



BARNES[™]
AEROSPACE

SUPPLIER QUALITY REQUIREMENTS

BARNES AEROSPACE – LANSING
DIVISION

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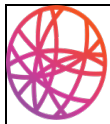
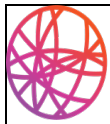


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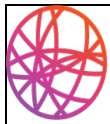
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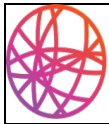
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GENERAL

This document is applicable to all Barnes Aerospace - Lansing Division (“Barnes”) contractual deliverables including tooling and services. All suppliers and sub-tiers shall be contractually required to adhere to the requirements set forth in this document, except as noted below.

Suppliers shall disregard any specific requirement within this document if that relevant section is superseded by text instructions within a valid contract, identified in a V-Op or by other written instructions from Barnes.

If any questions arise from the supplier or sub-tier for contractual requirements that are not addressed by this document or requirements are in question, the supplier shall contact their Barnes Buyer for direction.

Suppliers shall comply with the Purchase Terms & Conditions identified on the Barnes Aerospace Website (www.barnesaero.com).

Additionally, suppliers who receive a P.O. with Governmental (Military) end use shall also comply with the applicable Government Terms and conditions also located on the Barnes website Terms and conditions.

Quality Policy

Barnes Aerospace Lansing Division is committed to providing the highest quality products, on time delivery performance and services that meet the expectations of our worldwide customers. Our success is the result of a unified pursuit of continuous improvement and excellence throughout the entire organization. We are responsible corporate citizens and conduct our business in accordance with the highest ethical standards.

Right of Entry

Right of entry is defined on Barnes purchase order terms and conditions. Barnes, its customers, and/or regulatory authorities have the right to access Seller’s facilities and that of Seller’s sub-tier suppliers to review parts, materials, processes, tooling, equipment and any other items involved in this order and all applicable records.

Where Export Control or Intellectual Property concerns are warranted, the supplier shall make arrangements within their organization to allot for Barnes, it’s customers and/or regulatory authorities to fulfill their mandates as stated above.

Supplier Code of Conduct

Suppliers shall always comply with all laws and regulations. Suppliers shall ensure a standard of professionalism, business practices, Health, Safety & Environment practices and operate in a manner that is ethical and responsible. Suppliers shall communicate to their employees the importance of product safety and the implications of failing to maintain product conformity.

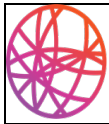
QUALITY SYSTEMS REQUIREMENTS

Quality Management Systems

It is required that all suppliers implement and maintain a QMS that is registered or compliant with AS9100¹ and, if registered, that their Registrar is in accordance with AS9104. Authorized distributors may be registered to AS9120 in lieu of AS9100. Testing and Calibration laboratories shall be registered to ISO/IEC 17025 (See Measuring and Test Devices, Page 7).

Suppliers shall provide Barnes Lansing with access to applicable relevant data within the OASIS database (e.g., audit reports, findings, corrective actions, etc) upon request.

Applicable suppliers working to P.O.’s with GE, Rolls Royce, Pratt & Whitney and/or SAFRAN as end users are also required to comply with the requirements of AS13100



Suppliers shall notify Barnes immediately if they lose or have a lapse in any registration for their QMS.

Suppliers failing to obtain, or comply with, the relevant approval(s) could be removed from the Barnes approved supplier list.

The following standards are recommended for implementation by all suppliers, and may be contractually mandated for use by Barnes or its customers:

AS9145 – Requirements for Advanced Product Quality Planning and Product Part Approval Process

RM13000 – Problem Solving Requirements

AS13001 – Supplier Self Release Training Requirements

RM13002 – Requirements for Developing Qualifying Alternate Inspection Frequency Plans

RM13003 – Measurement Systems Analysis Requirements for the Aero Engine Supply Chain

RM13004 – Defect Prevention APQP & PPAP

RM13007 Sub Tier Management

RM 13010 Human Factors

¹Or recognized international equivalent.

QUALITY RECORDS & RETENTION POLICY

All suppliers and sub tiers to Barnes who generate any record as a result of satisfying contractual requirements shall assure that such records are maintained in accordance with AS9100. These records shall be maintained permanently, unless otherwise specified by contract. Quality records must be maintained in ink or other permanent form. Documents requested by Barnes, its customers or regulatory entities shall be made available in English

Suppliers and sub tiers shall assure that any record that is generated and maintained electronically are backed-up on a continuous cycle and shall assure that these back-ups are secured to prevent damage, deterioration and/or use by unauthorized personnel.

Suppliers and sub tiers who use electronic datasets that generate a record (i.e., validation points, number of points used for dimensional confirmation, etc.) shall assure that such datasets and results of measurements are retained and maintained as a record.

Work Transfer

Suppliers shall notify Barnes Lansing Procurement in writing when work will transfer to another facility or change in critical equipment usage. A mitigation plan shall be submitted that identifies the impact and risks. If special processes are involved, the supplier shall make sure that prior to transfer to another facility, all required Special Processes are approved by the customer and or NADCAP as applicable. LAI and FAI shall be completed.

Suppliers required to comply with AS13100 shall audit their work transfer program annually and have records available for review when requested.



SPECIAL PROCESS APPROVALS

General

Suppliers, who perform special processes on Barnes product that require either customer approval or approval to NADCAP, shall hold the relevant approval. This includes the approval of product, procedures, processes, personnel and equipment. The Barnes contract or the customer specification shall identify the need for a special process approval.

Suppliers shall provide Barnes Lansing with access to applicable relevant data within the OASIS database (e.g., audit reports, findings, corrective actions, etc) upon request.

Suppliers who forego or fail having a special process approval from the customer, or who refuse or fail registration with NADCAP when these are required, shall not be allowed to perform any work on product requiring such approvals unless authorization or approval has been retained from the customer.

Suppliers who are unsure if a process is special and requires approval shall contact their Buyer for direction.

Customer Process Approval

When the customer requires that they approve a process, the supplier shall work through Barnes when obtaining the process approval. This includes the approval of product, procedures, processes, personnel and equipment. Barnes will work with the customer and supplier to negotiate contacts and other required information in order to grant the process approval.

Suppliers who already hold the relevant process approval from a customer shall forward to Barnes all pertinent information upon request to assure that the process is in accordance with customer requirements.

Suppliers shall not ship any product that was manufactured prior to gaining a required process approval from the customer without the written authority of Barnes.

Suppliers shall notify Barnes immediately if they lose a process approval from a customer for a process, they perform on Barnes product.

Operational Control (Process Control)

The Supplier shall establish and implement processes in accordance with the specification(s) contracted to.

The supplier shall document the processes and the applicable controls for maintaining compliance to the specified contractual work / specification(s).

The supplier shall ensure they take into consideration: employees, materials, facilities and equipment, methods, and human factors when developing said controls to assure personal and product safety.

The supplier shall establish acceptance criteria of product(s) and or services.

The Supplier shall ensure that the supplied product to Barnes conforms to the physical, dimensional, and visual requirements.

Frozen Process Approval

If a customer process approval is “frozen,” the supplier shall not modify or otherwise change any of the process parameters without the approval of Barnes and/or the customer (this may include changing manufacturing to an alternate machine, a change in manufacturing method, switching the power buss, moving the location of the machine or other process parameters). If a change to the method of manufacturing is deemed to be required, a re-approval of the process may be necessary.



Suppliers who change operations to a new manufacturing site (i.e. new facility or transfer to a different facility) are mandated to obtain a re-approval to any frozen process before manufacture can commence.

Suppliers should contact their Buyer before making any changes to any process parameters on a frozen process to determine if such a change will invalidate the approval.

Suppliers shall not ship any product that was manufactured outside of the approved frozen process parameters or was manufactured prior to gaining approval/re-approval of the frozen process without the written authority of Barnes.

NADCAP Special Process Approval

Suppliers shall hold and maintain current registration with NADCAP for the relevant special process, as required by Barnes or applicable customer.

Suppliers shall not be allowed to manufacture any product under a process requiring NADCAP approval until such approval is in place unless written authority is given by Barnes.

Suppliers shall notify Barnes immediately if they lose a special process approval from NADCAP for a special process they perform on Barnes product.

PROCESS CHANGES

Suppliers shall notify Barnes and obtain approval through their Buyer prior to implementing any changes in product or process design, including changes in manufacturing location or sub-tier supplier.

REVISION CONTROLS

Suppliers are required to verify the revision status for all documents associated with a contract from Barnes. This includes, but is not limited to, V-Ops, Drawings (customer, Barnes, tooling, Blueprints etc.), Mylar, Datasets, Specifications, Contracts and Purchase Control Cards (PCC). Suppliers shall contact their Buyer if unsure of any revision status.

