CPI AERO

SUPPLIER

QUALITY ASSURANCE

REQUIREMENTS

MANUAL

SQAR-001

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INTRODUCTION

CPI Aero produces Aerospace components for Military and commercial aerospace applications. CPI Aero is an AS9100 third party certified company and has great pride in its commitment to excellence in quality products and service to our customers.

In the rapidly changing technology of today's environment, we constantly face new challenges. Today's customer expects: high quality, high reliability and on time deliveries. Meeting these goals requires the dedicated effort of CPI Aero employees and suppliers both individually and collectively.

Supplier Quality Assurance Requirements were prepared to assist in the attainment of these goals. We expect our suppliers to review, understand and comply with the requirements invoked by the CPI purchase order and this SQAR document.

Suppliers are to notify CPI in writing when there are significant: facility or organizational changes such as: company name, location, senior quality management, manufacturing line changes and changes to process.

1. Purpose

The purpose of this manual is to describe the quality requirements imposed, in whole or in part, on CPI Aero suppliers by the CPI purchase order. These requirements are those necessary to assure that materials, products and services delivered to CPI are in conformance with the requirements imposed on the purchase order. In addition, general information considered to be of a helpful nature to CPI Aero suppliers is included.

2. Scope

This manual identifies the requirements that are imposed on suppliers who provide materials, products or services for incorporation on contract deliverable product to CPI Aero, hereafter identified as CPI. This manual is applicable on those CPI purchase orders that impose SQAR-001. **CPI-SQAR-001 Rev. E supersedes all previous CPI SQAR revisions.**

3. Responsibility

3.1 As a supplier of aerospace products, CPI bears the responsibility of assuring the quality of all products supplied to its customers. These products are subject to inspection by CPI, Military and Commercial Aerospace customers and the United States Government to verify compliance to all contractually identified quality requirements.

3.2 CPI's quality assurance program is "Third Party Certified" to AS9100, and has been approved to: Boeing, Northrop Grumman, Sikorsky, Spirit Aerosystems, Vought Aircraft and Lockheed Martin Quality requirements, all of which require the establishment of procedures for the selection of suppliers and for the periodic review and assessment of the control of purchased material and services furnished by suppliers.

3.3 Emphasis is placed on using suppliers who deliver products or services that meet the CPI requirements outlined and described in this manual, which is directed to assisting CPI suppliers in meeting these performance goals.

3.4 The supplier has the primary responsibility to develop and maintain a quality system, which meets CPI's requirements. The supplier is responsible for notifying CPI when the requirements of this manual and/or the purchase order cannot be met. Should a conflict exist between this manual and the purchase order, the purchase order shall take precedence.

4. Requirements

4.1 Quality/Inspection System

The CPI supplier shall maintain a Quality Assurance program meeting the requirements of this document, which is derived from AS9100. The system shall assure that all parts and assemblies submitted to CPI conform to applicable drawings, specifications, quality clauses/codes and other purchase order requirements. The supplier will be responsible for all inspections and tests required to substantiate product conformity. The supplier shall execute this responsibility not only during his own production operations, but also in any procurement made in fulfillment of a CPI purchase order. ***The supplier shall provide objective evidence of product conformity regardless of the manufacturing source.***

4.1.1 The supplier's inspection system shall comply with applicable requirements of this document and shall be implemented by written and controlled procedures. At a minimum these procedures should include the following elements:

1) **Materials and Parts control**
2) **Measuring and Test Equipment Control (calibration)**
3) **Product Inspection-Testing (Receiving, In-process and Final)**
4) **Procurement Control**
5) **Nonconforming Material Control**
6) **Corrective Action**
7) **Handling, Storage and Packaging**
8) **Control of Tooling, Customer/Government Property Management**
9) **Records**

4.2 Supplemental Quality Assurance Requirements Clauses

4.2.1 Quality Clauses are special quality requirements selectively imposed on suppliers by specific reference within the body of the CPI purchase order. The purchase order will list by number each applicable quality clause. Suppliers are expected to review and understand these clauses to assure compliance can be attained prior to purchase order acceptance. The quality clauses are in addition to, and do not substitute for the requirements of this document.

4.3 Supplier Contact Point

The supplier contact point at CPI is always the Buyer. All questions, problems or requests for additional information should always be directed initially to the Buyer. **Do not accept any changes to the technical requirements, quantity, due dates, revision levels and/or quality requirements unless authorized via purchase order change notice or revised purchase order issued by the CPI Buyer.**

4.4 Distributors, Brokers, Manufacturers' Representatives

Distributors, brokers and manufacturers representatives accepting CPI purchase orders must recognize that all purchase order requirements apply to them, as well as to the material manufacturer. As the direct supplier to CPI and as a representative to the manufacturer, it is your responsibility to assure that you, as well as your suppliers, meet all CPI purchase order requirements.

4.5 Supplier Performance Monitoring

CPI maintains a delivery and quality rating system to track supplier's conformance and performance to the requirements of purchase orders. Any nonconformance to purchase order requirements may affect your rating and possibly, your approval status. In addition, a nonconformance may result in a **Corrective Action Request (CAR)** being issued to you from CPI. You are responsible to issue corrective action requests to your suppliers as applicable.

4.5.1 Your response to a CAR must be complete and acceptable within the allotted time frame. Failure to meet any of these conditions will result in your being placed in a temporary disqualified status. Suppliers placed in a temporary disqualified status will be permitted to complete their existing purchase orders with no increases in quantity, but will not be issued any new purchase orders pending resolution of the CAR(s), which caused the disqualification.

4.6 Corrective Action

The supplier shall have an effective program for timely investigation, stock purge, corrective action and follow up, for rejections initiated by both the supplier and CPI.

4.6.1 When the supplier discovers discrepancies that may also exist in products already delivered to CPI, a telephone call to the CPI program manager and written notification shall provide all the particulars.

