Global Supplier Quality Manual

DEFENSE SEGMENT ADDENDUM

Revision 1.5
March 2022

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19.1. QC-112 PPAP Check list

The supplier shall complete and submit the PPAP check list with every level 3 PPAP. This document will assist in ensuring all elements are present and complete.

19.2. Commercial Off the Shelf (COTS)

Commercial off the Shelf (COTS) Components are items sold in the commercial marketplace. These parts are commercially available (and at times procured through distributors). They cannot be modified, combined, evolved, or “of-a-type” commercial items. They must truly be “as-is”. For further definition, refer to FAR 2.101.

When providing a PPAP for COTS parts, Oshkosh’s suppliers are expected to submit all 18 elements of PPAP. At times, due to the nature of COTS parts, Oshkosh’s suppliers may be unable to obtain all data for all 18 elements for a level 3 PPAP. In these cases, the supplier is expected to demonstrate / affirm conformance with supporting PPAP documents or Certificates of Conformance by supplying the following minimum PPAP elements:

- Design Record (Bubble Print)
- Engineering Change Documents (If applicable)
- Customer Engineering Approval (If applicable)
- Dimensional Results / Print Notes Verification
- Sample Production Parts
- Master Sample Photos
- Customer Specific Requirements (CFAT- if applicable)
- Parts Submission Warrant
- Catalog Page or equivalent from OEM to demonstrate commerciality (if available)

When the supplier cannot attain all PPAP elements, a Certificate of Conformance (C of C) will be required in addition to the above elements. The C of C letter shall:

- Confirm the article is commercially available
- Be on the supplier’s company letterhead
- Include the Oshkosh part number
- Include the part revision level,
- Be signed by a representative within the contractor’s organization that has decision making authority.
- Positively affirm that the part meets the requirements within the print.

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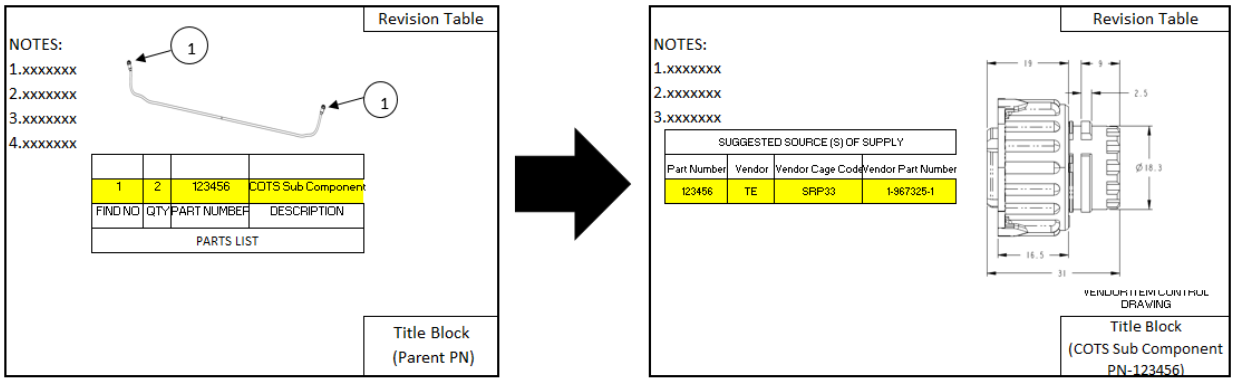
19.2.1. "COTS Plus":

Parts that are Commercial Off the Shelf (as defined above) but have additional print or performance requirements that Oshkosh has deemed important (because of the part's application). If the OEM catalog page or product data sheet that does not include all Oshkosh Defense print specifications, the supplier is responsible to provide objective evidence that the part meets the requirement within the Oshkosh Defense print.

NOTE: *Caution is needed when a COTS component is "modified" with additional specifications. Modifications to COTS parts re-classify it as a COTS Plus part. If a modification alters the original specifications, re-testing the part in its entirety is required to demonstrate that no unintended performance shortcoming will occur because of the modification.*

19.2.2. COTS subcomponents

For COTS subcomponents within the Purchased Part Level (Parent), only the certificate of conformance and design record are required if COTS Vendor Part Number specified by subcomponent drawing is used. If no Vendor Part Number is specified, a one-piece dimensional result, print note verification, design record, and Supplier Change Request (if applicable) are required.



