

# PPAP – Production Part Approval Process



**OSHKOSH™**

# Purpose

It is Oshkosh Corporation's mission to provide our customers with defect-free products and service and to supply them globally at the lowest total cost. The goal is simple - to be the benchmark supplier in every market. This goal can only be achieved with the support and commitment between you, our supplier and us. Clear Concise expectations and requirements will make the supplier-customer relationship more rewarding for all.

# Training Objectives

- Drive consistency of the PPAP process
- Improve technical skills of compiling PPAP
- Improve customer satisfaction & part quality
- Avoid common mistakes and oversights
- Achieve PPAP First-Pass-Yield of 1 (100%)



# PPAP Overview

- Production Part Approval Process (PPAP)
- The purpose of PPAP is to verify that all customer engineering design record and specification requirements are properly understood by the Suppliers
- Ensure that the manufacturing process has the capability to produce product consistently meeting these requirements during an actual production run at the quoted production rates.



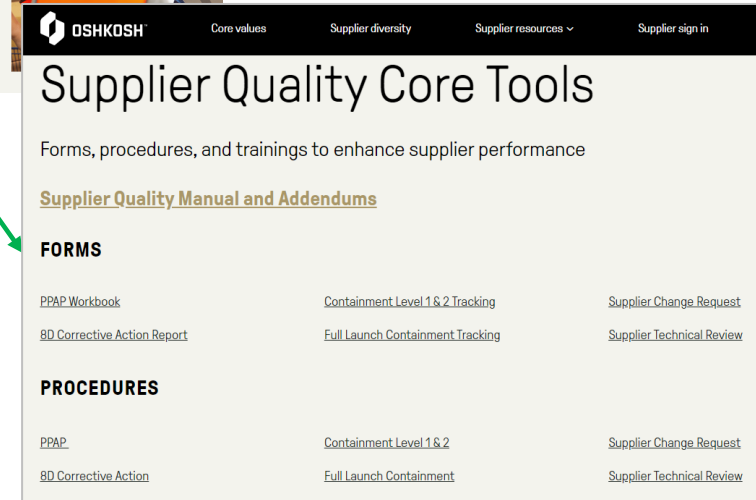
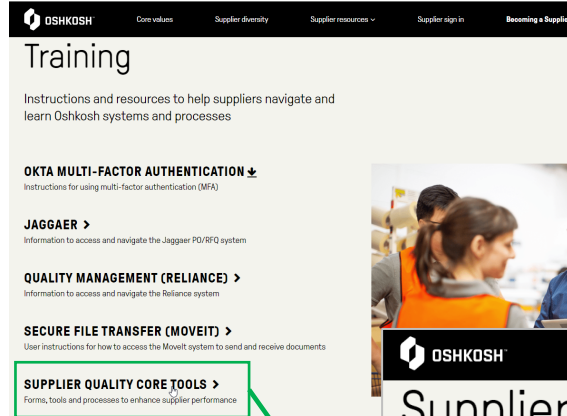
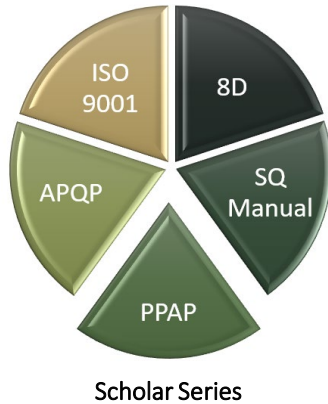
# Oshkosh PPAP Requirements

- The Oshkosh corporation PPAP requirements were established by utilizing the AIAG 4th edition PPAP manual and Appendix H
- As a Heavy Truck Industry OEM we have the liberty per AIAG to establish our own PPAP requirements and are not required to be strictly held to the Automotive PPAP requirements.
- OSK's submission Levels, and Interim Approval Processes are similar to Automotive (AIAG) requirements.

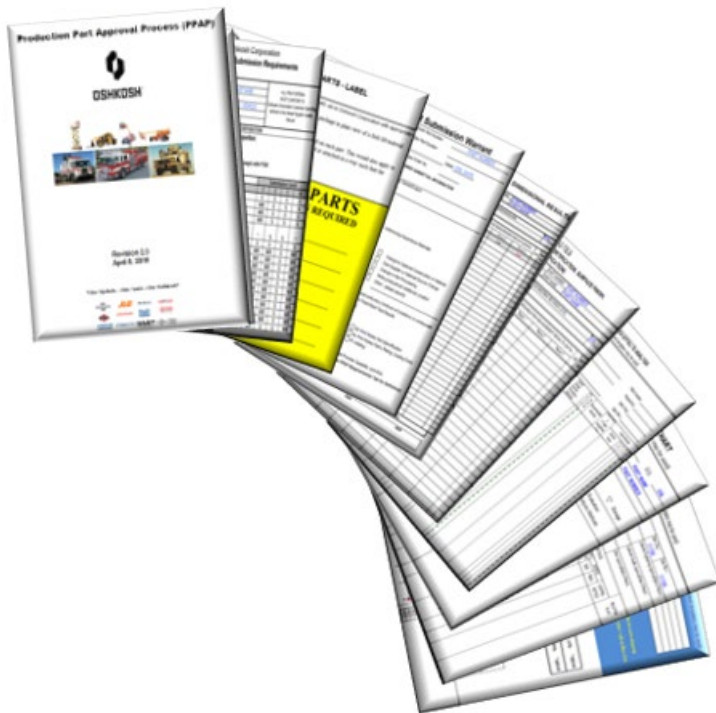


# Training Resources

- Oshkosh Supplier Network (OSN)-
- Scholar Series
- AIAG



# PPAP Workbook



OSHKOSH		Oshkosh Corporation PPAP Part Submission Requirements					
Part Number:	PART NUMBER	Purchase Order No.	ALL PPAP CRITERIA MUST CONFORM TO Oshkosh Corporation Customer Specifics defined in the Global Supplier Quality Manual				
Revision Level:	ERL DATE	Part Description:			PART NAME		
Supplier Name:	SUPPLIER NAME	Reason for Request:					
Supplier Number:	101112	OSK Program:			MODEL / VEHICLE		
Date Issued:		Submission Due Date:					
UNLESS OTHERWISE SPECIFIED IN WRITING BY OSHKOSH CORPORATION:							
Default PPAP Submission Level 2 - Unless Otherwise Specified by Oshkosh Corporation (Segment Specific Requirements may vary)							
S = Supplier Must Send Items to Oshkosh Corporation for Approval							
* = Applicable material info required (material certification, Certificate of Compliance, or catalog page) with PSW							
N/R= Documents are not required for development or submission (unless otherwise noted by program ie NGDV)							
PPAP Submission Requirements and Detail Description				Submission Level			
				1	2	3	4
1.) Part Submission Warrant (PSW)				S	S	S	S
2.) Dimensional Results (Sub-Components Required - Refer to OSK-P2000 Production Part Approval Process (Sec 5.6); Weld dimensionals/documentation (such as WPS/PQR/Welder certs) to be noted on DIMENSIONAL - WELD tab)				N/R	S	S	S
3.) Design Records (Bubble Print)				N/R	S	S	S
4.) PPAP Samples - first production order / upon request prior to production order				N/R	S	S	S
5.) Print Notes: (Attach copy of Raw Material Certification / Performance Test Report / Surface Finish, Paint Process)				*	S	S	*
6.) Supplier Change Request (OSK-F1000 / RCM) - if applicable				S	S	S	S
7.) Design Failure Modes effects Analysis (DFMEA) - if supplier is design responsible				N/R	N/R	S	N/R
8.) Process Flow Diagram (PFD)				N/R	N/R	S	N/R
9.) Process Failure Modes Effects Analysis (PFMEA)				N/R	N/R	S	N/R
10.) Initial Process Capability - for major / critical characteristics - if applicable				N/R	N/R	S	N/R
11.) Measurement System Analysis (MSA) - for major / critical characteristics - if applicable				N/R	N/R	S	N/R
12.) Process Control Plan				N/R	N/R	S	N/R
13.) Appearance Approval Report (AAR) - if applicable				N/R	N/R	S	N/R
14.) Checking Aids (Fixture, gage, template, etc) - if applicable				N/R	N/R	S	N/R
15.) Records of Compliance with Customer Specific Requirements - if applicable				N/R	N/R	S	N/R
16.) Photo Documentation (Master Sample of PPAP parts & Section J-Labeling)				S	S	S	N/R
17.) Tooling Photo Documentation - if applicable				N/R	S	S	N/R
18.) QC-112 PPAP Check List				N/R	N/R	S	N/R
Additional Submission Instructions below:							

# PPAP Management

- PPAPs are managed through Oshkosh Reliance
- PPAP workbook is located on the Oshkosh Supplier Network (OSN)
  - Training – Supplier Quality Core Tools

