AEROSPACE SUPPLIER QUALITY REQUIREMENTS (ASQR-01)

INTRODUCTION

This document defines supplier quality requirements as agreed upon by the following business entities herein referred to as "P&W".

Member	Abbreviation	Applicability
Collins Aerospace	Collins	For Collins Aerospace Quality requirements, refer to your purchase order (PO).
Pratt & Whitney	PW	See below
Pratt & Whitney Canada	PWC	See below

This document has been developed based upon the requirements of the International Aerospace Quality Group (IAQG) IA/AS/EN/JISQ 9100 - Quality Management Systems - Requirements for Aviation, Space and Defense Organizations.

When a supplier provides product or services to (together: "P&W") PW or PWC.

Note: *For guidelines on implementing supply chain best practices, reference IAQG Supply Chain Management Handbook (SCMH) and AESQ (RM) Reference Manual.*

REVISION SUMMARY

This document has been revised to:

1. Removed Collins Chapter 1 requirements as they were consolidated into COL-ASQR-PRO-0003 (Aerospace Supplier Quality Requirements) which can be accessed here
2. Aligned paragraph numbering & terms and definitions with AS13100A

3. 4.3.3.1 created Table 2 QMS Certification Requirements. Clarified requirements.
4. Add 8.1.3.1. h. An anonymous employee reporting channel for product safety concerns
5. ASQR 07.5 incorporated into ASQR-01. Add AS9125 Non-Deliverable Software
6. 17.2.3 Production Part Approval Process File and Submission. Removed interim B to align to 9145.

QUALITY MANAGEMENT SYSTEM (QMS) REQUIREMENTS FOR P&W

1. SCOPE

The requirements of this document apply to all organizations that furnish product, material, processes, or product related services to P&W as a contractual requirement regardless of organization's industry, regulatory accreditation, or certification status, and each Organization shall be responsible for ensuring that all members of its supply chain comply with the requirements set forth herein.

> ***Note:*** *In this document the term,* ***"Organization"*** *refers to companies receiving a PO directly from P&W and the term* ***"Supplier"*** *refers to companies at a lower level providing product or services to Organizations.*

2. INFORMATIVE REFERENCES

2.1 It is the responsibility of the Organization to obtain the latest revisions of all documents specified by this ASQR. These documents include, but may not be limited to, the following:

Table I: Documents Referenced in ASQR-01

Document	Title
AS9100*	Quality Management Systems – Requirements for Aviation, Space and Defense Organizations
AS13100	AESQ Quality Management System Requirements for Aero Engine Design and Production Organizations
AS9125	Non-Deliverable Software
ASQR-09.1	Flight Safety Parts Program
ASQR-20.1	Supplier Sampling Requirements
IATF 16949	Quality Management System
ISO 9001	Quality Management
ISO 10012	Measurement Management Systems – Requirements for Measurement Processes and Measuring Equipment
ISO 17025	General Requirements for the Competence of Testing and Calibration Laboratories
Nadcap AC 7004	Nadcap: Quality Management System

**Developed under the auspices of the IAQG and listed here as SAE International "AS" publications. Equivalent versions may be published by other standards bodies (e.g., European Committee for Standardization (CEN), Japanese Standards Association/Society of Japanese Aerospace companies (JSA/SJAC).*

3.2 TERMS AND DEFINITIONS

Airborne Software

Software for airborne systems and equipment used on aircraft (aircraft Bill of Material).

Deliverable Software

Software delivered to an external customer or supplier. This may be airborne, ground based, manufacturing, test and support software that may be embedded with hardware.

Distributor

Organization carrying the purchase, storage, splitting, and sale of products and not transforming, assembling, or otherwise modifying purchased product.

Independent Method of Inspection

Method of inspection using calibrated and traceable measuring & test equipment using inputs different from those of the software under test such programming errors, specification interpretation errors, and decisions made by the programmer that affect the accuracy of the inspection are not duplicated. Independent methods of inspection may include hand gauging, bench layout, previously approved automated inspection programs, manual-mode machine inspection involving a different programmer/inspector or automated inspection programs involving a different programmer/inspector

Input Data Sheet (IDS)

A summary completed by P&W or Design Responsible Supplier to communicate Key Characteristics as defined by the output of the Design Risk Assessment.

Manufacturing and Test Software

Software used in design, analysis, manufacture, inspection, acceptance, test or calibration that has a direct effect on the configuration, conformity or quality of deliverable product.

