

**PREFERRED
RELIABILITY
PRACTICES**

**PRACTICE NO. PT-TE-1433
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APRIL 1996**

MECHANICAL FASTENER INSPECTION SYSTEM

Practice:

Applies a formal Flight Assurance inspection system for mechanical fasteners used in flight hardware and critical applications on ground support equipment (GSE), including all flight hardware/GSE interfaces.

Benefit:

This practice significantly enhances flight reliability by ensuring that mechanical fasteners do not fail during the mission due to inadequate integrity requirements or Quality Control inspection procedures.

GSFC Programs That Use Procedure:

All Flight Programs at GSFC are required to use this practice.

Center to Contact for More Information:

GSFC

Implementation Method:

The mechanical fastener inspection system, defined in detail in Ref. 1, assigns responsibility to specific Quality Assurance individuals assigned to each project team. These individuals are responsible for ensuring that the various steps, provisions, requirements, and procedures defined by the inspection system are appropriately complied with including review of fastener procurement documentation, monitoring of inspections and tests, reporting, and problem resolution.

Specification, Ref. 2, defines the fastener integrity requirements for all fasteners used in flight hardware and for critical nuts and bolts used on ground support equipment, including all flight hardware/GSE interfaces. This specification includes specific requirements for material selection, audit of manufacturers and approval of their products, material test reports, and traceability. Quality Assurance Provisions include screening inspections and testing, visual inspections, tensile testing, nondestructive evaluation, dimensional inspection, and hardness and proof testing. The fastener inspection system ensures that the requirements of this specification are appropriately applied in the procurement of fasteners by each project by

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requiring that the Flight Assurance Manager or his/her designee review and approve all fastener procurements in accordance with Ref. 2.

Fasteners, along with their vendor test and inspection reports, are delivered to the Assurance Management Representative, (AMR) assigned to the specific project. The project Cognizant Engineer, (CE) originates a work request for incoming inspection by a contractor operated inspection facility, (Lanham Inspection Facility) and also generates a Certification Log in accordance with Ref. 3. He also forms a Certification Log package by attaching appropriate vendor test and inspection reports and data to the Certification Log. The AMR reviews the Certification Log package and the work request and forwards this documentation and the fasteners to the Lanham Inspection Facility for inspection in accordance with a Fastener Inspection Test Plan, Ref. 4. All fasteners are identified as acceptable/rejectable in accordance with the Certification Log. Fasteners that exhibit nonconformance are tagged and impounded until they are dispositioned by the CE in accordance with the Problem Record, Ref. 5. On occasion, the Material Review Board will disposition discrepant fasteners and initiate corrective action to resolve nonconformance issues that can not be dispositioned by the CE in accordance with Ref. 5. Upon completion of the fastener inspection/test by the Lanham Inspection facility, the Lanham inspector completes the Certification Log which includes all inspection reports and pertinent data associated with the inspection. The Certification Log and the fasteners are returned to the AMR for review. The AMR returns the conforming fasteners to the CE. Figure 1 is a flow diagram of the Fastener Inspection System.

Technical Rationale:

The integrity of fasteners is a significant element in the reliable operation of flight hardware. The high reliability required of fasteners is dependent upon appropriate procurement documentation and acceptance inspection and testing procedures. Impact of Nonpractice: Inadequate procedures in the procurement and acceptance of fasteners could permit the use of inappropriate or defective fasteners in flight hardware and result in mission failure.