4.6.2 CPI will report discrepancies such as poor quality, warranting corrective action to the supplier. CPI will request formal corrective action from suppliers exhibiting excessive discrepancies. The reply shall give evidence that the circumstances surrounding the cause of the discrepancy were thoroughly investigated and appropriate and positive steps were taken to preclude recurrence of the discrepancy. The affectivity point of the corrective action shall be so noted by date and or serial number. The reply must be returned to CPI within 30 calendar days, unless otherwise specified, after receipt of the request for corrective action.

4.6.3 Failure on the part of the Supplier to answer corrective action requests (CAR's) within the time allotted may result in the suspension of the supplier from the approved supplier list.

4.7 Root Cause Analysis (RCA)

In order to arrive at an effective corrective action, a thorough root cause analysis (RCA) must be performed. A root cause analysis is a class of problem solving methods aimed at identifying the root cause of problems, or events

4.7.1 Root Cause analysis is predicated on the premise that problems are best solved by attempting to correct, or eliminate root causes, as opposed to merely addressing the immediate obvious symptoms.

4.7.2 By directing measures at root causes, the likelihood of problem recurrence will be minimized; it is however recognized that complete prevention of recurrence by a single intervention is not always possible, but is more the exception than the rule. Please note that Root Cause Analysis is frequently viewed as a tool of Preventative Action.

4.7.3 Despite the seeming disparity in purpose among the various schools of root cause analysis, there are some basic principles that for the purposes of this instruction, be considered as universal. Therefore, it is possible to define a general process for performing Root Cause Analysis.

4.7.4 General Principles

1) Aiming performance improvement measures at root causes is more effective than merely treating the symptoms of a problem.

2) To be effective, RCA must be performed systematically, with conclusions and causes backed up by documented evidence.

3) There is usually more than one root cause for any given problem.

4) To be effective, the analysis must establish all known casual relationships between the root cause(s) and the defined problem.

4.8 General Process for Performing and Documenting an RCA Based Corrective Action.

4.8.1 Notice that RCA (steps 3, 4 & 5) forms the most critical part of a successful corrective action, because it directs the corrective action at the root of the problem. That is to say, it is effective solutions we seek, not just the root causes.

1) Define the problem.

2) Gather data/evidence.

3) Ask why and then again to each answer of why, at least five (5) times and identify the casual relationships associated with the defined problem.

4) Identify which causes if removed or changed will prevent recurrence.

5) Identify effective solutions that prevent recurrence, are within your control, meet your goals and objectives, and do not cause other problems.

6) Implement the recommendations.

7) Observe the recommended solutions to ensure effectiveness.

4.9 Completing Corrective Action Requests

4.9.1 Supplier Corrective Action Requests (CAR's) are forwarded electronically (e mail) when defective product from a supplier is discovered. Instructions for the completion of the corrective action e mail are as follows:

1) **Root Cause of the discrepancy:** This area needs to reflect the details of the investigation, determining the root cause of the non-conformity. This section of the CAR must include the steps that were taken in determining the root cause of the non-

conformity and the depth of the investigation that was conducted in assuring that the root cause of the discrepancy was in fact uncovered.

2) **Action taken to correct the specific discrepancy:** This area needs to reflect a description of the action taken to correct the specific discrepancy. This area is completed once the investigator has completed determining the course of action to correct/rework the discrepancy noted in the Discrepant Material Report (DMR). After these two sections are completed, the responsible individual needs to state his/her name and the date that areas one and two (above) were completed.

3) **Action taken to determine if other product is affected by the same or similar deficiency:** This area needs to reflect that portion of the investigation that has determined if additional product has been affected as a result of the root cause.

4) **Action taken to correct the weakness which allowed the defective product to be shipped to CPI:** This area needs to reflect, where applicable, the findings on behalf of the supplier and/or customer where the material has been supplied and where the material was subsequently found to be non-conforming. A statement is required in this section that reflects the findings of their investigation and the details of the process breakdown that allowed the discrepant material to be shipped to CPI.

5) **Action taken to prevent recurrence of the root cause of the discrepancy:** This area needs to reflect a statement relative to the corrective action(s) taken to prevent recurrence of the discrepancy, resulting from the investigation and findings that determined the root cause of the non-conformity. After these three sections are completed, the responsible individual needs to state the target date for the implementation of the documented corrective action, the author's name/ title and the date that areas three, four and five (above) were completed.

6) The CAR is then emailed back to the sender at CPI for input into the corrective action database.

4.10 Survey and Audit Format

CPI reserves the right to perform both pre-award and post award surveys/audits of facilities, for the purpose of determining capability and compliance with CPI quality requirements. Sources certified to ISO 9001:2000 or AS9100 standard must exhibit and present a copy of the certification issued by an accredited registrar. All certificates are verified for authenticity in the Oasis database. In the event any discrepancies are found during a survey or audit, CPI Aero Supplier Quality Assurance (SQA) will ask for corrective action on the discrepancy. A written response to our corrective action request will normally be required within two weeks of notification.

4.10.1 The CPI Aero Quality Assurance Management System requires the use and control of "approved suppliers". To meet this requirement a list of approved suppliers is prepared, used and updated regularly. New suppliers are added to the list based on surveys with approved results; while existing suppliers are subjected to periodic review to determine the need for audit, resurvey and/or re-audit. The supplier survey parameters are based on the requirements contained in the current revisions of ISO 9001 and AS9100. The actual survey/audit will be performed by CPI Quality Assurance personnel or their authorized agents. The guidelines for characteristics reviewed during general surveys/audits are listed below; however, it should be noted that applicability to your facility might vary in accordance with the product, service or operations to be supplied and/or the supplier's specialty or capability as applicable.

