



Lockheed Martin Aeronautics Company

REVISION 27

CONTROLLED AND APPROVED BY:

Lockheed Martin Aeronautics Company
Supplier Quality Management
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* REVISED

** ADDED

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PART II. MANUFACTURED SPECIAL TOOLING ONLY – SELLER REQUIREMENTS

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** 2.1.3 “Non-Recurring Tools or Non-Recurring Engineering Tools” (NRE) - NRE tools are defined as ST tools authorized by Buyer only to facilitate manufacturing or delivery of Buyer items and shall be considered as Buyer Furnished Tooling. NRE Tools are further defined in Part II, Section 2.2.

2.2 Modification Kit Tool (“MKT”) is categorized as ST and used to update or modify aircraft assemblies and structures.

2.3 “Tooling Tools” means all gages used by Seller to control the fabrication or coordination of production tooling, holes, Interchangeable-Replaceable (“I/R”) features, critical mating points and surfaces or contours it represents. Tooling Tools are for tooling purposes only and shall not be used for production purposes.

* 2.4 “Seller-Owned Tooling” means all ST and Tooling Tools owned by Seller and used in the process of fabricating, inspecting, assembling and coordinating of particular Items and/or tools as described in paragraphs 2.1 and 2.3. Seller-Owned ST is not to be confused with any form of Buyer Furnished Tooling. This is a tool owned by Seller and not owned by Lockheed Martin.

2.5 STE means either single or multipurpose integrated test Items engineered, designed, fabricated or modified to accomplish special purpose testing. STE consists of Items that are interconnected and interdependent so as to become a new functional entity for special testing purposes. STE excludes:

- Consumable property
- ST
- Facility Items (except necessary improvements for installing STE)
- Plant equipment Items used for general plant testing purposes

2.6 MSE is used in manufacturing operations to support, test or prove the functional operation of an Item.

2.7 MSE consists of the following types of Items and shall be considered United States (“U.S.”) Government property:

2.7.1 SE required to make an Item operational in its intended environment. SE includes the following:

- Common and Standard SE – For use on more than one type Item
- Peculiar or Non-Standard SE – For use on a peculiar or specific Item

2.7.2 MTE required for use in manufacturing operations to conduct tests and/or prove the functional operation of a specific Item. MTE is peculiar to manufacturing in that it is not normally used by Buyer to support the Item in an operational environment.

2.8 “Control Media” means tooling and electronic data used to control I/R and/or coordinating points and are categorized as follows:

2.8.1 “Master Tooling” – Master tool gages used to establish dimensions and features during manufacture of Production Tools which control I/R and/or coordination points of production Items. Unless Buyer has provided Seller with prior specific written authorization to do so, Seller shall not use Master Tooling for production purposes, i.e., Item verification, drilling, trimming or forming.

2.8.2 “Controlled Production Tooling” – Tooling such as jigs and fixtures used to establish dimensions and features of Items and which control I/R and/or coordination points of those Items.

2.8.3 “Electronic Data” – Computer-generated electronic data used to establish dimensions and features during manufacture of production tools which control I/R and also used during fabrication of production Items for control of I/R features, e.g., trim, attach holes.

2.9 Manufacturing Engineering Data Model ("MEDM") – An electronic Computer Aided Three-Dimensional Interactive Application ("CATIA") model used to fabricate designed or non-designed tools. The MEDM may contain contour, reference lines, attach pattern, periphery, tooling holes, text, etc. in any combination for tool fabrication and/or the tool design. The MEDM may contain specific inspection points designated by Buyer's Integrated Product Team ("IPT"). The inspection point coordinates can be recorded electronically and can be displayed on a paper plot of the MEDM. A Coordinate Measuring Machine ("CMM") or other inspection device control program may be created from the MEDMs containing inspection point information defined by Buyer.

2.10 "Production Tools" means jigs, fixtures, dies, and other tools made for use in manufacturing Items.

** 2.10.1 "Convenience Tools" are typically Production Tools and are Buyer Furnished for the convenience of the Seller with an option to use for this PO. However, this type tool can also be a Tooling Tool to be used at the Seller's convenience for tool coordination or tool manufacturing.

2.11 Interchangeable-Alterable ("IA") Items mean controlled interchangeable manufactured Items that may require limited alteration of specific features or opening edges during installation. The alteration, if any required, may be the removal and/or addition of edge material. The alteration task is only accomplished during installation.

2.12 Electronic Supplier Problem and Resolution ("e-SPaR") - This online system is available on the Buyer's Supply Chain Management Homepage at <http://www.lockheedmartin.com/us/aeronautics/materialmanagement.html> and is the approved system for Seller to request information regarding PO requirements, including Engineering drawing clarifications, tool design clarifications and any related issue that does not pertain to a physical discrepancy within a tool.

** 2.12.1 Examples of such submittals or request, but are not limited to, would be a request for Buyer to ship applicable coordinating tool to Seller for the purpose of accomplishing Production Tool to Master Tool coordination.

** 2.12.2 Clarifying language within the PO, Tool Design or Build Package.

2.13 Seller Aircraft Tooling Report ("SATR")

2.13.1 A SATR is a document initiated by Seller to document a discrepant Buyer-furnished ST condition. Buyer shall reply with authorization for rework or repair, if required, of "out of engineering" discrepancies or conditions.