All Views\All PPAPs

Advanced Filter Reset Expand Rows

Actions on (0) selected documents Export view to

<input type="checkbox"/>	Phase	Assigned	Segment	Supplier Name	ERP Supplier ID	Part Number	Item Rev	PPAP Level	Due Date	Priority
<input type="checkbox"/>	Closed		Defense After Market	PARKER HANNIFIN CORP	1003728	33211AX	A	Level 2		
<input type="checkbox"/>	Closed		Defense After Market	PARKER HANNIFIN CORP	1003728	3052432	A	Level 2		
<input type="checkbox"/>	Closed		Defense After Market	PARKER HANNIFIN CORP	1003728	12857FX	A	Level 3		
<input type="checkbox"/>	Closed		Defense After Market	PARKER HANNIFIN CORP	1003728	3674301	A	Level 2		
<input type="checkbox"/>	Closed		Defense After Market	PARKER HANNIFIN CORP	1003728	3483871		Level 2		
<input type="checkbox"/>	Closed		Defense After Market	PARKER HANNIFIN CORP	1003728	3369863		Level 1		
<input type="checkbox"/>	Closed		Defense After Market	PARKER HANNIFIN CORP	1003728	1713710	A	Level 2		
<input type="checkbox"/>	Closed		Defense After Market	PARKER HANNIFIN CORP	1003728	3479288	B	Level 2		
<input type="checkbox"/>	Closed		Defense After Market	PARKER HANNIFIN CORP	1003728	3602574	D	Level 2		
<input type="checkbox"/>	Closed		Defense After Market	PARKER HANNIFIN CORP	1003869	2GL819	B	Level 2		
<input type="checkbox"/>	Closed		Defense After Market	NEW INDUSTRIES	1005721	12606247		Level 3		
<input type="checkbox"/>	Closed		Defense After Market	MAYVILLE ENGINEERING CO	1004105	3741915	B	Level 2		
<input type="checkbox"/>	Closed		Defense After Market	MAYVILLE ENGINEERING CO	1004105	3537393		Level 2		
<input type="checkbox"/>	Closed		Defense After Market	MAYVILLE ENGINEERING CO	1004105	3880054		Level 2		
<input type="checkbox"/>	Closed		Defense After Market	KAPCO INC	1003374	12414411-007	E	Level 3		

**OSHKOSH** Core values Supplier diversity Supplier resources Supplier sign in

## Supplier Quality Core Tools

Forms, procedures, and trainings to enhance supplier performance

[Supplier Quality Manual and Addendums](#)

### FORMS

<a href="#">PPAP Workbook</a>	<a href="#">Containment Level 1 &amp; 2 Tracking</a>	<a href="#">Supplier Change Request</a>
<a href="#">RD Corrective Action Report</a>	<a href="#">Full Launch Containment Tracking</a>	<a href="#">Supplier Technical Review</a>

### PROCEDURES

<a href="#">PPAP</a>	<a href="#">Containment Level 1 &amp; 2</a>	<a href="#">Supplier Change Request</a>
<a href="#">RD Corrective Action</a>	<a href="#">Full Launch Containment</a>	<a href="#">Supplier Technical Review</a>

# What Oshkosh Expects of Suppliers

# PPAP Submission

## Reasons for PPAP submission:

- Initial Submission
- Engineering Change(s) / Drawing revisions
- Tooling: Transfer, Replacement, Refurbishment, or additional
- Correction of Discrepancy
- Production Break to Oshkosh Corporation > 1 year
- Change to Construction or Material (optional material for example)
- Sub-Supplier or Material Source Change
- Change in Part Processing
- Parts Produced at Additional Location or processes with new equipment
- Ensuring proper drawing level is referenced and utilized
- Other – Please specify

### REASON FOR SUBMISSION (Check at least one)

- |                          |  |                          |   |
|--------------------------|--|--------------------------|---|
| <input type="checkbox"/> | Initial submission   | <input type="checkbox"/> | Change to Optional Construction or Material |
| <input type="checkbox"/> | Engineering Change(s)  | <input type="checkbox"/> | Sub-Supplier or Material Source Change      |
| <input type="checkbox"/> | Tooling: Transfer, Replacement, Refurbishment, or additional | <input type="checkbox"/> | Change in Part Processing                   |
| <input type="checkbox"/> | Correction of Discrepancy                                    | <input type="checkbox"/> | Parts produced at Additional Location       |
| <input type="checkbox"/> | Production Break to Oshkosh Corporation > 1 year             | <input type="checkbox"/> | Other - please specify                      |

# Submission Requirements

- **A Level 2 PPAP** submission is the default PPAP level for all products supplied to Oshkosh Corporation. Please follow segment specific guidelines for levels 1, 2 & 4; when not clearly defined, any questions should be directed to the applicable segment SQE. SQE can request additional PPAP samples and process documentation based on the part criticality. Levels 1, 2 and 4 PPAPs do not need to be pre-approved prior to the first order delivery (could be prototype or production based on program). Segment specific guidelines may differ, so please check all Addendums & Buyer/SQE when in doubt.
- There may be instances when the specific Oshkosh Corporation Segment will require a PPAP submission level greater than or less than Level 2, depending on the specific component being supplied and contract requirements.
- Oshkosh Corporation provides acknowledgement/approval of the PPAP package via Reliance notification (no more signed PSWs).

# Submission Requirements

- When a **Level 3** PPAP submission is required, Suppliers are ***not authorized to ship production material to Oshkosh Corporation without full or interim prior-approval by an OSK Quality Engineer.***
  - On a rare occasion OSK may request PPAP parts be sent to Oshkosh for review along with the PPAP submission.
  - Interim PPAP approval may be used to permit the supplier to ship material on a limited time or quantity basis in accordance with the Interim Approval Worksheet and Part Submission Warrant
  - Oshkosh Corporation provides acknowledgement/approval of the PPAP package via Reliance (no longer do we sign a Part Submission Warrant (PSW)).
  
- When a **Level 4** PPAP submission is required and utilized for non-production or New Product Development (NPD) submissions, it shall be sent to Oshkosh Corporation with the first order.

# What Oshkosh Expects of the Supplier

- Suppliers shall manage the completion and submittal of PPAP's 7 calendar days (minimum) prior to the Purchase Order due date
- PPAP's are considered **living documents** and are expected to be maintained to represent the current production process
- When the supplier encounters Corrective and Preventive Actions, updates to the PFMEA and Control Plans should be made promptly
  
- PPAP re-submittals are required when:

## REASON FOR SUBMISSION (Check at least one)

- |   |  |
|---|--|
| <input type="checkbox"/> Initial submission   | <input type="checkbox"/> Change to Optional Construction or Material |
| <input type="checkbox"/> Engineering Change(s)  | <input type="checkbox"/> Sub-Supplier or Material Source Change      |
| <input type="checkbox"/> Tooling: Transfer, Replacement, Refurbishment, or additional | <input type="checkbox"/> Change in Part Processing                   |
| <input type="checkbox"/> Correction of Discrepancy                                    | <input type="checkbox"/> Parts produced at Additional Location       |
| <input type="checkbox"/> Production Break to Oshkosh Corporation > 1 year             | <input type="checkbox"/> Other - please specify                      |



# Interim Approval

- Interim Approval may be temporarily granted and **must be considered the exception**
- Interim approval **must** include a date or quantity
- Interim Approval will not be granted if any of the following elements are missing or incomplete
  - QC – 112 PPAP Checklist
  - Design Record & Dimensional Results
  - Engineering Change Documents – RCM (if applicable)
  - Customer Engineering Approval (If applicable)
  - Print Note Verification
  - Material/Performance test results
  - Qualified Lab Documents
  - Sample Production Parts
  - Master Sample Photos
  - Customer Specific Requirements – Component First Article Testing (CFAT)
  - Part Submission Warrant (PSW)

Part Submission Warrant	Dimensional Results/Print Notes	Design Record	Engineering Changes	DFMEA	Process Flow Diagram	PFMEA	Control Plan	Process Capability	MSA	Appearance Approval	Checking Aids	Material Performance Testing	Qualified Lab Docs	Sample Production Parts	Master Sample Picture	Customer Specific Requirements (CFAT)
2.2.18	2.2.9	2.2.1	2.2.2	2.2.4	2.2.5	2.2.6	2.2.7	2.2.11	2.2.8	2.2.13	2.2.16	2.2.10	2.2.12	2.2.14	2.2.15	2.2.17
<i>Elements shaded green (above) indicate minimum submittal for interim approval</i>																

# PPAP Reviewer/Approver Expectations

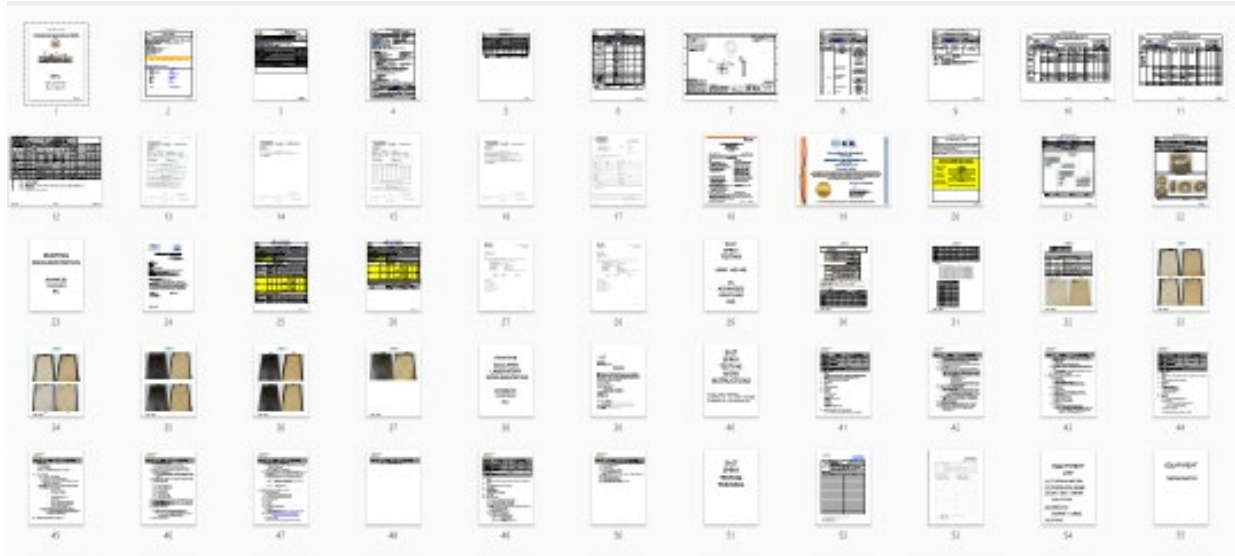
# Expectations by the Reviewer

Sample parts and supporting documentation are submitted to show evidence that:

