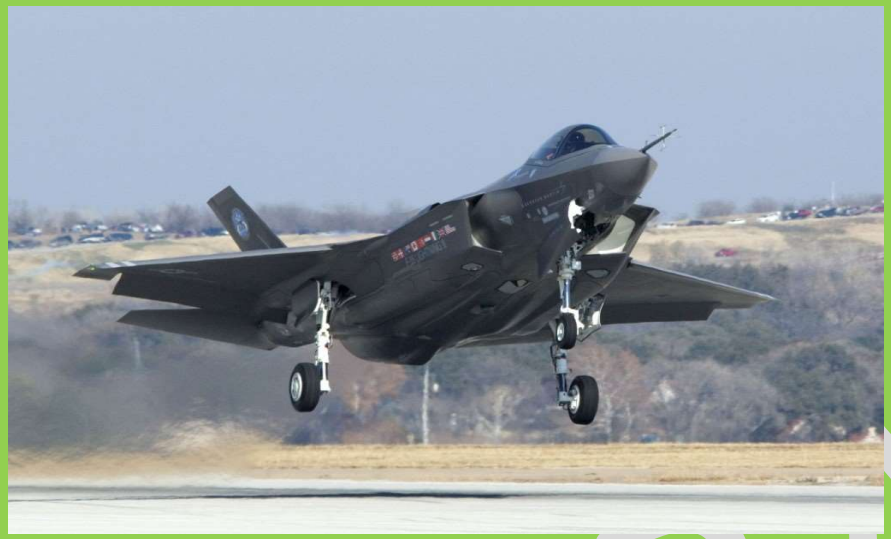
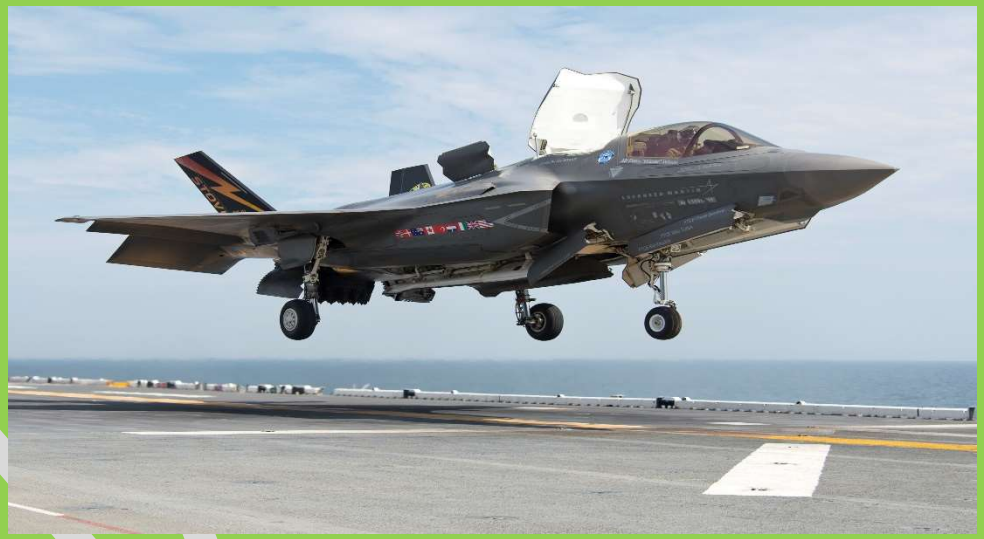
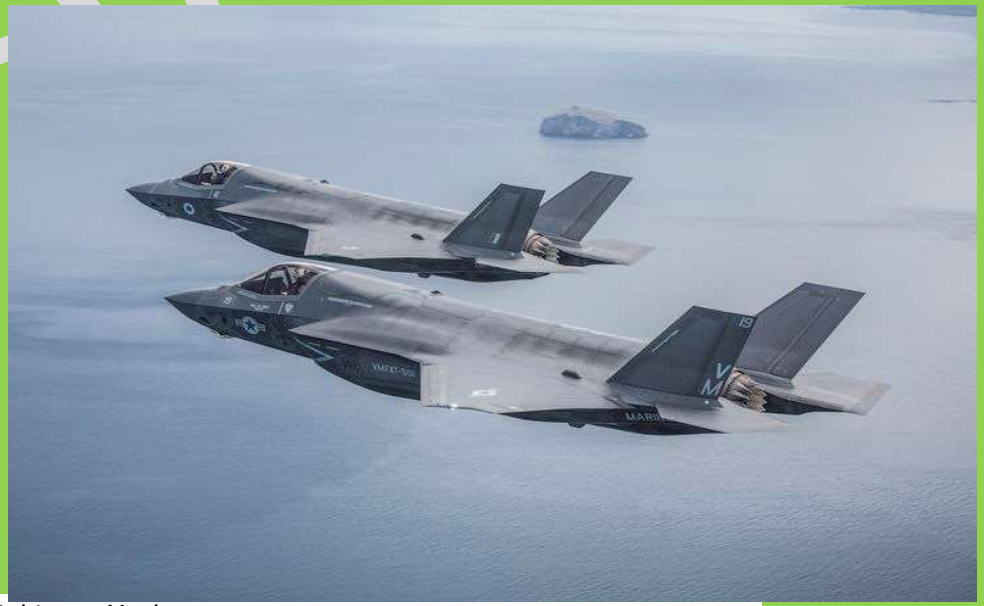
2020 Supplier Quality – Requirements Overview

[rev 08-26-2020]

NMG AEROSPACE







Our Guiding Values

integrity • commitment • partnership • teamwork • innovation
respect • continuous improvement

Preface Notes

- This presentation provides a summary of many of the <u>more important</u> quality requirements.
- This presentation does NOT reference , summarize, or discuss all possible requirements associated with a PO issued to a supplier.
- A thorough contract review by supplier is needed.
  - Referenced documents
  - Technical specifications
  - Determine the specific relevancy to the product/service.