V-OPS (VENDOR OPERATION SKETCHES)

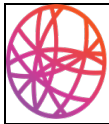
Barnes provides to suppliers a Vendor Operation Sketch, commonly referred to as a V-Op, as referenced in their contract for processing requirements. Suppliers are required to assure that the revision level of the V-Op called out in their contract matches the latest revision of the V-Op they have on file. If any discrepancy is noticed between the contract and the V-Op on file, suppliers shall contact their Buyer for clarification of the proper revision level to process product.

Ops will provide not only characteristics and tolerances, but also provide information if a process is a special process and requires approval (noted as a significant operation on the V-Op and cannot be changed without approval), specifications to work and accept product to, the Barnes part number as well as the customer part number and other relevant text notes not found in the contract.

Suppliers are required to adhere to all requirements of the supplied V-Op. If any requirements or text notes are unclear, the supplier shall contact their Buyer for clarification.

COMMUNICATION OF CHANGES

Verbal /email (without a revised document) notification changes to specifications, PCC's, V-OP's agreements of instructions shall under no circumstances be construed as approval to proceed. The approval to proceed must be documented on a revised P.O. and submitted to the supplier. Revisions to PCC's, specifications or V-OP's, shall be forwarded along with being documented on a revised P.O. and submitted to the supplier by the buyer



NONCONFORMING MATERIAL CONTROL

Control of Nonconforming Product

The supplier shall establish a method of detection, segregation, and feedback of product nonconformities or process noncompliance. Product, or product as a result of suspect or nonconforming process, must be reviewed for disposition by designated technical personnel. Depending upon the situation, containment hold actions must also consider product which may be at receiving, downstream operations, shipping, in-transit, or received by Barnes. If it is determined by technical authority the product or effected product is, in fact, nonconforming, and product has been released to Barnes, communication must be made to Barnes buyer or quality department within 24 hours (see Disposition Authority). A corrective action report utilizing the eight-discipline (8D) methodology shall be required for all situations where product was released to Barnes. Records of nonconforming product should be maintained and used to support reduction in scrap and rework or continuous improvement activities.

Disposition Authority

Barnes does not have design authority for final engineering dimensions on any of the product that suppliers manufacture. Therefore, no supplier to Barnes has disposition authority for any product. All dispositions requiring final customer approval for fit form, or functionality of the product for nonconformance will come from Barnes' customer. When dimensions are an in-process requirement, Barnes will disposition product. Suppliers will be notified, when relevant, of the disposition of nonconforming product. All requests for disposition will require a formalized corrective action report with eight discipline methodology upon request for disposition. All requests can be forwarded to the Barnes buyer and/or quality representative.

Deviation Permit / Concession

Suppliers shall ensure that they have retained authorization for use prior to release under concession or deviation permit any and all product that does not meet the specification or contractual requirements.

Design Escapement Notification (DEN)

BOEING SUPPLIERS AND SUB-TIERS ONLY

Suppliers and their sub-tiers shall notify Barnes Lansing procurement of any design related nonconformance to customer requirements as defined in DPD, drawings, parts list, materials, process specifications, and verification documents.

The notification of Design Escapement shall include:

- a. Affected process(es) or Product(s) part number(s) and name(s);
- b. Description of the nonconforming condition and the affected engineering requirement (i.e., what it is and what it should be)
- c. Quantities, shipping dates, purchase orders;
- d. Suspect/affected serial number(s) or date codes, lot numbers, or other part identifiers

Corrective Action

The supplier is responsible to meet all contractual obligations when shipping product to Barnes. Corrective action request will be required in the event Barnes receives product and subsequent nonconformance is identified amongst the dimensions, appearance, or documentation supplied with said product, corrective action requests may also be issued to its supplier for lack of adherence to delivery schedules, damaged product and packaging, and/or follow-through or



loss of certification credentials. Barnes Quality department will generate a supplier corrective action (SCAR) and associated reference number for tracking purposes. The supplier may choose any corrective action format that complies with the 8D Methodology as outlined in AS13000. Containment activities must commence immediately with response of containment results within 24 hours and corrective action plan within 30 days.

Supplier shall determine the root cause of the nonconformity using an established methodology, such as 5-why, Fishbone, Cause & Effect, or Fault Tree Analysis. Corrective actions shall ensure that the root cause of the nonconformity is addressed to a systemic level, including any escape points. Corrective actions shall take into account human factors and actions to mitigate them.

Completed corrective actions shall be submitted in English to Barnes Supplier Quality with objective evidence of actions taken. Barnes Supplier Quality will close the SCAR once implementation of effective corrective actions has been verified. Barnes may require an onsite audit to verify corrective actions.

Supplier Chargeback Process

Costs incurred as a result of supplier's lack of adherence to purchase order and quality system requirements, will be itemized for review between Barnes Quality or Buyer and Supplier Quality or Purchasing personnel. Costs that Barnes assumes as a result of supplied and pass-through situations shall be the responsibility of the supplier.

Suppliers may request return of defective product to address a nonconformance by contact to Barnes Buyer or Quality. Barnes will make all reasonable attempts to return product, however, Barnes does reserve the right not to return requested defective product due to customer demands or product being reworked on site. If product cannot be returned, Barnes will provide to the supplier all available documentation, drawings, photographs and any other relevant information so the supplier can carry out investigations.

Itemized chargeback information will be shared with the supplier prior to submitting to Barnes internal Finance department for debit and credit adjustments. The supplier has the right to dispute the charges by circumstantial evidence of the situation through its Buyer and Quality contacts. These situations will be reviewed on a case-by-case basis. Charges that can be incurred include administrative processing fees, handling/sorting/rework costs, loss of scheduled manufacturing time, expedite and repackaging fees, concession and waivers, on-site audit and travel expenses as a result of quality and delivery problems, and pass-through charges as a result of Barnes' customer fees.

Each supplier is assessed yearly for the number of corrective actions raised. Excessive occurrence activity, or repeated SCAR activity for a single part number, may result in an on-site audit, the removal of a particular part number or the removal of the supplier from the Approved Supplier List.

MEASURING & TEST DEVICES (METROLOGY/CALIBRATION)

Calibration Suppliers

External providers of calibration services to Barnes shall be accredited to ISO 17025 in the scope of the calibration being performed. Suppliers shall assure that they hold the relevant



approvals before performing any measuring and test services. Personnel performing calibration shall meet minimum vision requirements as specified in [Qualification of Personnel](#) below.

Calibration suppliers are required to confirm that points of certification and tolerances for any measuring and test device are provided in the Barnes contract before carrying out any service. If these requirements are not provided with the contract, the supplier must contact their Buyer to obtain the relevant information before proceeding with the service. All calibrations shall state uncertainty of less than 25% of the gage tolerance unless otherwise specified.

Calibration suppliers are required to provide a certificate of measurement and testing for each measurement device that includes as a minimum:

- a) Description and unique identification of equipment or measurement device.
- b) Date measurement or test was complete.
- c) Measurement results obtained, including before and after measurements.
- d) Assigned interval.
- e) Procedure used to perform certification.
- f) Designated points of measurement and tolerances applied.
- g) Standard used during measurement, including its own status.
- h) NIST traceability number.
- i) Environmental conditions and corrections, if necessary.
- j) Measurement error and uncertainties and their cumulative effects if applicable.
- k) Any limitations in use.
- l) Identification of person(s) performing calibration.
- m) Identification of person(s) responsible for correctness of recorded information.
- n) Unique identification (such as serial number) of any calibration certificate and other relevant documents concerned.

[Calibration – Tooling](#)

Suppliers performing calibration of tooling (i.e., dies, fixtures, etc.) belonging to or accountable to Barnes, its customers, or the U.S. government shall have a calibration system conforming to the requirements of ISO 10012:2005 and/or ANSI/NSCL Z540.3.

[Calibration - All Other Suppliers](#)

All suppliers who manufacture materials or products for Barnes shall have a reliable system for the metrological confirmation of measuring and test equipment for all internal gaging used to confirm Barnes product.

[SERIALIZATION & TRACEABILITY OF PRODUCT](#)

Serialization (when mandated) and heat lot traceability are stringent requirements for all of the products that Barnes manufactures. Suppliers must maintain this serialization and/or heat lot traceability of the product in their possession, from receipt through return shipment.



Serialization – Supplier Assigned

When the Supplier is responsible for the assigning and the marking of serialization, the shipping documentation from Barnes will note the serial numbers to be used for the relevant batch or batches of parts. Serial numbers provided will either be by a range or be specific in nature. The supplied V-Op will identify the location, method and structure of the serial number to be marked.

Suppliers are not allowed to substitute an internal serial number for a Barnes serial number on product or documentation. All product, documentation and records generated for a serialized part must make reference to the provided Barnes serial number.