- The design records and specifications have been properly understood and met
  
- The manufacturing process has the capability to produce conforming parts in the actual production environment
  
- The PPAP submittal is organized
  - AQEs may require that PDFs are not embedded within the Excel PPAP workbook
  - Create an index to aide the reviewer
  - Label documents to show relationships between specifications and evidence of compliance

# PPAP Submission Format

- Example of PPAP submission as a .pdf file in the order of the QC-112 checklist. (Adobe Pro used here)



# PPAP Level 1 Elements and Requirements

# PPAP Part Submission - Level One Requirements

Default PPAP Submission Level 2 - Unless Otherwise Specified by Oshkosh Corporation (Segment Specific Requirements may vary)				
S = Supplier Must Send Items to Oshkosh Corporation for Approval				
* = Applicable material info required (material certification, Certificate of Compliance, or catalog page) with PSW				
N/R= Documents are not required for development or submission (unless otherwise noted by program ie MGDV)				
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2.) Dimensional Results (Sub-Components Required - Refer to OSK-P2000 Production Part Approval Process (Sec 5.6); Weld dimensionals/documentation (such as WPS/PQR/Welder certs) to be noted on DIMENSIONAL - WELD tab	N/R	S	S	S
3.) Design Records (Bubble Print)	N/R	S	S	S
4.) PPAP Samples - first production order / upon request prior to production order	N/R	S	S	S
5.) Print Notes: (Attach copy of Raw Material Certification / Performance Test Report / Surface Finish, Paint Process)	*	S	S	*
6.) Supplier Change Request (OSK-F1000 / RCM) - if applicable	S	S	S	S
7.) Design Failure Modes effects Analysis (DFMEA) - if supplier is design responsible	N/R	N/R	S	N/R
8.) Process Flow Diagram (PFD)	N/R	N/R	S	N/R
9.) Process Failure Modes Effects Analysis (PFMEA)	N/R	N/R	S	N/R
10.) Initial Process Capability - for major / critical characteristics - if applicable	N/R	N/R	S	N/R
11.) Measurement System Analysis (MSA) - for major / critical characteristics - if applicable	N/R	N/R	S	N/R
12.) Process Control Plan	N/R	N/R	S	N/R
13.) Appearance Approval Report (AAR) - if applicable	N/R	N/R	S	N/R
14.) Checking Aids (Fixture, gage, template, etc) - if applicable	N/R	N/R	S	N/R
15.) Records of Compliance with Customer Specific Requirements - if applicable	N/R	N/R	S	N/R
16.) Photo Documentation (Master Sample of PPAP parts & Section J-Labeling)	S	S	S	N/R
17.) Tooling Photo Documentation - if applicable	N/R	S	S	N/R
18.) QC-112 PPAP Check List	N/R	N/R	S	N/R
Additional Submission Instructions below:				



# Part Submission Warrant (PSW)

- PSW summarizes the PPAP and informs the customer why, what and by whom the PPAP is submitted
- This form shows the reason for submission (design change, annual revalidation, etc.) and the level of documents submitted to the customer.
- Declaration of part compliance
- RCMs to be listed here
- If there are any deviations the supplier should note on the warrant or inform that PPAP cannot be submitted.
- Materials Reporting Per Suppliers Standards Guide Section D element 18F referencing Hazardous Materials

OSHKOSH		Part Submission Warrant	
Part Name	<u>PART NAME</u>	Oshkosh Part Number	<u>PART NUMBER</u>
Show n on Draw ing Number		Supplier Part Number	
Engineering Revision Level	<u>ERL DATE</u>	Dated	<u>ERL DATE</u>
Safety and/or Government Regulation	<input type="checkbox"/> Yes <input type="checkbox"/> No	Purchase Order No.	
<b>ORGANIZATION MANUFACTURING INFORMATION</b>		<b>CUSTOMER SUBMITTAL INFORMATION</b>	
SUPPLIER NAME <u>101112</u>		Customer Name/Division	
Organization Name & Supplier/Vendor Code		Buyer	
ADDRESS		555555555	
Street Address		DUNS	
CITY	STATE	ZIP	U. S. A.
City	Region	Postal Code	Country
<b>MATERIALS REPORTING</b>			
Compliant to requirements stated in the Suppliers Standards Guide (Section D 18 F) referencing Hazardous Materials.			
<input type="checkbox"/> Yes <input type="checkbox"/> No			
<b>REASON FOR SUBMISSION (Check at least one)</b>			
<input type="checkbox"/> Initial submission		<input type="checkbox"/> Change to Optional Construction or Material	
<input type="checkbox"/> Engineering Change(s)		<input type="checkbox"/> Sub-Supplier or Material Source Change	
<input type="checkbox"/> Tooling, Transfer, Replacement, Refurbishment, or additional		<input type="checkbox"/> Change in Part Processing	
<input type="checkbox"/> Correction of Discrepancy		<input type="checkbox"/> Parts produced at Additional Location	
<input type="checkbox"/> Production Break to Oshkosh Corporation > 1 year		<input type="checkbox"/> Other - please specify _____	
<b>REQUESTED SUBMISSION LEVEL (Check one)</b>			
<input type="checkbox"/> Level 1 - Warrant only submitted to customer - *Appropriate material info required (material certification, Certificate of Compliance, or catalog page)			
<input type="checkbox"/> Level 2 - Warrant with product samples, SIR, and Material Performance/Surface Finish/Part Test Results			
<b>(Check items that have been submitted within this PPAP submission)</b>			
<input type="checkbox"/> 1. Part Submission Warrant (PSW)		<input type="checkbox"/> 4. PPAP Samples	
<input type="checkbox"/> 2a. Dimensional results (SIR)		<input type="checkbox"/> 5. Print Notes (check all that apply)	
<input type="checkbox"/> 2b. Dimensional results (Weld)		<input type="checkbox"/> 6. Engineering Change Records / Deviations	
<input type="checkbox"/> 3. Design Record / Drawing		<input type="checkbox"/> 3a. Print Notes: Material Tests	
		<input type="checkbox"/> 3b. Print Notes: Surface Finish Tests	
		<input type="checkbox"/> 3c. Print Notes: Functional Tests	
		<input type="checkbox"/> 3d. Print Notes: Part Identification	
		<input type="checkbox"/> 3e. Print Notes: Paint, Plating, Coating Tests	
<input type="checkbox"/> Level 3 - All Level 2 Requirements plus: QC-112 (Defense only), DFMEA, PFMEA, Control Plan, Initial Process Capability, MSA, checking aids, customer specific requirements (SFAI), master sample photo, testing photo			
<b>(Check items that have been submitted within this PPAP Submission - See PPAP Requirements Tab)</b>			
1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/>			
<input type="checkbox"/> Level 4			
<b>(Check items that have been submitted within this PPAP Submission)</b>			
<input type="checkbox"/> 1. Part Submission Warrant (PSW)			
<input type="checkbox"/> 2. Dimensional results (SIR)			
<input type="checkbox"/> 3. Design Record / Drawing			
<input type="checkbox"/> 4. PPAP Samples			
5. Confirmation of conformance to all Print Notes: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a			
Is each Customer Tool properly tagged and numbered? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a			
<b>Declaration:</b>			
I have noted on this part submission warrant any deviation from the associated design record and/or any areas of non-compliance to the Oshkosh Corporation requirements. <input type="checkbox"/> Yes, Explain _____			
Organization Authorized Signature _____ Date _____			
Print Name _____		Phone No. <u>555-555-5555</u>	Fax No. _____
Title _____		E-mail _____	
<b>FOR CUSTOMER USE ONLY</b>			
(Level 4 PPAPs do not require signed PSW)			
PPAP Warrant Disposition: <input type="checkbox"/> Approved <input type="checkbox"/> Rejected <input type="checkbox"/> Other _____		Customer Tracking Number (optional) _____	
Customer Signature _____		Date _____	
Print Name _____		Customer Tracking Number (optional) _____	
DISTRIBUTION STATEMENT C: (Applies to all FM TV Technical Data)			
Distribution authorized to US government agencies and their contractors; Resales: Administrative or Operational Use; State or Determination/Part Submission Warrant (Supplier Completion Date). Other requests for this document shall be referred to: The Project Manager, M edware, Tactical Vehicles, A&E, Engineering Director, M al Stop #500, 6501 East 11th In Road, Wauwatosa, WI 4307-0000 DSN 796-6622 or Comment at (906)282-6922			