Supplier Quality Requirements

Content Overview

- NMG - **QP-7.4.1-003** Quality Procurement Requirements
- Raytheon/United Technologies/Collins Landing Systems –
  - **ASQR-01** Supplier Quality System Requirements
  - **COL-ASQR-PRO-0003** Supplier Quality Requirements
  - **LS-SBU-A001 SQA** LS Supplier and Product Quality Requirements
  - **LS-SBU-A002** SQA First Article Inspection Supplier Instructions
  - **LS-SBU-A004-SQA** LS Manufacturing Plan Review and Approval

Content Overview

- Other NMG Customer quality requirements references
- MPS – Manufacturing Planning & Use of Approved Processors
- FOD – Handling/Corrosion Control
- FAI – Required fields
- Product Identification
- Nonconforming Material – MRB & Disclosures
- Quality Alerts
- Engineering Change Proposal Requests (ECPR)
- Records of Manufacturing

NMG Aerospace

QP-7.4.1-003

Quality Procurement Requirements

NMG Aerospace QP-7.4.1-003

Purpose

- Defines and explains quality requirements for supplier and supplier's sub-tiers on product/process purchased by NMG Aerospace. Includes –
  - NMG customer requirements
  - NMG quality requirements
  - Industry requirements

NMG Aerospace QP-7.4.1-003

Scope

- Invoked by direct reference on the PO to suppliers.
  - Comply with the applicable requirements.
  - Flow down the applicable requirements to sub-tier suppliers and processors.
  - In the event of a possible conflict with requirements, notify NMG.
  - Deviation from an applicable requirement is not permitted unless specifically authorized in writing by **NMG Director or Quality Manager.**
  - When PO specifies **LS-SBU-A001-SQA** refer to Appendix A and Appendix B for Collins specific requirements.
  - Caution – latest version of referenced documents applies.

Applicable Documents

- AS9100, Quality Management Systems
- AS9102, Aerospace First Article Inspection Requirements
- Air Cruisers - QSP-605, Supplier certification program
- Boeing D6-51991 Quality Assurance Standard for Digital Product Definition
- Heroux Devtek – HPS-010 Quality Assurance Requirements for Suppliers
- Honeywell SPOC
- Safran/Messier-Bugatti-Dowty –Pride Manual SCREQ001
- Safran – GRP-0087
- AS9146, Foreign Objective Damage (FOD) Prevention Program
- NAS 412 Foreign Objective Damage/Foreign Object Debris (FOD) Prevention

Applicable Documents, cont'd

- UTC (Collins) ASQR-01 Aerospace Supplier Quality Requirements
- Collins COL-ASQR-PRO-0003, Supplier Quality Requirements
- Collins LS-SBU-A001-SQA, LS Supplier and Product Quality Requirements
- Collins LS-SBU-A002-SQA, First Article Inspection Supplier Requirements
- Collins LS-SBU-A004-SQA Manufacturing Plan Review and Approval
- Collins Colorado Springs, Procedure 1.6.1.8, Quality Purchase Codes
- Collins Interiors evacuation systems A9000
- Collins Cargo MP-1004
- Collins SIS MSD 601, Quality Requirements for Suppliers
- Zodiac/Aerazur-IGQ 20022 General quality instructions
- QFRM 8.3-001 Request for Deviation Waiver

NMG Aerospace QP-7.4.1-003

Process

- **Acceptance Authority Media** (record the status of tasks/operations)
  - Processes are accomplished prior to signing the process. documentation ("stamp/sign as you go"), includes electronic signing.
  - Processes are performed by those that are qualified/trained.
  - Documentation is complete and corrected per industry standards
  - Stamps used to indicate product acceptance are controlled to prevent unintended/unapproved usage.
  - Staff is trained on the above criteria

Certificate of Conformance (C of C)

- Must accompany all materials/products shipped to NMG. As a minimum, the certificate must include:
  - NMG Aerospace purchase order number
  - Part number and revision level
  - Quantity, Lot/batch number; Serial number(s), when applicable
  - Shelf Life, when applicable
  - Statement certifying compliance with the PO/drawing/specification.
  - Statement that the applicable chemical/physical and/or mechanical test data is on file and available for review by NMG and NMG customer.
  - Reference to approved DMR's/Waivers/Deviations, etc., when applicable.
  - Signature, date and title of the seller's responsible representative.