Examples include:

- Part specific program (e.g. Computer Numerical Control (CNC) and Coordinate Measuring Machine (CMM)
- Gage Calibration
- Computer Aided Design Models (CAD)
- Programmable Logic Control (PLC)
- Executive software, (e.g., \robot dipping, CMM, CNC, etc.)
- Special Process Software (e.g., heat treat, shot peen, sonic wall inspection, plasma spray, etc.)
- Dot Peen
- Performance Acceptance Test (PAT or Acceptance Test (AT)
- Burn-In

- Hardware/ Software Qualification
- Lab View scripts for PAT
- Control Model Scripts used in Production Validation, Compiler, Assemble
- Engineering test equipment software

Operator Certification/ Operator Self-verification Program

A method whereby an Operator, with the required training, has the capability and authority to determine the acceptability or non-acceptability of parts they inspect.

Quality Clinic System

A proven root cause corrective action system that integrates people with the right skills, standard work, measurement systems, visual management, effectiveness & metric tracking and management support, in order to address in a timely manner, the problems arising from customer escapes, supplier escapes and internal process defects.

RTX Qualified Distributor List (RTX QDL)

The list of Distributors that are qualified by RTX to provide metals, electronics, and hardware.

Note: *Electronics include electrical, electronic, and electro-mechanical components (e.g., connectors, wire, electronic components, terminals, lugs, pc boards, semiconductors). Hardware includes fasteners (e.g., nuts, bolts, rivets, washers, pins, screws, clamps, springs, seals, O-rings, ferrules, fittings). Metals include metallic raw materials (e.g., bar, sheet, plate, tube, wire, forging, casting, billet, ingot).*

Software Verification

Evaluation which may occur at various times during a software process to ensure input requirements at the end of a development stage have been met. Verification includes review, analysis, inspection and test

4. QUALITY MANAGEMENT SYSTEM (QMS)

Supplier receiving a purchase order from P&W shall comply with the requirements of AS13100 and ASQR-01. The following P&W company-specific requirements are aligned to the numbering scheme of AS9100 and AS13100.

Note*: Where Reference Manuals documents (e.g. RM13004, RM13145, RM13006) are referred to in AS13100, the contents of those Reference Material documents are not to be interpreted as establishing additional requirements to AS13100.*

4.3 Determining the scope of Quality Management System – Supplemental Requirements

4.3.1.1.1The Organization shall comply with the latest revisions of ASQR, P&W-specific quality system requirements, and other documents referenced herein. The Organization shall establish

compliance within 60 days of the document effective date unless otherwise specified in the P&W publication notification.

4.3.1.3.1 The wording of AS13100 Section 4.3.1.3 is replaced by, “When organization has not maintained their QMS Certification, notify member within 48 hrs of event. Items to include in notification: Official letter of event and audit results / reason for loss of certification.”

4.3.2 (Deliverable Software)

The requirements of AS13100 Section 4.3.2 are hereby replaced with the following requirement: the Organization shall comply with the following requirements when providing Deliverable Software.

4.3.2.1 Deliverable Software – Maintain a system that meets or exceeds the following requirements or as specified by the contract or PO.

4.3.2.1.1 Suppliers who receive a PO from a Member where the supplier’s product offering to said purchase order includes deliverable software, must meet the intent of AS9115 as a minimum.

4.3.2.2 Deliverable Airborne Software

4.3.2.2.1 RTCA/DO-178 shall be the preferred approach for deliverable airborne software development. The supplier shall complete and maintain a checklist that shows compliance to RTCA/DO-178 requirements when requested by the Member.

4.3.2.2.2 All software plans required in RTCA/DO-178 shall be submitted to the applicable Member for review and approval prior to the start of the software development process. All subsequent revisions/changes shall also be submitted for review and approval. Note: Additional regulatory orders and issue papers may apply.

4.3.2.2.3 For software that meets the equivalent of RTCA/DO-178 level E criticality, the supplier shall submit its planned software development process for review and approval.

4.3.2.3 RTCA/DO-178 Alternative: When RTCA/DO-178 is not used for the software development process, the supplier shall submit to the applicable Member the alternative software development process for review and approval prior to the start of the software development process. All subsequent revisions/changes shall also be submitted for review and approval. Examples of this type of deliverable software include:

- Manufacturing
- Test
- Ground Based Systems
- Deliverable airborne software that does not meet the requirements of paragraph 4.3.2.2.

4.3.3.1 Table 2 QMS Certification Requirements

Organizations that require certification to AS9100/AS9110/AS9120 shall be certified by a suitable accredited Certification Body (CB) that participates in the IAQG Certification Scheme (Industry Controlled Other Party - ICOP). A list of accredited CBs participating in the IAQG Certification Scheme can be found within the Online Aerospace Supplier Information System (OASIS).