# Supplier Standards Guide (SSG) Section D.18.F – Hazardous Materials

- F. Obligations to Comply with Environmental and Hazardous Materials Regulations and Prohibitions on Use of Certain Hazardous Materials
- i. *Environmental Regulations.* Supplier shall manage the efforts described by this Purchase Order to ensure that all aspects of the contract execution, to include, but not be limited to, the following Supplier activities: design, manufacturing, testing, and storage activities, are in compliance with all applicable national, federal, state, provincial, municipal and local environmental laws, regulations and requirements. Supplier shall notify Buyer within 72 hours if any governmental authority gives any direction that could result in permit or other violations.
  - ii. *Hazardous Materials.* Supplier agrees that any order involving delivery of any hazardous material (including any material defined as a hazardous material under 49 CFR 171.8, any hazardous chemical as defined in 29 CFR 1910.1200(c), and any hazardous material and/or toxic substance as defined in any other applicable law) shall be packaged and shipped in accordance with the Federal Hazardous Materials Transportation Law, 49 U.S.C. § 5101, et seq., Hazardous Materials Regulations, Title 49 CFR Parts 100-185, Occupational Safety and Health Administration Regulations, Title 29 CFR Part 1910, and Material Safety Data, Transportation Data, And Disposal Data, For Hazardous Materials Furnished To Government Activities (FED-STD-313). The warning label required on hazardous material by 29 CFR 1910.1200 shall not be obscured by other stamps or labels. Supplier shall provide a Material Safety Data Sheet ("MSDS") to Buyer for each hazardous material as a condition of this Purchase Order. Supplier must submit the most current MSDS available (1) prior to the initial shipment, (2) with the first shipment of each year thereafter, and (3) upon any changes affecting the characteristics or composition of the hazardous material previously reported. An MSDS from the manufacturer may be used to satisfy one or more of the requirements of this Section; provided, however, in no event shall any MSDS bear an issue date earlier than 24 months before the date of submission.
  - iii. *Prohibition on Use of Certain Hazardous Materials.* Supplier shall not use asbestos, cadmium (used in electroplating processes), lead, mercury, hexavalent chromium (used in electroplating and coating processes), trichloroethylene (TCE), polychlorinated biphenyls, radioactive materials, or other highly toxic or carcinogenic materials without receiving prior written approval from Buyer. The use of pretreatment or painting/coating products containing any lead or hexavalent chromium is strictly prohibited.

# Hazardous Materials Reference Defense Addendum

As referenced in Section D.18F of the Oshkosh Supplier Standards Guide, the use of any pretreatment, plating, painting, or coating of any kind that contains **Hexavalent Chrome** is strictly prohibited. Any supplier to Oshkosh Corporation shall have systems in place to monitor and control the coating processes used by upstream suppliers when plating requirements are not strictly defined within the Oshkosh design record. Hexavalent Chrome can appear in several forms and can be known by many several nomenclatures. Regardless of the specific nomenclature referenced on the coating certification, usage is strictly prohibited.

Different ways of representing Hexavalent chromium are given below:

- Hexavalent chromium
- Hexavalent chrome
- Hex chrome

Different plating specifications that may contain Hex Chrome (the specifications below may be prohibited. Due diligence is required to verify conformance).

- ASTM B633 (Standard for Electro deposited coatings of Zinc on Iron and Steel)
- ASTM B633 (Coating thickness) Type II
- ASTM B633 (Coating thickness) Type III
- Zn/Fe SC (Coating thickness in micrometers) Type II
- Zn/Fe SC (Coating thickness in micrometers) Type III
- Zinc Yellow
- Zinc Clear
- Chromate
- Chromate conversion coating
- Zinc chromate
- Zinc Dichromate

In addition, Dacromet is not specifically a chromate coating, but a type of Zinc-Rich paint which contains Hex chrome.

# PPAP Elements Checklist QC – 112 for PSW

2.2.18	PSW	Y	N	N/A	Comments
2.2.18	Is the current copy of the PPAP workbook utilized (Note: See Oshkosh Supplier Network or Reliance for latest revision- located: <a href="https://osn.oshkoshcorp.com">https://osn.oshkoshcorp.com</a> )?				
2.2.18	Are all sections completed properly and the PSW signed and dated?				
2.2.18	Does the revision level for the drawing submitted match the Purchase Order?				
2.2.18	Is the PO # field completed?				
2.2.18	Is the Manufacturer & Customer name accurate & complete?				
2.2.18	Is the buyer's name included?				
2.2.18	Is the Materials Report Section in compliance with Suppliers Standards Guide (Section D.32)?				
2.2.18	Are the reason(s) for PPAP submittal accurate AND checked?				
2.2.18	Is the correct Submission level checked AND applicable elements checked?				

# PPAP Level 2 Elements and Requirements

# PPAP Part Submission Level Two Requirements

Default PPAP Submission Level 2 - Unless Otherwise Specified by Oshkosh Corporation (Segment Specific Requirements may vary)				
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N/R= Documents are not required for development or submission (unless otherwise noted by program ie NGDV)				
PPAP Submission Requirements and Detail Description	Submission Level			
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2.) Dimensional Results (Sub-Components Required - Refer to OSK-P2000 Production Part Approval Process (Sec 5.6); Weld dimensionals/documentation (such as WPS/PQR/Welder certs) to be noted on DIMENSIONAL - WELD tab	N/R	S	S	S
3.) Design Records (Bubble Print)	N/R	S	S	S
4.) PPAP Samples - first production order / upon request prior to production order	N/R	S	S	S
5.) Print Notes: (Attach copy of Raw Material Certification / Performance Test Report / Surface Finish, Paint Process)	*	S	S	*
6.) Supplier Change Request (OSK-F1000 / RCM) - if applicable	S	S	S	S
7.) Design Failure Modes effects Analysis (DFMEA) - if supplier is design responsible	N/R	N/R	S	N/R
8.) Process Flow Diagram (PFD)	N/R	N/R	S	N/R
9.) Process Failure Modes Effects Analysis (PFMEA)	N/R	N/R	S	N/R
10.) Initial Process Capability - for major / critical characteristics - if applicable	N/R	N/R	S	N/R
11.) Measurement System Analysis (MSA) - for major / critical characteristics - if applicable	N/R	N/R	S	N/R
12.) Process Control Plan	N/R	N/R	S	N/R
13.) Appearance Approval Report (AAR) - if applicable	N/R	N/R	S	N/R
14.) Checking Aids (Fixture, gage, template, etc) - if applicable	N/R	N/R	S	N/R
15.) Records of Compliance with Customer Specific Requirements - if applicable	N/R	N/R	S	N/R
16.) Photo Documentation (Master Sample of PPAP parts & Section J-Labeling)	S	S	S	N/R
17.) Tooling Photo Documentation - if applicable	N/R	S	S	N/R
18.) QC-112 PPAP Check List	N/R	N/R	S	N/R
Additional Submission Instructions below:				


## PPAP Level Two

- Part Submission Warrant (PSW)
- Dimensional Results & Design Record (Bubbled Print)
- Dimensional Results – Weld
  - Weld Procedure Specification (WPS)
  - Procedure Qualification Record (PQR)
  - Welder Certifications
- Production Samples (First production order/upon request prior to production order)
- Photo Documentation (Master Sample, Section J Labeling)
- Print Notes (attached copy where applicable)
  - ❑ Raw material certifications
  - ❑ Performance test reports & Qualified Lab Docs
  - ❑ Surface finish (Surface Preparation, Painting and Finishing, Plating)

# Dimensional Results

- Dimensional and Design Record consists of the Bubbled Print and Dimensional Results tab (can be weld dims too)
  - Oshkosh drawing **must** be used or RCM approval needed
- 100% dimensional inspection is required for a minimum of one (1) production representative part for each PPAP Level two submittal
- One (1) piece dimensional results are required for any subcomponent outlined on the drawing, in addition to overall assembly.

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 a full dimensional layout from each

 <b>DIMENSIONAL RESULTS</b>												
ORGANIZATION:		SUPPLIER NAME					PART NUMBER:		PART NUMBER			
SUPPLIER NUMBER:		101112					PART NAME:		PART NAME			
NAME OF INSPECTION FACILITY:						ENGINEERING REVISION LEVEL						ERL
DATE:												
Supplier required to provide marked up drawing to identify items inspected												
ITEM	DIMENSION / SPECIFICATION	TOLERANCE		SPECIFICATION / LIMITS		GAGE TYPE*	QTY TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)			OK	
		-	+	MIN	MAX			Piece 1	Piece 2	Piece 3		
ex	4	1	1	3	5			8.00	3.00	2.00		
1				0	0							
2				0	0							
3				0	0							
4				0	0							
5				0	0							
6				0	0							
7				0	0							
ITEM	DIMENSION / SPECIFICATION	TOLERANCE		SPECIFICATION / LIMITS		GAGE TYPE*	QTY TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)			OK	NO OK
		-	+	MIN	MAX			Piece 1	Piece 2	Piece 3		
ex	4	1	1	3	5			8.00	3.00	2.00		
1	450	0	50	450	500	TAPE MEASURE	3	476	475	475	X	
2	4.0, 1/2" TERMINAL (EMC 40501-1)			#VALUE!	#VALUE!	STUD GAUGE	3	CORRECT	CORRECT	CORRECT	X	
3	4.0, 3/8" TERMINAL (EMC 40381-1)			#VALUE!	#VALUE!	STUD GAUGE	3	CORRECT	CORRECT	CORRECT	X	
4	PART LABEL			#VALUE!	#VALUE!	VISUAL	3	CORRECT	CORRECT	CORRECT	X	
5	4/0 BLACK WELDING CABLE			#VALUE!	#VALUE!	VISUAL	3	CORRECT	CORRECT	CORRECT	X	
6	BLACK HEATSHRINK (EPS 300)			#VALUE!	#VALUE!	VISUAL	3	CORRECT	CORRECT	CORRECT	X	
7	BLACK HEATSHRINK (EPS 300)			#VALUE!	#VALUE!	VISUAL	3	CORRECT	CORRECT	CORRECT	X	
8	13.34	REF	REF	#VALUE!	#VALUE!	CALIPER	3	13.40	13.38	13.38	X	
9	10.29	REF	REF	#VALUE!	#VALUE!	CALIPER	3	10.37	10.37	10.34	X	