Acceptance Test Reports

- Acceptance test reports shall be maintained per record retention requirements and provided to NMG Aerospace upon request or as specified below.
- **Special Processor:** Each shipment must include one (1) legible and reproducible copy of a certificate showing each process performed The certificate(s) shall include the name and current revision level of the process, the specification to which it conforms, the signature and title of an authorized representative of the seller. When parts are serialized, serial numbers must appear on the certification.
- **Certification of x-ray** - All parts requiring radiographic certification will be submitted to a NMG Aerospace and processed in accordance with applicable NMG Aerospace and Government specifications and standards. The x-ray film and one (1) legible and reproducible copy of the report must accompany the material. When parts are serialized, serial numbers must appear on the certification and x-ray film.
- **Raw Material Analysis**- Raw Material orders require chemical and physical analysis for all raw materials used in the manufacturing of this product. Acceptance of raw material(s) utilizing "Typical Analysis Report" will only be accepted if the report specifies the lot, batch, heat, mill, and name of the producer.
- **Synthetic Rubber Components and Raw Material** - Each package of synthetic rubber components shall be marked with date of cure, part number, quantity, compound number, and manufacturer's identification (if different from part number). Date of cure on O-rings shipped to NMG Aerospace shall not be older than is permissible under Bulletin SAE-ARP5316. Synthetic rubber raw materials shall be identified with date of cure, compound, and manufacturer's name.
- **Hazardous Material**-Certification and appropriate data sheets defining chemical composition, safety and health hazards, first-aid measures and storage requirements for materials supplied with this order shall be forwarded to the buyer at a minimum of three (3) days prior to delivery and accompany shipment. FAR 52.223-3.

Communication

- All communication regarding any Purchase Order from NMC shall flow through suppliers assigned NMC Supply Chain Representative and/or NMC Supplier Quality. At no time "unless formally instructed by NMC in advance" shall any supplier contact NMG's customer regarding any work covered by an NMC Purchase Order. If NMG's customer contacts the supplier regarding any work covered by an NMC Purchase Order, NMC shall be notified immediately.
- **Competence:** Supplier employees will have the required competence and training to consistently provide quality products/services. The supplier will identify required training/competence of employees and assure requirements are met. Inspectors will be trained in metrology and GD&T as required.
- **Foreign Object Debris/Damage**
  - Supplier will maintain a FOD program that is compliant with NAS 412 Foreign Object Damage / Foreign Object Debris (FOD) Prevention.
- **Identification and Traceability Product:**
  - The **parts must be identified with a lot/serial number and date of manufacture**. The traceability number must be on the shipping paperwork and traceable back to supplier's production and product conformity.
  - The supplier shall retain evidence to document that items furnished under this contract conform to contract requirements. Evidence will generally include information tracing the items back to the manufacturing source or its authorized distributor. At a minimum, evidence shall be sufficient to establish the identity of the item, its manufacturing source, and conformance to the item description. Documentation will be kept indefinitely.

Counterfeit Goods

Counterfeit Goods are defined as goods or components that:

- Are an unauthorized copies or substitute of an Original Equipment Manufacturer (OEM) item.
- Are not traceable to an OEM sufficient to ensure authenticity in OEM design and manufacture.
- Do not contain proper external or internal materials or components required by the OEM or not constructed in accordance with OEM design.
- Have been reworked, remarked, relabeled, repaired, refurbished, or otherwise modified from OEM design but not disclosed as such or are represented as OEM authentic or new.
- Have not passed all OEM required testing, verification, screening, and quality control processes.
- NMG Aerospace suppliers/sub-suppliers will take appropriate measures to prevent the delivery of goods containing counterfeit parts/components or materials including:
- For parts/components, ensure procurement from:
  - the OEM
  - OEM authorized supplier (must have OEM cert)
  - customer directed source
  - supplier that can provide:
    - OEM certs
    - Sufficient records providing unbroken supply chain traceability to the OEM
    - Test and inspection records demonstrating the item's authenticity.
    - Note: Material certs will be available for all parts/components. Supplier is responsible for verifying chemistry of material certs.
- For raw material, verification to requirements provided on the material certs.
- For Commercial off the Shelf (COTS), verification to requirements on the Certificate of Conformance.
- If NMG Aerospace suppliers and/or sub-suppliers become aware of counterfeit goods, Control of Non-Conforming Material Procedure will be followed including potential disclosure to the customer.

First Article Inspection

- First article inspection (FAI) shall be completed and maintained by the supplier per current revision of AS 9102. *The supplier shall perform a full FAI or partial (Delta) for affected characteristics, when any of the following occur:*
  - 1st production runs for the NMG part (Full FAI required).
  - *A change in design characteristics affecting form, fit or function.*
  - *A change in manufacturing source(s), process(es), inspection method(s), location of manufacture, tooling,, or materials that can potentially affect form, fit or function.*
  - *(ie – location of manufacture change, NMC specified sub-tier supplier change). (Delta FAI may be acceptable).*
  - *A change in numerical control program or translation to another media that can potentially affect form, fit or function.*
  - *A natural or man-made event, which may adversely affect the manufacture process.*
  - *An implementation of corrective action required to complete previous FAI, as described in AS9102, section 4.4.*
  - *A lapse in production for two years shall require an update for any characteristics that may be impacted by the inactivity. This lapse is from the completion of last production operation to the actual restart of production.*

Material Review Board (MRB) / Nonconforming Material Disposition Authority:

- The supplier may disposition any product where they are the design authority except the top level part where NMG or NMG's customer requires approval.
- Supplier may disposition nonconforming material as "scrap" for supplier owned materials without NMG Aerospace approval.
- Supplier may disposition nonconforming material "rework to print" within normal process controls prior to outside processing without NMG Aerospace approval unless product is governed by Customer specifications (DOC 300, Pride Manual, etc.).
- Any nonconformance to a build to print design that cannot be eliminated and brought back into conformance to NMG Aerospace/customer design shall be presented to NMG Aerospace for approval (i.e. "use as is" or "repair") **prior to shipment**.
- Suppliers cannot deviate from P.O. without NMG approval. A Request for Deviation/Waiver (QFRM 8.3-001) must be submitted to NMG Engineering via the NMG Buyer within 24 hours of first awareness of a nonconforming condition.