20. Design Record (AIAG PPAP 2.2.1)

The Supplier shall comply with the Oshkosh Defense Design Record for the product/part referenced on the Purchase Order. This includes sub-components (drawings) associated with Purchased product/part. Where the Design Record is in electronic format, the Supplier shall produce a hard copy. Examples include, but are not limited to pictorial of the parts, GD&T sheets, drawings and identifications of measurements taken. Engineering Drawings (Balloon Prints) shall accompany each PPAP submittal.

Best Practice: *Layout the balloon print so the numbering of all features is formatted sequentially in a left-to-right, clockwise pattern on the first page of the drawing, and continues sequentially and clockwise for pages, 2, 3, … when design records have multiple pages. This pattern expedites the review and approval process.*

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21. Authorized Engineering Change Documents *(AIAG PPAP 2.2.2)*.
Only production-released / approved drawings shall be utilized for PPAP submittals.

The Supplier shall maintain copies of any authorized engineering change documents for those changes not yet recorded in the Design Record but incorporated in the product, part or tooling. Marked drawings are acceptable for PPAP submission when a released drawing is not available due to timeline constraints. Any marked drawings from Oshkosh Defense must be signed and approved by Oshkosh Design Engineering, and a copy of the approved Oshkosh Defense Supplier Change Request (RCM) must accompany the PPAP submittal.

22. Customer Engineering Approval *(AIAG PPAP 2.2.3)*
Where specified by the customer, the organization shall have evidence of customer engineering approval.

23. Design FMEA *(AIAG PPAP 2.2.4)*
DFMEA is required at the component level for all parts where the Supplier is considered design responsible for all Level 3 PPAP submittals.

23.1. FMEA Special Characteristics Introduction
In accordance with the AIAG PPAP Manual (Fourth Edition), Special Characteristics are defined as product characteristics or manufacturing process parameters which can affect safety or compliance with regulations, fit, function, performance, or subsequent processing of product. There are two types of Special Characteristics: Critical Characteristics and Significant Characteristics:

Critical Characteristic (CC) - A Critical Characteristic is defined as a product characteristic or manufacturing process parameter that can potentially affect compliance with government regulations, safe vehicle operation, or safe equipment function.

Significant Characteristic (SC) - A Significant Characteristic is defined as a product characteristic or manufacturing process parameter which can affect fit, function, performance or impact subsequent processing of product.

Examples of Special Characteristic symbols

23.2. FMEA Characteristic Assignment Process
Critical and Significant Characteristics shall be assigned based on the Severity and Occurrence data derived from the Design and/or Process Failure Mode and Effects Analyses (DFMEA and PFMEA). Criteria for assignment of special characteristics shall be in accordance with the below Criticality Matrix *(see Figure 1 below)*. All special characteristics shall be documented on the corresponding control plan.

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Significant Characteristics - Significant Characteristics shall be identified, recorded, and implemented when a DFMEA or PFMEA Severity Rank of 5, 6, 7, or 8 is identified with a corresponding Occurrence Rank of 4, 5, 6, 7, 8, 9, or 10. All items identified as a Significant Characteristic shall demonstrate a minimum Cpk of 1.33 or be subject to 100% inspection.

Critical Characteristic - Critical Characteristics shall be identified, recorded, and implemented when a DFMEA or PFMEA Severity Rank of 9 or 10 is identified regardless of the corresponding Occurrence Rank. All items identified as a Critical Characteristic shall demonstrate a minimum Cpk of 1.67 or be subject to 100% inspection.