References:

- 1) - Fastener Inspection- GSFC Doc. No. P-303-625
- 2) - GSFC Fastener Integrity Requirements- S-313-100
- 3) - The GSFC Certification Log- FAP P-303-820
- 4) - Fastener Inspection/Test Plan- GSFC Doc. No. FAP P-303-626
- 5) - Problem Record Items - GSFC Doc. No. FAP-303-845 NASA

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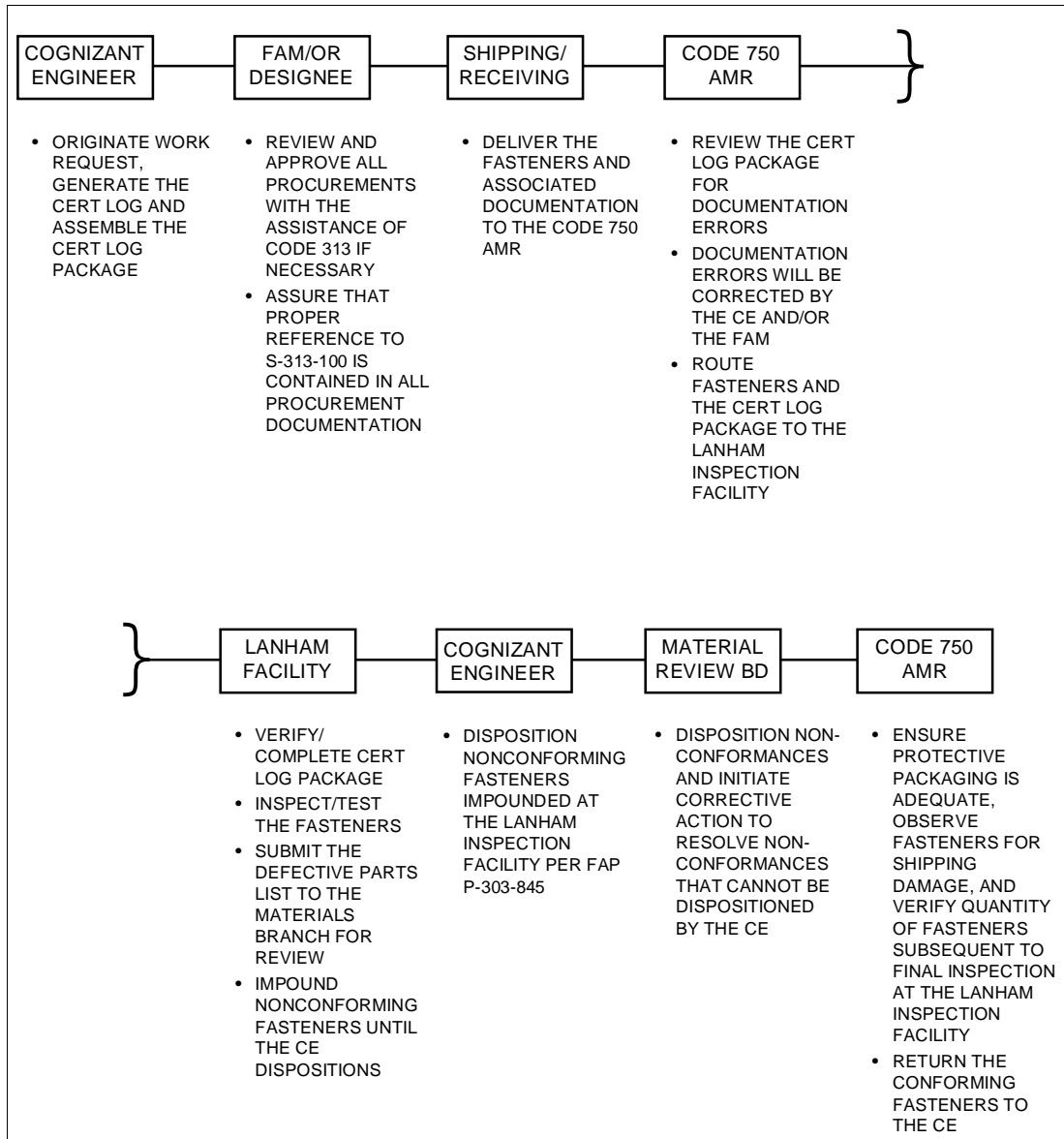


Figure 1: Fastener Inspection Flow Chart