Serialization – Barnes Assigned

Shipping documentation from Barnes will note the serial numbers for the relevant batch or batches of parts.

Product will be marked, tagged or labeled with the relevant serial number. Suppliers must maintain this serial number during all stages of product realization. If the marking, label or tag must be removed, the mark, label or tag will be reapplied immediately after the process is complete by the original method applied. Suppliers are not allowed to add or alter a serial number on any part or documentation. All documentation supplied by the supplier will make reference to the Barnes serial numbers.

Suppliers are not allowed to substitute an internal serial number for a Barnes serial number on product or documentation. All documentation and records generated for a serialized part must make reference to the Barnes serial number.

Suppliers who are found at fault for losing serialization of product will be issued a SCAR and may be denied payment for services rendered if traceability cannot be re-established and product is deemed scrap.

If unsure of any serialization of product, the supplier shall contact their Buyer for direction.

Traceability

Shipping documentation sent with product will identify the heat lots for the relevant batches. All product supplied by Barnes has heat lot traceability and is typically shipped in containers that quarantine unique heat lots when more than one heat is involved. This traceability must be maintained by the supplier during all stages of product realization.

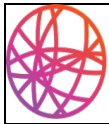
Suppliers are not allowed to mix heat lots for any reason without having a method of positive recall of heat lots to matching documentation and product. Failure to maintain heat lot traceability can cause product to be scrap.

Suppliers who are found at fault for losing traceability for a heat lot will be issued a SCAR and may be denied payment for services rendered if traceability cannot be re-established and product is deemed to be scrap.

If unsure of any heat lot traceability, the supplier shall contact their Buyer for direction before commencing any work on product.

Acceptance Authority Media

As part of the QMS requirements defined in AS9100, suppliers shall establish controls of the acceptance authority media of its personnel (i.e., stamps, electronic signatures, passwords.)



Suppliers shall verify compliance of documentation/signoff of the manufacturing or inspection of products to include typos, errors, omissions, training, uncertified personnel, falsification, and proper use of AAM. Verification shall also be part of the supplier internal QMS audit.

INSPECTION

Sampling

Suppliers are not allowed to use statistical process control or sampling as a method of reporting conformance to requirements without the written approval of Barnes. All products manufactured by a Supplier requires 100% verification of characteristics generated as a result of the process performed or per the V-Op.

INSPECTION TYPES

First / Delta / LAST Article Inspection Report

All suppliers and their sub-tiers are required to provide a first and/or a delta first article inspection report to Barnes for all products when required. Suppliers shall use and adhere to (AS) (EN) (SJAC) 9102 (Forms 1, 2 and 3) for all first and delta / last article inspection reports.

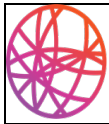
Suppliers shall provide a first or delta first article package. This package shall be marked "First" or "Delta First Article Inspection Report Package" and shall include as a minimum:

- a) The first and/or delta first article inspection report.
- b) A copy of the drawing ballooned with numbers that correspond to AS9102 form 3-character number.
- c) Copies of previously approved first or delta first articles as referenced on AS9102 form 1.
- d) Copies of the suppliers or sub-tiers special process approval(s) from AS9102 form 2.
- e) All material test reports when applicable as referenced in AS9102 form 2.
- f) Sub-tiers certificates of conformance referenced in AS9102 form 1 and/or form 2.
- g) Test or validation reports referenced in AS9102 form 2.
- h) Any documentation to ship product incomplete.
- i) Copies of any approved nonconformance waiver.
- j) Any other relevant information used in the execution of the first or delta first article inspection reports (i.e. C.M.M. reports, calibration reports, etc.).

First article inspection reports are required for all new products a supplier manufactures for the first time. Omission of first article text requirements on a contract or V-Op does not void or supersede this requirement for first article inspections for all new products.

First articles for assemblies shall be comprised of AS9102 Forms 1, 2 and 3 for the completed assembly part number. Sub-assembly and detail part numbers comprising the assembly part number shall have form 3 only.

Delta first article reports shall be required for products that have had a lapse in production for 18 months, product that has had a configuration change, a change in manufacturing location, a change in the method of manufacturing, a change in the V-Op revision level or a failed first article for characteristic(s) that have been corrected. Omission of delta first article text



requirements on a contract or V-Op does not void or supersede this requirement for delta first article inspections.

Last article inspection report shall be performed at the end of production processing when the source of complete production is planned or at the request of Barnes Lansing.

Suppliers shall conspicuously mark the first/delta/last article part as “First Article., Delta Article” or “Last Article”. Acceptable means of identification include wire tagging or a strip of masking tape applied and the notation above marked on the tape. Suppliers shall not electro-chemical etch, vibro-peen, stencil, ink mark or otherwise mark the surface of any parts for first /delta/last articles unless specifically allowed by contract or V-Op.

Suppliers are not allowed to use their own or different forms than that specified above, unless a customer specifies the use of their form (i.e. G.E. S-500). If use of a customer designed form is required, the contract, V- Op or other documentation will identify the relevant form. This specific form will be provided upon request if needed by the supplier.

Production Part Approval Process

Barnes reserves the right to require Suppliers to implement the Production Part Approval Process (PPAP) per AS9145. This requirement will be invoked via contract or purchase order.

Supplier Basic Inspection – Non-serialized parts

Suppliers are required to carry out 100% inspection on all non-serialized parts for all characteristics generated as a result of the process performed or per the V-Op. Individual inspection reports shall not refer to more than one part number. A separate inspection report is required for each combination of circumstances.

Inspection reports shall record for each characteristic measured the tolerances applied and actual results, signature or initials or stamp of personnel accepting product, the quantity accepted versus quantity rejected and reference to the measuring device used to confirm compliance of a given characteristic.

Non-serialized parts can be reported on a single inspection report as a group, as long as the range from minimum to maximum as measured for the batch of parts is reported for each characteristic.

Supplier Basic Inspection – Serialized Parts

Suppliers are required to carry out 100% inspection on all serialized parts for all characteristics generated as a result of the process performed or per the V-Op.

Inspection reports shall record for each characteristic measured the tolerances applied and actual results, signature or initials or stamp of personnel accepting product, the quantity accepted or rejected and reference to the measuring device used to confirm compliance of a given characteristic. Each inspection report shall make reference to the Barnes serial number(s).

Serialized parts shall **not** be reported as a group unless allowed by contract or V-Op. A unique and separate inspection report is required for each individual serial number.



Supplier C.M.M. Inspection

Suppliers who use a programmable C.M.M. for inspection shall meet the requirements in [Appendix A](#), and may be required to provide the relevant program for approval by our customer. After approval, such programs shall not be allowed to be changed without prior approval by Barnes and/or the customer.

***Note:** Suppliers performing inspection using fixed or portable CMM's, laser trackers, or articulating arms are strongly encouraged to attain accreditation to the Nadcap Measurement & Inspection commodity.*

Receiving Inspection at Barnes Aerospace

All products manufactured by a supplier (who does not hold delegation authority) will be subjected to a receiving inspection. Any product(s) found defective shall be quarantined and the supplier notified. A SCAR shall be raised requesting corrective action(s) from the supplier.

Source Inspection

When required, suppliers shall provide access and support for government Source Inspectors, source inspection by the customer, source inspection by design cognizance, source inspection by Barnes or any combination thereof. If source inspection is required, it will be noted as a text field in the Barnes contract.

Test Specimens

The Barnes contract, V-Op or supplied customer specification shall identify the need for and the type of testing and/or specimens required.

If the supplier purchases the raw material used during production, suppliers are required to provide with the shipment, a raw material test piece 2" x 8" for flat stock or 5" long test piece for bar and rod. Each test piece shall be identified with the material heat lot number.

Certain testing and specimens may be required by our customers in order to approve a special or frozen process. Suppliers shall provide the required documentation in English for onward transmission to the customer.

Nondestructive Testing / Inspection

Suppliers shall not be allowed to perform any type of nondestructive testing without holding relevant approvals (this includes Fluorescent Penetrant Inspection, Radiographic (including real time), Magnetic-particle, Ultrasonic C-Scan, Eddy-Current, etc.).

All nondestructive testing requires approval either by Barnes, the customer, a third party or any combination thereof. Such nondestructive testing approvals shall be maintained as a quality record. Suppliers shall provide evidence upon request that such approvals are valid and in force.

Suppliers, who perform nondestructive testing, but have no requirement for approval from Barnes shall contact their Buyer immediately for clarification prior to performing any further nondestructive testing.

Suppliers shall notify Barnes immediately if they lose an approval for nondestructive testing, they may perform on Barnes product.