2.13.2 This online system is available on the Buyer's Supply Chain Management Homepage and was created to provide Seller with a traceable electronic means of reporting ST discrepancies and achieving disposition authorization from Buyer's program representative.

2.13.3 Access is granted by applying for an account on the Buyer's Supply Chain Management Homepage at <http://www.lockheedmartin.com/us/aeronautics/materialmanagement.html>. Highlight "Quality Requirements" and select "Corrective Action".

* 2.13.4 Seller shall initiate a SATR to document physical discrepancies, request for deviation from specifications or special processes of Buyer-furni

- * 3.8 Seller shall identify F-35 I/R Holes with a 1/8" band of red paint around each hole or group of holes as illustrated in Figure 3 and Figure 4.

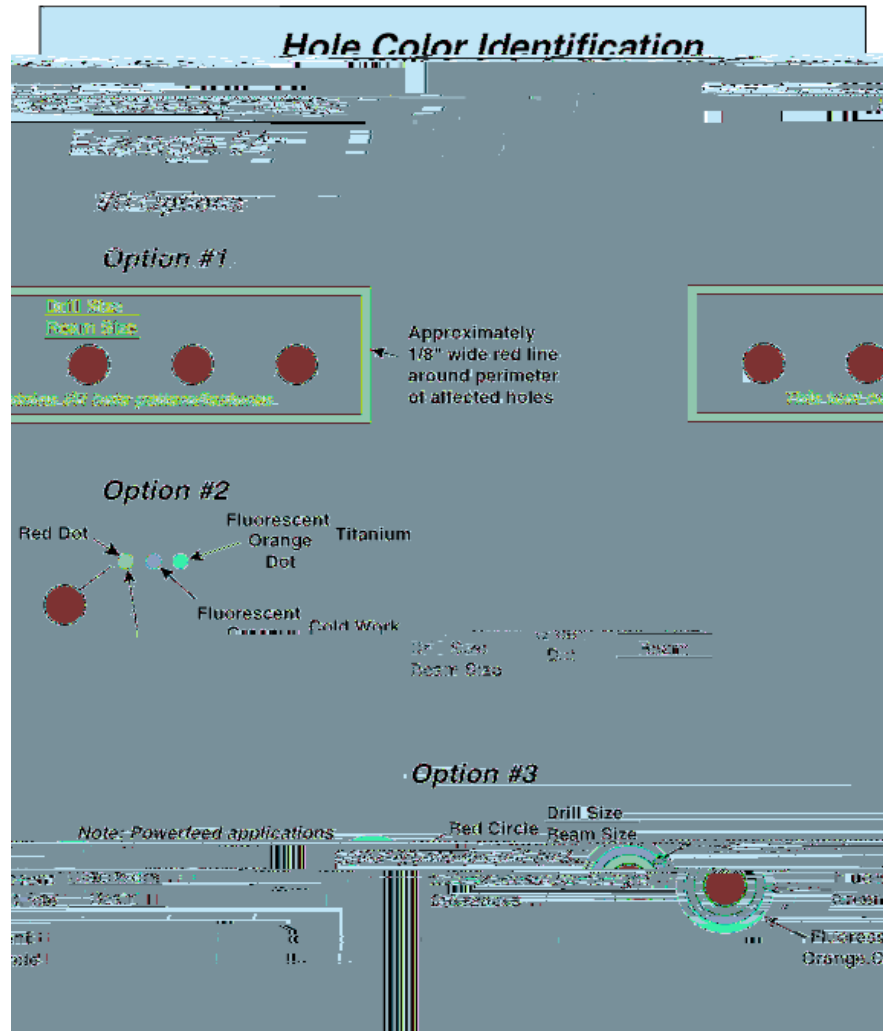


Figure 3. I/R Hole identification Options

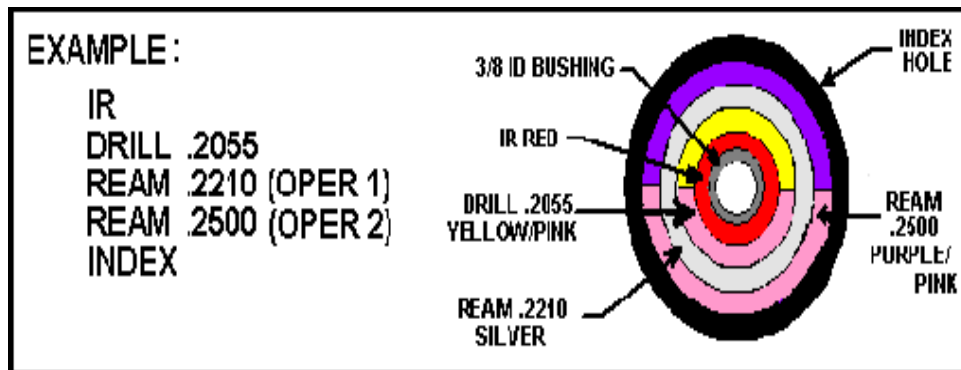


Figure 4. I/R Hole Identification Example

The Government or Commercial prime contract number indicated in this PO and, if applicable, type of Item (e.g., ST, STE, SE, MTE, etc.)

Serial number of the shipping document for tools received by Seller from Buyer or another authorized party and all packing sheet information.