4.10.2 Guidelines for Characteristics to Review during Surveys/Audits

a. Manufacturing Facilities.
b. Quality of inspection planning, controls, capability and management.
c. Product/Commodity visibility and defect prevention program.
d. Product /Commodity performance characteristics.
e. Past experience with the type product to be supplied.
f. Capability/Condition of the manufacturing equipment.
g. Control of engineering drawings and changes.
h. Control and maintenance of inspection equipment and production tools used as a media of inspection.
i. Control of personnel certification.
j. Material storage and handling & FOD prevention.
k. Control of Non-Destructive Testing and special processes.
l. Control of non-conforming material and supplies.
m. Corrective Action program.
n. Shop floor discipline and employee aptitude.
o. Calibration capability and resources.
p. Availability of latest specifications.

4.11 Purchase Order

The purchase order is a documented agreement (contract) between the buyer and seller that conveys what is to be supplied and the administrative, technical and quality requirements to be met. Suppliers are advised to read the Terms and Conditions imposed by the purchase order since they are responsible for the compliance thereto.

4.11.1 In some cases, when specified by the CPI purchase order, the supplier must use approved suppliers for special processes such as: heat treat, plating, bonding, chemical film and paint. This requirement is flowed down to CPI from the customer.

4.12 Purchase Order Review

The supplier is responsible for reviewing the CPI Aero purchase order for the following:

A) The part number and revision level match that of the documentation contained in the technical data package.
B) The date of delivery is correct (late delivery affects your quality rating).
C) The work to be performed is correct (incomplete work, or work not performed per the purchase order will affect your quality rating).
D) Quality Clauses: It is the suppliers' responsibility to meet all the quality requirements of this document and those invoked by the Quality Clauses stated on the CPI Aero purchase order (***The delivery of incomplete/incorrect certification packages will affect your quality rating).***

4.12.1 Upon completion of the purchase order review, the supplier is to complete the purchase order acknowledgement. By signing and returning the purchase order acknowledgement to CPI, the supplier agrees to all terms and conditions of the purchase order in its entirety including the work/service/product to be performed/supplied, will be delivered by the date on the purchase order and that the supplier has everything required to perform per the purchase order. ***All and any exceptions to the subject purchase order must be made at this time.***

4.13 Change Approval

For those items produced against a supplier generated set of requirements (proprietary products and the like) the supplier shall obtain CPI Aero approval, in writing , prior to returning the purchase order acknowledgement, that any changes in design, material, or production processes that may affect form, fit, or function, interchangeability, reliability are acceptable. The baseline configuration is considered to be the configuration originally specified by the CPI Aero engineering for procurement. Facility ownership and/or location changes must also be reported to CPI Aero in a timely manner.

4.14 Non-Conforming Material

The supplier must maintain a documented system to ensure non-conforming products are immediately identified as non conforming and segregated as size permits, from conforming products and withheld in a designated and controlled area for review and disposition.

4.15 CPI Aero Supplied Material

If materials are provided by CPI to the supplier for the performance of work, the supplier, by acceptance of the material and subsequent delivery of product warrants that no commingling of any such CPI supplied material with other material (either acquired by the supplier or provided by other customers to the supplier, etc.) has occurred.

4.16 Technical Data

The Technical Data Package is built and validated to support procurement. The (TDP) consists of one or more of, but may not be limited to the following:

A) Engineering Drawings
B) Mylars
C) Parts Lists
D) Loft Data
E) Electronic Data (models)
F) Engineering Change Orders(ECO's)
G) Engineering Data Lists (EDL'S)

4.17 Document Control

The supplier shall maintain a system for the control of drawings, specifications, planning, procedures, other technical documents, and changes thereto. The system shall provide for the timely removal of incomplete, obsolete or defaced documentation from the production and inspection areas. Each supplier using numerical control equipment shall have procedures to assure control of non-deliverable software and NC tapes, including the initial proofing, change and update control.

4.17.1 Unless otherwise specified in the purchase order, drawings and specifications shall be the revision in as noted on the purchase order.

4.18 Measuring and Testing Equipment Control

The supplier must maintain a calibration program, meeting the requirements of ANSI Z540-1 & ISO 10012-1. The system must ensure the timely recall and calibration of all company and employee owned measurement and test equipment used for production acceptance. Suitable records must be maintained and available for review.

4.19 Process and Manufacturing Controls/Operational Planning

CPI requires detailed **Shop Routings/Inspection Plans** for the purpose of process, inspection, manufacturing and sub-tier supplier control. The shop routing/inspection plans provide documented evidence of process control and inspection acceptance that enables the supplier to produce conforming articles from lot to lot.

a) A document traceable to the CPI part number showing the manufacturing and inspection operations, listed sequentially, that are to be performed.
b) Identification of sub-tier suppliers that will be used in the processing of CPI components. Sub-tier suppliers must be on the suppliers approved supplier list or on a CPI customer approved supplier list as required by the CPI purchase order.
c) CPI inspection traveler completed.
d) Part identification in accordance with MIL-STD-130 unless otherwise specified.

4.20 Use and Control of Special Process Sub-tier Suppliers

CPI requires all suppliers performing work or delivering supplies for use on contract deliverable materials to be approved. It is the responsibility of the supplier to request and insure that sub-tier suppliers have and understand all required specifications, thereby "Approving" the sub-tier supplier. All special processing required via a Government, ASTM or Customer process specification shall be performed by supplier approved sub-tier suppliers, **except** when the CPI purchase order requires the use of **Customer Directed Sources** via **Quality Clause QC-05**. QC-05 applies to (but not limited to): Prime and Paint, Chemical Film (alodine), Anodize, Heat Treat, Age Hardening, Plating/coating, all NDT, Shot Peening, Bonding, Welding, Brazing, X-ray, N-ray, Ultrasonic scan. If QC-05 is contained in the CPI purchase order, then **Customer approved suppliers are the only suppliers to be used for the aforementioned processes**. In addition the sub-tier supplier must reference the CPI purchase order number and part number on their certification.