Non-conforming Product

- Scrap dispositions apply only to supplier supplied product.
  - When replacement of product is necessary to fulfill the deliverable quantity on lot-controlled items, such replacements must come from the same material lot, batch or heat lot, as applicable.
  - If the scrap disposition renders the deliverable quantity short, then promptly notify NMG buyer.
- Notify NMG Aerospace promptly **(within 24 hours)** upon discovery of nonconformity that may affect product already delivered.
  - Include a clear description of the nonconformity, PNs affected, Serial Number(s), lot number(s) or manufacturing date(s), quantity, and delivery date(s).
  - Support NMG Aerospace with additional data, and product if necessary, per contract, to resolve customer concerns.

Part Packaging and Preservation

- Parts must be packaged, stored and shipped in a manner to prevent damage and preserves product conformity. (LGPS 1000)
- Reference ASTM-D3951-10 for :Standard Practice for Commercial Packaging"
- Reference MIL-STD-2073 (current revision) for Standard Practices for Military Packaging"
- Reference LGPS1000 Corrosion Control

Record Retention

- Must be controlled indefinitely.
- Suppliers must have process for record storage, retention and retrieval.
- Supplier shall not destroy the records without first providing NMC the opportunity to retain the records and obtaining NMG written permission for destruction.
- Cloud servers used to store records need to be ITAR compliant

Right of Access

- When requested, the supplier/processor must allow NMG personnel, government and civil aviation authorities, and customers access to their facilities, including personnel, and records as required for quality and management systems reviews, product/process validation evaluations, or investigations.
- The supplier/processor must flow down this requirement to sub-tier suppliers/processors.

Shelf Life

- Materials or articles having definite age degradation characteristics (shelf life) shall be identified with manufacturing date, and/or cure date, shelf life, expiration date, storage condition requirements and any other data pertinent to the supplied materials or articles.
- NMG reserves the right to reject and/or return any material with less than 80% of shelf life remaining.

Special Process

- Applicable NADCAP certification is required whenever performing or sub-contracting NADCAP governed processes (to include but not be limited to - NDT, powder coat, chemical processes, dry film, paint, welding/braze, heat treat, non-conventional machining (laser, ECM, EDM), shot peen, composite manufacturing.) Reference PRI-Network.org/NADCAP for a complete list of approved vendors.

Superseding Requirements

- Special Processes must be accomplished in accordance with PO, applicable drawing and specifications.
- Any deviation (including use of a superseding specification), must be authorized and approved by the Design Authority.

Collins Aerospace

COL-ASQR-PRO-0003

Supplier Quality Requirements

Order of precedence

- Order of precedence for documents -
  - NMG Customer PO/Contract
  - NMG Customer drawing referenced on PO
  - NMG Customer specifications referenced on drawing
  - Industry specifications referenced on drawing

Quality Alerts/GIDEP Alerts

- Quality Alert – communicates quality related issues or information to suppliers/processors.
- Requirements in the Quality Alert are amendments within the flow down requirements. Typically include an effective date.
- Upon receipt of a Quality Alert:
  - Review the requirements listed in the alert.
  - Determine contractual impact to the alert.
  - Notify the applicable buyer of any potential impact.
  - Take actions to ensure compliance with requirements.
  - Respond as outlined in the alert.

Quality Alerts/GIDEP Alerts

- A Government/Industry Data Exchange Program ("GIDEP") Alert covering product delivered directly or indirectly to Collins –
  - Must be actioned per the requirements within the Alert correspondence.
  - Collins informed of status (through NMG) whether they come through a Collins Aerospace SBU or through a supplier's supply chain. (http://www.gidep.org/)

Collins Aerospace

LS-SBU-A001-SQA

LS Supplier and Product Quality Requirements

LS-SBU-A001-SQA

Purpose

- Supplement to ASQR-01 and COL-ASQR-PRO-0003 supplier quality requirements.

Scope

- Applicable to Landing Systems Tier 1 (NMG), sub-tier, and processors when ASQR-01, COL-ASQR-PRO-0003, and LS-SBU-A001-SQA is invoked by direct reference on the purchase order.
- Deviations to requirements must be authorized in writing by LS SQA management.

Responsibilities

- Ensure use of LS and customer-directed supply/process resources.
- Ensure capability of offload sub-tiers and quality of product and service provided.
- Contact Supply Chain Management or a Supplier Quality Representative for questions or clarification.
- Right of access addendum - Supplier shall notify LS Procurement for coordination of activities if contacted directly by LS customers or regulatory agencies.

Quality Alerts

- 1.5 Quality Alerts – see ASQR-01 and/or COL-ASQR-PRO-0003

- https://utcaerospacesystems.com/supplier-documents/
- For *COL-ASQR-PRO-0003*, LS-SBU-A001-SQA, Doc 200, UTC Terms & Conditions Addendum choose "Landing Systems" from the list of Divisions.
- http://www.utc.com/Suppliers/Pages/Aerospace-Supplier-Quality-Requirement-Documents.aspx for ASQR-01 and associated documents and related forms.