Organizations (Tier 1) receiving a purchase order from P&W and their Suppliers shall meet the requirements of AS13100 Table 2.
Exceptions to the above are the following:

Organization Type	Exceptions to the above are the following:
Type 1: Make to print Type 2A: Design and Manufacture	Design and Manufacture suppliers (i.e., suppliers to Organizations) shall only need to be compliant to 9100, not registered.
Type 3: Distributor	Shall be registered on the RTX QDL. Distributors that provide hardware/parts that have been manufactured to a P&W drawing, the manufacturer of those P&W drawing parts shall be registered AS9100.
Type 4: Special Process	Per 13100 Table 2 "QMS Certification Requirements" the QMS Approval requirement for Type 4: Special Process Organizations is replaced with the following: Organizations and Suppliers that only provide the following special processes on P&W products shall be certified to the appropriate Nadcap commodity and scope. • Chemical Processing • Coatings • Heat Treating • Nonconventional Machining and Surface Enhancement • Nondestructive Testing • Welding All other Organizations and Suppliers providing special processes on P&W products shall have a certified QMS to AS/EN/JISQ 9100 or Nadcap AC7004.
External Calibration or Laboratory Service Providers (i.e., Nadcap Materials Testing Laboratories)	ISO/IEC 17025, ISO 10012, Nadcap AC7004, or by signatories to the International Laboratory Accreditation Cooperation (ILAC)
Industry Standard Part or Industry Standard Raw Material Manufacture.	ISO 9001 registration.

For Type 2a, the Design and Manufacture organization must establish a sub-tier special process management system, encompassing suppliers that do not possess NADCAP certification. This program should include maintaining a list of qualified special process suppliers and ensuring oversight of both internal and external processes. Oversight measures should include, but are not limited to, onsite special process audits and periodic product testing to validate product integrity.

7. SUPPORT

7.1.5.1.2.1.1 Monitoring and Measuring Resources - General

Significant-Out-Of-Tolerance (SOOT) condition is defined as Measuring and Test Equipment (M&TE) out-of-tolerance condition that either (a) exceeds 25% of the product tolerance (the maximum acceptable level of deviation from a product's specification, measurements or standards), or (b) when measured error of the M&TE is greater than two times the calibration tolerance (the maximum acceptable deviation between the known standard and the calibrated device) when product tolerance is not known.

When M&TE is identified as SOOT, the supplier shall:

- Document the SOOT results in calibration records.
- Assess impact of the SOOT condition on product inspected with the SOOT M&TE since its last non-SOOT calibration.
- Notify P&W within 24 hours if it is determined that impacted parts could have been shipped (see section 10.2.3)
- Ensure corrective action measures to eliminate the SOOT condition and minimize product risk. Such measures may be included but are not limited to
    - Adjustment or repair or replacement of M&TE
    - Review of future use of similar M&TE
    - Review of conditions that may have caused SOOT (e.g. improper usage, storage, or maintenance)
    - Over inspection of potentially impacted production hardware

7.1.5.1.3.7 Confirm Acceptance - Supplemental Requirements

When performing Measurement System Analysis (MSA), the Organization shall comply with the requirements of AS13100 Table 4 MSA Acceptance Limits, with the following exception: The acceptable Gage Repeatability and Reproducibility (R&R) for all Characteristic Categories is ≤ 20%of tolerance.
Relative to Table 3, AS13100, MSA studies for CDMS applications on minor features are only required when requested by Pratt and Whitney.

7.2.3.1. Delegated Product Release Verification (DPRV) Representative Training – Supplemental Requirements

DPRV personnel (Delegated Quality Representative (DQR) for P&W) shall be certified per the requirements of Supply Chain Operating Procedure SCOP DQR.

7.5.2.1.3.1 In cases where the organization maintains documented information in their native language as well as in English, and there is a conflict, the English language document shall take precedence.

7.5.2.1.3.2 For communication with the P&W, organizations shall have the capability to communicate in English including the following documents unless otherwise approved by the P&W:

- Quality manual
- First level Quality procedures
- Process documentation requiring P&W approval
- All formal communication (e.g., ASQR forms, and P&W specific Forms, FAI, PPAP documents)

7.5.3.5 Original nondestructive evaluation/testing process related records

Section 7.5.3.5.4 of AS13100 is hereby replaced with the following requirement:

Original nondestructive evaluation/testing process-related records (e.g. radiographic film & images and electronic sonic scan data sets) shall be maintained, in accordance with the retention period specified in Table II.

Electronic sonic data used for part acceptance shall be retained per Table II. This would include any additional scans used to assess part acceptance as well as all scan segments mandated by the technique sheet.