Note: For A10 Program; Suppliers need to print out the D1-4426 listing on the Boeing web-site at the time parts are special processed as objective evidence that the sub-tier supplier used was approved at the time the special process was performed. The latest revision of D1-4426 can be found by following the link: http://www.boeing.com/companyoffices/doingbiz/d14426/index.html

4.21 First Article and Final Inspection Reports

The purpose of first article inspection is to provide objective evidence that all engineering design and specification requirements are properly understood, accounted for, verified and documented. The suppliers system shall provide a process, as appropriate, for the inspection, verification and documentation of the first production article. CPI has adopted the **AS9102, Aerospace First Article Requirement,** as the

standard for purchased hardware. Adoption of this standard improves the process for and consolidates multiple CPI first article inspection requirements.

1) A First Article Inspection **(FAI)** shall be performed on new product of the first production run in accordance with AS9102. **All First Article Inspection Reports shall be documented on an AS9102 compliant form..**

2) A copy of the suppliers Final Inspection Report is required for all deliverable product shipped to CPI Aero (other than First Articles) and shall include:
   - **a)** A copy of the final acceptance inspection report for the quantity of parts delivered, demonstrating compliance to all the design criteria.
   - **b)** All material certifications, NDT reports, process certifications and functional test reports when applicable.
   - **c)** Copies of SPC charts or 100% inspection documentation of all 'key characteristics" as indicated on the drawing furnished to the supplier from CPI.
   - **d)** Customer "Certified Suppliers" will be considered CPI preferred suppliers, provided that the customer certified supplier complies with all the applicable requirements of this SQAR.

NOTE: ALL DIMENSIONS WITH A TOLERANCE OF .001" OR LESS SHALL BE 100% INSPECTED AND DOCUMENTED ON YOUR INSPECTION REPORT.

4.22 Certifications

THIS SECTION APPLIES TO ALL CERTIFICATIONS REQUIRED BY THE PURCHASE ORDER. PLEASE READ CAREFULLY.

When certificates of compliance ("certs", certificates of conformance, CoC, etc.) are required by a CPI Aero purchase order, they must display at a minimum, the following elements:

Lot Specific – the certificate must make specific reference to the part number (and the process specification number if a process) the CPI Aero purchase order number and the quantity of units so that it cannot be confused with another lot of parts. A unique shipper number or certificate number is required for each lot. Written certification shall state the material used conforms to the specification requirements and test reports are on file.

- **a) Statement of Quality** – A statement to the effect that the parts are of the required configuration have been manufactured or processed to meet the requirements of the referenced order, specifications, etc., must be present. This can take many forms using various words, but the essence of the statement must be that the parts **do conform** to the applicable requirements. Where tests are required

to be performed in accordance with the purchase order, simply stating test values is insufficient.

b) Dated Signature – the certificate must be signed (a reproduction, stamp, or printed facsimile of a specific individuals signature is acceptable), and the signature dated. Often the date will appear elsewhere on the page, which is acceptable. Certifications that do not display a signature with a date are unacceptable. The certificate should be **signed and dated** by an official of the company. The officials name must be **typed or printed** next to, or underneath the signature.

4.23 Material Certifications (Ref. DLA QAP-EQ002)

The supplier must present the material manufacturers' certificate of test for each heat or melt of material used in the manufacture of inspection lot product. The certificate shall show that the test results are in accordance with specification requirement and shall be entered into the inspection record. When a certificate of compliance is required, the material certification:

a) Shall be signed and dated by an authorized company officer with the signature name typed or printed next to or underneath the signature..
b) Shall be accompanied by actual inspection test results.
c) Shall state the specification the material is certified to.
d) Shall include the name of the material.
e) Shall include documentation for all required processes.
f) Purchase order traceability from mill to the CPI supplier.
g) All documentation must be legible.

Note: For the A10 Program: Supplier must provide objective evidence via purchase order traceability that; The procurement of fasteners and/or electrical, electronic and electro-mechanical parts delivered and/or used in the manufacture of deliverable items must be directly from the manufacturer or authorized manufacturer's distributor, e.g., licensed or franchised distributor."

4.23.1 Metallic Products

Products produced from "as received" material, material purchased in accordance with technical requirements of the contract/purchase order, including products to be heat treated during the manufacturing cycle shall require certificates (test report results) or mill certification and shall be verified by the CPI supplier for conformance with the requirements of the applicable material specification, including conformance with the properties with the type, grade, class and condition ordered. Ref. paragraph 4.22.

4.23.2 Inconclusive Certification

Inconclusive certification will require verification testing in accordance with than applicable specification and shall be performed on the chemical test lot and the mechanical test lot of any particular material received and test report shall form part of the contract/purchase order inspection records. Ref. paragraph 4.22.

4.23.2 Heat Treated Parts

Those articles which during the manufacturing cycle have been heat treated as may be required by the drawing to obtain desired mechanical properties must be tensile and/or hardness tested as applicable to assure conformance to the drawing requirements. Ref. paragraph 4.22.

4.23.2.1 When necessary due to product size, tensile test coupons may be taken from the same material from which the part is made. Test coupons shall be the same thickness as the maximum section of the part being heat treated and shall be subjected to the same heating and cooling cycles performed in the heat treatment of the parts.

4.23.3 Non-Metallic Products

Test certifications from the raw material producer or source certification shall be examined by the CPI supplier for conformance to the applicable material specification. The certification received from the material producer/supplier may be the sole basis for acceptance when the certificate establishes that the material meets the requirements of the applicable specifications. Ref. paragraph 4.22.

4.23.4 Surface Finishes and Treatments/Metallic Coatings

a) **Plating-Surface Finishes and Treatments:** Samples shall be selected, examined and tested in accordance with requirements of the applicable finish specification cited within the technical documents of the contract/purchase order with the acceptance/rejection criteria of the specification applying. In lieu of specific testing inspection criteria, the CPI supplier may furnish the plating vendor's certification with inspection results attached as objective quality evidence of surface finish conformance with specified requirements. Ref. paragraph 4.22.

b) When hydrogen embrittlement relief treatment is required, the CPI supplier shall include on the certification a statement that product was so treated by baking at the temperature and time required.