Engineering Data

- 1.6.1. Parts shall be manufactured/processed to the latest process specification revisions in effect at the time of commencement of the manufacture/processing.
- 1.6.2. Suppliers are responsible for ensuring they have the current and or latest drawing and specification requirements per current purchase order(s) requirements.
- 1.6.3. Use of an older revision drawing or specification is not acceptable unless authorized by LS Engineering. Written authorization is required prior to any performance of the older version requirements.

Engineering Change Proposal Request (ECPR)

- 1.7.1. Suppliers may request an engineering change by completing an Engineering Change Proposal Request (ECPR), form *LS-LG-F-014-ENG*.
- 1.7.1.1. Completed forms shall be submitted through Content Server
- 1.7.1.2. The ECPR shall be properly completed including the reason or the justification for the ECPR. An incomplete ECPR will be returned to the originator for resubmission.
- 1..1.3. The results of a LS review of the request will be forwarded to the supplier.

Quality Record Retention (LS specific)

- Quality records - maintain no fewer than **10** years past the end of the program.
- Planned destruction or disposal of quality records -
  - Records pertaining to supplied LS product.
  - Notify Supplier Quality Assurance in writing at least 2 months prior.
  - Notified in writing prior to destruction or disposal.

Material Substitution

- Not allowed unless authorized by engineering drawing / model, material specification, LS MRB disposition or superseding of a material specification.
- Applicable to (not limited to):
  - Material grade (or stock such as bar, rod, tube, extrusion, and flat)
  - Material Condition (i.e. heat treat)

Manufacturing Records Control

First Article

- First Article Inspection Reports (FAIR) prepared as noted in -
  - AS9102
  - ASQR-01
  - COL-ASQR-PRO-0003
  - LS-SBU-A002-SQA
- Supplier responsible for adherence to requirements in current versions.

Records of Manufacturing

- 2.3.1. The supplier and supplier's sub-contracted sources shall maintain manufacturing records that provide traceability to all manufacturing and inspection operations. These records shall clearly indicate material status and acceptability and shall include the following information as a minimum:
- 2.3.1.1. Part number, revision, and material traceability.
- 2.3.1.2. List of all serial numbers (if serialized) or quantity of parts (if non-serialized).
- 2.3.1.3. Clear description of operations performed in the proper sequences to produce the completed product to include in process, receiving, and final inspections.
- 2.3.1.4. Record the number of parts accepted or rejected at each completed operation. Rejected serial numbers, if serialization is a requirement, and rejection documents/reports shall be noted adjacent to the applicable operation.
- 2.3.1.5. Record date of acceptance or rejection activity at each operation with operator's stamp or initials.

Records of Manufacturing

- 2.3.1.6. Clearly reflect the identification requirements, applicable specification, content and method. This can be accomplished as part of the Shop Traveler identification operation, reference to a work instruction or an attached picture of a correctly identified completed part (preferred).
- 2.3.1.7. When manufacturing lot quantities are reduced or "split", activity shall be recorded at applicable operations on both the original and on the new Shop Traveler. If serialization is required, the serial numbers remaining on the original and the serial numbers being transferred to the new traveler shall be clearly noted. The supplier's quality department shall approve split orders.
- 2.3.1.8. For operations performed by an outside source, record information traceable to source used, process purchase order, or certification number.
- 2.3.1.9. Note: Verification of any special process planning to ensure compliance to the specification parameters shall be accomplished prior to the actual process being performed. Objective evidence of the plan approval shall be retained and available upon request.

  2.3.1.9.1 Evidence of any required rework activities

  2.3.1.9.2 Evidence of completion of MRB disposition actions.

Product Identification

- 3.1. Part Marking and Serialization:
- 3.1.1. Part marking and serialization shall be clearly identified in the supplier's control plan/manufacturing documentation for all parts. Suppliers shall have a process in place to ensure no duplication of serial numbers.
- 3.1.2. The supplier shall maintain a serialization record for each serialized component manufactured. Suppliers shall not duplicate serial numbers on any given part number regardless of revision or configuration changes. Identification and traceability is required for all material, where applicable
- 3.1.3. All product identification (including permanent etching) shall be clearly legible after final surface coatings (including prime and paint) unless specifically allowed otherwise by engineering specifications.
- 3.1.4. Country of origin must be identified on all products, bag or tags for imported parts in accordance with U.S. Customs regulation 19 CFR Part 134.11 e.g. "Made in China", "Product of Japan", "Assembled in Italy".
- 3.1.5. All identification shall be applied prior to final inspection.
- 3.1.7. All products received by LS shall have supplier's final acceptance stamp on product or on a tag/package if product does not have an adequate space for stamping.
- 3.1.13. Non serialized parts shall be identified with date of manufacture (DOM i.e. DD/MM/YY or MM/YY), batch or lot number.