QUALIFICATION OF PERSONNEL

When personnel are required to be qualified for a process by the Barnes contract, customer, regulatory agency or any combination thereof, personnel performing the process shall hold an active and valid qualification while performing that process on product.

Barnes and our customers require that all personnel who perform a special process be qualified (i.e., chemical cleaning, surface treatments (paint, primer, coatings, etc.), heat treat, welding, laboratory, nondestructive testing, and non-conventional machining). These special processes may require approval to NADCAP as well as by our customers. Suppliers shall assure that they hold the relevant approval(s) (see the special process approval section above).

When qualification requirements are not dictated by NADCAP, the customer or by an industry standard, suppliers shall be responsible for identifying the type and extent of qualification required to exhibit competency of personnel for a given process. Records of qualifications shall be maintained.

Personnel performing visual inspections or product acceptance activities, including calibration, in-process inspections, dimensional, and layout, shall be examined for visual acuity and color vision as administered by a medically trained/qualified person as follows:

- Individuals shall be examined at least annually for visual acuity, and once every five years for colorvision.
- Personnel shall be tested in at least one eye, corrected or uncorrected.
- Personnel shall be capable or distinguishing and differentiating colors used in the method for which certification is required, the process being performed, or inspection activity.
- Records shall be retained for each individual.
- Personnel shall meet the minimum requirements of [Table 1](#) below.

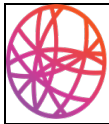
Inspection Activity	Minimum Vision Requirements
Visual Inspection, calibration, or product acceptance	<ul style="list-style-type: none"> • Snellen 20/30, or • Jaeger 2 at 16 inches
Visual Weld Inspection	<ul style="list-style-type: none"> • per AWS D17.1
Nondestructive Testing	<ul style="list-style-type: none"> • per NAS 410

Table 1 - Minimum Vision Requirements

MATERIAL FREE ISSUE

When Barnes supplies the raw material that will become part of the end product, suppliers shall not be allowed to procure replacement material without the express written consent of Barnes. Suppliers shall contact their Buyer for directions on replacement material.

All raw material supplied during the satisfying of contractual requirements shall be returned to Barnes if the total combined surface area of all left-over material is 12" x 12" (or 144 Square Inches) or greater unless otherwise specified on the V-Op. This does not include shavings, chips or other such waste material.



Suppliers are not allowed to retain, hold or dispose of material (either as raw material or product) unless authorized by Barnes. Suppliers are required to return all products or raw materials including scrap in a timely manner.

Suppliers who fail to return or account for all materials or products may be charged for the replacement of such materials or products or be denied payment for services rendered on non-returned parts.

Suppliers shall maintain records, store, and dispose government owned tooling/material in compliance with FAR 52.245-1.

Ozone Depleting Substance

Suppliers and their sub-tiers MUST comply with 40 CFR 82 Subpart E. The following warning statement shall be identified if applicable on the shipping or storage container:

“WARNING: Contains [or Manufactured with, if applicable] [*insert name of substance*], a substance which harms public health and environment by destroying ozone in the upper atmosphere.”

PACKAGING

Wooden Crates

Wooden crates used during shipments of product to a supplier are the property of Barnes and are built to be part number specific. Suppliers are required to reuse manufactured wooden crates during return shipment of product. Suppliers may be charged for the cost of wooden crates if they are not returned or if they are disposed of by the supplier without the consent of Barnes.

Suppliers shall refrain from using any type of nail or staple to secure lids to wooden crates.

If a wooden crate is damaged beyond use, and the supplier requests to re-manufacture the wooden crate or use an alternate shipping container, they shall first contact their Barnes Buyer for directions and adhere to the relevant statement(s) below.

Wood used in Pallets and Containers

Wood used in pallets or containers must meet the import standards of other countries including China, Austria and the European Union.

Suppliers in the United States using pallets or containers constructed of entirely non-coniferous (hard) woods must be constructed from wood of U.S. origin and must have appropriate certification proving this. The pallet or container must be stenciled “NC-US” (meaning non-coniferous wood of U.S. origin) or other appropriate marking as defined by the United States Department of Agriculture Animal Plant Health Inspection Service (USDA – APHIS). Stenciling must be in characters at least one inch high.

Suppliers in the United States using pallets or containers constructed in part or in whole from coniferous (soft) woods must use wood packing material that has been heat treated to attain a minimum core temperature of 133

°F (56 °C) for at least 30 minutes. The pallet or container must be marked with a “HT” stamp in accordance with American Lumber Standard Committee (ALSC) Regulations.



Normal Packaging

Supplier's shipping product in a container other than a provided wooden container (i.e. cardboard) shall:

- a) Assure that external packaging used during shipment will be robust enough to withstand normal handling and should also offer a degree of protection against careless or accidental handling. Where excessive weight or multiple components are in one box, double or triple walled boxes shall be utilized along with wall and bottom stiffeners where practical. Where necessary, boxes shall be banded to pallets to help prevent handling damage.
- b) Components shall be wrapped in Kraft paper and separated to prevent metal-to-metal contact. Items too small to be individually wrapped shall be bagged. Each bag shall contain a tag identifying the applicable information (i.e. part number, serial number(s), MFG. Date, etc.). Bags shall be sealed to prevent entry of foreign objects.
- c) After wrapping components in Kraft paper, components shall be over-wrapped in bubble wrap to prevent handling damage during shipment
- d) Suppliers are not allowed to use staples to close any type of shipping container or bag. Shipping containers shall be sealed by use of tape only. Bags can be hot sealed in lieu of tape.

Suppliers shall apply all applicable labels, bar codes and document windows as necessary to the outside of shipping containers.

If product is damaged during shipment and it is determined that the supplier failed to provide adequate protection, a SCAR will be raised and issued to the supplier. Suppliers may be liable for costs to salvage, repair or rework and/or for the submission of waivers to customers for product damaged during return shipment, when it has been determined that adequate protection was not provided by the supplier.

MATERIAL HANDLING

Suppliers shall take steps to assure that all materials and products are handled with white lint-free gloves, whenever possible, to prevent the un-necessary contamination of surfaces. Surface contaminants (such as fingerprints) that have the potential to become masked or hidden can impact the serviceability of products that are adhesive bonded, primed, painted or vacuum brazed at a later stage of manufacture.

Suppliers shall assure that surfaces have been completely cleaned prior to shipment. Suppliers are allowed to hand wipe Titanium and Titanium alloy surfaces. Suppliers shall assure that any type of solvent or cleaner used is not detrimental to Titanium and Titanium alloys (i.e., cleaners containing halogens such as chlorine or fluorine). The use of 1,1,1-trichloroethane, perchloroethane and methanol are strictly prohibited from use on Titanium and Titanium alloys. Suppliers shall assure that Titanium and Titanium alloy products do not come into contact with dissimilar materials that would be detrimental or contaminate surfaces.

Titanium surfaces shall not come in contact with any PVC film (PVC, either as plasticized PVC film, or as rigid PVC blanking covers), polynet, corrugated paper/board, bubble wrap, or unapproved dunnage (peanuts, hot pack or Styrofoam).

Product shall not be stored, moved, stacked or otherwise conveyed in a metal-to-metal contact when pass the point that such conditions would be detrimental to the final part surface finish requirements. Suppliers must strive to keep Titanium surfaces free from nicks, gouges, scratches and indentations to prevent the potential of surface stress risers. When a surface



finish is required by the Vendor Operation sketch, surface finish requirements shall be met at final inspection as applicable at the supplier's facility.

Suppliers shall assure that product protection (i.e. edge protectors, caps, plugs, etc.) are applied, when necessary, to products after final machining of edges, bores, holes and chamfers to help prevent damage and surface stress risers and to protect against foreign material contamination.

SHIPPING DOCUMENTATION

Suppliers to Barnes shall provide with each shipment of product a minimum of a packing slip, certificate of conformance for each part number, material test reports when relevant, verification of test results when relevant, first or delta first articles when required and inspection reports. All documents must be in English.

*FAIR/FIR/DELTA/ LAIR/LIR package must be inside of the shipping container and identified as such. AS9102 requirements or customer mandated forms are applicable. Reference Inspection Types section.

Packing Slips

Packing slips shall be in English and include the suppliers name and ship from address. Packing slips shall also include the number of boxes in shipment, part numbers shipped, quantities for each part number and reference to the Barnes contract number.

Raw Material Test Reports

Raw material (including pastes, adhesives, paints, primers and other perishable goods) shall be tested and certified to the referenced standards and specifications in the Purchase Control Card (PCC) per the Barnes contract.

Certifications for raw material shall include as a minimum:

- a) Originating melt house.
- b) Heat / Batch / Cast / Lot or other material traceability information.
- c) Chemical test results.
- d) Physical test results.
- e) Mechanical test results
- f) Documentation shall be in English

If all relevant certifications as required by the PCC cannot be provided, the supplier shall contact their Barnes Buyer for direction.