## Dimensional Results – Best Practice

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.*

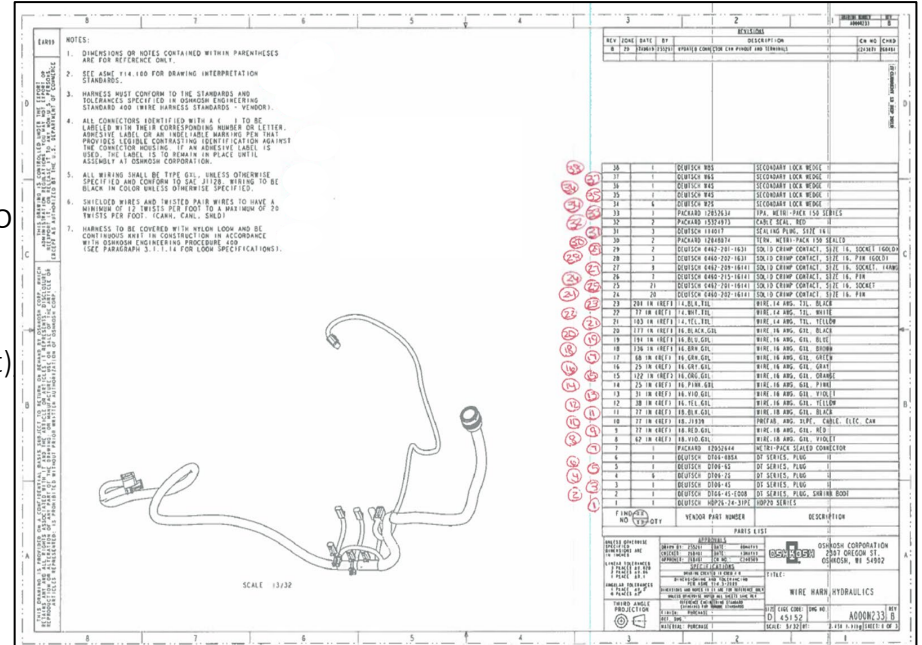
## Dimensional Results – Best Practice (GD&T)

- 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	<i>Basic</i>	<i>Basic</i>	<i>Basic</i>	<i>Basic</i>	<i>CMM</i>	1	60.256			X	
89	22.23	<i>Basic</i>	<i>Basic</i>	<i>Basic</i>	<i>Basic</i>	<i>CMM</i>	1	22.220			X	
90	9.53	0.500	0.500	9.030	10.030	<i>CMM</i>	1	9.526			X	
91		GD&T	GD&T	0	0.500	<i>CMM</i>	1	0.130			X	
	"Bonus Tol"	GD&T	GD&T	GD&T	GD&T	<i>CMM</i>	1	0.496			X	

# Design Record

- Legible – Part Drawing, Notes & ALL Text
- Complete – All sub-component prints included
- Released – Only approved drawings should used for PPAAP submittals
  - If deviation needed (ie Oshkosh hasn't released drawing yet) an approved RCM required with PPAAP submittal
- Bubbled – All Dimensions, Notes & Material
  - if noted separately from Notes section



*Work with Buyer/SQE to confirm referenced drawings are current*

# QC – 112 – Dimensional Results / Print Notes

2.2.9	Dimensional Results / Print Notes	Y	N	N/A
2.2.9	Are the dimensional results, dated-signed and relatively current?			
2.2.9	Are 3 parts measured as required for Level 3 PPAP?			
2.2.9	Is 1 part measured for sub-tier level drawing?			
2.2.9	Are the TOLERANCES properly recorded?			
2.2.9	Are the MIN / MAX spec limits on the ISIR correct according to the TOLERANCE limits on the print?			
2.2.9	Are the dimensional results within specification?			
2.2.9	If dimensional results for each of the 3 pieces are <i>identical</i> , is there justification for the exact values recorded (it otherwise appears to be pencil-whipped)?			
2.2.9	Are Standard or Metric units properly recorded according to the print ?			
2.2.9	Are proper GAGE TYPES used for the specified tolerance (adequate discrimination)?			
2.2.9	Are proper GAGE TYPES used for the application (calipers / tape measures have limited use)?			
2.2.9	Are multiple dimensions ALL listed and ALL verified (example 2x's, 6x's, etc.)?			
2.2.9	Are MSA / GRR / Capability Studies provided for Critical Characteristics?			
2.2.9	For multi-cavity tooling, at least 1 piece per cavity must have a complete layout			



# Welding Standards - WPS & PQR

- The supplier shall develop and deliver Welding Procedure Specifications (WPS), Qualification Records (PQRs) and Weld Repair Procedures
- Welder Qualification Records (WQRs) shall be available on request
- The use of pre-qualified weld joints as specified in American Welding Society (AWS) D1.1 does not preclude submittal of welding procedures

Page 1 of 2  
www.aws.org/education/mechanics  
500 - 401 York Avenue  
Wilmington, MA 01893-0995  
P.O. Box 1445-3373  
Fax: (204) 948-2269

Qualification Records (PQR)  
ASME Boiler and Pressure Vessel Code  
Conditions Used to Weld Test Coupon.

Date: \_\_\_\_\_

of Test Coupon  
(Thickness shall be recorded for each filler metal or process used.)

**Postweld Heat Treatment (QW-407)**  
Temperature \_\_\_\_\_  
Time \_\_\_\_\_  
Other \_\_\_\_\_

**Gas (QW-408)**  
Percent Composition  
Gas(es) (Mixture) Flow Rate  
Shielding \_\_\_\_\_  
Trailing \_\_\_\_\_  
Backing \_\_\_\_\_

**Electrical Characteristics (QW-409)**  
Current \_\_\_\_\_  
Polarity \_\_\_\_\_ Volts \_\_\_\_\_  
Amperes \_\_\_\_\_  
Tungsten Electrode Size \_\_\_\_\_  
Other \_\_\_\_\_

**Technique (QW-410)**  
Weld Speed \_\_\_\_\_  
String or Weave Bead \_\_\_\_\_  
Qualification \_\_\_\_\_  
Wipes or Single Pass (per side) \_\_\_\_\_  
Single or Multiple Electrodes \_\_\_\_\_  
Other \_\_\_\_\_

**Welding Procedure Specification WPS 00875**

Manufacturer: Welds R US Parent Material: P90SPL  
Weld Type: Single - V Butt Type Material Thickness (mm): 15 mm  
Welding Position: Flat

**Weld Preparation Details (Sketch)**

Joint Design \_\_\_\_\_ Welding Sequences \_\_\_\_\_

**Parent Materials**

Welding joint	Material 1	Material 2
Type	Steel	Steel
Designation	S960 QL	S960 QL
Thickness [mm]	10	10

**Filler Material**

Type	Wire	Welding Position
Designation	X96	Direction of welding
Diameter [mm]	1.2	Comments

**Shielding Gas**

Name	Mixture	Bead type
Mixture	82%Ar+18%CO <sub>2</sub>	Weave width
Flow rate [l/min]	15	Number of passes
Preheat Temperature	80°C	Number of beads

**Welding Parameters**

Run	Welding Process	Filler Material Type	Filler Material Size [mm]	Welding Current Intensity [A]	Polarity	Arc Voltage [V]	Travel Speed [cm/min]	Welding Energy [kJ/cm]	Time t <sub>tot</sub> [s]
1	135	X96	1.2	+	120	17	12	10	10
2	135	X96	1.2	+	230	27	35	11	11
3	135	X96	1.2	+	230	27	35	11	11
4	135	X96	1.2	+	230	27	35	11	11
5	135	X96	1.2	+	230	27	35	11	11
6	135	X96	1.2	+	230	27	35	11	11
7	135	X96	1.2	+	230	27	35	11	11

# Welding Procedure - Armor

Prior to manufacturing, the Supplier shall develop welding procedures for all ballistic weldments in accordance with applicable welding code for Armor Steels and Aluminum

For Defense, the welding code is dictated by the code in place during contract award

Any deviation from the stated requirement is to be submitted and approved using RCM process




# QC-112 - Weld

Weld	Y	N	N/A	Comments
Are all weld lengths, sizes, types & locations cited on the ballooned drawing?				
Are the WPS AND PQR's #'s referenced on the PPAP worksheet?				
Are the WPS AND PQR's #'s INCLUDED in the PPAP submittal?				
Are the WPS and PQR authorized by a CWI (or equivalent authority)?				
Are 3 weld features measured as required for Level 3 PPAP?				
If WPS not required per AWS (for example), are appropriate weld documentation and verification methods included?				

