



Modern Industries Inc.

Purchase Order Quality Requirements for Fabrication of Goodrich Landing Gear Products

1. General

1.1. Supplier shall notify MII's Purchasing Department when;

1.1.1. The PO price and supplier's quoted price are different, no price on the PO or are unable to comply with all PO and Quality Requirements. Non-Compliance may render the product unfit for use.

1.1.2. As to any product or service obsolescence at least 180-days in advance of such obsolescence. Notification must include reason for obsolescence, last time buy date, and specifications and pricing for alternative products or services recommended to replace obsolete product or service.

1.1.3. In the event material is scrapped at supplier's fault, supplier will be debited the total cost of Modern Industries investment of said product. (Machining & Special Process Suppliers Only).

1.2. Modern Industries maintains a 3-day ship window on all shipments. Any shipment arriving outside this window is subject to refusal of shipment and returned to supplier at the supplier's expense.

1.3. Material for set-up piece to be furnished by supplier.

2. Quality System

2.1. The supplier shall have a Quality System compliant to AS 9100 (Current Revision). This system shall be documented and be available for review by an MII representative prior to the initiation of production and throughout the life of the purchase order.

3. Materials

3.1. Material substitutions are not allowed unless authorized by engineering drawing / model, material specification, or superseding of a material specification. This applies to (and is not limited to):

- Material grade (or stock such as bar, rod, tube, extrusion, and flat)
- Material Condition (i.e. heat treat)
- Material Mill or Foundry Source as applicable.

3.2. Part(s) must meet customer drawing, specifications and current revision level.

3.3. Materials or parts shall be manufactured/processed to the latest material or process specification revisions in effect at the time of commencement of the manufacture/processing.

3.4. Raw material/forgings/castings

3.4.1. Raw Material Requirements :

3.4.1.1. Scope: section 3.4.1.1. applies to suppliers who supply raw material / forgings / castings directly to Modern Industries and Modern Industries suppliers.

3.4.1.1.1. Definition: every kind of metal or non-metal shape to be used by the supplier for further machining and processing to get semi-finished or ready made parts which includes, but is not limited to, bar stock, tubes, plates, and sheets.

3.4.1.1.2. Suppliers shall have a method to test each batch / heat / lot of material per section 3.4.1.5.4.

3.4.1.1.3. Test results shall be listed on all Certificates of Conformance

3.4.1.1.4. Suppliers shall conduct annual raw material verifications per section 3.4.1.4.

3.4.1.2. Forging / Casting Requirements:

3.4.1.2.1. Includes but is not limited to all material types furnished as impression or press forgings, swagings, like forged or casted blocks, rings, and shapes.

3.4.1.2.2. All forgings, castings and swagings shall be identified with a vendor code or logo, which shall be specific to that particular supplier.

3.4.1.2.3. The supplier shall maintain traceability from the raw material manufacturer's heat or lot numbers to each individual forging, casting and swaging. Heat or lot numbers shall be noted on supplier's Certification of Conformance.

3.4.1.3. Approval of raw material suppliers / forgers / casters:

3.4.1.3.1. Modern Industries will base approval of raw material suppliers on (only suppliers who supply raw material directly to Modern Industries are affected):

3.4.1.3.1.1. ISO9001 certification and QMS audit results

3.4.1.3.1.2. Initial mail survey

3.4.1.3.1.3. On-site audits (if required)

3.4.1.4. Independent Verification of Raw Material:

3.4.1.5. Scope: section 3.4.1.4. Applies to suppliers who supply raw material / forgings / castings directly to Modern Industries.

3.4.1.5.1. Annual verification shall be performed and results provided to Modern Industries. This applies to all material types furnished as forgings, castings and/or raw material stock.

3.4.1.5.2. Test samples of each material type noted shall be certified by an accredited laboratory:

3.4.1.5.2.1. This may be done as the normal testing process for each heat/lot.

3.4.1.5.2.2. The laboratory shall be certificated to an accredited third party registrar (Acceptable 3rd party accreditations for Laboratories include: A2LA, ISO/IEC 17025, and NADCAP).

3.4.1.5.3. Testing shall be in accordance with the requirements of the engineering specification

3.4.1.5.4. Supplier shall provide test specimens when required by the purchase order in accordance with specification requirements.