Tool location within "Sellers" facility, rework, progressive inspection, calibration, maintenance and acceptance dates

Copy of the completed Certified Property

7.1.3 Seller shall provide verification of compliance upon request from Buyer or Buyer representative.

7.1.4 Seller shall control tool traceability by ensuring all tool identification labels, plaques and removable details of tool are stored, handled, used and transported appropriately to prevent loss of any items associated with Buyer Furnished Tooling.

7.2 Upon receipt of boxed and sealed tools, Seller shall notify Buyer's Representative to break the seal of

- Original tool number – where applicable or for replacement of ST only
- Original Tool Code – where applicable or for replacement of ST only
- Original tool asset number (barcode number) – where applicable or for replacement of ST only

8.0 TOOL QUALITY CODE CATEGORIES

* 8.1 Seller shall fabricate all tools to the quality code stated in this PO. If no quality code is imposed or “Buyer Accept at Source” is not stated in this PO, Seller fabricated tools shall be quality Code 2 below and shall be identified as defined in Part II, paragraph 2.2.

- ** 8.1.1 Seller shall coordinate manufacturing of such tools with Buyer’s Assigned Quality Representative to establish applicable points of validation, inspection, coordination or verification, if any.

8.2 “Code 1” – These tools are made of the best and most durable practical materials available. They are capable of producing Items with critical tolerances at an accelerated production rate without addition or changes in construction. However, duplicate tools may be required by Buyer in some cases.

8.3 “Code 2” – Incomplete and/or low production rate quality tools that can be revised at a later date to meet the needs of an accelerated production program (capable of being reworked to Code 1 tools). Combined operational tools comparable to Code 1 tools used for performing multiple operations. Tools that can be revised by separating them into Items or sections to make one or more Code 1 tools if required by production scheduling.

8.4 “Code 3” – Permanent type tools made from moderately priced materials and used for low production rates or a limited number of ship requirements. These tools must be capable of holding blueprint tolerances. If production is greatly increased, it may be necessary to replace these tools when authorized to Code 1 or 2.

8.5 “Code 4” – Low production rate tools made of low cost materials. These tools are used for accomplishing emergency, temporary, or off-station production operations. They must be capable of making Items or assemblies that will meet minimum quality control standards. When making Items with this type of tooling, a maximum amount of handwork, standard setups, layouts, etc. is permitted.

8.6 “Code 5” – Lowest cost tooling that is used for production operations. These tools are needed for making Items or assemblies where it is impossible to make them by layout, handwork, standard tools, or setups. Use of handwork, standard clamps, etc., is permitted when finishing Items to meet engineering tolerances.

* **9.0 TOOL PROTECTION AND STORAGE REQUIREMENTS**

9.1 Seller shall ensure its quality system maintains surveillance in order that Control Media is not abused or damaged while out of storage/shipping containers. Seller shall be responsible for Buyer Furnished tooling while in Sellers possession and shall take particular care when tools are being stored, handled, transported, loaded into and removed from jigs and fixtures. Preservation, storage and shipping container requirements are illustrated in Part IV of this Manual.

10.0 SHIPPING INSTRUCTIONS

10.1 Buyer shall specify destination and mode of transportation for tools that are to be shipped from any point of origin.

Note: Seller shall ensure all Tooling and shipping/storage containers are in usable condition prior to shipment. If either tool or shipping/storage container is not in usable condition, Seller shall initiate an e-SPaR for PO authorization to rework, repair or manufacture a new container and or a SATR for authorization to rework or repair a tool.

10.2 Seller shall provide advance notice to the Buyer's Representative when performing closure of a Control Media container.

* 10.3 Seller shall contact Buyer's Representative for closure of the Control Media container. If Buyer's Representative is unavailable within two (2) business days to witness the closure of the Control Media container, Seller's QA shall fill out the Form FWP-1209 or GD1856-1 as applicable. Seller's QA and/or Buyer's Representative shall verify the following are complete and included before closure and sealing:

- A. Control Media contents are complete
- B. Applicable surfaces are greased/protected from the elements per Appendix A
- C. Loose details, i.e., L-pins, clamps, sub-assemblies, etc., are shored
- D. FWP1209 or GD1856-1 is stamped and complete

10.4 Prior to shipment, Seller shall note physical damage, if any, to any tool and shall document all such damage, if any, as specified in Part I, Paragraphs 2.12 and 2.13.

10.5 Seller shall use lead seals, steel stamped by Seller, to seal the Control Media container.

10.6 If movement of Control Media will affect Seller'

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Remove grease and/or other preservation treatments from the jig and loosen any pins and/or bushings that may have corroded during shipment.

Install permanent details such as counter-balances, etc., that were temporarily removed for shipping and check to ensure proper function.

Remove and establish storage means for removable details for each jig.

Level the jig (horizontal plane) as necessary to maintain +/- .005 inches tolerance.

Verify the plumb (vertical plane) of the jig to within +/- .005 inches tolerance. Use buttons where they are provided or the candlestick mounts common to the jig Lines Of Sight (LOS) for this purpose.

Note: It is sometimes necessary to adjust the level of the jig slightly in favor of the plumb in order to avoid excessive twist.

Set-up and establish the jig reference system using the Laser Tracker targeting system (or equivalent) based on the coordinates provided on the jig. Target points and identification tags with values are stamped on each jig for this purpose.