Table II. with below retention period for retained documented information

Time Period (from date of manufacture)	Part Type
40 years	Flight Safety Parts, Safety Parts, Flight Critical Parts as defined in ASQR-09.1, Critical Rotating Part, Critical Part, Engine Structural Integrity Program (ENSIP) Critical Part, PWC Safety Significant Item, rotor grade billet
10 years**	All other except industry standard parts
5 years**	Industry Standard Parts

(** physical radiographic films on non-serialized parts are only required to be retained for 2 years)

8. OPERATION

8.1.1 Product Safety Supplemental Requirements

Organizations supplying Flight Safety Parts shall comply with the requirements of ASQR-09.1.

Note: *Some P&W-specific designations for Flight Safety Parts are: PW Flight Safety Part (FSP), PW Prime Reliable Part, PWC Critical Part, PWC Critical Rotating Part, PWC Engine*

Structural Integrity Program (ENSIP) Critical Part.

8.1.3.1. h. An anonymous employee reporting channel for product safety concerns.

> ***Note:*** *For guidelines on implementing SMS (Safety Management System) supply chain best practices, reference IAQG Supply Chain Management Handbook,* SCMH-7.22.2*.*

8.2.1.1 Customer Communication – Supplemental Requirements

8.2.1.1.1.1 This paragraph in AS13100 is replaced by the following: The Organization shall adhere to P&W form submission instructions (e.g., web-based, email) for each form listed in Table III.

8.2.1.1.2.1 This paragraph in AS13100 is replaced by the following: The Organization shall submit ASQR-01 Form 3 for all formal communications, and requests with respect to P&W-specific quality requirements unless otherwise listed in Chapter 2 Table III.

ASQR-01 Form 3 is used for items such as:

Clarification, interpretation, or identified error with a drawing, specification, or requirement.

A request for approval to use an alternate method to comply with a P&W quality system requirement (use of an alternate method is not permitted without prior P&W approval)

> ***Note:*** A S Q R -01 Form 3 is used for communication only. It is not used for disposition of product non-conformances.

Table III: Organization Communication Forms

Form	***Name***
ASQR-01 Form 3	*Supplier Request for Information*
ASQR-01 Form 4	*Supplier Work Transfer Request*
ASQR-01 Form 6	*Notification of Potential Quality Escape*
ASQR-01 Form 7	*Delegated Quality Representative (DQR) Candidate Application*
ASQR-01 Form 8	*Letter of Agreement, Delegated Quality Representative Program*
ASQR-01 Form 9	*RTX-Distributor Request*

8.2.1.1.6 Upon receiving notification of a P&W Eagle Eyes Alert, bulletin, revised procedure, or specification, ensure it is both reviewed and understood by all members of your organization that are affected.

These reviews shall be documented on a reading log, signed and dated by the Organization's quality

department, and, upon request, the reading log shall be available for review by P&W.

Ensure P&W communications are shared with your suppliers as applicable.

Provide new/revised email addresses of any individual who may need to receive P&W communications to P&W SQA.

8.4.4 Type and Extent of Control – Supplemental Requirements

8.4.2.1.4 AS13100 Paragraph 8.4.2.1.4 is replaced by the following: The Organization shall ensure that the counterfeit part prevention process includes a mechanism for reporting counterfeit parts to the organization's purchasing representative within 24 hours of it being confirmed.

8.4.2.1.6 AS13100 paragraph 8.4.2.1.6 is replaced by the following: For PWC, the organization shall notify PWC via ASQR-01 Form 4 prior to any planned work transfers (e.g., from one organization facility to another, from the organization to a member of its supply chain, from one member of its supply chain to another). The organization shall not interrupt the flow of material from any existing source prior to obtaining PWC approval. PWC reserves the right to require additional substantiating data or quality controls.

8.5.1.1 Control of Equipment Tools and Software programs

8.5.1.1.1 AS13100 Section 8.5.1.1, paragraph 8.5.1.1.1 is replaced by the following: The Organization shall comply with the requirements of AS9125 when utilizing non-deliverable software such as, Manufacturing, Test, Inspection or Support Software.

8.5.1.1.2 For P&W external providers, the following control of software requirements shall also apply:

8.5.1.1.2.1 Coding standards shall be defined and shall include but not limited to i) software unique identifier ii) revision control and ii) naming convention for modules, executables, developmental and production file names.

8.5.1.1.2.2 Shop floor personnel shall have the ability to verify that the correct software has been loaded.

8.5.1.1.2.3 Verification

The first run of a software program must be either:

- Dry run
- Tested on a suitable test piece and should be representative of the part
- Verified using simulation software (e.g., Vericut, etc.), or
- A computerized comparison of the original software program prior to use

Note: An equivalent method to the above is acceptable.

Software for automated inspection (e.g. CMM, etc) shall be verified by correlation of the test results with the results from an independent method of inspection. The independent method requires a different person other than the person who created the inspection program to perform the verification.