3.4.2. Material verification and inspection:

3.4.2.1. When performing magnetic particle, fluorescent penetrant and/or visual inspection, all forging suppliers shall remove all detectable indications such as laps, cracks, seams, bursts, ferrite fingers, inclusions, porosity, and laminations, and re-inspect by applicable method to ensure their removal. If the removal of indications results in a dimensional nonconformance, a rejection tag (IDR) that documents the nonconformance, shall be completed.

3.5. Foreign Material Requirements

3.5.1. Berry Amendment: The DFARS clause 225.222-7014, Preference for Domestic Specialty Metals requires that any specialty metals incorporated into articles to be delivered to the DoD shall be melted in the United States its possessions or Puerto Rico or in certain qualifying countries. (Note: all steels used for landing gear components are considered "specialty metals".)

3.5.2. Special requirements apply to material produced in company(s) located in a country other than the United States or Canada and the country does not have a Bilateral Airworthiness Agreement (BAA) for the product being supplied.

3.5.3. A product verification plan shall be submitted to Modern Industries for review and approval. A certification and report from the laboratory documenting compliance to applicable specification requirements shall accompany each shipment as part of the material documentation package.

3.5.4. Suppliers intending to purchase raw material stock, forgings, castings and standard hardware from sources outside North America shall notify Modern Industries and obtain concurrence prior to commencing the procurement activity.

3.5.5. All suppliers providing parts for U.S. Military programs shall conform to the Berry

Amendment requirement which requires any specialty metals incorporated into articles to be delivered to the Department of Defense (DOD) shall be melted in the United States, its possessions, or Puerto Rico, or in certain quality countries (note: all steels used for landing gear components are considered "specialty metal"). Parts

4. Subcontracting

4.1. No subcontracting of items listed on the PO without MII's written approval.

4.1.1. When subcontracting, the supplier shall,

4.1.1.1. Demonstrate control of all sub tier suppliers.

4.1.1.2. Ensure customer approved suppliers are utilized.

4.1.1.3. Ensure the capability of all sub tier suppliers and the quality of all products.

4.1.1.4. Maintain an approved supplier list.

4.1.1.5. Ensure all PO requirements are flowed down.

4.1.1.6. included on the sub- tier supplier's purchase order :

- Sub tier supplier location.
- Date
- Purchase order number
- The Prime (for example, Boeing, Lockheed, Gulfstream)
- The program (for example, 747, GV, F-15)
- Specific part number being processed to include any "-" dash number
- Quantity of parts to be processed
- If serialized, list of all serial numbers processed
- If applicable, the special process being performed
- The process specification number, revision and if applicable the type and class the process must be performed to

Note: For flight safety, fatigue and/or critical parts, the purchase order shall state the following: Record the actual hardness value achieved for each serial number processed.

- The purchase order shall state the following: Record duration times and set point temperatures for all thermal treatments.

Note: For example, normalizing, austenitizing, tempering, stress relieving, embrittlement relieving

- Validate supplier/processor manufacturing plan has been approved.

- Packaging requirements.
- The flow down of the SEAD checklist requirement.
- The flow down of paragraph 10.

4.1.2.If a processor is used, that special processor:

4.1.2.1. Is listed on GLG's Doc 200 as an approved processor.

4.1.2.2. Listed on the end customer's (for example, Boeing, Lockheed, Gulfstream) Approved Supplier List as an approved processor.

4.1.2.3. Is approved for the process specification being performed.

4.1.2.4. Meets the requirements of paragraph 8.

5. Special Process Accreditation

5.1. When a special process is performed, the processors shall complete and maintain accreditation of special processes to NADCAP.

6. Manufacturing Plans and Techniques

6.1. In accordance with AS9100 (current revision) clause 7.3.6., the supplier shall ensure that Manufacturing Plans are validated to the design master (specifications).

6.1.1. Submittal to Modern Industries:

6.1.1.1. The submittal shall be in English.

6.1.1.2. The submittal shall contain at a minimum:

- Part Number
- Supplier Name
- Program

6.1.1.2.1. An indication if any of the following controlled specifications apply to the submitted part:

- CPC 6203
- CPC 6400
- D581-25629-1
- D6-1276
- D8-0965
- DPS 4.804
- LGPS 1301

- LGPS 7010
- LGPS 8000
- MMC 369
- Flight Safety Part
- Critical Part

6.1.1.3. Modern Industries shall communicate to the supplier the result of manufacturing plan reviews in writing.

6.1.1.4. The supplier shall incorporate any changes identified by Modern Industries for non-compliance to the plan and/or the specifications.