Measure the position of the candle-stick mounts, if applicable, per Tool Design drawing. Typically, there are four (4) mounts. Work from forward to aft along the Basic (lower) Line-Of-Sight (LOS) and then along the Auxiliary (upper) LOS. Observe squareness of the points and maintain within .005-inches total tolerance reading. The Auxiliary LOS is allowed run-out in the Z-axis (Water Line) but not in the X-axis (Buttock Line).

Measure the position and alignment of the end-plates on the respective jigs to the basic and auxiliary LOS criteria per Tool Design drawing.

Measure and create a y-axis (Fuselage Station) plane on the forward end-plate. The y-value should correspond to the nominal value shown on the tool design drawing and be planer within .010-inch total tolerance reading.

Measure and create a y-axis (Fuselage Station) plane on the aft-ward end-plate as in the previous step. The y-value should correspond to the nominal value shown on the Tool Design drawing and be planer within .010-inch total reading. Observe the overall length of the jig between the end-plates and verify parallelism to +/- .010 inches tolerance.

Anchor jig to floor as specified and illustrated in PM-4053, if applicable to tool type.

Document all readings and/or damaged conditions noted in the steps per Part I, section 7.0 of this Manual.

Submit SATR forms to document damage and out-of-tolerance conditions for rework/repair authorization, if any is required.

Rework or repair any damaged tool details and out-of-tolerance conditions dispositioned by Buyer according to tool design drawing or special instructions. For C-130 and P-3 program, Seller shall make note of the completion of all verification points, inspection data and rework or repairs within the "Tooling Log Book" (GD1856-1) accompanying each jig.

Perform additional inspection/verification items as requested by Buyer representative, if applicable.

Establish periodic inspection points and records for future dimensional stability checks by verifying these key features during this initial set-up process. See Part I, section 11.0 of this Manual for PI/V requirements.

Verify or install a new DS-228 Tool Identification Tag, if required on all tools per PM-4053, section 3.8. Stamping and dating of Tool Identification Tag shall be accomplished as directed by Buyer representative.

Tool shall be placed into use for Trial Run/Tool Proof/FAI activity only.

Tool shall not be released for Production service until successful Tool proofing activity is completed.

**** 14.0 LOCKHEED MARTIN SUBCONTRACT SOURCE BOOK**

14.1 Subcontract Source Book's (SSB) are unique and are only applicable to LM Aero-Marietta's C-130 Program if specified by this PO and Buyers Statement of Work (SOW). Otherwise, the TMS Manual is fully imposed and shall take precedence when discrepancies exist between this Manual and the SSB when Quality Appendix QX is imposed, referenced or declared by this PO.

14.2 Any deviation or exceptions shall only be authorized by C-130 Program Management and shall be incorporated by PO revision or amendment. Clarification or deviation request shall be submitted as illustrated in Part I, section 2.12.

END PART I

3.2 Unless otherwise stated in Buyer's Build-to-Package ("BTP"), CMM, theodolite, photogrammetry, calibrated machine probe, and/or laser tracking are the only acceptable methods for contour verification, and are the preferred methods for hole pattern verification. CMM inspection is the overall preferred method for verification. Exception: If the CMM output data is such that the data is not electronically transmittable to a CATIA model for review, and/or calculations must be performed manually in order to complete the inspection activity (e.g., vector data must be manually calculated for hole locations), the use of theodolites or laser tracking when the data can be readily uploaded electronically to CATIA are then the preferred methods of inspection.

3.3 Inspection Grid Pattern: Unless otherwise stated in Buyer's BTP or specified in PM-4053, Seller shall inspect surfaces requiring verification using the following grid pattern:

Verify loose details are identified per program requirements per PM-4053
Verify I/R markings are per PM-4053 and that Tool Design clearly identifies I/R features and flag notes are used for identifying these features per this Manual in Part II, section 8.0 for production tools
Verify I/R identification on tool contains mandatory I/R statement per PM-4053
Verify if PI/V identification is noted on tool plaque, if applicable
Verify Heat Thermal Survey applicability per PM-4053
Verify material certifications, Certificates of Conformance (C of C)
Verify Progressive Inspection Logs have been completed as required in this Manual
Verify applicable leak checks have been performed per PM-4053, as applicable
Verify fiberglass plies and resin are per PM-4053 requirements, if applicable
Verify potting compounds used for bushing placement per PM-4053, if applicable
Verify all potted bushings coordinate to coordinating tool per PM-4053
Verify all hole and drill bushing identification is per Tool Design
Verify Shipping/Storage container per Tool Design and PM-4053, if applicable
Verify Shipping documents are correct per this Manual and Buyers Shipping Requirement PM-5010 or as specified by Buyer in this PO
Verify tool protection requirements have been accomplished per PM-4053 for shipment to final designation, e.g., Overseas, Domestic.

- * 3.9 Seller shall stamp the DS228 Tool Identification Plaque as defined in PM-4053 for tool identification by placing Seller quality stamp and date in the Trial Run block if Trial Run Type I, II or III are specified on this PO. If Trial Run Type IV is specified on this PO, Seller shall place "N/A" in the Trial Run block and place Seller quality stamp and date in the Production block. Tool identification plaque requirements are fully illustrated in PM-4053, section 3.8. Trial Run is the process of verification that the tool functions as necessary to produce a part or assembly per engineering requirements in a production environment.

