

Landing Gear SOW Quality Requirements

Quality Assurance

General Requirements

The Contractor shall be a FAA approved repair station with appropriate rating to perform overhaul of Heavy Landing Gear and have implemented a Quality Management System that meets the intent of the requirements of International Aerospace Quality Standard AS 9100.

Prior to contract award the government shall perform a Quality Management System Audit to verify AS 9100 compliance to the standard.

Quality Forms

The Contractor shall comply Procurement Quality Requirements, dated September 2011, see attachment 3-8.

Contractor Quality Assurance Plan/Manual

Contractor shall submit their Quality Plan/Manual with their proposal.

The QA manual/plan shall identify the supplier's management, policies, standard practices, job instructions, and work instructions. The manual shall describe requirements for quality, including failure reporting, throughout all areas of contract performance, including fabrication, processing, assembly, inspection, test, packaging, storage, and shipping. The manual shall detail the complete flow of material from receipt to final shipment and may include flowcharts if available. If workmanship standards and/or manufacturing process differences exist between flight and non-flight hardware, the Quality Manual shall clearly identify these differences.

Documentation

The Contractor shall ensure the generation and delivery of all documentation as called for in this Contract.

In addition to that documentation specifically called for in the Contract, upon request by the NASA COTR, the Contractor shall make available a copy of any document or data generated during this contract performance for review by the NASA at either the Contractor's facility or via the internet. This includes, but is not limited to, technical reports and memorandums, tooling drawings, studies, analyses, parts and materials data, test data.

Pre-Ship Review (PSR)

The Contractor shall hold a Pre-Ship Review at the Contractor's plant at the completion of verification tests by NASA and prior to shipment of the hardware to NASA. A PSR shall be held prior to the delivery of each hardware item. Any differences between the hardware to be delivered and the drawings or specifications shall be listed and acceptance justifications presented. All discrepancy report documentation is to be discussed and included as part of the Data Delivery Package (described below).

Landing Gear SOW Quality Requirements

At the time of the PSR, documents and analysis to support satisfaction of the requirements of this SOW for the hardware being delivered shall be complete and all actions from previous reviews for the hardware being delivered shall be closed.

A Data Delivery Package shall be presented for review at each PSR. The Contractor shall deliver objective evidence with the hardware, showing product assurance acceptance of in-process workmanship processes, and final inspection. The Contractor shall implement all corrective actions necessary to remedy, before final acceptance, any nonconformance with respect to this SOW or the specifications noted on the design drawings. A government source inspection shall be required prior to shipment. NASA shall have final approval authority over all tests, verification, and documentation.#

Data Delivery Package

The Data Delivery Package (DDP) is the primary quality record that documents the hardware deliverables were manufactured from specified materials, using specified processes, and meet the physical requirements of the drawing package. The DDPs shall be made available for review at the pre-ship review for each of the different hardware deliverables. A DDP is required for each assembly as well as each manufactured component within the assembly as each item progresses through the manufacturing process. At the time of assembly, the component level DDPs are combined with the Assembly DDP. These documents shall be maintained at all times and made available upon request by NASA Quality representatives. The DDP package shall be comprised of, but not limited to, the following data:

- Final Drawing Package- includes drawings and part lists updated to the current revision, rework instructions, change orders, and discrepancy reports, if any. NASA will be responsible for updating any drawings and the Contractor shall be responsible for updating parts lists.
- Tooling drawings and Tooling Inspection Reports
- Manufacturing Process Traveler (see paragraph 3.2.2) - includes inspection sign-off for each process step.
- Non-Conformance Reports (NCRs) - includes disposition status
- Material Data Package – includes List of Materials with Lot Numbers, Expiration Dates (when applicable), Certificates of Compliance (C of C), Material Test Reports and FAA Forms 8130 for all components .
- Dimensional Inspection Reports and Completed Travelers – stamped/signed quality control document including inspection.
- Open Items List - documents reason for item(s) being open and proposed closure date
- Life Limited Components List
- A complete list of all Airworthiness Directives, Service Bulletins, and Service Letters Embodied.
- Submittals to Boeing with Boeing Response (if applicable).