- For P& W suppliers, acceptable correlation requires the difference to be within 10% of the tolerance for each characteristic.
- Differences greater than 10% but not exceeding 25% may be acceptable with documented justification.
- Differences greater than 25% are unacceptable. Please refer to Appendix A for additional details.

8.5.1.3 Production Process Verification

8.5.1.3.1 When specified by P&W, the Organization shall use the P&W online system to capture production process verification data (e.g., PPAP, FAI) and audit data

8.5.1.4 Control of Product and Service Provision – Supplemental Requirements

8.5.1.4.1.1 The use of handheld spectrometry devices, or equivalent, to verify 100% of material input at the part manufacturer only applies if required by P&W.

8.5.1.4.3 c AS13100 Section 8.5.1.4.3.c, is replaced by the following: Unless otherwise specified, where visual acceptance is performed the lighting intensity for inspection shall be 100 foot candles or 1076 LUX minimum, measured at the inspection surface of the part.

8.5.1.6 First Article Inspection (FAI) –Supplemental Requirements.

8.5.1.6.1.b.2 When subsequent process changes occur that may impact the original part marking approval, producer shall resubmit for a new approval.

> ***Note:*** *On an exception basis where part marking process changes affect a group of parts, with prior approval from P&W, part family/grouping validation may be acceptable.*
>
> ***Note:*** *Where part marking changes are related to a new revision of the part, and with submission of an appropriate photo for archive purposes, a side-by-side inspection could be used for validation purposes.*

8.5.1.6.1.d.4 Include a reproduction of product part marking (e.g., photograph or sample) that represents production marking within the FAI report.

> ***Note:*** *To ensure correct part marking, approval can be obtained from P&W prior to FAI submission.*

8.5.1.6.1.h All new and partial FAIs require a (PPC) Process Map, PFMEA, and Control Plan and shall be flow down to all supply chain levels per AS13100. PPC is not required to be submitted with the new or partial FAI, PPC shall be kept by the organization and made available to P&W upon request. When required by P&W, the organization shall provide objective evidence that PPC has been completed, to the applicable PW representative

8.5.1.9 Appointment of Competent Person, Including Any Required Qualification – Supplemental Requirements

8.5.1.9.1 d. The Organization shall request and obtain approval for the use of an Operator Self-Verification Program – also known as Operator Certification Program - or special manufacturing methodologies (e.g., manufacturing controlling features, die/mold control and method of manufacturing) from P&W using ASQR-01 Form 3, unless otherwise specified.

9. PERFORMANCE EVALUATION

9.1.1.1.3 .1 Upon request of P&W, Organizations shall compute PFMEA risks using the Action Priority method. (see RM13004 for the preferred Action Priority method).

9.1.1.1.7.1.1 Temporary Key Characteristics

TKCs are treated in similar manner as permanent KC's (e.g. KPC1, KPC2, IDS KC) which are defined in this document. In the event a TKC is deployed, P&W shall require the Organization to:

Conduct a Gage Repeatability & Reproducibility study per RM13003 with the goal of achieving a Percent-To-Tolerance Ratio ≤ 20%.

Conduct a short-term Process Capability Study (per RM13006) by collecting a minimum of 25 consecutive pieces over two or more manufacturing lots, demonstrating statistical control with a SPC control chart, and achieving a Cpk ≥ 1.33.

Unless otherwise approved by P&W, once these thresholds are met TKCs may be removed, and the Organization's corrective action is considered to have been validated.

9.1.1.2 Alternate Strategies to 100% Inspection (Alternate Strategies) - Supplemental Requirements

9.1.1.2.2 This paragraph in AS13100 is replaced by the following: Product acceptance inspection shall be 100% for all characteristics unless the organization and their suppliers meet the requirements of ASQR-20.1.

9.1.1.2.3 Sampling plans defined in ASQR 20.1 and sampling plans and alternate sampling plans requiring Customer approval per ASQR 20.1 shall be submitted for approval using ASQR-01 Form 3. Documented P&W approval is required prior to implementation.

> ***Note**: Any alternate sampling plan outlined in RM13002 is considered an alternate sampling plan and requires P&W approval prior to implementation.*

10. IMPROVEMENT

10.2.3 Problem Solving Methods for Customer Escapes - Supplemental Requirements

10.2.3.1 Corrective Action Verification

10.2.3.3 This paragraph in AS13100 is replaced by the following: The Organization shall inform

P&W using ASQR-01 Form 6 within 24 hours upon discovery of suspect non-conforming product having been shipped regardless of destination.