3.10 Trial Run is applicable as listed below.

Type I	Trial Run Required
Type II	Trial Run Required
Type III	Trial Run Required
Type IV	Trial Run Not Required

4.0 TOOL IDENTIFICATION AND SHIPPING REQUIREMENTS

4.1 Tool identification for Buyer tooling is controlled by PM-4053. Seller shall check for the latest revision of PM-4053 requirements by visiting the on-line revision history link located on the Buyer's BTP website.

4.2 Seller shall identify each Seller-manufactured ST in a conspicuous place using a permanent method such as stamping, engraving, etching, stenciling, etc. as required per PM-4053.

4.3 To ensure applicable inspection data and acceptanc

5.0 PROCESS FOR TRANSFERRING TOOL DESIGNS FROM SELLER TO BUYER

5.1 Digital Data Transfer – The transfer of digital data between Seller and Buyer is controlled through Buyer's BTP Computer Aided Design/Computer Aided Manufacturing (CAD/CAM) Engineering Data Transfer Group. Buyer shall identify Seller Points Of Contact ("POC") for setup of digital data transfer capabilities and forward this information to Buyer's BTP CAD/CAM Engineering Data Transfer Group. Buyer's BTP CAD/CAM Engineering Data Transfer Group shall contact Seller POCs and identify required capabilities, data transfer site information, (including passwords, directory information, email notifications, and access controls), and how Seller will be notified of data transfer activities.

- * 5.2 Hardcopy Data Transfer – Seller shall coordinate all hard copy transfer of designs through Buyer if required by this PO.

6.0 SEALING CRITICAL LOCATORS

6.1 Torque seal requirements for tooling are defined by site and program as illustrated;

Fort Worth requirements: F-22A tooling – **Pink**
All other tooling – **Purple**

Marietta requirements: Tooling – **Pink**

Palmdale requirements: Tooling – **Pink**

All torque seal applications that are not for sealing locators or critical locating features can be White.

7.0 DUPLICATE TOOL MANUFACTURING

7.1 Seller shall manufacture duplicates of LM Aero tools, when authorized by Buyer, and shall verify that the original LM Aero tool matches the original tool design before proceeding with duplication task.

7.2 Seller shall notify Buyer if discrepancies exist between Tool and Tool Design as required in Part I, section 2.13.

* 8.0 INTERCHANGEABLE- REPLACEABLE ("I/R") DESIGN AND MANUFACTURING

8.1 Seller shall design and manufacture all tooling containing I/R features as defined in PM-4053.

8.2 Seller of Buyer authorized "design and build" tooling shall design I/R tools as illustrated in Figure 6 and PM-4053 Section 2.4.