4.24 Item Identification

All items shall be identified in accordance with MIL-STD-130 unless otherwise specified. **ALL ITEMS IDENTIFIED PER MIL-STD-130 SHALL BE AS FOLLOWS:**

1) Design Activity (Cage Code)
2) Part Number
3) Revision Level
4) Date of Manufacture
5) Suppliers Cage Code (MFR#)
6) Suppliers' Acceptance Stamp

Example for Detail Part: 98897-4P221106-133B Rev. L
MFR 9U679 03-24-07
Acc. Stamp

Example for Assembly: 98897ASSY4P221106-137A Rev. L
MFR 9U679 03-24-07
Acc. Stamp

4.25 Shelf Life Limited Material

Self life limited parts shall be placed in three categories, Elastomerics, Assemblies and Chemicals.

1) Elastomerics Identification

Unit packs shall be marked by stenciling, printing, stamping, or by the use of labels or tags with the following information as a minimum:

a) Manufacturers Name
b) Manufacturers part number
c) CPI part number (if applicable)
d) Revision level of the CPI part number (if applicable)
e) Nomenclature
f) Quantity
g) Lot traceability number
h) Manufacture date
i) Supplier cage code (MFR#)
j) Expiration Date

NOTE: ALL ITEMS MUST HAVE A MINIMUM OF 80% SHELF LIFE REMAINING.

2) Assemblies: Identification

Unit packs shall be marked by stenciling, printing, stamping, or by the use of labels or tags with the following information as a minimum:

- **a)** Manufacturers Name
- **b)** Manufacturers part number
- **c)** CPI part number (if applicable)
- **d)** Revision level of the CPI part number (if applicable)
- **e)** Nomenclature
- **f)** Quantity
- **g)** Lot traceability number
- **h)** Manufacture date
- **i)** Supplier cage code (MFR#)
- **j)** Expiration Date

3) Chemicals

All chemicals requiring shelf life control, such as potting compounds, adhesives, paints, etc., shall be identified with a shelf life tag. MSDS must be included as required.

4.26 Record Retention

All records of test and inspection results and administrative quality documentation required by contract or subordinate specifications (quality records) shall be retained by the supplier for a period of not less than **ten (10) years** after the completion of the purchase order unless a longer period is specified on the CPI purchase order. If a supplier subcontracts the record retention (for example: the supplier is sending a part out for radiography) the supplier shall impose the same record retention requirement on their subcontractor.

4.27 Tooling

All tooling fabricated for the manufacture of deliverable product for CPI and/or its customers or, for use by another/or same supplier must be accompanied by an AS9102 inspection report demonstrating validation of the tool. All suppliers' that receive Government owned tooling shall implement and maintain a Government Property Management System compliant with FAR 52.245-1. Suppliers will be audited by CPI Aero Quality Assurance annually to ensure compliance to FAR 52.245-1.

4.28 CPI Supplied Tooling

It is the suppliers' responsibility to verify that product manufactured from CPI supplied tooling; conforms to all engineering drawing requirements. If any product manufactured from CPI supplied tooling is discrepant due to the fault of the tooling, the supplier is to notify the cognizant CPI Aero Buyer immediately. Any discrepant product manufactured from CPI supplied tooling shall not be shipped to CPI without the written consent of the CPI buyer with Quality concurrence. All suppliers' that receive CPI Aero owned tooling shall implement and maintain a customer property management system. Suppliers' that possess CPI Aero owned tooling shall be audited annually for compliance to the CPI Aero Supplier Property Management Requirements.

4.29 Source Inspection and Surveillance

All tooling and deliverable product; with the exception of standard hardware (NAS, MS, AN, etc...) shall be inspected at the suppliers facility (Source Inspected) prior to shipment to CPI Aero unless otherwise directed by the CPI Aero Quality Manager in writing. Failure to receive Source Inspection shall be cause for the rejection of the delivered product.

a) Upon completion of the parts, all suppliers' **outside of New York Tri-State area must** request Source Inspection via the E-Launch web-site @ vscnet.com, All suppliers' **within the New York Tri-State area must** contact the CPI Quality Manager to schedule source inspection by e-mail vtieniber@cpiaero.com or telephone: 631-586-5200 x133. The supplier must allow 24 hours for scheduling.

b) The suppliers' own inspection of the completed articles **must be** complete, including all Final Inspection Reports, certifications and other paperwork required by this document and the purchase order.

c) The supplier **must** make available any required drawings, specifications or other related documents.

d) The supplier **must** make available any tools, gages or other instruments necessary to establish conformance of the articles. This includes personnel with the requisite skills to operate such devices.

e) The supplier shall provide reasonable assistance and facilities to the CPI and/or government/customer representatives engaged in the activities related to CPI procurement.

f) Any deviations from the design data **must be** approved by the cognizant customer/government agency.

g) Upon completion of the source inspection the Source Inspector shall complete CPI Form QMF-98 (Supplier Quality Surveillance Report as objective evidence of the acceptance.

h) A copy of the QMF-98 shall accompany the shipment along with a copy of all the documentation reviewed by the source inspector.

i) Should Source Inspection be waived, the supplier must obtain written authorization from CPI Aero Quality Assurance to ship without

Source Inspection via form QMF-38 otherwise the product may be rejected back to the supplier.

j) The source inspector shall also acceptance stamp and date **ALL** the parts being accepted.

4.30 Personnel Training/certification

The supplier shall establish metrics to monitor and validate personnel proficiency for all critical processes. The supplier shall: establish resource, implement and document such training, to professionalize personnel, commensurate to their responsibility. Records for all training, relative to critical processes shall be available for review upon request.