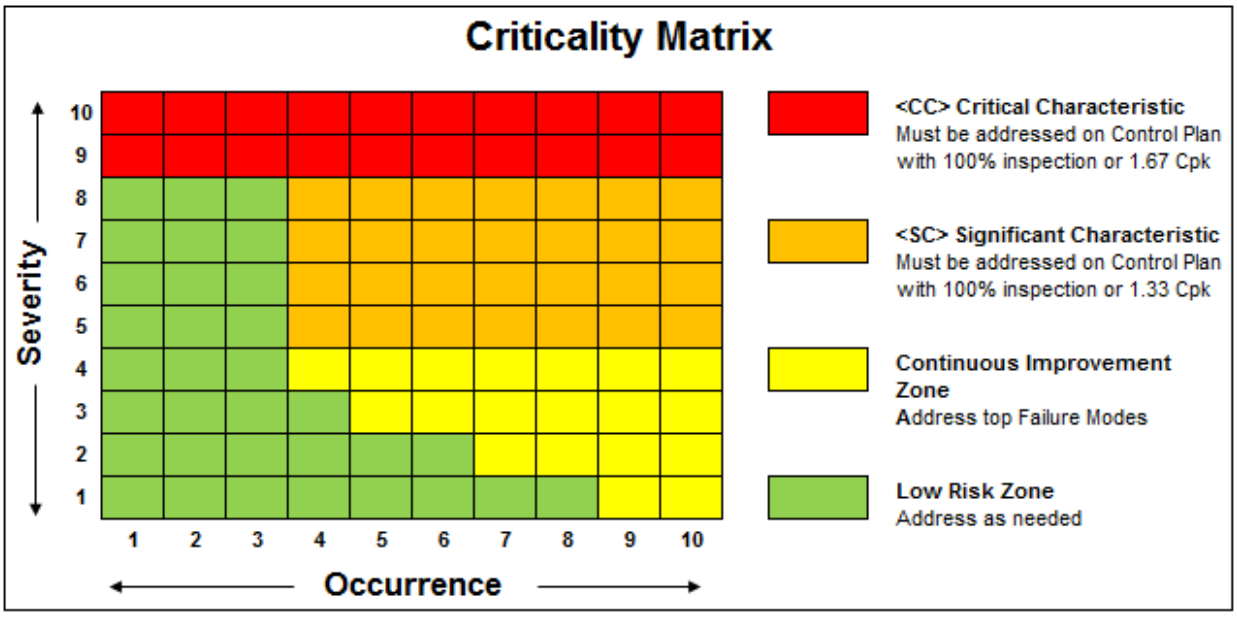

Figure 1: Criticality Matrix to be used for identification and Classification of Special Characteristics

23.3. FMEA Severity Ranking Assignment

Assignment of DFMEA and PFMEA Severity Rank values shall be in accordance with *Figure 2* below. If there is any disagreement between criteria for assignment of Severity Rank in the table while performing DFMEA or PFMEA analysis, the more severe (higher) rank value shall always be utilized.

23.4. FMEA Occurrence Ranking Assignment

Assignment of DFMEA and PFMEA Occurrence Rank values shall be in accordance with Figure 3 below. If there is any disagreement between criteria for assignment of an Occurrence Rank in the table while performing DFMEA or PFMEA analysis, the more severe (higher) rank value shall always be utilized. Note that the Occurrence column pertaining to Testing applies to both DFMEA and PFMEA.

23.5. FMEA Detection Ranking Assignment

Detection Ranks are not to be considered in the assignment of special characteristics. However, for the purposes of conducting DFMEA and PFMEA analyses and determining Risk Priority Number (RPN) values, the Oshkosh Defense standard table within the PPAP workbook (Table Cr3 from the AIAG Potential Failure Mode and Effects Analysis Manual Fourth Edition) shall be utilized.

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SEVERITY RATING SCALE				
CUSTOMER EFFECT	**SEVERITY OF EFFECT ON PRODUCT**	**RANK**	**SEVERITY OF EFFECT ON PROCESS**	**ASSY EFFECT**
Failure to Meet Safety and/or Regulatory Requirements	Potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation without warning.	**10**	May endanger operator (machine or assembly) without warning.	**Hazardous without warning**
	Potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation with warning	**9**	May endanger operator (machine or assembly) with warning.	**Hazardous with warning**
Loss or Degradation of Primary Function	Loss of primary function (vehicle / item inoperable, but does not affect safe operation).	**8**	100% of production run may have to be scrapped, line shutdown, or stop ship.	**Major Disruption**
	Degradation of primary function (vehicle / item operable but at a reduced level of performance)	**7**	A portion of the production run may have to be scrapped, deviation from primary process including decreased line speed or added manpower.	**Significant Disruption**
Loss or Degradation of Secondary Function	Loss of secondary function (vehicle / item operable, but does not affect safe operation, but secondary functions inoperable)	**6**	100% of production run may have to be reworked off line and accepted.	**Moderate Disruption**
	Degradation of secondary function (vehicle / item operable, but secondary functions operate at reduced level of performance)	**5**	A portion of the production run may have to be reworked off line and accepted.	
Loss or Degradation of Tertiary Function	Condition impacting a tertiary function but vehicle remains operable, appearance or audible noise, or item does not conform and noticed by >75% of customers	**4**	100% of production run may have to be reworked in station before it is processed.	**Minor Disruption**
	Condition impacting a tertiary function but vehicle remains operable, appearance or audible noise, or item does not conform and noticed by ~50% of customers	**3**	A portion of the production run may have to be reworked in station before it is processed.	
	Condition impacting a tertiary function but vehicle remains operable, appearance or audible noise, or item does not conform and noticed by <25% of customers	**2**	Slight inconvenience to process, operation, or operator.	**Annoyance**
No effect	No discernible effect	**1**	No discernible effect.	**None**