6.1.1.5. Submittals shall include a copy of the latest plan to be used to produce product.

6.1.1.6. Planning shall include as a minimum:

6.1.1.6.1. Applicable supplier and processor (including location)

6.1.1.6.2. part number

6.1.1.6.3. Drawing / model revision level

6.1.1.6.4. Planning revision table with dates of effectivity and summaries of changes Note: Manufacturing plans submitted for Modern Industries 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. The only exceptions may be the correction of minor typographical errors that do not constitute a tangible change to the plan.

6.1.1.6.5. Maximum section thickness at time of heat treat

6.1.1.6.6. Special process specifications including the name and location of the processor, specification, type, and class

6.1.1.6.7. Date, temperature, and time for each thermal treatment

6.1.1.6.8. each NDT activity (MPI techniques signed by a level 3, shall be kept at the tier 1 supplier's facility, and available upon request with the exception of NDT performed in accordance with DPS 4.747. A MPI technique is a required submittal to Modern Industries for review.

6.1.1.6.9. All inspection points

6.1.1.6.10. All operations are to be noted in their proper sequence

6.1.1.6.11. Optional sequences or operations are to be defined in the planning

6.1.1.6.12. The techniques required for complete approval of the manufacturing plan are:

- Chrome grind
- Heat treat
- HVOF
- HVOF grind
- NDT performed in accordance with DPS 4.747
- Shot peen
- Structural welding

6.1.1.6.13. Additional special processes such as plating and NDT shall have techniques available for review upon request by Modern Industries. All NDT techniques shall show evidence of approval by a recognized NDT Level III authority.

6.1.2. Manufacturing plans/techniques not submitted through the Modern Industries control plan portal shall not be reviewed and shall be rejected back to the supplier for re-submittal.

6.1.3. Manufacturing planning (MPS) is required to be on record for all individual components where the supplier is building to an engineering drawing / model and does not have design authority. These records are to be available upon request at Modern Industries suppliers.

6.1.4. Prior to production authorization, validation of the manufacturing plan shall be conducted to assure compliance with Design/Processing Specifications. Evidence of validation shall be provided to Modern Industries.

6.1.5. Manufacturing plans/techniques shall be submitted as part specific and shall be inclusive by part number. Multiple part numbers submitted in one technique will be rejected for re-submittal.

6.1.6. Products with the following characteristics shall be submitted to Modern Industries for review prior to manufacturing:

- Minimum ultimate tensile strength (UTS) 180 KSI and above (HRC 40)
- CPC6203
- CPC6400
- D6-1276

- D8-0965
- DPS 4.804
- LGPS 1301
- LGPS 7010
- LGPS 8000
- MMC 369
- Flight safety parts
- Critical parts
- Note: manufacturers of springs with tensile strength of 180KSI or higher are exempt from this requirement

6.1.6.1. Parts that have/are controlled by/are:

6.1.6.2. Techniques shall be submitted through the supplier:

- Chrome grind
- Heat treat
- HVOF
- HVOF grind
- NDT performed in accordance with DPS 4.747
- Shotpeen
- Structural welding

6.1.6.3. Supplier shall have on file a complete MPS including all the applicable techniques from their sub tier suppliers.

6.1.7. Unless otherwise required by engineering drawing/model/specification, revisions to manufacturing plans shall be submitted when the following occurs:

- Thermal processing parameters are revised
- Processors are changed
- When re-sequencing or adding operations after final machining

6.1.8. Manufacturing of parts will commence only after the plan is approved. Exceptions will be made only with Modern Industries (otherwise manufacturing is performed at supplier's risk).

6.1.9. Fabricators of products that are identified as "flight safety parts" or "critical parts" shall comply with all customer specific control/process specifications directly associated with these parts.

6.1.10. All manufacturing plans and techniques shall be reviewed at least every five years to

ensure compliance to current machining practices and engineering requirements.

6.2.3.7. Standard components:

- 6.2.1. Suppliers of standard hardware shall maintain traceability to actual manufacturer and manufacturing lot.
- 6.2.2. The supplier shall ensure that all standard hardware with Boeing design authority is procured from approved manufacturers and distributors in compliance with Boeing's D590 Parts Standards specification requirements.
- 6.2.3. The supplier shall ensure that First Article Inspection records for all standard hardware with Boeing design authority are available upon request.