Product Identification

- 3.1.14. Contact LS Supplier Quality Assurance if further clarification is required.
- 3.1.15. Identify product with the appropriate design activity code per the engineering drawing / model requirements
- 3.1.16. The LS manufacturer's identification codes are as follows:
  - Oakville MFR02121
  - Burlington MFR02KZ1
  - Fort Worth MFR6K4C8
  - Troy MFR97153
  - *Cleveland MFR13002 (used only when defined by contract)*
- **Note: Supplier manufacturing codes shall not be used unless specifically called out on the engineering drawing part marking specification requirement.**
- LGPS 1600:
- 3.2.15 A part number and inspection stamp shall be applied to each individual part. When the marking is not possible due to part size, the identification method will be called out in the drawing (i.e., bag and tag or other options).
- LGPS 1603:
- 3.2.14 A part number and inspection stamp shall be applied to each individual part. When the marking is not possible due to part size (i.e., small parts), they shall be marked by bag and tag.

Nonconforming Product

- 8.1.1. Suppliers shall not ship nonconforming material without receipt and completion per LS MRB disposition or unless authorized in writing by MRB disposition or receipt of an approved “Request for Custody” form.
- 8.3.1. For a discrepancy discovered that may be reworked into a conforming condition prior to subsequent processing, the supplier’s standard internal rework process shall be followed. Rework records shall be maintained as per the Records of Manufacturing
- 8.3.2. For a discrepancy discovered within a special process or during, the guiding specification for that specific special process may provide rework guidelines. Rework records shall be maintained as per the Records of Manufacturing
- 8.3.3. Any NDT rejections must be submitted to LS MRB for review and disposition.
- 8.3.4. The supplier shall document the discrepancy on a LS Quality notification(QN) form (LG DIV SQA FORM 2963)
- 8.3.6. Once disposition is obtained from LS MRB each element of the disposition shall be stamped off and dated as evidence of completion.
- 8.3.7. If any special processes are used for the repair, the supplier shall list the processor used, the certificate number, and date.
- 8.3.8. Dispositioned QN’s shall be treated as a repair router and follow the part(s) through the entire repair process, stamped and dated as the operations are in fact completed.
- 8.3.9. Except when specifically authorized by the engineering drawing / specifications or LS Material Review Board (MRB) disposition, welding on any LS assemblies or machined/formed detail components for the purpose of repair is prohibited.

Disclosures

- 8.5.1. Suppliers shall provide written notification to LS within 24 hours when a nonconformance is determined to exist, or is suspected to exist, on product already delivered to LS or LS customers using the AS9131 template.

Supplier's Use of Approved Processors

- 12.2.1.Only LS approved sources shall be used to perform special processes on aircraft production parts manufactured for LS engineering drawings/design.
- 12.2.2.When LS customer controlled processes are required, (e.g. Boeing "BAC's", DPS, "PS's", and Lockheed "5PTP's"), selected process sources shall be listed in both the LS Doc 200 listing as approved for quality system and in the applicable customer's listing (i.e. Boeing D1-4426, and Lockheed QCS-001) for the controlled process.
- 12.2.3.The supplier shall maintain and use an approved processor list and are responsible for ensuring that approved sources meet the requirements of the applicable specifications.
- 12.2.4.Suppliers are responsible for ensuring that processing meets the requirements of the applicable specifications defined in the engineering and contractual requirements.
- 12.2.5.The supplier's purchase order shall flow down to the processor all applicable information required to perform work correctly to engineering and contractual requirements and as required by individual process specification and end customer requirements. The purchase order shall clearly specify the full scope of processing to be performed, MRB actions required, applicable specification number(s), revisions and addendums or modifications, part numbers, quantity, serial numbers (if applicable), applicable program and prime customer and identify LS as the supplier's direct customer.

Collins Aerospace

LS-SBU-A004-SQA

LS Manufacturing Plan Review and Approval

(Addendum to LS-SBU-A001-SQA)

LS-SBU-A004-SQA

- **Responsibility**
  - NMG Supplier Quality and Procurement are responsible for the management and administration of the requirements contained in this document
  - Supplier are responsible for ensuring the use of customer directed supply and process sources
  - Suppliers are responsible for ensuring the capabilities of any offload sub tiers to be used and the quality of the products and or services provided.
  - Suppliers shall contact NMG Supplier Quality and or Procurement to obtain any clarifications required prior to production or delivery of products.
  - Suppliers shall contact NMG Procurement if contacted directly by NMG customers in order to coordinate activities as required.
- Manufacturing Plans and Techniques
  - Manufacturing plans (MPS) must be generated for all individual components and assemblies when the supplier is manufacturing to an engineering drawing / model and does not have design authority.
  - Manufacturing plans (MPS) must be submitted and approved by NMG prior to start of manufacturing unless approval from NMG procurement in writing to proceed at supplier risk.
  - The planning must include the minimum engineering data references (specification, flag note, etc.) necessary to control and produce the parts and include all of the machining, processing, test and inspection operations necessary to complete the parts to the purchase order and engineering requirements. This includes applicable satellite plans and techniques from sub tier suppliers and processors.
  - All plans must be reviewed and approved by the supplier prior to submit to NMG.
  - The manufacturing plan(s) must be retained on file at the supplier's manufacturing facility or their sub-tier when applicable, and must be available upon request by NMG.

- The plan documentation must include the following details as a minimum:
  - Supplier name and address.
  - Full part number including dash number.
  - Engineering drawing / model revision level.
  - MPS revision and date
  - Planning revision table including revision dates, descriptions of changes and traceability to the individual making the change. All planning changes must be documented, including editorial changes to correct typographical errors or minor editorial changes.
  - Raw material, raw material specification, raw material size and heat treat condition.
  - All operations must be noted in their proper manufacturing sequence including all inspection and test points.
  - **Part identification including process specification, method, process detail (i.e. depth, font size) and text.**
  - Note – Supplier acceptance stamp required on all finished parts, bag or tag. Date of manufacture, batch or lot number is required for all non-serialized products. This must be noted on all MPS at the appropriate operation prior to release and shipment to NMG.