Figure 2: Severity Ranking Criteria for DFMEA and PFMEA

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Detection Rating Scale		
Rank	**DETECTION PROBABILITY**	**CRITERIA**
10	**No detection opportunity**	No current process control; Cannot detect or is not analyzed.
9	**Not likely to detect at any stage**	Failure Mode and/or Error (Cause) is not easily detected (e.g. random audits)
8	**Problem Detection Post Processing**	Failure Mode detection post-processing by operator through visual/tactile/audible means.
7	**Problem Detection at Source**	Failure Mode detection in-station by operator through visual/tactile/audible means or post-processing through use of attribute gauging (go/no go, manual torque check/clicker wrench, etc.)
6	**Problem Detection Post Processing**	Failure Mode detection post-processing by operator through use of variable gauging or in-station by operator through use of attribute gauging (go/no go, manual torque check/clicker wrench, etc.)
5	**Problem Detection at Source**	Failure Mode or Error (Cause) detection in-station by operator through use of variable gauging or by automated controls in-station that will detect discrepant part and notify operator (light, buzzer, etc.). Gauging performed on setup and first-piece check (for set-up causes only).
4	**Problem Detection Post Processing**	Failure Mode detection post-processing by automated controls that will detect discrepant part and lock part to prevent further processing.
3	**Problem Detection at Source**	Failure Mode detection in-station by automated controls that will detect discrepant part and prevent automatically lock part in station to prevent further processing.
2	**Error Detection and/or Problem Prevention**	Error (Cause) detection in-station by automated controls that will detect error and prevent discrepant part from being made.
1	**Detection not applicable; Failure Prevention**	Error (Cause) prevention as a result of fixture design, machine design or part design. Discrepant parts cannot be made because item has been error-proofed by process/product design.

This scale was adapted from the AIAG FMEA Manual (4th Edition)

23.6. Process Flow Diagram *(AIAG PPAP 2.2.5)*
Process Flow Diagrams are required for all Level 3 PPAP submittals.

23.7. Process FMEA (AIAG PPAP 2.2.6)
PFMEAs are required for all Level 3 PPAP submittals. Additional FMEA requirements are outline in section 13.6

23.8. Control Plan (AIAG PPAP 2.2.7)
Control Plans are required for all Level 3 PPAP submittals.

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24. Measurement Systems Analysis (MSA) Studies *(AIAG PPAP 2.2.8)*

For all Level 3 PPAP submittals, Oshkosh requires *separate* GR&R's be submitted *for each* measurement gage or device family gage that is used to validate Special (Significant, Critical, Major or CSI) Characteristics identified on the Design Record or listed in the Control Plan.

Note: not all product and process characteristics listed in the Control Plan are expected to require extensive measurement systems analysis scrutiny. Suppliers are encouraged to use a risk-based approach when evaluating whether GR&R's should be required for any non-Special Characteristic measurements listed in the Control Plan. However, where no Special Characteristics are identified in the Design Record or in the Control Plan, Oshkosh reserves the right to require MSAs and/or demonstration of Initial Process Capability on any characteristics.

24.1. Definitions

- **Measurement Systems** are the collection of instruments or gages, standards, operations, methods, fixtures, software, personnel, environment and assumptions used to quantify a unit of measure or fix assessment to the feature characteristic being measured.

- **Gages** are any devices used to obtain measurements or data (includes go/no-go devices).

- **Device Family Gages** are standard non-precision gages and measurement tools (such as micrometers or calipers) that are of the same make and model.

- **Measurement System Analysis (MSA)** is a mathematical method of determining how much the variation within the measurement process contributes to overall process variability. MSA is used to ensure the use of the right measurement system for running production. Oshkosh requires suppliers to perform MSA in accordance with AIAG MSA Manual 4th edition. Additional training, analysis instruction, and worksheets are available within the PPAP workbook, and on the Oshkosh portal **https://osn.oshkoshcorp.com/**

- **Gage Repeatability and Reproducibility (GR&R)** is used to ensure that measurements used in the manufacturing process are reasonably consistent regardless of how many times they are performed, or by who they are performed. GR&R can be useful to suppliers in that they can identify equipment that needs service, or operators who need additional training on the equipment. In addition to repeatability and reproducibility (GR&R), MSA studies must also address bias, linearity and stability.