# Production Samples

- Sample Production Parts (AIAG PPAP 2.2.14)
- The supplier shall ensure that the “PPAP Sample Parts” label is filled out and attached appropriately to the outside of each package

 <b>OSHKOSH™</b>	<b>PPAP SAMPLE PARTS - LABEL</b>
<p>Send identified sample(s), such as, Piece#1, Piece#2, Piece#3, etc to Oshkosh Corporation with appropriate label.</p> <p>Please complete and attach this page on the outside of each package in plain view of a fork lift/material handler/operator. Put the Packing slip pocket near the label.</p> <p>In the event parts are “Loose” shipped, a label should be placed on each part. This would also apply to parts laying 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.</p>	
<p style="text-align: center;"><b>PPAP SAMPLE PARTS</b> <b>INSPECTION VERIFICATION REQUIRED</b></p> <p>Purchased Order#: _____</p> <p>Part Number: _____</p> <p>Revision Level: _____</p> <p>Supplier Name: _____</p> <p>Supplier Number: _____</p> <p>Supplier Inspected By: _____</p>	

# Photo Documentation

- A master sample is not required to be retained by the supplier unless specifically requested by Oshkosh, however the supplier is required to photo document a Master Sample for all PPAP submittals
- Photo documentation should illustrate what the parts will look like in the final state in which they are provided to Oshkosh.
- Photo documentation should include part labeling (to include any date codes, vendor codes, cage codes, etc. if applicable), and no paint zones if applicable.
- Sent along with production order after all pictures are taken for PPAP submission







OSHKOSH		PPAP MASTER SAMPLE "PICTURE" DOCUMENTATION	
ORGANIZATION:	SUPPLIER NAME	PART NUMBER	PART NUMBER
SUPPLIER NUMBER:	NOTE	PART NAME:	PART NAME
	DESIGN RECORD CHANGE LEVEL:		EFFECT DATE
Supplier is required to visually document the Master Samples (PPAP Parts):			
1.) Document how the parts are labeled. To include any date codes, vendor codes, etc. (if applicable)			
2.) Document the parts as a whole what they look like in the final state in which they are provided to Oshkosh Corporation.			
PICTURES OF MASTER SAMPLE LABELING			
PICTURES OF MASTER SAMPLE PART			
			
PRINT NAME	SIGNATURE	TITLE	DATE

# QC – 112 Master Sample (photo)

2.2.15	Master Sample (photo)	Y	N	N/A	Comments
2.2.15	Do they capture paint / no paint zones?				
2.2.15	Do they capture the part marking ID and it is correct per print requirements?				
2.2.15	Do they capture significant view angles of the part?				
2.2.15	<b>(UID-Specific requirements)</b> Is the sample label photo taken directly perpendicular to the label, at approximately 1 foot away, with no glare on the label?				

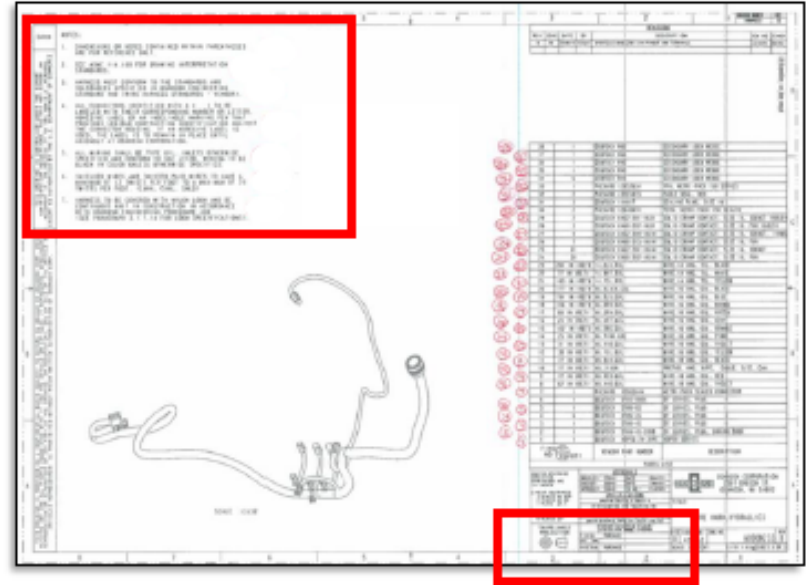
# Packaging & Shipping

- The Supplier shall provide for adequate facilities and instructions for handling, packaging and shipping to protect the products and prevent damage during storage and transit
- The Supplier shall conform to the requirements of the Oshkosh Supplier Standards Guide Section J, which is available at
- <http://osn.oshkoshcorp.com>

 <b>SECTION J LABELING VALIDATION</b>			
ORGANIZATION:	SUPPLIER NAME	PART NUMBER:	PART NUMBER
SUPPLIER NUMBER:	101112	PART NAME:	PART NAME
TOOL / FIXTURE NUMBER:		DESIGN RECORD CHANGE LEVEL:	URL
DATE:			
Supplier is required to provide sample of SSG Section J compliant label(s) and document with Photo in PPAP workbook			
PICTURE OF SECTION J COMPLIANT LABELING			
Part Number (P)  123456		Country Origin: USA Revision: A Container Code: C0001	
Quantity (Q)  12	Purchase Order(K)  246810		
Kanban ID (I)  AA10000	Location (L)  711		
<b>Please Save This Space On The Labels For a Future Oshkosh Initiative</b>			
Supplier Name City/State/Zip		OSK Location Name City/State/Zip	

# Print Notes

- Describes material, performance & finish requirements
- Write out entire print note in the PPAP workbook verbatim
  - Don't write "Print Note #1"
- Material callout is sometimes found in the title block and should be noted on Print Notes page



# Print Notes – Raw Material Certifications

- It is the supplier's responsibility to confirm material conformance to applicable standards
- The supplier shall perform all chemical, physical, metallurgical or mechanical property tests as specified by the Design Record or Mechanical Property Tests as specified by the Design Record or Control Plan
- When the supplier maintains “design record authority” for the part or it's subcomponents and material details are not documented on the design record, Oshkosh requires all material tests results be maintained by the supplier and made available upon request
- Raw material composition are presented in a Certificate of Analysis (COA)

**OSHKOSH CORPORATION**  
 10000 WISCONSIN DRIVE, MILWAUKEE, WI 53226  
 PHONE: 414.224.2000 FAX: 414.224.2001  
 WWW.OSHKOSH.COM

**CERTIFICATE OF ANALYSIS**  
 ITEM NUMBER: 10000000000000000000  
 ITEM NAME: 10000000000000000000  
 ITEM QUANTITY: 10000000000000000000  
 ITEM WEIGHT: 10000000000000000000  
 ITEM LENGTH: 10000000000000000000  
 ITEM WIDTH: 10000000000000000000  
 ITEM THICKNESS: 10000000000000000000  
 ITEM AREA: 10000000000000000000  
 ITEM VOLUME: 10000000000000000000  
 ITEM DENSITY: 10000000000000000000  
 ITEM SPECIFICATION: 10000000000000000000  
 ITEM STANDARD: 10000000000000000000  
 ITEM TEST METHOD: 10000000000000000000  
 ITEM TEST RESULT: 10000000000000000000  
 ITEM TEST DATE: 10000000000000000000  
 ITEM TEST LOCATION: 10000000000000000000  
 ITEM TEST OPERATOR: 10000000000000000000  
 ITEM TEST INSTRUMENT: 10000000000000000000  
 ITEM TEST EQUIPMENT: 10000000000000000000  
 ITEM TEST FACILITY: 10000000000000000000  
 ITEM TEST REPORT NUMBER: 10000000000000000000  
 ITEM TEST REPORT DATE: 10000000000000000000  
 ITEM TEST REPORT LOCATION: 10000000000000000000  
 ITEM TEST REPORT OPERATOR: 10000000000000000000  
 ITEM TEST REPORT INSTRUMENT: 10000000000000000000  
 ITEM TEST REPORT EQUIPMENT: 10000000000000000000  
 ITEM TEST REPORT FACILITY: 10000000000000000000

TEST METHOD	TEST RESULT	TEST DATE	TEST LOCATION	TEST OPERATOR	TEST INSTRUMENT	TEST EQUIPMENT	TEST FACILITY
10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000

**MECHANICAL TEST**


TEST METHOD	TEST RESULT	TEST DATE	TEST LOCATION	TEST OPERATOR	TEST INSTRUMENT	TEST EQUIPMENT	TEST FACILITY
10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000

**CHEMICAL ANALYSIS**

TEST METHOD	TEST RESULT	TEST DATE	TEST LOCATION	TEST OPERATOR	TEST INSTRUMENT	TEST EQUIPMENT	TEST FACILITY
10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000	10000000000000000000

# Print Notes - Performance Test

- The Supplier shall perform tests for all part(s) or material(s) when performance of functional requirements are specified by the Design Record or Control Plan.
- Performance testing is the process to verify functionality of the product when exposed to application conditions
- Qualified Lab Documentation must accompany each performance test result when ISO17025 lab isn't used
- Welding Procedure Specifications (WPS) and Procedure Qualification Records (PQRs) shall be included within the PPAP submittal when applicable and shall be Stamped, dated as "approved" by a Certified Welding Inspector (CWI).
- Performance Tests Results Shall indicate the following

 <b>PRINT NOTES</b> (ATTACH COPY OF PERFORMANCE TESTS)											
ORGANIZATION:		SUPPLIER NAME				PART NUMBER:		PART NUMBER			
SUPPLIER NUMBER:		101112				PART NAME:		PART NAME			
NAME OF INSPECTION FACILITY:						ENGINEERING REVISION LEVEL					
DATE:						ERL DATE					
Supplier required to provide marked up drawing to identify all "PRINT NOTES" verified											
ITEM	SPECIFICATION	SPECIFICATION / LIMITS		GAGE TYPE	QTY. TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)			OK	NOT OK	
		MIN	MAX			Piece 1	Piece 2	Piece 3			

- Design Record change level of parts tested
- Authorized engineering changes
- Number, date and change level of specifications to which part was tested
- Date testing took place
- Quantity tested
- Specific parameters and actual results

It is the supplier's responsibility to plan for ongoing material and performance testing which should be identified as separate line items on the control plan

# QC – 112 Material/Performance Testing

2.2.10	Material / Performance Testing	Y	N	N/A	Comments
2.2.10	Are material certifications included for all requirements specified on the print?				
2.2.10	Are material certification(s) provided (where no specification is given) to establish a base-line of product acceptability?				
2.2.10	Are material certification(s) dated relatively recent (within 12 months)?				
2.2.10	Are material certification(s) signed and dated?				
2.2.10	Are foreign Certification(s) translated into English?				
2.2.10	Are material certification(s) provided for sub components?				
2.2.10	Are material certification(s) included for hardware called-out on the print?				
2.2.10	Do certification(s) included explicitly reference standards cited (example: SAE/MIL/ASTM)?				
2.2.10	Do material certification(s) show adherence to specified temperature requirements?				
2.2.10	Are test results included for product material(s) when performance or functional requirements are specified by the design record AND/OR the supplier's Control Plan?				