Upon implementation of corrective action, to ensure effectiveness, the Organization shall have a documented process in place to ensure that 100% over-inspection (i.e., additional independent measurement of the affected characteristic(s)) is performed of the deviated characteristics for a-minimum of the next three consecutive manufactured lots (quantities of parts produced under conditions that are considered uniform) unless otherwise specified by P&W.

10.2.3.4 Pratt and Whitney reserves the right to initiate the development and implementation of a Quality Clinic System for suppliers who illustrate underperforming quality metrics. Guidance would be provided by a Pratt & Whitney subject matter expert.

AS13100 Chapter B

9145 - Advanced Product Quality Planning (APQP) and Production Part Approval Process (PPAP) - AESQ Supplemental Requirements

Organizations shall comply with the requirements of AS13100 Chapter B and C when PPAP is invoked by a Purchase Order (PO) or any other contractual document issued by P&W. (e.g. PW - QA 6100, PWC - PO clause).

16.6.9 Phase 4 - Product and Process Validation - Supplemental Requirements

16.6.9.1 b.

1. Process Stability (i.e., statistical control) shall be understood prior to process capability analysis using SPC control charts. Whenever possible, the data collection and monitoring activity through the use of SPC control charts shall be done at the transformation operation. Refer to RM13006.

2. Where stability is not achieved, the organization shall investigate the causes for instability, take appropriate actions to establish best possible stability and ensure product meets customer requirements

17. (5. - 9145) PRODUCTION PART APPROVAL PROCESS (PPAP) REQUIREMENTS

17.1 P&W-specific submission requirements for PPAP

17.1.1.2 The Organization shall submit a PPAP project plan with the commit dates to complete each PPAP Element to their P&W Focal Point (MFP) for approval within 15 business days of P&W Purchase Order issuance. If business conditions cannot support submission of a PPAP Project Plan within the 15 business days, the Organization shall work with the MFP to establish an alternate submission date. Failure to meet these commit dates may result in revoking the authorization to ship hardware and require submission of new dates with detailed justification.

The Organization shall submit all PPAP planning & objective evidence utilizing P&W's electronic system/PPAP software application. In the event the software system is not available, the Organization shall contact their P&W MFP for submission requirements.

The PPAP requirement are applicable to Organizations (Tier 1) receiving a purchase order from P&W and their Suppliers. The Organization shall flow down the requirements of PPAP to all levels of the supply chain (internal and external) and maintain records of their compliance. A risk-based decision process may be used to assess PPAP applicability of supply chain components and operations when approved by P&W. Any risk-based process used to determine applicability of PPAP to any level of the supply chain shall be documented and approved by the MFP. Upon a satisfactory internal review, the Organization shall submit all approved PPAP Approval Forms and objective evidence from all levels of its supply chain.

The Organization shall initiate a deferral request at the time that it is identified the planned PPAP timing cannot be met. This is done using the P&W online PPAP software application or ASQR-09.2 Form 1 and PPAP Deferral Form (ASQR- 09.2 Form 2), attaching a PPAP Element 9 (FAIR) and Element 10.1 (Part Marking Approval) to authorize the shipment of production parts prior to achieving Full or Interim Approval.

Note: *Reference AS9145 for PPAP resubmission based on product or process changes.*

17.2 Production Part Approval Process File and Submission

17.2.3.1.c.The PPAP File shall:

- Be part number specific. With prior approval some elements may be satisfied using a part or process family methodology with all unique characteristics accounted for approval from P&W.
- Be maintained by the Organization at the manufacturing location
- Be maintained with all applicable items up-to-date and represent the current production process regardless of whether P&W requests a formal submission
- Contain copies of all PPAP approvals including objective evidence
- Be available and provided upon request by MFP
- The organization shall submit all PPAP planning & objective evidence utilizing P&W Online PPAP software application. In the event the software is not available, the Supplier Producer shall contact the MFP for submission requirements.

When PPAP requirements have not been completely fulfilled, the Organization may submit the PPAP Package and partially completed Elements for review. Elements identified as incomplete shall contain an action plan to achieve closure of any open item(s) including the commitment of actions, target dates, and owners to achieve Full Approval.

The Organization shall obtain authorization via the P&W online PPAP software application or by providing ASQR-09.2 Form 1 (PPAP Approval) to the MFP.
The following PPAP dispositions are possible:

- Full Approval
- Interim Approval
- Rejected (not authorized to ship)

Interim Approval indicates a gap between the PPAP requirements and the Organization's current status on the following Elements:

- 2 – Design Risk Analysis (DRA)
- 4 – Process Failure Modes and Effects Analysis (PFMEA)
- 6 – Measurement Systems Analysis (MSA)
- 7 – Initial Process Capability Studies
- 9 – First Article Inspection Report (FAIR)
- 10.2 – Production Process Run(s)

Interim Approved production part shipment will be suspended after the plan date for Full PPAP Approval has expired. Interim approval remains valid after expiration of Full Approval plan date. The Organization shall submit a new plan for Full Approval via the P&W online PPAP software application or the MFP via ASQR-09.2 Form 1 and include any changes to the package to continue shipments. The new plan should be submitted prior to expiration.