24.1.1. GR&R Requirements:

The minimum number of appraisers, trials and parts when performing GR&R's are as follows:

- Variable data - 3 appraisers, 3 trials, 10 parts
- Attribute data - 3 appraisers, 3 trials, 30 parts

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Parts used in the study should represent the entire range of the tolerance. Whenever possible, the appraisers used to conduct the study should be the ones who normally perform the measurements in production. Measurements should be taken in the normal production location utilizing the production measuring equipment for the entire study.

Assessment of the measurement system should be based on the Total Tolerance of the feature being measured (i.e. %GRR to TOLERANCE). Guidelines for measurement system acceptability are as follows (reference Table VIII-A):

- The percent GRR should be less than 10% for gages used to measure Special Characteristics
- Gages whose percent GRR is between 10% to 30% may be acceptable for some applications, but use of the gage must be approved by Oshkosh Defense Quality Engineering
- Gages whose percent GRR is over 30% are considered unacceptable for the application and cannot be used

GRR	Decision
Less than 10 percent	**Gage considered to be acceptable for application**
10 percent to 30 percent	**Gage may be acceptable for some applications. Use of gage must be approved by OSK**
Over 30 percent	**Gage considered to be unacceptable for application**

Table VIII-A: GR&R Criteria

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25. Dimensional Results *(AIAG PPAP 2.2.9)*

100%-dimensional inspection is required for a minimum of three (3) parts for each Level 3 PPAP submittal. 100%-dimensional inspection is required for a minimum of one (1) part for each Level 2 PPAP submittal. One (1) piece dimensional results are required for any subcomponent outlined on the drawing being purchased for each Level 2 or Level 3 PPAP submittal.

Dimensional results for PPAP must be taken from production parts. For production parts that are produced from more than one die, mold, tooling, pattern, cavity or production process, the Supplier shall complete full dimensional layouts from each.

Measuring equipment should have a discrimination of at least one-tenth of the total tolerance being measured (AIAG MSA, chapter 1 sect. E)

A.) Best Practice: *it is permissible to add additional tabs to the Excel PPAP workbook to facilitate better organization of the PPAP submittal. Example- separate dimensions and print notes worksheets preceded by the applicable bubbled print for multiple components of an assembly / weldment. Be careful that the embedded formulas also are copied if you add worksheets.*

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B.) ***Best Practice:*** *True Position specifications. To facilitate better understanding, and standardize documentation, it is recommended to list both the "x" and "y" basic dimensions, the hole/feature size, and true position tolerance zone as shown below. Also, express "Bonus Tolerances" as a separate line item within the dimensional PPAP worksheet. The example below expresses the allowable bonus tolerance that can be added to the True Position feature frame when a maximum material condition (MMC) exists.*

ITEM	DIMENSION / SPECIFICATION	TOLERANCE		SPECIFICATION / LIMITS		GAGE TYPE*	QTY. TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)			OK	NOT OK
		-	+	MIN	MAX			Piece 1	Piece 2	Piece 3		
88	60.33	Basic	Basic	Basic	Basic	CMM	1	60.266			X	
89	22.23	Basic	Basic	Basic	Basic	CMM	1	22.220			X	
90	9.53	0.500	0.500	9.030	10.030	CMM	1	9.526			X	
91	⌖ Ø0.5Ⓜ A B C	GD&T	GD&T	0	0.500	CMM	1	0.130			X	
	Bonus Tol	GD&T	GD&T	GD&T	GD&T	CMM	1	0.496			X	

26. Records of Material / Performance Test Results *(AIAG PPAP 2.2.10)*

26.1. Material Test Results

It is the Supplier's responsibility to confirm the conformance of their material to applicable standards for PPAP submission. The Supplier shall perform all chemical, physical, metallurgical, or mechanical property tests for all parts and product materials when chemical, physical, metallurgical or mechanical property requirements are specified by the Design Record or Control Plan.

Examples of Material Test Results that are required for all PPAP submittals include: raw material certifications, painting, plating, heat-treating, welding (documentation necessary to demonstrate conformance to specified weld requirements such as Weld Procedure Qualification Requirements), etc.