4.31 Submission of Waivers and Deviations (form DD1694)

When a supplier needs to obtain a request for waiver/ deviation via form DD 1694, the supplier is to provide the following:

1) Sufficient digital photography sketches (or ship the part/assembly to CPI) so the product can be evaluated. All shipping costs associated with the evaluation will be the responsibility of the supplier.

2) A complete description of the discrepancy (should be: and is:), the drawing location of the defect and applicable specifications must be provided.

3) The supplier shall also include a rework/repair operation sheet. The supplier shall also forward his/her internal cost to effect the rework/repair in box 19.

4) Boxes 1, 13, 19, 20, 22, 23, 24 of form DD1694 are to be completed by the supplier The Root Cause and Corrective Action box 24 must be specific per paragraphs 4.7 thru 4.8 of this SQAR document.

5) All costs incurred for additional testing or consideration for modifying the contract as requested by the procurement/Contracting Officer, or his designee is the responsibility of the supplier requesting the Waiver/Deviation.

6) Upon CPI Aero acceptance of the content of form DD1694, the form is then submitted to the cognizant DCMA QAR for

review and submittal to the appropriate government engineering office.

4.32 Control and Use of Digital Product Definition

4.32.1 OBJECTIVE

To assure the control of Digital Product Definition data, related hardware and software, in accordance with customer and government requirements. The following requirements are to be used only when a specification for the use and control of DPD/MBD is not flowed down on the CPI purchase order.

4.32.2 ACRONYMS

- **CAD** Computer Aided Design
- **CAE** Computer Aided Engineering
- **CAI** Computer Aided Inspection
- **CAM** Computer Aided Manufacturing
- **CMS** Coordinate Measurement Systems
- **DPD** Digital Product Definition
- **ERS** Enhanced Reference System
- **FAI** First Article Inspection
- **IGES** Initial Graphics Exchange Specification
- **LEV** Low End Viewer
- **MBD** Model Based Definition
- **MDD** Master Dimension Definition
- **MDI** Master Dimensions Identifier
- **MDS** Master Dimension Surface
- **NC** Numerically Controlled
- **NIST** National Institute of Standards and Technology
- **OEM** Original Equipment Manufacturer
- **OJT** On-The-Job Training
- **PAS** Product Acceptance Software
- **QA** Quality Assurance
- **QP** Quality Procedure
- **STEP** Standard for the Exchange of Product Model Data
- **2D** Two-Dimensional
- **3D** Three-Dimensional

4.32.3 GENERAL

This document contains quality system requirements for all suppliers receiving/using digital product definition. While the application of this document

is beneficial and recommended for all phases of design, manufacturing, test, and inspection, it is required for data used to produce computer Aided Designs or data used for in-process or end item inspection of deliverable hardware (including accountable tooling and tooling used as a media of inspection). This document is intended as a supplement to, not a replacement for Supplier Quality Assurance Requirement (SQAR).

4.32.4 DEFINITIONS

- **Authority Datasets** – Source dataset used for product manufacturing and QA acceptance. Authority datasets may originate from customer, from internal design department, or through a reverse engineering process. Customer supplied MDD, MDI, MDS, IGES and STEP datasets can be used as authority datasets when received in accordance with a formal request for such data.
- **Computer Aided Design** – The use of computers to assist in the development and evaluation of engineering design data and drawings.
- **Computer Aided Engineering** – the use of computers to develop engineering data to supplement engineering designs, used in production and inspection. (This includes parts lists, picture sheet data lists, tool parts lists, etc.)
- **Computer Aided Inspection** – The use of computers and digital processes to inspect production parts or tools.
- **Computer Aided Manufacturing** – The use of computers and computer data to develop production parts, including fabrication, assembly, and installation.
- **Derivative Datasets** – A reproduction of all or part of an authority datasets. This includes paper and mylar plots, tool designs, 3D models, inspection datasets created to analyze as-built designs, check templates, numerical control (N/C) datasets/media, datasets with nominal values for CMS use QA inspection plans and other extractions (dimensions, views, etc.) for inspection use.
- **Digital Product Definition** – The electronic elements that specify the geometry and all design requirements for a product (including notation and parts lists), and encompassing all aspects of CAD/CAM/CAI/CAE.
- **DPD Quality Assurance Plan** – A comprehensive document describing the quality system for management of digital data and DPD processes throughout the company.
- **Enhanced Reference System** – A permanent tool reference system, established for the life of the tool, which is transferred from an existing reference system or created specifically for CMS. It is designed to provide established coordinate points on a tool that allow for accurate measurements in all areas of a tool.
- **Inspection Data** – The resultant data generated from an inspection process.
- **Inspection Media** – The derivative datasets, programs, and inspection plans prepared for use during an inspection process.
- **Low End viewer** – An entry level, visualization CAD system used to view, analyze, extract, and print dimensional and other required data from the DPD dataset.

- **Product Acceptance Software** – Any DPD software (including CAD, LEV, data exchange, and CMS) used to inspect and accept production parts, assemblies, and tooling.
- **Reverse Engineering** – A process of developing a DPD dataset from as physical media such as a Master Gage, Sample Part, or 2D Drawing. Reverse engineering data may be used as an authority digital dataset, only if it is developed in accordance with a documented process that has been approved by QA and the customer.

4.32.5 Requirements

A). **Digital Product Definitions QA Plan**

1) Each supplier will develop and maintain a comprehensive DPD Quality Assurance Process to assure the integrity of product engineering and/or tooling configuration is maintained throughout the DPD system from receipt of customer data through the creation of derivative datasets, to product acceptance and process improvement/process control.