The Organization shall initiate a deferral request when it is identified the planned PPAP timing cannot be met via the P&W online PPAP software application or using the PPAP Deferral Form (ASQR- 09.2 Form 2), attaching a PPAP Element 9 (FAIR). All deferral requests shall contain a detailed justification with the reasoning PPAP approval cannot be met at that time, the need for the deferral, an action plan for meeting PPAP requirements and must be accepted and concurred with by the (MFP) SPCE, Quality, and Procurement leadership. Deferral shall not exceed three iterations.

Where there are current technology limitations or it is prohibitively expensive to satisfy the process stability, process capability, and/or production yield requirements of this section, the Organization shall submit a request for exception via the online PPAP system. P&W-specific forms may be used in the event the online system is not available.

> ***Note**: Requests for exemptions are only available for Initial Process Capability Studies and Production Process Run(s) Elements.*

The Organization shall review applicable Elements as part of any corrective action (e.g., QNs, escapes, P&W/Certification Body/Regulatory audit findings, negative trending of Cost of Poor Quality, Product KC (e.g. KPC1, KPC2, IDS KC) or Process KC (e.g. KPC-M)) to determine the impact and update affected Elements where appropriate as per AS9145. (Reference AS13100 & RM13000)

17.2.3 Production Part Approval Process File and Submission - Supplemental Requirements

Table 13 - AESQ PPAP elements requirement
The following elements are modified or added as shown here.

PPAP ELEMENT 6: Measurement System Analysis - Supplemental Requirements
MSA shall, at a minimum, be performed and documented on the measurement methods for KCs (product and process) identified in the Control Plan as per SAE AS13100 7.1.5.1.2 Table 4.

Gage Repeatability & Reproducibility (Gage R&R) studies shall have a Precision-to-Tolerance (P/T) ratio of ≤ 20% unless a lower maximum ratio is required by P&W.

Where attribute data is used to assess feature acceptability (e.g., pass/fail criteria), the following criteria shall be used to determine acceptance of the measurement system: Pass/Fail: Attribute agreement ≥ 90% or Kappa ≥ 0.8

PPAP ELEMENT 8: Packaging, Preservation, and Leveling Approvals
The Organization shall obtain P&W approval that their methods of packaging, preservation, and labelling for production materials conform to Member-defined specifications.
P&W may require, but is not limited to, packaging form submittal, pictures of structural packaging process steps as well as legible photos or graphic examples of all required labels and the organization's detailed instructions.

PPAP ELEMENT 10.1: PW SPECIFIC REQUIREMENTS: Part Marking Approval

The Organization shall document that part marking requirements are met by obtaining approval from P&W. Part marking objective evidence submitted with the FAI report under Element 9 shall satisfy Element 10.1 created in a PPAP online software application must be addressed through the standard procedure.

PPAP ELEMENT 10.2: PW SPECIFIC REQUIREMENTS: Production Process Run(s):

A Production Readiness Review (PRR) should be completed prior to the Production Process Run to verify that the manufacturing process is documented and ready for production while operating at the customer demand rate. Upon P&W request, the Organization shall record and submit the results of the review, including corrective action to resolve any identified risks or issues.

The Production Process Run(s) shall be performed at the intended production site(s) under production conditions (i.e., tooling, gauges, processes, sequence, operations, instructions, materials, personnel, environment) to demonstrate the ability to satisfy P&W requirements.

The Organization shall track and document the defect rate of all parts produced during the Production Process Run.

After completing the FAI, the completed Production Process Run shall be evaluated per the following acceptance criteria:

Table V

Approval Level	Acceptance Criteria	Interpretation

Full	• Minimum 25 consecutive parts with no QNs and no active Minor Deviations. • Second dimensional report (applicable sections of AS9102 FAI Form 3 Characteristic Accountability, Verification, and Compatibility Evaluation, or equivalent form may be used) produced from or after the 25th part.	The process satisfies the acceptance criteria.
Interim	• FAIR with data from any additional parts available at time of submission. Note: For P&WC PPAP packages, Interim is divided in A and B and additional requirements apply.	The process does **not** meet the acceptance criteria for Full approval. The organization shall implement corrective action as necessary and continue data collection.