7. Supplier Internal Audits

- 7.1. All suppliers and processors shall maintain an internal audit system
- 7.2. The organization shall conduct internal audits at planned intervals to determine whether the quality management system conforms to AS9100 (current revision) and to the quality management system requirements established by the organization.
- 7.3. Selection of auditors and conduct of audits shall ensure objectivity and impartiality of the audit process.
- 7.4. Auditors shall not audit their own work
- 7.5. Suppliers shall demonstrate control of all sub-tiers. Records shall be maintained and available to reflect periodic audit schedules.
- 7.6. Suppliers shall maintain an approved sub tier suppliers list.

8. Testing

- 8.1. When applicable; retain test specimens used for testing to assure process of product conformity as required by governing specification.
- 8.2. Furnish certifications identifying processes performed. Certifications shall provide current specification level, items such as but not limited to thickness, hardness, results, or special process parameters with each shipment.
- 8.3. Material Certifications shall reflect actual values, including mill data.
- 8.4. Qualified Personnel shall complete inspection and tests as applicable.

9. Identification:

9.1. Part Marking and Serialization:

- 9.1.1. Part marking and serialization shall be identified in the supplier's control

plan/manufacturing documentation for all parts.

9.1.2. All products shall be identified with GLG's customer's (for example, Boeing, Lockheed, Gulfstream) part number as required by the engineering drawing and specification requirements.

9.1.2.1. Modern Industries shall be contacted during the contract review planning process or prior to final application if there are any questions as to the specific identification requirements or content.

9.1.3. All product identification (including permanent etching) shall be clearly legible after final surface coatings (including prime and paint) unless specifically allowed by engineering specifications.

9.1.4. All products received by Modern Industries shall have supplier's final acceptance stamp on product or on tag/package if product does not have an adequate feature for stamping.

9.1.5. Non serialized parts shall be identified with date of manufacture.

9.1.6. Parts requiring serialization shall be identified with unique serial numbers, which shall not be duplicated.

9.1.7. Serial numbers shall remain unique and consecutive for each engineering drawing / model part number regardless of revision.

9.1.8. Serial numbers shall consist of:

9.1.8.1. An alpha supplier prefix code (shall be a letter code assigned by Modern Industries).

9.1.8.2. A minimum of four and a maximum of six digits (shall be numbers only).

9.1.9. A permanent alpha supplier prefix code shall be assigned by Modern Industries. The alpha supplier code shall be the serial number prefix placed either before (preferred arrangement) or above (alternate arrangement) the serial number if the space does not allow in-line placement:

Preferred arrangement	Alternate arrangement
ABC1234	ABC 1234

9.1.9.1. Serial numbers shall not be duplicated

9.1.9.2. Serial numbers shall not restart from 0001 when the dash number changes.

	Part number	Serial numbers used
Original configuration is "-1"	65B01751-1	ABC0001 through ABC0099

Configuration change moves from “-1” to “-3”	65B01751-3	ABC0100 and on
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9.1.9.3. If products are of opposite configuration, left and right handed product, the same serial number shall not be used on both hands, opposite configuration. Two applications of serial numbers are suggested:

	Serial number selection	Example
Option 1:	Left hand: odd numbers Right hand: even numbers	ABC0001, ABC0003, ABC0005 etc. ABC0002, ABC0004, ABC0006 etc.
Option 2:	Left hand: use 0001 thru 0999 Right hand: use 1000 thru 1999	ABC0001 through ABC0999 ABC1000 through ABC1999

9.1.9.4. The prefix code of the finished part supplier shall be used in place of the forging, casting, extrusion or swaging supplier prefix code.

9.1.9.5. Contact Modern Industries for further clarification.

9.1.9.6. Suppliers of the detail items shall provide cross-reference traceability to the original forging serial numbers if new serial numbers are assigned.

9.1.9.7. If required by the drawing / model, the design activity code should be located in the title block on the engineering drawing / model. The GLG manufacturer’s identification codes are as follows:

- Cleveland MFR13002
- Oakville MFR02121
- Burlington MFR02KZ1

9.1.10. When serial number traceability is required by design requirements, applicable serial numbers shall be identified on all supplier and supplier’s sub-tier quality records (e.g. travelers and process certifications).

9.1.11. Application of drawing / model revision letters on product is only allowed when required by purchase order, engineering drawing / model or specification.