Certificates of Conformance

Each certificate of conformance shall be for each specific part number sent to Barnes. Certificates of conformance shall not refer to more than one part number. A separate certificate of conformance is required for each combination of circumstances.

Certificate of Conformance – Minimum Requirements

- a) Document unique serial number.
- b) Supplier's name address and telephone number.



- c) Delivery address.
- d) Part number and revision (and reference to any other part number requested per the contract).
- e) Purchase order number and line-item number.
- f) Description of goods supplied, identified by part number / material buying standard as referenced in the contract and/or PCC.
- g) Listing of all relevant specifications used in manufacture.
- h) Serial / batch / lot / heat / cast number – as applicable for traceability.
- i) Quantity and date of shipment.
- j) Statement confirming compliance with purchase order requirements.
- k) Signature and title of person authorized to release product.

Certificate of Conformance – Conditional Requirements

- a) For rubber, non-metallic and perishable goods such as paints and adhesives – shelf life, cure date, or expiration date.
- b) Reference to any nonconformance report number (SCAR).
- c) Copies of and reference to any authority allowing shipment if not complete.
- d) Confirmation of compliance with any special requirements of the order, e.g. first/delta article, modification, repair scheme or service bulletins, etc.

Inspection Reports

Suppliers shall include inspection reports in English for all parts manufactured as part of their shipping documentation. Inspection reports shall be in accordance with the inspection type requirements section of this document.

COUNTERFEIT MATERIAL

Suppliers shall implement a program for the prevention of Counterfeit Parts per AS6174 – Counterfeit Material, Assuring Acquisition of Authentic and Conforming Material.

Inventory Obsolescence/Excess Inventory

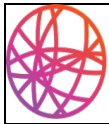
For Boeing suppliers, Suppliers shall comply with X31764 Excess Inventory section.

For Non-Boeing end user suppliers, they shall have a process and procedure to control inventory obsolescence or excess inventory. The supplier shall be notified by Barnes Lansing if the customer has made a significant change that impacts the supplier's inventory. i.e drawing change of materials including hardware.

For termination of activity by either Barnes or its customers, communication shall be between the supplier and Barnes Procurement agent to determine the necessary steps in association with the contract or signed P.O.

FOREIGN MATERIAL PREVENTION

Suppliers shall implement a program for the prevention and elimination of foreign material contamination per AS9146 – Foreign Object Damage (FOD) Prevention Program – Requirements for Aviation, Space, and Defense Organizations.



Suppliers are required to assure that all products in their possession that have the potential for foreign material contamination are protected from such contamination, from receipt through return shipment. Because of the potential for the high cost of this type of contamination, it is imperative that suppliers are diligent in protecting against the introduction of all types of foreign material into and onto product.

Product as received from Barnes with foreign material protectors in place shall be returned in the same manner. Suppliers shall not be allowed to permanently remove or modify such protection devices when returning product.

When Barnes provides to a supplier an inventory of protectors for incorporation into product after processing, such protectors shall be protected at all times to prevent their use on unauthorized product or by unauthorized personnel. Such protectors shall be applied according to the provided V-Op. If no such instructions are available, the supplier shall contact their Buyer for directions.

TOOLING

Suppliers shall be approved to the requirements of [Appendix A](#) prior to receiving digital models or datasets for the manufacture of tooling. Suppliers who manufacture tooling for Barnes shall assure that the tool is manufactured to the supplied CAD, Mylar or Barnes drawing as applicable. If Barnes does not specify marking requirements for the tool in the contract or other supplied documents, the Supplier shall as a minimum mark on the tool:

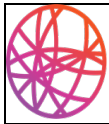
- a) Tool number
- b) Barnes part number
- c) Customer part number (if known)
- d) Die material, if applicable
- e) Weight over 25 pounds, if applicable
- f) Property of (owners name)

If unsure of any marking requirements or content of mark, the supplier shall contact their Barnes Buyer to obtain the proper marking instructions.

Suppliers who manufacture tooling for Barnes shall supply an inspection report showing results of all characteristics that affect part conformity for each tool manufactured. Each report shall identify the tool number, inspector reporting results, required dimensions including tolerances and actual results.

Tooling manufactured by a supplier and shipped to Barnes shall be subjected to inspection of selected dimensions on the tool to verify the accuracy of the supplied inspection report. Dimensions selected may be few in number and be selected on the basis of importance for the tool involved. If any of the selected dimensions fail, a 100% inspection of critical features shall be required. Tools failing the over check may be returned to the supplier for replacement and/or correction at the cost of the supplier.

Suppliers who have Barnes or customer owned tools on-site that are required for the manufacture of product shall be responsible for the tool's preservation and condition during the length of time the tool is in the supplier's possession. Suppliers shall assure that tools that are



Barnes property are not used on other programs, products or used by unauthorized personnel. If any tooling belonging to or accountable to Barnes, its customers, or the

U.S. Government is lost, damaged, or otherwise found unfit for use; Supplier shall notify their Barnes Buyer for further instructions.

Suppliers are not allowed to modify or change the form, fit or function of any tool without the express written consent of Barnes.

Tools that require periodic maintenance (i.e. calibration, repair, etc.) shall be returned to Barnes upon request to carry out the relevant tool maintenance. If a prior agreement exists between Barnes and the Supplier, the supplier will be allowed to carry out such maintenance. All tooling held by a supplier that is the property of Barnes shall be immediately released upon the request for its return.

Suppliers who are allowed to perform calibration on tools shall assure that their measuring and test system meets the requirements of ISO 17025, ISO 10012:2005, or ANSI/NSCL Z540.3. Records of calibrations shall be maintained and shall be provided upon request from Barnes. Any tool calibration that fails certification shall be taken out of service and the Barnes Buyer contacted immediately.

Suppliers shall maintain records of storage and disposition of government owned too(s) in compliance with FAR 52.245-1.

KEY CHARACTERISTICS & STATISTICAL PROCESS CONTROL

Key Characteristics

Suppliers shall monitor and measure all Key Characteristic per AS9103 when the requirement is specified in either their contract or when a dimension is noted as KEY on the Vendor Operation Sketch.

Statistical Process Control

When required to perform statistical process control of a characteristic by contract, Barnes's Quality department shall be contacted so the sampling method, frequency of sampling and charts used by the supplier can be reviewed for approval.

Suppliers who will be required to perform SPC are not allowed to select methods without prior approval. Barnes's quality department will give directions to the supplier for the frequency of providing statistics for the characteristic(s).

DIGITAL PRODUCT DEFINITION

Suppliers shall meet the requirements of [Appendix A, Supplier Quality Requirements for Control and Use of Digital Product Definition \(DPD\)](#) in order to receive digital datasets from Barnes or its customers.

Suppliers shall be approved by Barnes for the receipt and use of digital datasets. Suppliers shall complete a capabilities survey annually to retain approval.



SUPPLIER SUB-TIER CONTROL

Suppliers who utilize sub-tiers in the manufacture of Barnes product shall assure that the requirements in this document, the contract and any relevant specification are flowed down to the sub-tier when approved. Suppliers shall assure that no information or documentation associated with the contract is released to a sub-tier without approval from Barnes.

Suppliers shall assure that sub-tiers who perform any process on product hold approvals by the relevant standard (i.e., NADCAP), the customer, the design cognizance, Barnes or any combination thereof. Suppliers who are unsure of the required approvals should contact their Barnes Buyer.

Suppliers shall implement and maintain a system for the approval and disapproval of their sub-tiers. This system shall demonstrate the type and extent of control placed on their sub-tiers, including where applicable, special process, customer and delegated approvals.

GOVERNMENT RATED ORDERS (DPAS)

When a contract from Barnes states that it is a rated order the supplier shall assure that they comply with the requirements of Defense Priorities and Allocations System (DPAS) 15 CFR Part 700.

Compliance with the provisions of this regulation and official actions is required by the Defense Production Act and the Selective Service Act and related statutes.

Violators of these regulations and statutes are subject to criminal penalties. Any person who places or receives a rated order shall be thoroughly familiar with, and must comply with, the provisions of 15 CFR Part 700.

It is **mandatory** that suppliers flow down a DPAS rating, in its original format, to sub-tiers if they are used in satisfying a contract, if a DPAS rating was quoted in the Barnes contract to the supplier. The Barnes contract will specify the DPAS rating if it applies.

INTERNATIONAL TRADE IN ARMS REGULATIONS (ITARS)

Suppliers to Barnes must comply with the International Trade in Arms Regulations (ITARS) found in 22 CFR.