- Special process operations must list the name and location of the processor, applicable specifications and specific parameters (i.e.: type, class, as applicable).
- Special processes must be controlled and special process sources must be approved, listed on NMG or customer APL - Document 200.
- All thermal processing must be listed as a separate operation (i.e., embrittlement relief, stress relief, etc.). Required times, conditional delay requirements and temperatures must be documented.
- Machining techniques which impart significant localized heating (i.e. EDM, ECM, plasma application, and laser use) are not to be used unless authorized by engineering requirements, or MRB disposition.
- All MPS must include special process techniques that are traceable to their specific technique number, revision and or date.
- All NDT techniques must be approved by a recognized NDT Level 3 authority.

Inspection Requirements

- 100% inspection of all features is required. After successful FAI and 25 consecutive pieces are produced with all features found to be acceptable, reduced inspection using C=0, .65 AQL or 2.5 AQL (based on ASQR-20.1 Table B) may be considered. Authorization must be granted by NMG Supply Chain prior to implementing the above sampling plan.

LS-SBU-A004-SQA

- 1.1.1. Manufacturing plans (MPS) shall be generated for all individual components and assemblies when the supplier is manufacturing to an engineering drawing / model and does not have design authority.
- 1.1.2. Manufacturing plans (MPS) requiring LS approval shall be submitted and approved by LS prior to start of manufacturing.
- 1.1.3. The planning shall include the minimum engineering data references (specification, flag note, etc.) necessary to control and produce the parts and include all of the machining, processing, test and inspection operations necessary to complete the parts to the purchase order and engineering requirements. This includes applicable satellite plans and techniques from sub tier suppliers and processors.
- 1.1.5. All plans shall be reviewed and approved by the tier 1 holder of the LS purchase order.
- When plans are required to be submitted to LS, the tier 1 source shall review and approve
- the plan prior to submission to LS.
- 1.1.6. The manufacturing plan(s) shall be retained on file at the supplier's manufacturing facility or their sub-tier when applicable, and shall be available upon request by LS and/or its
- customers.

1.1.7.9. Operations that are required to be performed per a particular specification shall list that specification as part of the operation description in the planning.

1.1.7.10. Special process operations shall list the name and location of the processor, applicable specifications and specific parameters (i.e.: type, class, as applicable).

- 1.1.8. Special processes shall be controlled and special process sources shall be approved on Document 200.
- 1.1.10.All thermal processing shall be listed as a separate operation (i.e., embrittlement relief, stress relief, etc.). Required times, conditional delay requirements and temperatures shall be documented.
- 1.1.11.Machining techniques which impart significant localized heating (i.e. EDM, ECM, plasma application, and laser use) are not to be used unless authorized by engineering requirements, or MRB disposition.
- 1.1.12.All manufacturing plans and techniques shall be reviewed by the supplier at least every
- five years to ensure compliance to current engineering and specification requirements.
- 1.1.13.Supplier shall have a process to control the timing of the reviews.
- 1.1.14.**All NDT techniques shall be approved by a recognized NDT Level 3 authority.**

- 1.1.7. The plan documentation shall also be in English and include the following details as a minimum:

  1.1.7.1. Name of applicable manufacturer with facility address.

  1.1.7.2. Full part number including dash number. When purchase orders refer to part numbers other than the design engineering part number, the planning shall clearly reference both part numbers.

  1.1.7.3. Engineering drawing / model revision level.

  1.1.7.4. Planning revision table including revision dates and descriptions of changes and traceability to the individual making the change. All planning changes shall be documented, including editorial changes to correct typographical errors or minor editorial changes.

  1.1.7.5. Raw material (including forging part number if applicable), raw material specification, raw material size and heat treat condition.

  1.1.7.6. All operations shall be noted in their proper manufacturing sequence, including all inspection and test points.

  1.1.7.7. Optional sequences or operations shall be defined in the planning.

  1.1.7.8. Part identification including method and text.

Manufacturing Plan and Review Approval

- 4.2.6. Manufacturing plans submitted for LS review and approval shall be complete and officially 'released' by the supplier. Any subsequent changes (including, but not limited to: adding or removing notes, adding or removing operations, changes to processing parameters, etc.) require the supplier to roll up the revision level and document these changes in the revision table. This requirement is applicable to process technique sheets as well, and irrespective of, and independent of part production
- 4.2.7. A memo documenting the results of the manufacturing plan review shall be communicated back to the source(s) submitting the planning.
- 4.2.8. The supplier shall retain evidence of planning approval status.
- 4.2.9. Planning shall be revised as applicable and revisions documented until fully approved by LS.
- 4.2.10. Once planning is approved by LS it shall be considered frozen. Any changes to approved planning shall be resubmitted for review and approval.
- 4.2.11. Unless controlled by specification (i.e. DPS4.804, D6-1276, LGPS 8000, etc...) All changes to planning, including editorial changes, shall be documented in a revision table.
- 4.2.12. ALLOWED CHANGES: The following are allowed changes to an approved manufacturing plan and do not require Landing Systems M&PT and QA approval.
  - 4.2.12.1. Editorial changes:
  - 4.2.12.2. Clarification of existing instructions
  - 4.2.12.3. Documentation of changes to drawing revision level for parts
  - 4.2.12.4. Typographical errors

Collins Aerospace

LS-SBU-A002-SQA

First Article Inspection

Supplier Instructions

(Addendum to LS-SBU-A001-SQA)

First Article Inspection

- Applies to FAIs performed by suppliers and sub tiers for COLLINS LS product/service.
- Regardless of design authority and media source -
  - Goodrich, Boeing, Lockheed, Collins, etc.
  - 2D drawing, 3D DPD dataset, mylars, tabulated drawings, coordinate drawings, etc.