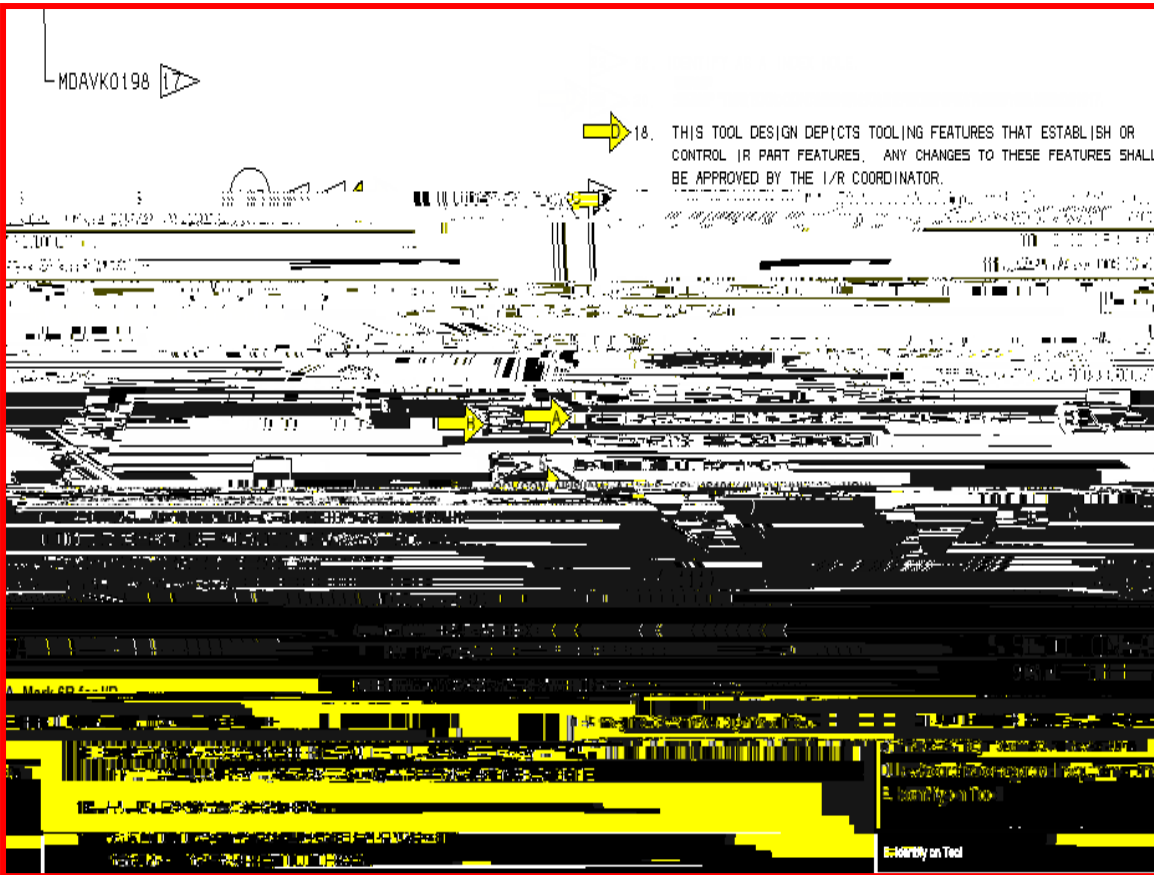


Figure 6. I-R Tool Design Requirements

**** 9.0 NON Interchangeable or Replaceable (I/R), NRE DESIGN AND MANUFACTURING**

9.1 Seller shall receive written authorization to design and manufacture tools once submittal of design, sketch, drawing, concept or schematics have been approved by Buyer's program personnel.

9.2 Seller shall notify Buyer Quality Representative when written authorization has been received. Seller's Buyer Quality Representative shall jointly develop an applicable validation process of all special processes, critical dimensions, leak checks or any unique point in the manufacturing process.

END PART II

PART III

INTERNATIONAL SELLER REQUIREMENTS

1.0 GENERAL

1.1 Part III is applicable to programs in which Buyer furnishes Seller with Items and/or material to support Buyer's BTP and is in addition to the requirements of Part I and Part II of this manual.

1.2 Fabrication requirements of ST, STE, and MKT by Seller or Seller's sub-tiers to produce Buyer-designed controlled Items and aircraft modifications, as specifically contracted by this PO, are defined in Part II of this Manual and controlled by PM-4053.

2.0 CONTROL OF SE, MTE AND STE

2.1 Receipt of SE – Seller shall return a stamped copy of SE receiver to Buyer within five (5) working days upon receipt of SE.

2.1.1 Maintenance and repair parts for SE – Seller shall requisition maintenance and repair parts for the SE provided as MSE from Buyer.

2.1.2 Modification of SE provided as MSE peculiar modification of SE – Seller shall receive a tool order, a peculiar modification kit and written Buyer authorization. Upon completion of modification, Seller will return the stamped off / approved copy of the tool order to Buyer.

2.1.3 Time Compliance Tech Order ("TCTO") modification of SE – Seller shall receive a TCTO modification kit and written authorization from Buyer authorizing Seller to install the kit. Upon completion of kit installation, Seller shall return a completed Letter of Certification ("LOC") to Buyer.

2.2 Receipt of MTE –

PART IV APPENDICES

APPENDIX A – REWORK, REPAIR AND COORDINATION GUIDE

1.0 GENERAL

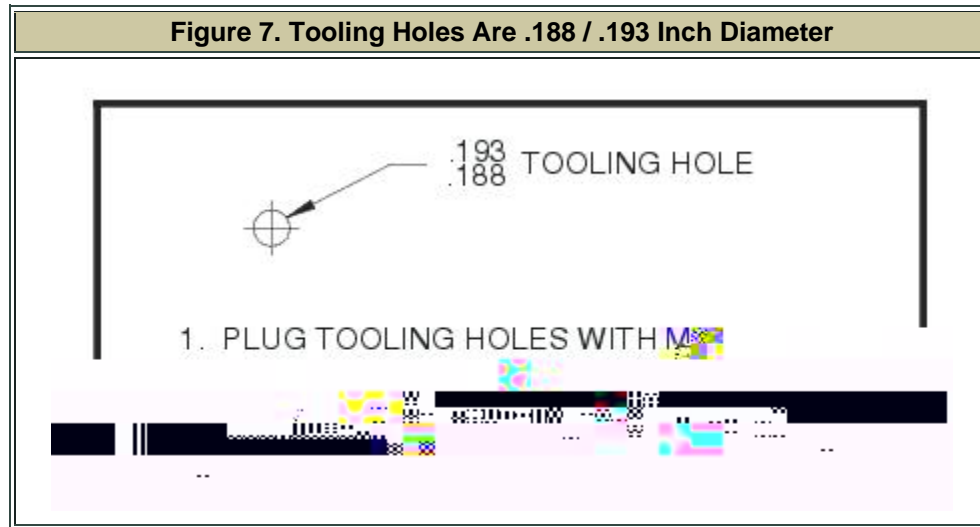
1.1 This Appendix A is applicable for all programs at all sites and is included in this Manual as specification guidance for the preservation, rework, repair and coordination of Buyer-furnished tools.

1.2 This Appendix A is provided as specification requirements for performing new make, rework, repair or coordination of Buyer-furnished tools.

* 1.3 This Appendix A is not all inclusive of tool

Produce tooling holes in Production Items as authorized and shall have a hole size tolerance of $+.005/-0.000$ and are located within one-half of such tolerance.

Locate and identify tooling holes on Item(s), as directed by Buyer, or illustrated in Figure 7. When Seller must plug tooling holes, Seller shall provide a general note to that effect as illustrated in Figure 7.



Maintain allowable production tolerances on interchangeable Items produced/verified with controlled production tooling as illustrated in Figure 8.