# Qualified Lab Documentation

## Accredited ISO 17025 Laboratory

- The name of the laboratory performing the test
- The laboratory's accreditation standard (accreditation number and/or name of the 3<sup>rd</sup> Party organization that provided accreditation)
- List of standards used for testing
- The date on which the testing took place

## Non – Accredited Laboratory

- The name of the laboratory performing the test
- Documentation (work instructions) for each type of tests conducted
- Training records / certifications of personnel who performed the testing
- List of all test equipment used to perform testing
- Calibration records of all test equipment used

# Example of Testing done by a Qualified Lab with Qualified Lab Documents

**ANDERSON LABORATORIES, INC.**  
 6330 INDUSTRIAL LOOP  
 GREENDALE, WI 53129-2434  
 (414) 421-7600 FAX 414-421-6540

## ANALYSIS REPORT

VO89 Date: 11/17/20 (Rev. 11/18/20)  
 PO# 94898

The data reported is certified to meet ASTM A213-17, Table 1  
 Spec: 41461434

Sample Identification: **75 X 1.50 X 2.25 LG ASTM A213 4140/42 HRV VALVE**  
 Laboratory File # **KO-295051A**

Silicon: <b>.19</b>	Vanadium: _____	Aluminum: _____	Silver: _____
Sulfur: <b>.002</b>	Tungsten: _____	Zinc: _____	Mercury: _____
Phosphorus: <b>.009</b>	Columbium: _____	Magnesium: _____	
Manganese: <b>.82</b>	Cobalt: _____	Titanium: _____	
Carbon: <b>.42</b>	Selenium: _____	Arsenic: _____	
Chromium: <b>.87</b>	Antimony: _____	Bismuth: _____	
Nickel: <b>.05</b>	Tin: _____	Cadmium: _____	
Molybdenum: <b>.19</b>	Lead: _____	Zirconium: _____	
Copper: <b>&lt;.01</b>	Iron: <b>Base</b>	Niobium: _____	

Analysis in weight percent unless noted.

Original Dimension, In.: **.1246** Bend Diameter: \_\_\_\_\_  
 Original Area, Sq. In.: **.01219** Bend Test Angle: \_\_\_\_\_  
 Yield T<sub>0.2</sub>: **92.837** Character of Fracture: \_\_\_\_\_  
 Yield Method: **2.5 x .05Ees** Approved: \_\_\_\_\_ Rejected: \_\_\_\_\_

Tensile, PSI: **119,819** Charpy, Ft. Lb.: \_\_\_\_\_  
 Elongation, %: **25.89** Charpy Specimen Size: \_\_\_\_\_  
 Gauge Length, In.: **.5** Latent Exp. Mts.: \_\_\_\_\_  
 Red. in Area, %: **58.78** Shear Fracture, %: \_\_\_\_\_  
 Character of Fracture: \_\_\_\_\_ Test Temperature: \_\_\_\_\_  
 Hardness, Actual Reading: **247 HRN 30/3000/15** Character of Fracture: \_\_\_\_\_  
 Converted Value: \_\_\_\_\_

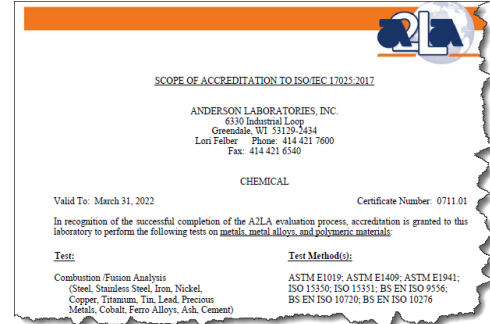
Results reported apply only to the sample submitted. Sample ID is not a confirmation of material identification. The recording of false, fictitious or fraudulent statements or omissions on this document may be punishable as a felony under Federal Statutes. Supplement to 80-29505 - Add'd Chemical Analysis with Material Conformance Statement.

The above tests were performed with the application of one or more of the following specifications: ASTM A44, A213, A370, A356, B8, B20, B21, B22, B24, B26, B27, B28, B29, B30A, B30B, B30C, B30D, B30E, B30F, B30G, B30H, B30I, B30J, B30K, B30L, B30M, B30N, B30O, B30P, B30Q, B30R, B30S, B30T, B30U, B30V, B30W, B30X, B30Y, B30Z, B30AA, B30AB, B30AC, B30AD, B30AE, B30AF, B30AG, B30AH, B30AI, B30AJ, B30AK, B30AL, B30AM, B30AN, B30AO, B30AP, B30AQ, B30AR, B30AS, B30AT, B30AU, B30AV, B30AW, B30AX, B30AY, B30AZ, B30BA, B30BB, B30BC, B30BD, B30BE, B30BF, B30BG, B30BH, B30BI, B30BJ, B30BK, B30BL, B30BM, B30BN, B30BO, B30BP, B30BQ, B30BR, B30BS, B30BT, B30BU, B30BV, B30BW, B30BX, B30BY, B30BZ, B30CA, B30CB, B30CC, B30CD, B30CE, B30CF, B30CG, B30CH, B30CI, B30CJ, B30CK, B30CL, B30CM, B30CN, B30CO, B30CP, B30CQ, B30CR, B30CS, B30CT, B30CU, B30CV, B30CW, B30CX, B30CY, B30CZ, B30DA, B30DB, B30DC, B30DD, B30DE, B30DF, B30DG, B30DH, B30DI, B30DJ, B30DK, B30DL, B30DM, B30DN, B30DO, B30DP, B30DQ, B30DR, B30DS, B30DT, B30DU, B30DV, B30DW, B30DX, B30DY, B30DZ, B30EA, B30EB, B30EC, B30ED, B30EE, B30EF, B30EG, B30EH, B30EI, B30EJ, B30EK, B30EL, B30EM, B30EN, B30EO, B30EP, B30EQ, B30ER, B30ES, B30ET, B30EU, B30EV, B30EW, B30EX, B30EY, B30EZ, B30FA, B30FB, B30FC, B30FD, B30FE, B30FF, B30FG, B30FH, B30FI, B30FJ, B30FK, B30FL, B30FM, B30FN, B30FO, B30FP, B30FQ, B30FR, B30FS, B30FT, B30FU, B30FV, B30FW, B30FX, B30FY, B30FZ, B30GA, B30GB, B30GC, B30GD, B30GE, B30GF, B30GG, B30GH, B30GI, B30GJ, B30GK, B30GL, B30GM, B30GN, B30GO, B30GP, B30GQ, B30GR, B30GS, B30GT, B30GU, B30GV, B30GW, B30GX, B30GY, B30GZ, B30HA, B30HB, B30HC, B30HD, B30HE, B30HF, B30HG, B30HH, B30HI, B30HJ, B30HK, B30HL, B30HM, B30HN, B30HO, B30HP, B30HQ, B30HR, B30HS, B30HT, B30HU, B30HV, B30HW, B30HX, B30HY, B30HZ, B30IA, B30IB, B30IC, B30ID, B30IE, B30IF, B30IG, B30IH, B30II, B30IJ, B30IK, B30IL, B30IM, B30IN, B30IO, B30IP, B30IQ, B30IR, B30IS, B30IT, B30IU, B30IV, B30IW, B30IX, B30IY, B30IZ, B30JA, B30JB, B30JC, B30JD, B30JE, B30JF, B30JG, B30JH, B30JI, B30JJ, B30JK, B30JL, B30JM, B30JN, B30JO, B30JP, B30JQ, B30JR, B30JS, B30JT, B30JU, B30JV, B30JW, B30JX, B30JY, B30JZ, B30KA, B30KB, B30KC, B30KD, B30KE, B30KF, B30KG, B30KH, B30KI, B30KJ, B30KK, B30KL, B30KM, B30KN, B30KO, B30KP, B30KQ, B30KR, B30KS, B30KT, B30KU, B30KV, B30KW, B30KX, B30KY, B30KZ, B30LA, B30LB, B30LC, B30LD, B30LE, B30LF, B30LG, B30LH, B30LI, B30LJ, B30LK, B30LL, B30LM, B30LN, B30LO, B30LP, B30LQ, B30LR, B30LS, B30LT, B30LU, B30LV, B30LW, B30LX, B30LY, B30LZ, B30MA, B30MB, B30MC, B30MD, B30ME, B30MF, B30MG, B30MH, B30MI, B30MJ, B30MK, B30ML, B30MM, B30MN, B30MO, B30MP, B30MQ, B30MR, B30MS, B30MT, B30MU, B30MV, B30MW, B30MX, B30MY, B30MZ, B30NA, B30NB, B30NC, B30ND, B30NE, B30NF, B30NG, B30NH, B30NI, B30NJ, B30NK, B30NL, B30NM, B30NN, B30NO, B30NP, B30NQ, B30NR, B30NS, B30NT, B30NU, B30NV, B30NW, B30NX, B30NY, B30NZ, B30OA, B30OB, B30OC, B30OD, B30OE, B30OF, B30OG, B30OH, B30OI, B30OJ, B30OK, B30OL, B30OM, B30ON, B30OO, B30OP, B30OQ, B30OR, B30OS, B30OT, B30OU, B30OV, B30OW, B30OX, B30OY, B30OZ, B30PA, B30PB, B30PC, B30PD, B30PE, B30PF, B30PG, B30PH, B30PI, B30PJ, B30PK, B30PL, B30PM, B30PN, B30PO, B30PP, B30PQ, B30PR, B30PS, B30PT, B30PU, B30PV, B30PW, B30PX, B30PY, B30PZ, B30QA, B30QB, B30QC, B30QD, B30QE, B30QF, B30QG, B30QH, B30QI, B30QJ, B30QK, B30QL, B30QM, B30QN, B30QO, B30QP, B30QQ, B30QR, B30QS, B30QT, B30QU, B30QV, B30QW, B30QX, B30QY, B30QZ, B30RA, B30RB, B30RC, B30RD, B30RE, B30RF, B30RG, B30RH, B30RI, B30RJ, B30RK, B30RL, B30RM, B30RN, B30RO, B30RP, B30RQ, B30RR, B30RS, B30RT, B30RU, B30RV, B30RW, B30RX, B30RY, B30RZ, B30SA, B30SB, B30SC, B30SD, B30SE, B30SF, B30SG, B30SH, B30SI, B30SJ, B30SK, B30SL, B30SM, B30SN, B30SO, B30SP, B30SQ, B30SR, B30SS, B30ST, B30SU, B30SV, B30SW, B30SX, B30SY, B30SZ, B30TA, B30TB, B30TC, B30TD, B30TE, B30TF, B30TG, B30TH, B30TI, B30TJ, B30TK, B30TL, B30TM, B30TN, B30TO, B30TP, B30TQ, B30TR, B30TS, B30TT, B30TU, B30TV, B30TW, B30TX, B30TY, B30TZ, B30UA, B30UB, B30UC, B30UD, B30UE, B30UF, B30UG, B30UH, B30UI, B30UJ, B30UK, B30UL, B30UM, B30UN, B30UO, B30UP, B30UQ, B30UR, B30US, B30UT, B30UU, B30UV, B30UW, B30UX, B30UY, B30UZ, B30VA, B30VB, B30VC, B30VD, B30VE, B30VF, B30VG, B30VH, B30VI, B30VJ, B30VK, B30VL, B30VM, B30VN, B30VO, B30VP, B30VQ, B30VR, B30VS, B30VT, B30VU, B30VV, B30VW, B30VX, B30VY, B30VZ, B30WA, B30WB, B30WC, B30WD, B30WE, B30WF, B30WG, B30WH, B30WI, B30WJ, B30WK, B30WL, B30WM, B30WN, B30WO, B30WP, B30WQ, B30WR, B30WS, B30WT, B30WU, B30WV, B30WW, B30WX, B30WY, B30WZ, B30XA, B30XB, B30XC, B30XD, B30XE, B30XF, B30XG, B30XH, B30XI, B30XJ, B30XK, B30XL, B30XM, B30XN, B30XO, B30XP, B30XQ, B30XR, B30XS, B30XT, B30XU, B30XV, B30XW, B30XX, B30XY, B30XZ, B30YA, B30YB, B30YC, B30YD, B30YE, B30YF, B30YG, B30YH, B30YI, B30YJ, B30YK, B30YL, B30YM, B30YN, B30YO, B30YP, B30YQ, B30YR, B30YS, B30YT, B30YU, B30YV, B30YW, B30YX, B30YY, B30YZ, B30ZA, B30ZB, B30ZC, B30ZD, B30ZE, B30ZF, B30ZG, B30ZH, B30ZI, B30ZJ, B30ZK, B30ZL, B30ZM, B30ZN, B30ZO, B30ZP, B30ZQ, B30ZR, B30ZS, B30ZT, B30ZU, B30ZV, B30ZW, B30ZX, B30ZY, B30ZZ