Suppliers shall assure that all technical data, software, hardware, drawings, specifications, documents, products, technologies or any other relevant information associated with any contract from Barnes will not be made available for viewing, copying, reading, monitoring or witnessing by any individual who is not a permanent resident (individual not holding a green card), or who is not a citizen of the United States (this includes independent third party auditors, regular and/or temporary employees, other customers personnel and facility visitors).

Suppliers shall also assure that any individual who does have access to these items shall not disclose, in whole or in part, any of the information to a second party.

BUY AMERICAN ACT

Suppliers to Barnes must comply with the Buy American Act.

Suppliers shall assure that any raw material procured for Military or Government contracts (if allowed by Barnes) is from a melt house within the United States or from a qualifying country.



Suppliers shall assure that any components procured from outside the United States that become part of the end product are from a qualifying country and will not cause the total number of sub-components to be greater than 50% of the total quantity of components comprising the total assembly.

CONFLICT MINERALS

Suppliers shall comply with the 2012 ruling on section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act relating to the use of conflict minerals.

SUPPLIER RATINGS

Quality performance and On Time Delivery (OTD) of suppliers to Barnes are monitored on a monthly basis to determine the status of a supplier. This information is used when placing a request for quote for new work, placing a purchase order or the addition/removal of work from a supplier.

Repeat Quality concerns are reviewed by the SQE and Materials Manager monthly and reported out to the Barnes Lansing Leadership team via monthly KPI review.

The supplier’s overall rating, status and QMS type will have a direct impact on the amount of work given to a supplier.

Suppliers shall submit to Barnes Lansing Materials Manager and SQE an improvement plan when quality or delivery fall below requirements based on trend data.

END-USER CUSTOMER REQUIREMENTS

Contracts by Barnes may identify an “end user” as part of the contract text. When the end user is identified in the contract, certain quality management systems adherences shall be required by that customer. Suppliers shall assure that they and their sub-tiers comply with the following systems requirements and its latest revision.

G.E. Aviation	S-1000	(must be customer approved)
Rolls-Royce	RR9000 SABRe	(must be compliant – non RPS work only)
United Technologies (UTAS/PW)	ASQR-01	(must be compliant – unless ESA)
Northrop Grumman	SQAR Manual	(must be compliant – non PS work only)
Bombardier/Shorts Brothers	QD 4.6-40	(must be compliant)
Lockheed Martin	QCS-001	(must be customer approved)
Boeing	D1-4426	(must be customer approved as applicable)

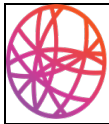
Note: This list is for reference only and is not exhaustive. Supplier is responsible for ensuring that all contract and purchase order requirements are identified and accounted for. Supplier shall contact their Buyer for clarification on any applicable end-user requirements.

SPECIFICATIONS (CUSTOMER, INDUSTRY, AND REGULATORY)

General

Specifications required in the manufacturing of product will be referenced in the supplied contract or the V-Op, either as a Note text or referenced in the “Applicable Specification” block located in the upper left-hand corner of V-Ops.

Suppliers shall contact their Barnes Buyer to obtain any referenced specifications they may require, limited to the restrictions below.



The supplier shall assure that any specification provided to them from Barnes is kept in a safe and secure environment to prevent the intended or unintended use, viewing, copying, printing, electronic conveyance or disclosure in whole or in part to any unauthorized individual.

Sub-tiers required by a supplier during manufacture shall adhere to these same requirements before the supplier provides a referenced specification to the sub-tier.

Customer Specifications

Barnes will not provide any copies of a customer specification to a supplier without first having the express consent of the customer.

Barnes will notify a supplier if a customer will not allow disclosure of a specification by Barnes to a supplier directly. If this occurs, the supplier will be given a contact name and number at the customer for obtaining the specification. If the specification cannot be obtained by this method, the supplier shall contact their Barnes Buyer for directions on how to proceed.

Sub-tiers used by a supplier during manufacture shall adhere to these same requirements before the supplier provides a customer specification to the sub-tier.

Regulatory or Industry Specifications

Barnes will not provide any copies of a regulatory or industry specification (i.e. ASTM, AMS, MIL, AS, ISO etc.) to a supplier. Suppliers shall be responsible for the purchasing and maintaining of these types of specifications.

PROPRIETARY INFORMATION CLAUSE

Suppliers, upon acceptance of a Barnes contract, thereby enter into an agreement to keep confidential all proprietary records, electronic data sets, drawings, specifications, software, hardware, tooling material / type / design, material type / grade, technical information and all other data furnished by Barnes and shall not disclose such information to a third party without the express written consent of Barnes.

The supplier shall return all such information and all copies thereof to the Barnes Buyer upon the Buyer's request.

The Supplier shall not, without the written consent of Barnes, use Buyer's name or trademarks or in any manner publish the fact that the Buyer has placed the contract.



APPENDIX A - SUPPLIER QUALITY REQUIREMENTS FOR CONTROL AND USE OF DIGITAL PRODUCT DEFINITION (DPD)

SUMMARY

This document establishes the requirements for suppliers to Barnes Aerospace – Lansing Division (“Barnes”) for the control and use of digital product definition in accordance with Barnes’ and its customers’ requirements. The requirements of this document are intended to ensure the protection and integrity of digital datasets is maintained throughout the lifecycle of the product.

SCOPE

This document is applicable to all suppliers that receive digital datasets from Barnes, its suppliers, or its customers for use in the production or inspection of products, production tooling, or inspection tooling or fixtures. In addition to these requirements, the requirements of the dataset owner (i.e., end user or design authority) shall apply. All applicable requirements shall be flowed down to any sub-tier external providers utilized by the supplier.

GENERAL

This document is a supplement to SQR-001, Barnes Aerospace Supplier Quality Requirements, and describes the requirements for supplier controls of digital datasets. Suppliers shall be assessed to the requirements of this document and be approved by Barnes Supplier Quality prior to being authorized to receive digital datasets belonging to Barnes or its customers. Suppliers shall maintain compliance with these requirements and are subject to periodic assessment by Barnes Supplier Quality in order to maintain approval.

DEFINITIONS

Annotation – Dimensions, tolerances, notes, text and symbology visible without any interrogation of the model.

Authority – Undisputed source of approved design data used for product manufacture and quality assurance.

CAD – Computer Aided Design – The use of computers to assist engineering design, or the systems that support the design process.

CAM – Computer Aided Manufacturing – Also known as Numerical Control (NC) – The use of computers and computer data in the development and production of all part types including fabrication, assembly, and inspection.

CATIA – Computer graphics Aided Three-dimensional Interactive Application – A CAD system with interactive graphics design software modules used to generate 3-D and 2-D geometric designs of products.

CMS (CAI/CAMS/CMM) – Coordinate Measurement Systems – Also known as Computer Aided Inspection (CAI) and Computer Aided Measurement Systems (CAMS). Measurement equipment such as Coordinate Measurement Machines (CMM), Laser Trackers, and numerically controlled machinery with inspection probe capability, which are used to support inspection activity.

Dataset – Information prepared and maintained by electronic means (CAD/CAM) and provided by electronic data access, interchange transfer, or on electronic media.



Derivative – A reproduction of all or part of an authority dataset, including paper and Mylar plots, tool designs, inspection datasets, check templates, numerical control (NC) datasets or media, CMS datasets or programs, QA inspection plans and other extractions (dimensions, views, etc.) for inspection or measurement use.

DPD – Digital Product Definition – The electronic data elements that specify the 3-D CAD geometry and all design requirements for a product (including notation and parts lists) and the use of this data throughout CAD and CAM systems.

EAR – Export Administration Regulations – Regulations established by the Department of Commerce controlling commercial or dual-use products.

IGES – Initial Graphics Exchange Specification – The ANSI data standard for the exchange of computer graphics generated product definition (no solids) between different manufacturers' CAD/CAM systems.

Inspection Plan – A description of 2-D or 3-D computer generated inspection media/methods derived from authority datasets and used to communicate inspection requirements and media usage to manufacturing and inspection areas.

ITAR – International Traffic in Arms Regulations – Regulations established by the Department of State controlling products for military use.

LEV – Low End Viewer – An entry-level CAD system to view, analyze, extract, and print dimensional and other required information from the DPD dataset.

PAS – Product Acceptance Software – DPD software, including CAD, LEV, data exchange, and CMS systems, used to inspect and accept parts, assemblies, tooling, and systems.

Reduced Content Drawing – Any DPD design dataset without full dimensioning of product features on a 2-D sheet. This includes Reduced Dimension Drawings (RDD) and “Simplified Drawings” which may contain reference to a 3-D surface definition or CAD geometry.

STEP – Standard for the Exchange of Product Model Data – Standard developed by ISO for the exchange of digital product data. It seeks to improve upon IGES by increasing the ability to transfer entire product lifecycle data.