18. AESQ SUPPLY CHAIN RISK MANAGEMENT PROCESS - SUPPLEMENTAL REQUIREMENTS

The requirements of AS13100 Section 18 are presented as a best practice and not mandatory deliverables for P&W. 21. KEY REQUIREMENTS FOR THE DEPLOYMENT OF QUALITY PLANNING TOOLS – SUPPLEMENTAL REQUIREMENTS

21.8 Initial Process Capability Studies - Supplemental Requirements

The following acceptance criteria for the evaluation of initial process study results shall be applied:

> ***Note**: Data collected from development or pre-production parts can be considered, provided the same tooling, equipment, and processes intended for production are used.*

Table IV

Approval Level	**Results**	**Interpretation**
Full	• **For IDS KC:** Variable Process Capability Index $\geq$ 1.33 • **For Process KC:** Variable Process Capability Index $\geq$ 1.00 • **Attribute:** 45 in a row without any nonconformances	The process satisfies the acceptance criteria. The supplier shall determine acceptability of Organization defined process KCs based on internal requirements

Interim	• Variable Process Capability Index < 1.33 • **Attribute:** Yield < 90% • Out-of-control conditions • Insufficient sample size Note: For P&WC PPAP packages, Interim is divided in A and B and additional requirements apply.	The process does **not** meet the acceptance criteria. The Producer shall investigate root cause and implement corrective actions and Organization control methods to ensure conformance. Mitigation plans shall be approved by P&W. The MFP can review the Process Capability Study results and propose necessary improvements to the process and Control Plan.

***Note 1**: Ppk may be used in place of Cpk when capability is being calculated for non-normal distributions or data is not in exact time order.*
***Note 2**: Execution of this PPAP Element does not automatically grant any sampling authorization. For RTX Supplier sampling requirements, refer to ASQR-20.1.*

When an Organization reaches PPAP Interim/Full Approval levels, process capability shall be maintained per Table IV above through life of production. Organization shall monitor stability, (i.e., using an SPC control chart or equivalent control chart) and process capability index (e.g., Cpk or Ppk). When the process is not meeting the required control and capability threshold, the Organization shall assure the appropriate reaction plan is followed (documented in the Control Plan and/or work instructions) and take improvement actions return process stability and/or bring capability back to a minimum of Cpk/Ppk =1.33 for KPC/KC features and a minimum of Cpk or Ppk = 1.33 for KPC or KC features and a minimum of Cpk or Ppk = 1.0 for Organization identified KC's, while under statistical control.

Appendix A - Required Conditions for the Use of Sampling in Testing of Computer Aided Inspection (CAI) Software

Section 8.5.1.1.2.3 contains the following items regarding verification of inspection software.

- Software for automated inspection (e.g. CMM, etc) shall be verified by correlation of the test results with the results from an independent method of inspection.
- For P&W suppliers, acceptable correlation requires the difference to be within 10% of the tolerance for each characteristic.
- Differences greater than 10% but not exceeding 25% may be acceptable with documented justification.

"Each characteristic" in the second bullet item means "all" characteristics for which a value is reported. In general, it should be assumed that for each reported feature characteristic, the potential measurement error arises from different sources and therefore each unique portion of the inspection program must be tested.

However, when all the following conditions are met, and subject to the qualifying note below, a sample of features may be used to validate the inspection software for characteristics of like features in a group.

- A group of features is produced in a single operation using automated NC machinery such that all features in the group have the same defect mode(s). For example, the form error of holes in a group produced in a single operation with a single spindle and single cutting tool will be "the same" in magnitude and shape. Therefore, a measurement error due to insufficient probe points in the hole will be "the same."
- The geometry of the part at each feature location is nominally identical. For example, a pattern of holes on a contour surface does not meet this condition even though they may be produced in a single operation, while a bolt hole pattern in a symmetrical flange possibly does meet this condition.
- The inspection program has a set of computer instructions which is used repeatedly for the inspection of the features in the group (e.g. a subroutine or section of code in a "loop"). Note this requires that all features have identical drawing requirements.
- The generated code for positioning of the inspection equipment between subroutine calls is a function of the CAI executive software which is tested and approved.

Examples of part features where these conditions are met may include:

- Bolt hole circles
- Flange scallops
- Blade attachment slots
- Blades of an integrally bladed rotor

Qualifying note:
Applicability of sampling must be agreed between the programmer and the program approver and the sampling strategy must be documented prior to initiation of the testing. Test results shall never be discarded to create a sampling strategy after the results are obtained.

Additional guidance:

For rotationally symmetric feature groups, a reasonable sample could be 4 at 90 degree increments.
For other qualifying groups, 10% randomly selected or higher, as required, to cover the 3 dimensional extent of the pattern may be reasonable.

Where a pattern of identical features has a requirement for the pattern (such as true position), this is considered a separate characteristic to be tested and sampling of features (such as individual holes) within the pattern would not apply.