First Article Inspection

► Contents

- Clarification of AS9102 FAI requirements, and definition of additional Collins & Collins LS requirements.
  - FAI Requirements
  - Traceability
  - Non-conformances
  - Assemblies, Source Control Dwgs, Proprietary parts
  - Distributor FAIs, Parent/Child FAIs, Maintenance parts
  - FAI approval matrix
  - Form instructions/objective evidence

First Article Inspection Report

► Appendix A: AS9102 Forms and Instructions

- **FORM 1**: Part Number Accountability
- **FORM 2**: Product Accountability – Materials, Special Processes, and Functional Testing
- **FORM 3**: Characteristic Accountability, Verification and Compatibility Evaluation
- Instructions are provided to complete each form. Only the more significant data fields are included here.
- **Note**: All data fields are to be filled out with the required information as described or "N/A".

First Article Inspection Report

- **Form 1, Block 5**: Part Revision Level: For COLLINS part, if the DIR is referenced on the PO, then COLLINS DIR version should be provided.

  Example shown below -

Figure 1

UTC Aerospace Systems

UTC Aerospace Systems

Data Status Report → DIR

Thu Jul 28, 2016 10:25:48 AM

Part Number 46301-3 → 1. Part Number:

DIR Version AQ

DIR 46301 Created Sep 8, 2015 → 5. Part Revision Level:

Item	Sht.No/Att	Rev
Sheet	2	D
	EO	D1, D2, D3
PL		AB

→ 7. Drawing Rev. Level:

Notice: THE INFORMATION CONTAINED HEREIN IS PROPRIETARY TO UTC AEROSPACE SYSTEMS AND SHALL NOT BE REPRODUCED OR DISCLOSED IN WHOLE OR IN PART FOR ANY PURPOSE EXCEPT WHEN SUCH USER POSSESSES DIRECT, WRITTEN AUTHORIZATION FROM UTC AEROSPACE SYSTEMS.

This document does not contain any export controlled technical data

First Article Inspection Report

- **Form 1, Block 7**: Drawing Revision Level

  Complete breakdown of all associated engineering documents (such as PL, NL, PSDL, MPL EO, NIEOs, etc.) as listed in DIR table shown in fig 1.

- **Form 1, Block 8**: Additional Changes

  Enter reference number(s) of any changes that are incorporated into the product as supplement or exclusion from mandatory drawing requirements.

  Dispositioned QN and/or approved ECPR (for clarification purpose only).

- **Form 1, Block 14**: Full FAI or Partial FAI

  For a partial FAI, provide the baseline part number (including revision level) to which a previous FAI was performed. Include the reason for the partial (e.g., released engineering, changes in process, changes in manufacturing, etc.).

First Article Inspection Report

- **Form 3, Block 5**: Characteristic Number

  When multiple items appear in the same note a single characteristic designator is acceptable. Dimensions that occur in multiple locations will require a unique characteristic number for each location/position. Each true position must be listed out separately (i.e., a true position requirement for a four-hole pattern would require that the true position callout be listed four times with corresponding results – see Figure 1).

  Basic and reference dimensions are optional.

- **Form 3, Block 6**: Reference Location

  Drawing/specification page number and location of feature. (e.g., E4-2 for Zone E4 on Sheet 2, DPD model location) If a drawing or specification does not include zone locations, enter the page number.

First Article Inspection Report

- **Form 3, Block 9**: Results

  Review LS-SBU-A002-SQA

- **Form 3, Block 10**: Designed/Qualified Tooling

  Record tooling identification number when design tooling, or specially designed tooling, including NC programming, or any other COLLINS approved special tooling is used as a means of attribute acceptance.

  Record gauge value or range when qualified tooling is used for attribute acceptance.

  Making sure tooling is traceable and under calibration control.

- **Form 3, Block 11**: Non-Conformance Number

  Record a non-conformance control document number for characteristics outside of the tolerance or requirement. Enter N/A if none.

First Article Inspection Report

- **Form 3, Block 14**: FAI Inspection Measuring Equipment

  Describe the inspection equipment used for the First Article Inspection product acceptance including the traceability number for the inspection equipment. For drawing notes with no measurable characteristics which list a specification, enter "Specification" and the specification number, or enter "Certification" and the certification number, as applicable. For informational drawing notes with no measurable characteristics, enter "Information" and/or "Visual", as applicable.

  Note: ASQR-01 requires gaging accuracy to be 10 to 1 (4 to 1 minimum). FAI inspection measuring equipment must be capable of accurately measuring the specific requirement (i.e., radius gage, thread gage, surface plate, etc.).

- **Form 3, Block 14**: FAI Inspector Identification

  Enter the signature, initials, or stamp of EACH inspector responsible for EACH result recorded in Field 9.

Questions