Translation – The change of digital dataset format from its original (native) CAD system format to another CAD, CAM, or CAI application format, requiring verification.

REQUIREMENTS

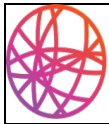
1. Quality Assurance Procedures and Documented Processes

1.1. **Documented Process** – Supplier shall develop and maintain documented DPD processes and/or procedures that assure integrity of product engineering, tooling, and configurations is maintained throughout the supplier's DPD system, from receipt of data, to creation of derivatives, manufacture of product, and inspection and product acceptance.

1.1.1. Barnes reserves the right to audit and/or review supplier's QMS to verify effectiveness of the supplier's documented DPD processes and procedures.



- 1.1.2. Elements of the documented DPD processes shall address the elements in Sections 2.0 through 11.0. These sections may be addressed in other supplier QMS documents. If so, reference shall be made to those documents within the documented process.
 - 1.2. **Flow Diagram** – The documented process shall include a flow chart or similar mechanism to describe the processes and techniques used to process DPD, beginning with the delivery of customer datasets, through all supplier organizations creating derivatives, to product validation and analysis of data for process improvement.
 - 1.2.1. The flow diagram shall specify all segregated, secure storage locations of authority and derivative media.
 - 1.2.2. The diagram shall specify all supplier departmental organizations responsible for performance of DPD operations, including organizations responsible for the delivery of data to sub-tier suppliers.
 - 1.2.3. The flow diagram shall identify the documented DPD processes or work instructions associated with control of the datasets and derivatives.
 - 1.3. **Responsibilities** – It is recommended that the supplier maintain a single, consistent configuration management and QA process to meet all applicable customer requirements. This documented process shall remain in effect through the life of the contract.
 - 1.3.1. Supplier shall notify Barnes within 30 days of any changes to the documented DPD process, changes in equipment utilizing DPD, or changes to CAD/CAM systems that may impact the ability to exchange, read, or translate DPD. Upon receipt of this notification, Barnes may require assessment activities to retain approval status.
- 2. Configuration Management and Media Security**
- 2.1. **Media Security** – Supplier shall develop and maintain documented processes used to ensure the integrity and security of datasets, derivatives, and other forms of DPD provided by Barnes and its customers. Processes shall include requirements for:
 - 2.1.1. Storage of datasets and derivatives.
 - 2.1.2. Archiving procedures with read/write protection which ensure access control for the contractually specified retention period.
 - 2.1.3. Encryption protection for the sending and receiving of electronically transmitted data;
 - 2.1.4. Establishing and maintaining a data backup system including remote storage and disaster recovery (Supplier must be able to demonstrate that any loss of data can be recovered);
 - 2.1.5. Access control with permission or password protection to ensure that supplied datasets cannot be modified by unauthorized personnel, including derivative datasets released for manufacturing and inspection;
 - 2.1.6. Developing and maintaining processes for configuration identification and control of CAM software and datasets. Objective evidence for verification of numerically controlled machinery and dataset performance must be obtained no later than the first production use and is required for release for production.



2.2 Configuration Management and Traceability – Supplier shall develop and maintain documented processes to ensure configuration control of all Barnes or customer-supplied datasets, supplier-created datasets, tool designs, and datasets sent to sub-tier suppliers. These processes shall include the following:

- 2.2.1 A formal release process for DPD which ensures that only current authorized DPD datasets are available for use in production and inspection. The supplier shall ensure that all derivative DPD data that is released is traceable to the authority dataset it was created from.
- 2.2.2 Supplier process planning (work instructions, routers/travelers, etc.) shall be traceable to the current authority dataset, when applicable.
- 2.2.3 A documented change control process for all datasets and dataset derivatives.
- 2.2.4 A documented process that includes control of non-current (obsolete) authority datasets and dataset derivatives.

2.3 Tooling Design – Suppliers performing tool design using Barnes or customer-supplied digital definition shall develop a documented process per Section 1 of this document, including the following:

- 2.3.1 Documented processes for design and development to ensure customer acceptance, identification, security, access, and change control of engineering and tool design. Designs shall have traceability to provided engineering data.
- 2.3.2 Design and development outputs shall meet the program requirements for design and shall identify any critical items, including any key characteristics, and specific actions to be taken for these items.
- 2.3.3 The design will provide the data requirement to allow the product to be identified, manufactured, inspected, used, and maintained; including the drawings, parts lists, and specifications needed to define the configuration and design features of the product.
- 2.3.4 Supplier shall have a process to perform predetermined periodic design reviews to specified requirements to ensure that all requirements have been met.

3. Product Acceptance Software

- 3.1. Supplier shall document and maintain processes for control of Product Acceptance Software (PAS). PAS includes software used to manufacture or inspect products and that is designed for use in the acceptance of these products.
 - 3.1.1. Supplier shall document and maintain PAS procedures and reference applicable documents in their documented DPD processes. Procedures shall provide for identification of software for a QA application, control of the QA approval version for product acceptance and control of obsolete software. All changes to PAS shall be documented and approved by supplier's Quality Assurance function.
 - 3.1.2. Supplier shall develop and maintain a documented process for reporting, tracking, and resolving software related product acceptance problems.
 - 3.1.3. Documented processes shall be maintained to prevent unauthorized changes, limit personnel access to software files, and to separate archives for masters and



duplicates. Supplier PAS storage methods shall take measures to minimize deterioration or regeneration of errors and to assure that reproduction of code occurs error-free.

3.1.4. Supplier PAS shall be verified prior to product acceptance use. Supplier shall establish and maintain a procedure independent of the software developer to determine that the software, and subsequent revisions, accomplishes its intended function. A formal means of identifying approved PAS is required with configuration control and QA management procedures.

3.2. Supplier Developed Software – Software developed by Supplier requires plans and instructions for building, configuration management, loading, and testing of code.

4. Internal Quality Audits

4.1. Procedures shall include provisions for auditing all operations affecting DPD data and related documentation to assure compliance with contractual requirements, software and production part quality standards, and the observance of security restrictions.

4.2. The audit plan shall include provisions for audit of sub-tier suppliers using DPD data on Barnes' or its customers' product and tooling.

4.3. Results of all audits shall be documented, retained, and made available for review upon request.

5. Problem Reporting and Corrective Action

5.1. Supplier shall assure that nonconforming digital product definition datasets are identified as discrepant, segregated, and reviewed for disposition.

5.2. Supplier's documented procedure for corrective action shall include reporting, tracking, and resolving all transmission, hardware, software and dataset problems and product deficiencies.

6. Procurement Control

6.1. Supplier shall flow down the requirements of this document and any identified dataset owner, design authority, or end-use customer requirements to their sub-tier suppliers when any digital datasets or dataset derivatives are used for manufacturing or product acceptance.

6.2. Supplier shall be responsible to Barnes and its customers for the maintenance, change incorporation, use of datasets, and observance of security restrictions by their sub-tiers for design, manufacture, and inspection. Supplier is fully responsible for and shall establish procedural controls to assure all datasets transferred between their company and all levels of their sub-tiers are in full compliance with ITAR, EAR, and any other contractual regulations and agreements.

6.3. Barnes and its customers reserve the right to survey and/or review the DPD quality assurance and configuration management systems of any applicable sub-tiers.

7. Control of Measurement Equipment

7.1. Supplier shall develop and maintain a system for the periodic maintenance and calibration of digital measurement equipment, including CMS, NC (CAM) equipment with calibrated inspection probes, and plotters used to produce drawings, mylars, or other inspection or tooling media. Calibration shall be traceable to NIST or equivalent standard and shall meet original equipment manufacturer's requirements.

7.1.1. Controls shall provide records of date of acceptance/rejection and next



maintenance due date. Measurement equipment shall be physically identified in accordance with certification records.

7.1.2. Mylars shall be stored and handled in a manner to prevent damage or deterioration and shall be periodically verified to confirm accuracy.

7.2. Suppliers using CMS for fabrication or inspection of parts or tools for Barnes or its customers shall document and control their CMS processes in accordance with Sections 3, 7, 8, and 11 of this procedure, as well as any applicable dataset owner or end-use customer requirements.

8. Inspection Media

8.1. Supplier shall ensure that all digital measurement operations performed on each part or tool are planned, and planning documentation specifies the media, instructions, and acceptance criteria for each measurement operation.

8.2. Supplier shall develop and maintain documented processes to extract inspection media and other measurement data from DPD datasets, including delivery and control of the media. This will include documented inspection plans or equivalent procedures that assure:

8.2.1. Accuracy of derivative media (e.g., mylars, tools, CMS programs, NC programs) from authority datasets.

8.2.2. Media is independently derived from and traceable to the authority dataset.

8.2.3. Media is under configuration control.

8.2.4. Media contains graphics, annotations, text, and/or GD&T to provide sufficient instruction for the inspection to be performed and the results to be obtained.