When the supplier maintains "design record authority" for the part (and sub-component parts), and material details are not documented on the design record, Oshkosh Defense requires all material test results (with Qualified Lab documentation) to be maintained by the supplier and made available to Oshkosh Defense upon request.

Material test results may be presented on any AIAG compliant form (the Oshkosh Defense PPAP workbook also includes a template). Raw material composition results are to be presented in a Certificate of Analysis (COA) form. Qualified Lab documentation must accompany each material test result form (reference the Qualified Lab Documents section of this Addendum).

Materials test results shall indicate and include:

- The design record change level of the parts tested
- Any authorized engineering changes that have not yet been incorporated into the design record (if applicable)
- The number, date, and change level of the specifications to which the part was tested
- The date on which the testing took place (rule of thumb is </= 18 months old)
- The quantity tested
- The specified parameters and actual results
- The material supplier's name

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26.2. Performance Test Results

The Supplier shall perform tests for all part(s) or product material(s) when performance or functional requirements are specified by the Design Record or Control Plan. A performance test (unlike in-process checks, which do not require qualified laboratory documentation) is the process of verifying the functionality of the Product (Finished Part) when exposed to the conditions that they will be used in.

The Supplier shall use the performance test form provided in the Oshkosh Defense PPAP workbook to document and submit the performance test results. Qualified Lab documentation must accompany each performance test result form (reference the Qualified Lab Documents section of this Addendum).

Performance test results shall indicate and include the following:

- The design record change level of the parts tested
- Any authorized engineering changes that have not yet been incorporated into the design record (if applicable)
- The number, date, and change level of the specifications to which the part was tested
- The date on which the testing took place
- The quantity tested
- The specified parameters and actual results

Welding Procedure Specifications (WPS), and Procedure Qualification Records (PQRs) shall be included within the PPAP submittal when applicable, and shall be stamped / signed, dated as “approved” by a Qualified Welding Inspector (see section 12).

26.2.1. On-going Testing

It is the Supplier’s responsibility to plan for ongoing material and performance testing and to identify these as separate line items in the Control Plan. This ensures that the Supplier has a plan for continuous verification of the performance and materials requirements. The interval of inspection is to be recommended by the Supplier, however, Oshkosh reserves the right to request a change in the frequency of this inspection

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27. Initial Process Studies (AIAG PPAP 2.2.11)

Initial Process Studies are required for all Level 3 PPAP submittals where Special (Significant, Critical, Major or CSI) Characteristics identified on the Design Record or listed in the Control Plan. 100% inspection is required until Cpk minimums are achieved.

- All Major or Critical Characteristics shall demonstrate a minimum Cpk of 1.67.
- All Significant Characteristics shall demonstrate a minimum Cpk of 1.33.
- 100% inspection to be conducted until Cpk thresholds met.
  - Inspections to be reflected within the supplier's Process Control Plan
  - Records as evidence of 100% inspection to be maintained, and submitted upon request

The requirements for Significant Production Runs and Quality Indices shall be in accordance with PPAP Manual (Fourth Edition) Appendix H. All other PPAP Manual 2.2.11 requirements apply as written in the PPAP Manual (Fourth Edition).

Where no Special Characteristics are identified in the Design Record or in the Control Plan, Oshkosh reserves the right to require demonstration of Initial Process Capability on any other characteristics.

28. Qualified Laboratory Documentation (AIAG PPAP 2.2.12)

Material or Performance Tests for PPAP shall be performed by a qualified laboratory.

After Market (GIPS) order quantities of </= 2 within a calendar year will require Material / Performance Certifications, but will not require Qualified Laboratory Documents

If Material or Performance Tests are performed by an Internal or External Lab that:
IS NOT accredited, the Supplier must provide:

- The name of the laboratory that performed the test
- Documentation (work instruction) for each type of test conducted.
- Training records / certifications of personnel who performed the testing (to show competency
- List of all test equipment used to perform testing
- Calibration records of all test equipment used
- The date on which the testing took place

IS accredited, the Supplier shall submit the test results on the laboratory letterhead or in the normal laboratory report format. The laboratory report must include:

- The name of the laboratory that performed the test
- The laboratory's accreditation standard (and accreditation number and/or name of the 3rd party organization that provided accreditation)
  - *Note: Oshkosh Defense expects that all accredited labs be accredited to a known lab accreditation standard such as ISO 17025*
- List of standards used for testing
- The date on which the testing took place

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29. Appearance Approval Report (AAR) *(AIAG PPAP 2.2.13)*

AAR's are only required when requested by Oshkosh Quality Engineering representative. Note: Paint and/or Coating requirements are covered by section 13.10 Material Test Results.