9.1.12. “Kits” shall have the following identified in a prominent location:

9.1.12.1. Each detail item shall be identified per applicable requirements of engineering drawing / model, specifications, and this document.

9.1.12.2. Quality acceptance of the kit.

9.1.12.3. Assigned kit part number and revision level.

9.1.12.4. Purchase order number and latest amendment level.

9.1.12.5. A supplier assigned unique non-repeatable number for each kit that provides complete traceability to all products within each kit.

9.1.13. Forging, casting, extrusion or swaging serialization:

9.1.13.1. Requires serialization per the engineering drawing / model requirements

9.1.13.2. The numeric portion only of the forging serial number should apply to the machined detail parts.

9.1.13.3. The prefix code of the finished part supplier shall be used in place of the forging, casting, extrusion or swaging supplier prefix code.

10. Certification

10.1. Each shipment shall be accompanied with a Certificate of Conformance (MII-FRM-00111), Material Certification, Certification for each Special Process performed and Detailed Inspection Report (DIP) as applicable.

10.2. Certifications from a sub-tier to the supplier shall provide traceability to the manufacturer and manufacturing lot.

10.3. Certification for material and special processes will be required with each shipment.

11. First Articles

11.1. The supplier shall perform a First Article Inspection (FAI) in accordance with AS 9102 (Current Revision).

11.2. A First Article Inspection Report (FAIR) shall be provide for each new part number, revision level, new lot and or annually.

11.3. The supplier shall provide an itemized blue print containing all characteristics including but not limited to the notes and title block items corresponding to FAI R.

12. Inspection

12.1. A detailed inspection report (DIP) containing 100% product verification is required.

12.2. The SEAD checklist, section 1, shall be used during final product review. SEAD checklist, sections 2 – 3, shall be completed as applicable. This form may be obtained from the MII buyer.

13. Changes and Modifications

13.1. No changes or modifications are permitted without MII's written approval operations, process, or an approved technique sheet that has been identified as being Fixed, Frozen or Significant.

14. Nonconforming Material

14.1. Any non-conformance from the requirements of the drawing, specification, delivery or purchase order requirements must be reported with root cause and corrective action in writing. All non-conformances shall be documented within shipping documents and individual parts specifically identified as non-conforming.

15. Packaging

15.1. Metal-to-Metal contact is prohibited. Product must be packaged to protect from damage.

15.2. Return parts, prints, documents and gages in the same containers as received unless otherwise directed in writing from MII.

16. Foreign Object Debris (FOD)

16.1. Suppliers shall have a written procedure which addresses elimination of Foreign Object Debris (FOD)

16.1.1. Minimum requirements shall include:

- Review of design and manufacturing process.
- Performance measurement
- Training.
- Material handling and part preservation
- Housekeeping
- Tool and hardware accountability
- Work is accomplished in a manner to prevent FOD
- MII has the right to perform FOD audits
- Supplier shall perform periodic self-assessments
- Physical entry control into FOD controlled areas
- Flow down requirement to sub tier suppliers

17. Records

17.1. Maintain All Quality Records for a minimum of seven years past the end of the contract or forward All Quality Records to MII with shipment unless otherwise specified.

17.2. The supplier is to request approval in writing prior to the destruction of records pertaining to product supplied to MII.

17.3. Methods shall be in place to prevent tampering or loss of records. A digital archive of data is preferred.

18. Right of Access

18.1. MII, its Customers and Regulatory Agencies reserve the right of access to the supplier's

premises to determine quality of work, records and material on parts and processes noted herein.

19. ITAR and EAR compliance

19.1. Suppliers and Processors shall ensure compliance to ITAR and E.A.R. requirements when handling GLG parts and documentation.

19.2. The supplier and processor shall flow down this requirement to all of their sub-tier suppliers.

Originating Department:		Supply Chain Management	
Approved By:	Ariel Barbeito	Approved By:	Mike Amick
Job Title:	SQE	Job Title:	Director
Signature:		Signature:	
Date:		Date:	
DATE	CHANGE DESCRIPTION		
04/05/2010	Initial Release		
06/11/2010	Deleted section 4, Revised Section 3 and 5, Added section 3.4 thru 3.5.5, 6 and 9.		
12/01/2010	Added paragraph 12.2, Revised paragraph 4.1.16 to add The flow down of the SEAD checklist requirement. 4.1.2.1 and 4.1.2.2 to clarify Doc 200 reference and remove website reference. Removed paragraph 9.1.2.1		