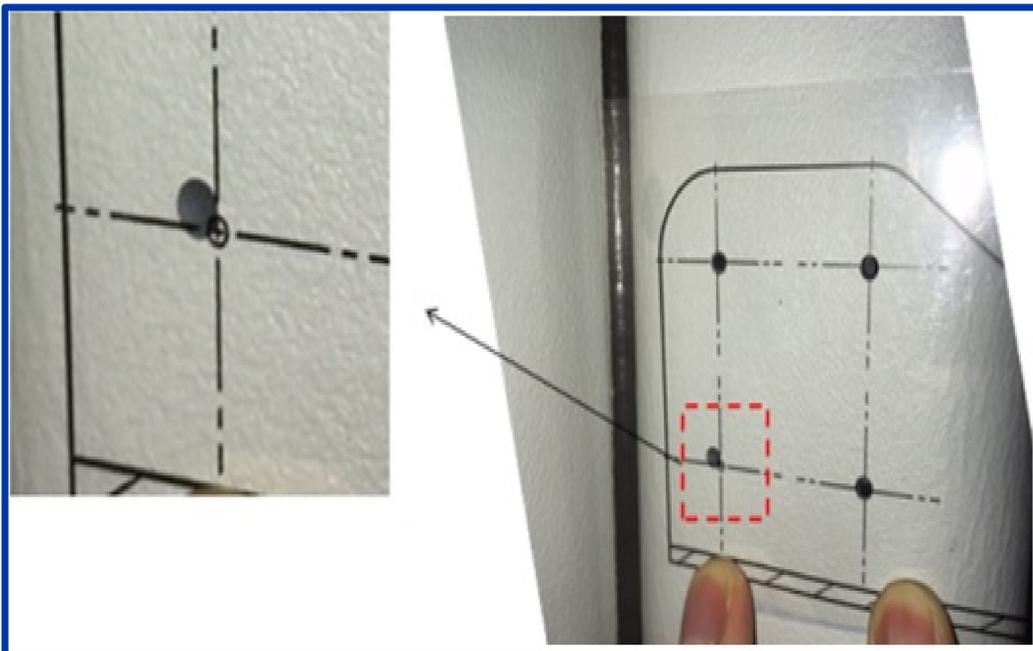
As a result of this escape, the supplier revised not only their processes for evaluating process changes to determine whether a Delta FAI is warranted and it revised its process for conducting Delta FAIs. The supplier also revised several of its ME and CNC Programming related processes to ensure improvement activities are fully analyzed to prevent potential unintended consequences and escapes.

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### Example #2

#### Process Improvement affected Fit, Form and Function

A Boeing sub-tier supplier conducted a FAI for hole location at 1<sup>st</sup> production utilizing a Coordinate Measuring Machine (CMM), and no issue was found. Therefore, the NC program was bought off by the positive FAI result. The NC program was revised at 2<sup>nd</sup> production in order to improve the cutter path during the cutting operation of the part, and a delta FAI was conducted for this NC program revision. There was no finding during the delta FAI. After the sub-tier supplier manufactured parts for several ship sets, they found that one hole which was drilled by a CNC and bought off by the NC program was shifted from nominal location causing deviation with out-of-tolerance hole location. The sub-tier supplier issued a NoE to notify this escapement to the Tier-1 supplier. All affected parts were still under the Tier-1 supplier's QMS, so no NoE was required from the Tier-1 to Boeing. However, this issue caused two line numbers to travel with open nonconformances from the Tier-1 supplier to the Boeing factory requiring rework. The supplier made a decision to scrap 12 shipsets of parts to avoid additional traveled work to the Boeing factory.



### Summary

The investigation determined that the NC program change at the 2<sup>nd</sup> production was done incorrectly. The purpose of the NC program change was only to improve the cutter path, however the NC program was also unintentionally modified changing one of the hole locations.

The key point is to ensure identification of all changes that may have occurred and use this information to define the appropriate delta FAI scope. In addition, there must be in process inspection of the product after the FAI process to ensure product continues to meet the type design.

### What Would You Do?

After reading the examples, consider the following discussion questions. They can be used in a team setting to generate dialogue around the “13 Things” or to help individual employees think about the situation from different perspectives.

1. What would you have done if your supplier failed to perform the delta FAI?
2. Would you have felt comfortable raising your concern with the supplier or management, and if so how would you have approached the situation?
3. What types of resources are available to your suppliers clearly identifying when a delta FAI is required?