30. Sample Production Parts *(AIAG PPAP 2.2.14)*

The Supplier shall ensure that the "PPAP Parts Label" is filled out and attached appropriately to the outside of each package. Label should be in plain view of a fork lift / material handler / operator. In the event parts are "Loose" shipped, a label should be placed on each part (this would also apply to parts lying on pallets). Label on a painted part must be wire tied or attached in a way such that the painted surface is protected from label adhesion.

31. Master Sample (AIAG PPAP 2.2.15)

A master sample is not required to be retained by the supplier unless specifically requested by Oshkosh Defense, however, the Supplier is required to photo document a Master Sample for all PPAP submittals. Photo documentation should illustrate how the parts will look like in the final state in which they are provided to Oshkosh. Specific focus of photo documentation should be on part labeling (to include any date codes, vendor codes, etc. if applicable), no paint zones if applicable.

32. Checking Aids (AIAG PPAP 2.2.16)

Checking aids include all dedicated instruments, templates, attribute and variable gages, fixtures, or jigs that are used to determine acceptance/rejection of a product characteristic.

If a device is specifically made for the part being verified, and the part is not available as a catalog item, it is a "checking aid".

The Supplier shall certify that all aspects of the checking aid agree with part dimensional requirements.

The supplier shall document all released engineering design changes that have been incorporated in the checking aid at the time of PPAP submission.

The supplier shall provide for preventative maintenance of any checking aids for the life of the part.

If a checking aid is used to verify a Special Characteristic, the Supplier shall conduct the appropriate MSA activities including Gage R&R (see section 14).

33. Customer Specific Requirements *(AIAG PPAP 2.2.17)*

If Component First Article Test (CFAT) is required per the Design Record, CFAT testing documentation shall be included with the PPAP submission.

34. Part Submission Warrant (PSW) *(AIAG PPAP 2.2.18)*

PSW's are required for all PPAP submissions. It is recommended that suppliers utilize the Oshkosh Defense version of the PSW. Equivalent forms may be considered.

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35. Revision Control Table

Version	Change Detail	Changed By	Change Date
1.1	Total revision of Defense Addendum	Scott Ball	11-14-2016
1.2	Sect. 3 changed record retention to 5 years, Sect. 4 changed counterfeit avoidance & detection, Sect. 9.1 added part marking legible after coating, Sect. 9.3 added armor traceability, Sect. 10 revised radiography requirements, Sect. 13 changed PPAP submittal to 7 days, Sect.13.1 & 13.2 replaced QC-116 with COTS, 13.11 ten-to-one rule added, 13.11 added 100% inspection, Section 13.13 added 100% inspection,	Scott Ball	11-01-2017
1.3	Sect. 1 added ISO registrar verbiage, Sect. 2 added Embedded Software, Sect. 8 added armor traceability and UID verbiage, Sect. 9 added qualification and sustaining verbiage, Sect. 11 added 11.5 a & b, Sect 12. 1 amended, Sect 14.2 amended, Sect. 14.2.2 added.	Scott Ball	04-01-2019
1.4	Revised / New: section 1.1 (new), 1.2, 10.3, 10.4 (new)11.1, 11.2, 11.2.1.3, 12, 14, 14.2.1 (new), 14.11B (new),	Scott Ball	10/120
1.5	(blue text) Added introduction (1). Added common practices summary list (2.3 and subsections 2.3.2 - 2.3.12). PPAP retaining requirement added (4). 3D Solid Model Specification requirements added (7). Supplier Non-Conforming material handling added (10 and subsections 10.1-10.2). Oshkosh/USG returned parts added (11). Casting requirements for aluminum castings and 3D model based casting added (15.1). Supplier change requests and appropriate handling added (17.7). Commercial off the shelf definition added (18.2). Demonstration requirements for COTS modified parts added (18.2.1). Bonus tolerance addition allowed onto true position when maximum material condition exists defined (24.B). Checking aid definition added (31). Revision table updated (34). Table of Contents updated. Section headings reformatted for consistency.	Scott Ball	3/11/22