2) The plan will cover/accomplish the following:
   a) Specifically identify the processes and techniques unique to the DPD system, including delivery of authority data t DPD data users in design, manufacturing, and quality.
   b) Define and document the authority and responsibility for each element of the plan, with QA having overall responsibility for the plan.
   c) Include a flow diagram that graphically depicts the flow of data through the DPD system from receipt from the customer, through all functional organizations creating derivatives, to product validation, and data analysis for process improvement. This flow diagram will specify as follows:
      - All segregated secure storage locations of authority and derivative datasets.
      - All departments/personnel responsible for performance of DPD operations, including the delivery of authority datasets to suppliers.
   d) Satisfy all of the requirements set forth in this document, or make reference to other documented procedures that satisfy these requirements.
   e) Reference applicable customer documents defining the authority status of geometric elements within customer supplied DPD datasets.
   f) Comply with and reference applicable synchronization documents.

g) Include procedures for change control and maintenance of hardware, software and datasets.

3) The DPD QA Plan will be available for customer review, and the customer will receive notification prior to any changes to the plan.

B) **Configuration Management and Media Security**
1) each supplier will develop and maintain procedures to ensure that the following are under configuration control) including change accountability).

a) DPD Controlled Production Hardware
b) DPD Controlled Tooling
c) Product Acceptance Software (PAS).
d) Coordinate Measurement Systems (CMS)
e) CAD/CAM Software.
f) Data Analysis Software.
g) Datasets Provided to Suppliers.
h) Authority Datasets.

1) A formal release system must be in placed to ensure that only released authority DPD datasets are available for production and inspection purposes.

i) Derivative Datasets.

1) Derivative datasets will be stored, and readily traceable to the authority source.

2) NC Datasets – Objective evidence for verification of NC machinery and dataset performance must be obtained no later than first production use and is required for subsequent release to production.

2) Procedures governing the configuration and control of authority or derivative datasets will include requirements for the following:

a) Data storage.
b) Data Access and Archival (including read/write protection and passwords to ensure access control.
c) Encryption protection for datasets transmitted outside of the company.
d) Data backup system, including remote storage, and disaster recover.

C). **Product Acceptance Software**

1). All PAS must be approved by QA and a system must be in place to identify all QA approved software.

2) All changes/revisions to PAS must be documented and must be approved by QA.

3). There will be procedures in place which provide for the following:
   a) Documenting, tracking, and resolving software-related product acceptance problems.
   b) Preventing unauthorized changes to PAS, limiting personnel access to software files, preventing deterioration of master software code, and assuring that reproduction of code occurs error free.
   c) Ensuring that, prior to use, all PAS is tested and verified, independent of the software developer, to ensure that the software accomplishes its intended function.
   d) Governing internally developed software and specifically addressing development, configuration management, testing, acceptance, and installation.

D). **Internal Quality Audits**

1) Each Supplier will develop and implement a system to audit all DPD operations to assure compliance with this document, with contractual requirements, with software and production part quality standards, and with applicable security restrictions.
2) Results of all audits must be documented and maintained for review by customer QA representatives per contract requirements.

E) **Problem Reporting and Corrective Action**

1) There will be procedures for identifying, reporting, tracking, and resolving deficiencies with All DPD datasets, hardware, software, and transmissions.
2) All nonconforming DPD datasets will be identified as discrepant, segregated, and reviewed for disposition.
3) When nonconforming PAS is identified, the equipment running that software will be identified and removed from further product acceptance use, unit the discrepancy is resolved.

F) **Procurement**

1) All requirements contained in this document will be flowed down to suppliers.
2) A system will be implemented to audit suppliers using DPD data, to ensure compliance and to maintain approval status.
3) Results of all supplier audits must be documented and maintained for review by customer QA representatives per contract requirements.

G). **Equipment Calibration and Control**

1) The following equipment will be periodically calibrated, calibration records will be maintained, and calibrated equipment will be physically identified in accordance with calibration records.

   a) CMS equipment.
   b) NC (CAM) equipment with inspection capability.
   c) Plotters (used to create drawings, mylars, or other inspection/tooling media).

H). **Portable CMS**

1) In addition to the requirements contained in this document addressing PAS, equipment calibration, inspection media, and training, there ware additional requirements for portable CMS, as follows:

   a) There will be a documented inventory of all components used for CMS measurements that affect the integrity of data collection.
   b) There will be documented procedures for the periodic calibration of these CMS components. The CMS OEM specifications for accuracy and repeatability will be retained. Calibration processes will be NIST or equivalent standards, and meet the OEM requirements.
   c) For all portable CMS systems used for tool/product acceptance, there will be documented procedures covering the following topics.

      1) Setting Scale.
      2) Establishing and manipulating coordinate system.
      3) Data collection parameters.
      4) Special targeting.
      5) QA data acceptance criteria.
      6) Operator calibrations.
      7) Inspection data format and archival.

I). **Inspection Media**

1) It will be the responsibility of QA to verify that all product design requirements are identified, and planned for inspection/validation. This will include all features defined by feature control frames, annotations, notes, and other specified requirements in the authority dataset and associated parts lists (including both dimensional and other properties).

2) It will be the responsibility of QA to develop digital inspection media and inspection plans, to analyze inspection data, and to generate inspection reports used for product acceptance.

3) There will be an inspection plan for every digital inspection process performed on parts and tools.

4) When applicable, inspection plans will include the following:
   a) Instructions and inspection methods used to validate each product feature for FAI, including graphics and text sufficient to illustrate inspection operations and results for each feature.
   b) If the product features are validated using methods other than dimensional measurement, the inspection plan will include a description of the process and/or media used.
   c) A reference to the authority digital dataset key identifiers (drawing sheet, revision level, and/or dataset name) used for product acceptance.
   d) Identification of data analysis required for product acceptance.
   e) Identification of the format used to document inspection test results.

5) When preparing an inspection plan, the following will be considered.

   a) The appropriate production stage, at which each feature should be verified in order to best monitor process capability, ensure validation of all product features, and integrate manufacturing and inspection processes.
   b) Analysis and delivery of measurement data for engineering disposition, design improvement, process control, and defect reduction.