8.2.5. Inspection media is created by qualified personnel.

8.2.6. Documents establish the coordinate system, datum targets, and datum features to be used.

8.2.7. Digital inspection operations are performed by qualified personnel.

8.3. DPD datasets with reduced content may require users at the supplier to extract information from the dataset sufficient to instruct and document manufacturing and inspection activity for the product. An LEV, 2-D views or sketches, or datasets may be used to convey this information as required.

8.3.1. When planning measurements for product acceptance, supplier's Quality function shall verify that all design requirements are identified and planned for inspection/validation. This includes all features defined by feature control frames, annotation, specification, notes and other specified requirements in the authority DPD dataset, and associated parts lists, notes lists, etc.

8.4. **Inspection Plots** – Suppliers using plots for product acceptance shall have documented procedures addressing the following:

- a. Plotter calibration – Follow OEM process for calibration and adjustment and independent validation to NIST or equivalent.
- b. Verification of engineering definition – Verification of developed flat pattern and plot verification features.
- c. Plotted media material – should be a minimum of 0.005 inches thick



polyester film. Paper plots may be approved on a case by case basis for tolerances greater than +/- 0.10 inches.

- d. Part number identification and revision – Traceability to Customer authority dataset.
- e. Verification of plotted media - acceptance criteria of plot accuracy prior to stamping and releasing plot to manufacturing or inspection.

Note: *The tightest product tolerance that can be reasonably inspected with a Mylar overlay is +/-*

0.030 inch after a grid check or defined verification features check has been performed.

- f. Quality acceptance stamping – Date, Temperature, Humidity, Accuracy and evidence of inspection.

8.4.1. Validation of Plot Accuracy – Check plots for accuracy prior to manufacture and inspection of parts. Measure to ensure the accuracy of the grid lines, or defined verification features vertically, horizontally and diagonally to validate plots. Grid lines are usually plotted in 10-inch increments. Check the grid lines from the first to the last grid line or defined verification features. Grid lines shall be within a tolerance of +/- 0.020 under 100 inches within +/- 0.030/- 0.10 over 100 inches.

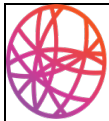
8.4.2. Environmental Controls – Plotting equipment shall be located in a temperature and humidity controlled environment. Development and validation of plots will be done in an environmentally controlled area using a real time monitoring system for temperature and relative humidity.

Note: *The tolerance noted in the plot accuracy stamp is the accuracy of the plot at the time it was generated and does not relieve the user the responsibility to validate the plot at the time of use.*

8.4.3. Handling & Storage - To maintain media accuracy and stability, plots are required to be stored in:

- a. A container not less than 3 inches in diameter.
- b. In a non-condensing moisture and chemical free area.
- c. Temperature from 65 to 80° F and relative humidity from 45 to 55 percent.
- d. Do not expose the media to heat generating sources. This may include laser printers, computer monitors, copy machines, air compressors, transformers, batteries, engines and sunlight.
- e. Do not fold, crease or damage as this affects the dimensional stability

8.4.4. Destruction of Obsolete/Unusable Plot Media – All materials and computing media of any kind containing PROPRIETARY information shall be disposed of by methods that ensure that all proprietary information is destroyed so that none of it can be reconstructed from the residue or remains. Disposal methods may include recycling, shredding, burning, etc. and are dependent upon the resources



at any given company/supplier facility.

8.5. **First Article Inspection** – All explicit and implicit design characteristics within the authority dataset shall be positively identified within the FAI plan per AS9102, including, but not limited to:

- 8.5.1. All features annotated within the 3D model (explicit)
- 8.5.2. Features of the 3D model not annotated (implicit)
- 8.5.3. All characteristics applicable on the 2D drawings/reduced content drawings
- 8.5.4. All applicable notes and materials lists
- 8.5.5. All feature tolerances per the standard/general notes

Note: 100% of the feature characteristics shall be identified and documented on the AS9102 Form 3.

9. DATA EXCHANGE METHODS

9.1. Supplier shall maintain the current level of hardware configuration, software, software revisions, and other digital system information required to maintain compatibility with datasets supplied by Barnes or its customers.

- 9.1.1. Supplier shall notify Barnes of any changes to the above systems that may impact compatibility. Barnes reserves the right to revoke DPD approval if system compatibility is not maintained.

9.2. Supplier shall have a documented process that ensures they can translate, receive, and validate all authority datasets without change to the data integrity.

9.3. Translations – When suppliers translate from Native CAD format to alternate formats, suppliers are responsible for all dataset translation. The process must include a method to verify the accuracy of translations. Suppliers must be able to demonstrate the CAD translation process, including verification/interrogation methods used, and the ability to identify known discrepancies.

- 9.3.1. Acceptance criteria for accuracy of translated surface profile/geometry (tolerance) must be determined by the supplier, and shall ensure that the end product will be within engineering tolerance. Objective evidence of translation validation must be retained.

Note: Typical allowable deviation is 1/10th of the tightest engineering tolerance.

- 9.3.2. The verification process for translation of datasets containing 3D annotation must ensure that all intended entities are accounted for in the translated media.

10. SPECIAL TOOLING

10.1. **Tool Design** - The supplier shall describe documented processes to ensure release, acceptance, identification, security, access and change control of tool design and tool inspection datasets. Tooling datasets shall have traceability to current authority engineering and derivative tooling dataset sources. The engineering authority dataset(s) shall be identified on the tool design when applicable.

10.2. The supplier shall ensure that when Tool Design responsibility is flowed down to sub-tier suppliers, the sub-tier supplier will be approved by the supplier.



10.3. **Traceability** - All digitally defined special tooling and physical inspection media (check fixtures, templates, etc.) will be identified and traceable to the engineering authority dataset, tool design dataset and any tool inspection datasets.

10.4. **Inspection** - These tools and tooling media shall be dimensionally accepted and periodically validated to the authority design at a frequency determined to ensure accuracy and repeatability of the tool before use.

11. TRAINING AND PROCESS PERFORMER

11.1. **DPD Training** - Suppliers shall define training requirements to assure competence and shall maintain employee training records, including on-the-job-training, for all DPD system users (e.g. quality, IT, planning, purchasing, contract review and Mfg).

11.1.1. The supplier shall ensure that all personnel having DPD system access have completed training adequate to perform digital product acceptance activities including digital inspection media generation, performance of inspections and 3D data collection.

11.1.2. Syllabus shall include training criteria necessary to ensure proficiency of process performers (e.g. planning, programmers, quality, etc.) to interpret ASME Y14.5 Dimensioning and Tolerancing (GD&T).

11.1.3. Training shall be updated due to changes driven by new equipment, software or program requirements.

REVISION HISTORY

Revision	Date	Description
A	11-Nov-11	Change site from BGI to Lansing
B	24-Oct-14	Updated to current requirements
C	20-Mar-17	Added Supplier Code of Conduct Updated Quality System requirements section adding additional compliance requirements/flow down Added Operational Control (Process Control) section Updated Nonconforming material Control Section with control of nonconforming product, Deviation Permit/Concessions, and Corrective Action Updated traceability section Added Supplier Chargeback Process Updated Inspection Types to encompass Last Article Inspection Updated Serialization/Inspections Updated Shipping Documentation requirements Updated counterfeit material section Updated Supplier ratings section
D	31-Aug-17	1) Added Barnes Lansing Quality Policy 2) Added Quality records to be maintained in ink or other permanent form to section Quality Records and retention times.3) Added reference AS 6174 to counterfeit material.
E	2-Oct-17	Added Appendix A for Digital Product Definition requirements. Other areas of significant change noted with change bar in left margin.



F	1-Nov-17	Added vision testing requirements to Qualification of Personnel section. Added link to DPD requirements for Tooling suppliers.
G	24-Nov-20	Added Communication of Changes section
H	10-Sep-21	Added Purchase Terms & Conditions to General Added additional requirements for Right of Entry – Export control and Intellectual Property Added AS13100 to Quality Management Systems Added OASIS database access to Quality Management Systems section Added NADCAP database access to the Special Process General Section
J	13-Jun22	Rev Letter I skipped to not be confused with the number 1. Added Documents must be in English to sections Quality Records and Retention, Corrective Action, Test Specimens, Shipping Documentation, Raw material Test Reports , Inspection Reports and Pack Slips. Added Work Transfer Section Added Design Escapement Notification – Boeing Suppliers & sub-tiers only section Added Acceptance Authority Media section Added Inventory Obsolesces and Excess Inventory Section Added Acceptance Authority Media – authorized signatures