Surveillance of the Contractor

The work activities and operations of the Contractor, Subcontractors, and suppliers are subject to evaluation, review, survey, and inspection by NASA/COTR and representative(s).

The Contractor shall provide the NASA representative(s) with documents, records, and access to workings areas within the Contractor facilities that are required by the representative to perform the overview activities.

Landing Gear SOW Quality Requirements

Government Source Inspection

The Government may elect to perform inspections at a supplier's plant. The following statement shall be included on all procurement documents: "All work on this order is subject to inspection and test by the Government at any time and place".

The Government quality representative who has been delegated NASA quality assurance functions on this procurement shall be notified immediately upon Contractor receipt of any supplier or Subcontractor orders. The Government representative shall also be notified 14 days in advance of the time that articles or materials are ready for inspection or test.

Contractor Source Inspection

The Contractor shall ensure that its procurement documents impose the applicable requirements on subcontractors and other suppliers. The Subcontractor and other suppliers shall in turn impose the requirements on their procurement sources.

The Contractor shall perform source inspection at the Subcontractor's or supplier's facilities in accordance with the contract or subcontract documentation or when one or more of the following conditions exist:

- In process, end item controls, or tests that are destructive in nature prevent the Contractor from verifying quality after delivery to the Contractor's facility.
- It is not feasible or economical for the Contractor to determine the quality of procured articles solely by inspections or tests performed at the Contractor's facility.
- Qualification tests are to be performed by the Subcontractor or supplier.
- Products are shipped directly from the source to NASA, by-passing the Contractor's inspection facilities.

Notification of Government Mandatory Inspection Points (GMIP'S)

The Contractor shall notify the SOFIA Quality at least fourteen (14) calendar days in advance of all mandatory hardware inspections, test activities, and deliveries at either the Contractor's or a Subcontractor's facility to allow timely participation by the NASA Quality Assurance personnel.

The NASA/COTR or representatives will perform the following MIPs listed below. The government may request additional MIPs if a specific process prohibits inspection at a later time or if the Contractor proposes a new process or specification.

- Pre-Ship Inspection / Data Review

NASA reserves the right, after review of the Contractor's planned inspection points, to add mandatory inspection points to the manufacture of the composite structure.

Configuration Management

The Contractor's Configuration Management (CM) system (available for review on request) shall control the design and hardware by means of drawings, specifications, and other documents and shall ensure all applicable changes are reviewed in a systematic manner to determine the validity and impact on performance, schedule and cost.

Landing Gear SOW Quality Requirements

Any flight item that is found to be non-compliant with the quality, workmanship and performance requirements of the contract shall be disposition via a waiver or deviation, unless the affected item is reworked to restore compliance or is replaced with a fully compliant item. The Contractor shall submit waivers and deviations to the COTR for final approval.

Contractor QA activities shall be defined in the Configuration Management Plan and described in detail in the QA Plan.

Part numbering and a traveler system shall be proposed.

Nonconformance Reporting

All hardware non-conformances shall be reported to the NASA/COTR and SOFIA Lead Quality Assurance Specialist. They shall be notified within 24 hours of each non-conformance.

The Contractor's processes for review, disposition and approval of non-conformances shall be described in their quality plan/manual or provided as a supplement document. The contractor is not granted MRB authority. No repair, use-as-is, or scrap shall be done without written NASA approval.

These processes shall ensure that positive corrective action has been taken to preclude recurrence and that appropriate audits and tests are performed to verify the implementation of the corrective action.

For each reported nonconformance, there shall be a report that documents the investigation and engineering analysis needed to determine the cause and corrective actions to disposition the nonconformance, and identify any closed problem reports that do not have a definitive cause or corrective action. Reports shall be submitted to the NASA/COTR and SOFIA QA for review and approval of the disposition. The supplier shall establish and maintain documented procedures to ensure products or components that do not conform to specific requirements are prevented from unintended use or installation. This control shall provide for identification, documentation, evaluation, segregation (when practical), disposition of nonconforming product, and for notification to the functions concerned.