Utilize a check pin for all I/R hole patterns to ensure patterns are made in accordance with the tool coordination tolerance tables included herein.

Utilize controlled production tooling to check and verify allowable production tolerances on interchangeable Items are from .010 smaller to .010 larger than the tool, as illustrated in Figure 8.

Utilize a check pin to check and verify the I/R hole pattern is made in accordance with the tool coordination tolerance tables included herein.

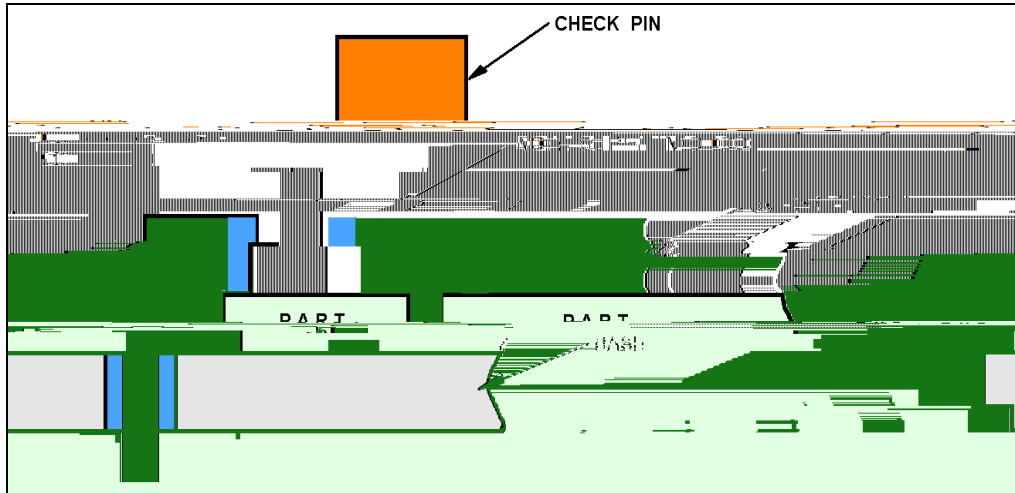


Figure 8. DOUBLE RAIL (INTERCHANGEABLE)

Verify replaceable and non-I/R part perimeters produced with production trim tools or check fixtures have allowable production tolerances from a maximum of .030 smaller, to a maximum of .030 larger than the tool, relative to the engineering drawing applicable feature tolerance as illustrated in Figure 9 and 10.

Verify perimeters are plus or minus .030 tolerances, unless otherwise stated on face of drawing. Example: An E.O.P. dimensioned as $+0.015, -0.030$ from a F.S., W.L., B.L. would apply. A "Tab" dimensioned as $+ \text{ or } -0.010$ for overall width, would apply if stated on the drawing.

Utilize a check pin to verify all I/R hole patterns are made in accordance with the tool coordination tolerance table.

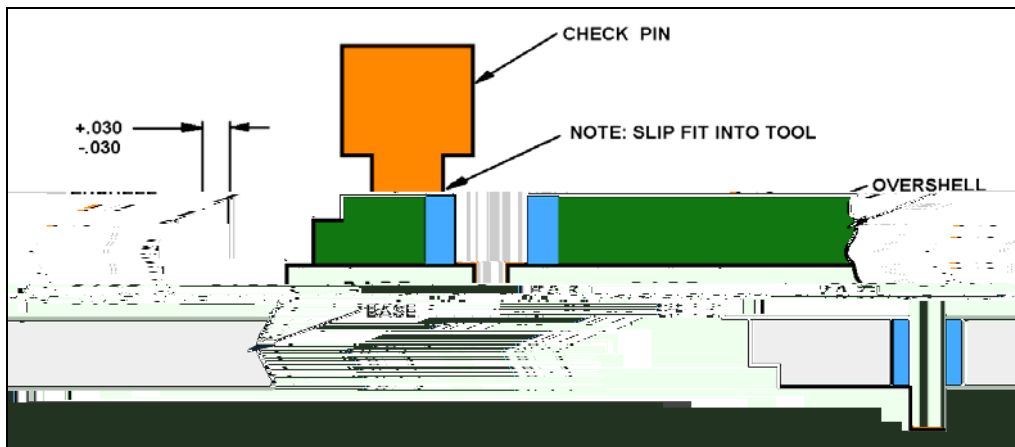


Figure 9. DOUBLE RAIL (REPLACEABLE, AND NON I/R, NET OR WITH EXCESS)

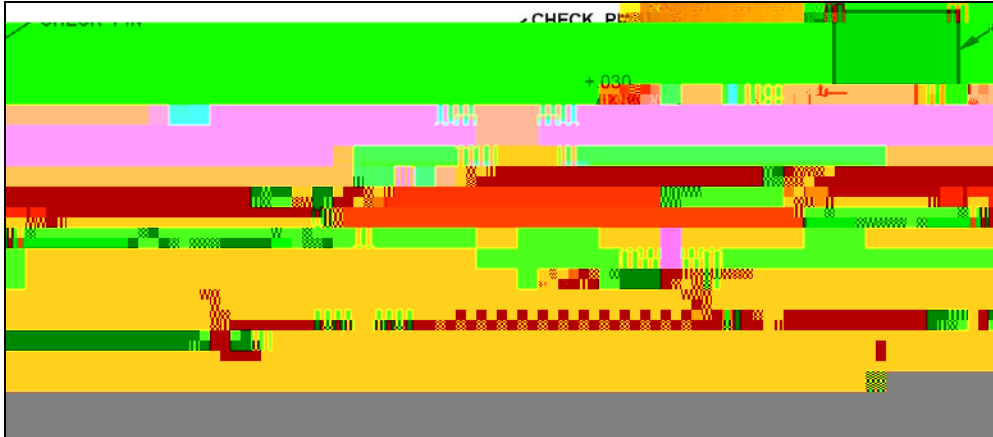


Figure 10. SINGLE RAIL SETBACK TYPE (REPLACEABLE, AND NON I/R, NET OR WITH EXCESS)