6) There will be documented procedures for extracting inspection media or other measurement data from DPD datasets. These procedures will include the following:

   a) Configuration control of inspection media, including traceability to source authority datasets.
   b) Method(s) used for media delivery.
   c) Requirement that inspection media is generated independent of manufacturing.
   d) Methods used to ensure that inspection media is generated by qualified personnel.

e) Identification of extracted data, and visible evidence of QA acceptance.

7) Data or datasets identified as "Reference Only" may not be used for product acceptance purposes.

8) The accuracy of plots used as inspection media will be verified prior to use.

9) Any output generated from plots and CMS inspection processes must have evidence of QA acceptance, and be under configuration control, including traceability to source authority or derivative digital datasets.

10) All inspection data must have documentation of verification by customer approved verification software to the master data set.

11) DPD datasets with reduced content, including MBD datasets without 2D views, may require users at supplier to extract information from the dataset sufficient to instruct and document manufacturing and inspection activity for the product. A LEV, 2D sketches/vies, and/or datasets maybe used to convey manufacturing and inspection information as required to fit the supplier's methods of operation. Note: use of a LEV requires compliance with sections 2.0, 8.2, and 9.0 of this document, as applicable.

12) When planning measurements for product acceptance, supplier's QA must verify that all product design requirements –i.e., all features defined by feature control frames, annotation, notes and other specified requirements in the authority DPD dataset (and associated parts list), including dimensional and other properties— are identified and planned for inspection/validation.

J) **Data Exchange Methods**

1) There will be a system implemented to identify the current level of hardware, software, and other digital system information required to maintain synchronization with customer supplied datasets and/or data exchange formats per applicable customer system compatibility requirements. This includes CADJ, LEV, data exchange, and other computing equipment that receives authority data and/or is installed/tested by the customer.

2) The customer will be notified of equipment configuration, and changes to it, when necessary to maintain synchronization requirement.

3) When customer authority data is received in translated format (e.g. STEP, IGES, etc.) the datasets must be verified prior to use.

K) **Tooling**

1) There will be documented procedures to ensure release, acceptance, identification, security, access and change control of tool design and tool inspection datasets.

2) When applicable, tool design and tool inspection datasets will include ERS datasets, which will be accepted according to a documented installation procedure.

3) When applicable, the engineering authority dataset will be identified on the tool design.

4) Tooling datasets will be under configuration control and will be traceable to current authority engineering and/or derivative tool design datasets.

5) All digitally defined tools and physical inspection media (check fixtures, templates, etc.) will be traceable to the authority tool design datasets, and any tool inspection datasets.

6) All digitally defined tools and physical inspection media will be accepted and periodically validated to the authority dataset, at a frequency determined to ensure accuracy and repeatability.

L) **Training and Personnel Requirements**

1) There will be documented procedures to ensure that QA personnel have DPD system access, and training adequate to perform digital product acceptance activities, including digital inspection media generation and 3D data collection.

2) If non-QA personnel perform product acceptance activities, there will be procedures defining the specific tasks and responsibilities that are authorized, and the corresponding requirements and training necessary to perform those tasks.

3) There will be documented training requirements for all DPD system users, including training syllabuses and OJT requirements. Records of DPD user training will be developed and maintained.

M) **QAID Requirements**

1) There will be a minimum of one point per inch (or any fraction) of curve for curves shorter than (5) inches. (Three (3) point minimum).

2) If the curve is longer than five (5) inches a minimum of five points are to be verified. Point spacing on the curve is not to exceed then (10) inches.

3) Points will have a maximum of ten (10) degrees of angular separation on curves or surfaces that are of a cylindrical nature. (This requirement is in addition to the requirements based on the length of the curve or the size of the surface).

4) Select a minimum of four (4) points per surface unless the surface area is less than two (2) square inches in which case three (3) points are adequate.

5) Points will normally be .375 inch in from the nominal edges of the individual surfaces (this includes tangencies between surfaces).

6) Points will be measured at inflections of surface tangency and at approximately one inch on either side of these inflections.

7) A minimum of five points are to be verified if the surface is larger that five (5) finches by five (5) or twenty-five (25) square inches. Point spacing on the surface is not to exceed the ten (10) inches.

8) If the surface has a profile tolerance of .010 inch or less, a minimum of one point will be defined for each five (5) square inches. A minimum of five (5) points per surface are to be verified. Point spacing on the surface is not to exceed five (5) inches.

9) If the surface has a profile tolerance of greater that .010 inch but les than .021 inch, a minimum of one point will be defined for each ten (10) square inches. A minimum of five (5) points per surface are to be verified. Point spacing on the surface is not to exceed seven (7) inches.

10) If the surface has a secondary profile tolerance controlling the smoothness of the surface, points shall be taken in a one (1) inch grid across the entire surface. Point spacing on the surface is not to exceed one (1) inch.

11) Points must be provided for the center of tooling holes, scribe lines (trim, crosshair, etc.), datum planes, and tooling surfaces (planes).

12) Tooling or Datum Planes will be described by a minimum of four (4) non-collinear points.

REVISION HISTORY

Revision	Date	Reason
D	9-01-2009	Added manufacturing line changes and process changes to Introduction, Added: CPI SQAR-001 Revision D supersedes all previous CPI SQAR-001 revisions to Scope. Added: Customer/Government Property Management to paragraph 4.1.1 8). Added: Note for A10 program to paragraph 4.20. Paragraph 4.21 2) clarified Final Inspection Report requirement. Added: Note: For A10 Program to paragraph 4.23. Added Government Property Management System compliant with FAR 52.245-1 to paragraph 4.27. Clarified Source Inspection and Surveillance requirements in paragraph 4.29.
E	3-05-2014	Paragraph 4.26 - Changed record retention duration from seven (7) to ten (10) years Updated cover sheet approval list to reflect CPI's current management organization.