Hardware Handling, Cleaning and Packaging

Qualified personnel working in accordance with approved procedures that address cleaning, handling, packaging, tent enclosures, shipping containers, bagging, and purging shall perform the handling of flight hardware. Compatible packaging shall be selected so that hardware is not contaminated or otherwise degraded during shipping or storage. All personnel working on flight hardware shall be certified as having completed the required training and competency certifications prior to handling any flight hardware.

Products shall be stored, preserved, marked, labeled, packaged, and packed to prevent loss of marking, deterioration, contamination, excessive condensation and moisture, or damage during all phases of the program. Stored and stocked items shall be controlled in accordance with documented procedures and be subject to quality audit. A certification log or traveler with all data from the assembly to delivery shall be delivered as part of Deliverable Items List and Schedule package. The material certifications shall also be a part of the Deliverable Items List and Schedule.

Landing Gear SOW Quality Requirements

The completed assemblies shall be marked in accordance with MIL-STD-130, and shall include but not be limited to the following:

- 1) Vendor Part Number
- 2) Vendor Name
- 3) Vendor Serial Number
- 4) Contract Number
- 5) Unit Name
- 6) Weight

Shipping

Contractor is responsible for providing an acceptable shipping container that protects the hardware appropriately for all environments the hardware may encounter.

By executing the act of product shipment, the Contractor certifies that the product complies with all contract requirements. Prior to shipping, contractor Quality Assurance personnel shall ensure that:

- Fabrication, inspection, and test operations have been completed and accepted.
- All products are identified and marked in accordance with requirements.
- The accompanying documentation (Contractor's shipping and property accountability form) has been reviewed for completeness, identification, and quality approvals.
- Evidence exists that preservation and packaging are in compliance with requirements.
- Packaging and marking of products, as a minimum comply with Interstate Commerce Commission rules and regulations and are adequate to ensure safe arrival and ready identification at their destinations.
- The loading and transporting methods are in compliance with those designated in the shipping documents.
- Integrity seals are on shipping containers and externally observable shock or humidity monitors do not show excessive environmental exposure.
- In the event of unscheduled removal of a product from its container, the extent of re-inspection and retest shall be as authorized by NASA or its representative.
- Special handling instructions for receiving activities, including observation and recording requirements for shipping-environment monitors are provided where appropriate.

The Contractor's quality assurance organization shall verify prior to shipment that the above requirements have been met and shall sign off appropriate shipping documents to provide evidence of this verification. The Contractor shall ship Freight On Board (F.O.B.) Destination. The Contractor has the responsibility for any damage incurred during shipment.

GIDEP Alerts and Problem Advisories

Contractors shall keep sufficient selection and usage records for all flight parts, assemblies and materials adequate to determine applicability of any issued Government Industry Data Exchange Program (GIDEP) alerts relevant to items used on the project. The Contractor shall review and disposition all GIDEP Alerts for relevancy and impact. In addition, the Contractor shall review and disposition any NASA Alerts and Advisories provided to the Contractor by the NASA/COTR or designee. Alert applicability, impact, and corrective actions shall be documented and status provided to the NASA/COTR on a monthly basis.

Landing Gear SOW Quality Requirements

Materials Procurement Requirements

Raw materials purchased by the Contractor and its subcontractors shall be accompanied by a Certificate of Compliance and, where applicable, the results of nondestructive, chemical and physical tests. This information shall be made available to the NASA/COTR for review. Materials used shall be bought according the drawing package specifications. The government shall approve any deviations of material types.

Process Selection Requirements

Manufacturing processes shall be carefully selected to preclude unacceptable material property changes during exposure to flight environments that could cause adverse effects to the material and/or to the intended applications. Materials and manufacturing process information shall be provided on the material list.