** 3.1.1 Unique Tolerances for Legacy Program Tool Holes and Excess Material as specified

Non-Designed C-130 and P-3 tools that are controlled by Tooling Tools, shall have a hole size tolerance of $+0.001$ to -0.000 and Pin tolerance for such tools shall be -0.0025 to -0.0030 per PM-4053 or as specified by this PO or Tool Design, if any or as directed by Buyers Program Engineering. Seller shall submit E-SPaR when discrepancies exist.

Tooling holes may be authorized for detail parts manufacturing or location control during assembly and may or may not appear on engineering drawing. Sellers shall place tooling holes in detail parts only after authorization from Buyer's Program Engineering to avoid potential interference with subsequent installations.

Material excess tolerance shall be per PM-4053 specification or as Buyer authorized through this PO to allow deviation from standard tolerance for part manufacturing. Standard tolerance of $+0.060/-0.030$ when material excess call out is $.100$ up to $.250$. For material excess greater than $.250$, the tolerance shall be $+0.100/-0.060$.

3.2 For tool inspection requirements of I/R tool coordination (applicable to new make, rework and coordination orders), Seller shall only utilize check pins which are AISI01 tool steel with a heat treat callout of RC 55-65 for pins with a diameter of $.2500$ or larger, and a RC 38-48 for pins with diameters smaller than $.2500$.

3.2.1 For Control Tool to Production Tool Coordination – Seller shall pin the control tool to the tool being coordinated with $.0000$ to $.0005$ undersize pins at four(4) locations reasonably close to the corners of the control tool. Seller shall inspect the remaining holes in accordance with pin tolerances shown in Table 2.0 for “Coordination Check of Control Tools”.

3.2.2 For Control Tool to Control Tool Coordination (Make New) – Seller shall install new control tool bushings utilizing pins with $+0.0000/-0.0002$ tolerance on diameter (Ref.: Transfer of hole pattern, Table 1.0).

3.2.3 For Control Tool to Control Tool Coordination (Rework) – During rework of control tools bushing, Seller shall install bushings0 Twinge7311.7964 0 TD.0003 Tc-.0027 Tilizinush9(g pins)th.5(d)5(t

Table 3.0 COORDINATION CHECK OF PRODUCTION TOOLS

HOLES UNDER .250	STEP PINS	HOLES .250 AND OVER
Nominal $+.0001/+.0010$ Nominal $+.0000/-.0002$ Nominal $+.0000/-.0030$.0005 Max	Coordination of Production Parts to Production Tools (Using Step Pins) P/T Bushing I/D Tolerance Lg. Dia. Pin in Tool Sm. Dia. Pin in Part Concentricity	Nominal $+.0001/+.0010$ Nominal $+.0000/-.0002$ Nominal $+.0000/-.0030$.0005 Max

C/T - CONTROL TOOL P/T - PRODUCTION TOOL	I/D - INSIDE DIAMETER O/D - OUTSIDE DIAMETER
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* 3.4 Seller shall verify I/R tooling tolerances are as follows:

Master Tooling is net (nominal).

Master Tooling to Production Tooling for trim and contour shall be $\pm .015$ over 80% of gauging surface and $\pm .020$ over 20% of the surface per PM-4053.

Production Tool to production Item for edge and/or cutout trim is $\pm .010$, except replaceable edges, net or with excess, which shall be $\pm .030$, unless otherwise stated on the engineering drawings.

Production Tool to production Item tolerance for contour is $.000$ to $+.020$.

Note: This tolerance is a tooling application which recognizes the engineering drawing tolerance of $\pm .010$, unless otherwise specified, for sheet metal Item contour relative to Item being placed against a solid tool surface for checking. The tooling application also recognizes restraint in the tool, in accordance with the engineering drawing.

Indenture tool development does not exceed $\pm .005$ total back to the master.

Buyer-furnished Master Control Tooling is not used for production purposes, i.e., Item verification, trimming, drilling, and forming.

* 3.5 Seller shall verify non-I/R tooling perimeter, holes and contour tolerances are as follows:

Non I-R Tooling Tools are net to engineering, unless otherwise identified on tool, i.e., excess on a tooling sample. Excess tolerance shall be per PM-4053 specification or as Buyer authorized through this PO to allow deviation from standard tolerance.

Tolerance from tooling tool to controlled production tooling is +/- .015" tolerance allowable over 80% of the gauging surface, and +/- .020" over 20% of the gauging surface as illustrated in Figure 6.0.

Tolerance from controlled production tooling to production Item equals +/- the engineering drawing tolerance, for edge and/or cutout trim and holes.

Controlled production tool to production Item tolerance for contour is .000 to +.020.