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*Lois W. Feilber*  
 LOIS W. FEILBER, QUALITY ASSURANCE MANAGER

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# QC – 112 Qualified Lab Docs

2.2.12	Qualified Lab Docs	Y	N	N/A	Comments
2.2.12	Do test reports indicate testing was done internally by the supplier?				
2.2.12	Does the test report indicate testing was done externally by a 3rd party?				
2.2.12	Do the Material or Performance Tests results meet the requirements outlined in section 13 of the GSQM Defense Addendum?				

# Print Notes – Surface Preparation, Painting and Finishing

- Supplier must comply with the Oshkosh finish requirement specified on the drawing or PO
- When the finish requirement is “silent”, supplier shall reference the FM100 Finish Methods or OSK PS-100 Paint Standard
- Tier 1 suppliers are responsible to ensure that finish requirements are upheld by the sub tier finish suppliers. (JLTV and FMTV A2 mandate qualification and sustaining quality requirements)
- It is highly recommended that tier 1 suppliers mitigate risks by requiring sub tier suppliers to document process flows, FMEA and Process Control Plans in accordance with OSK’s PPAP format
- As referenced in Section D.10.F of the Oshkosh Supplier Standards Guide, the use of any pretreatment, plating, painting or coating of any kind that contains Hexavalent Chrome is strictly prohibited

OSHKOSH <sup>®</sup> APPEARANCE APPROVAL REPORT (COMMERCIAL PAINT RESULTS)									
PART NUMBER		PART NUMBER		DRAWING NUMBER		APPLICATION (VEHICLES)		MODEL / VEHICLE	
PART NAME		PART NAME		BUYER CODE		E/C LEVEL		DATE	
ORGANIZATION NAME				MANUFACTURING LOCATION		SUPPLIER / VENDOR CODE		SUPPLIER / VENDOR CODE ###	
REASON FOR SUBMISSION				<input type="checkbox"/> PART SUBMISSION WARRANT <input type="checkbox"/> PRE TEXTURE		<input type="checkbox"/> SPECIAL SAMPLE <input type="checkbox"/> FIRST PRODUCTION SHIPMENT		<input type="checkbox"/> RE-SUBMISSION <input type="checkbox"/> ENGINEERING CHANGE <input type="checkbox"/> OTHER	
APPEARANCE EVALUATION									
Coating Spec. (if Applicable)	Attribute	Frequency	SPECIFICATIONS						
Color Match			Refer to Applicable QACs and or Specification on print/PO (Contact Buyer)						
TopCoat Gloss									
Crosshatch Adhesion									
Solvent Resistance									
Pencil Hardness									
Film Thickness (Powder)									
Film Thickness (Liquid)									
Production Adhesion Test									
Orange Peel									
Salt Spray Creepage									
Edge Coverage									
COLOR EVALUATION									
Color	Lot	Part #	SPECIFICATIONS						
			JLG Specifications Refer to: Color Code 4150613						
			Jerr/Den Specifications Refer to: Color Code Chart 4150613						
			Pierce Specifications Refer to: TBD						
			McNelis Specifications Refer to: TBD						
COMMENTS									
Document Painting Method / Industry Standard used to prepare these components.									
Method # / Finishing Requirement on Drawing:									
Cleaning Standard Utilized:									
Painting Standard Utilized:									
Characteristic	SPECIFICATION / LIMITS		GAGE TYPE	SUPPLIER TEST RESULTS (DATA)			OK	NOT OK	Notes
	MIN	MAX		Piece 1	Piece 2	Piece 3			
<b>Prime Coat:</b>									
Blast Profile									
Oven Cure Time (if used)									
Time (if used)									
Salt Spray									

Any JLG painted/powdered parts need to have completely filled out AAR tab for PPAP approval.

# Print Notes – Defense Paint tab

This is the document where the supplier shows what print standard, Industry standard, & process steps were used to coat the part

- The following tests & results are completed for both prime & topcoat:
  - Solvent permeability, cross hatch adhesion, dry film thickness test, along with salt spray results, ambient & oven cure times
- The supplier should note they aren't using any hazardous material not allowed per the Supplier's Standard Guide (Yes or No should be circled & signed)
- Confirm name, signature, title and date are all included

OSHKOSH											
DEFENSE PRINT NOTES - PAINT (PAINT & COATING TEST RESULTS)											
ORGANIZATION	SUPPLIER NAME			PART NUMBER							
SUPPLIER NUMBER	SUPPLIER # NUMBER			PART NAME/PART NAME							
NAME OF INSPECTION FACILITY:				ENGINEERING REVISION LEVEL				E/R/L			
DATE											
Supplier required to provide revised up drawing to identify all "PRINT NOTES" marked											
Document Painting Method / Industry Standard used to prepare these components											
Marked # / Finishing Requirements on Drawing:											
Cleaning Standard Utilized											
Recoat Standard Utilized											
Characteristic	Standard	SPECIFICATION/ LIMITS		GAGE TYPE	QTY. TESTED	SUPPLIER TEST RESULTS (DATA)			OK	NOT OK	
		MIN	MAX			Pass 1	Pass 2	Pass 3			
Prime Coat:											
Blast Profile											
Thickness*											
Thickness (including blast profile)*											
Permeability											
Adhesion											
Oven Cure Time (if used)											
Ambient Cure Time (if used)											
Salt Spray											
Top Coat:											
Thickness (over primer)*											
Total Thickness (reference)*											
Permeability											
Adhesion											
Ambient Cure Time (if used)											
Oven Cure Time (if used)											
* If a test will exist, mark based on coating thickness tolerance of the resin or class, in the contractor performance table per MIL-STD-1312 Rev. 4.2.2.0.											
Defense Segment: Compliant to the requirements stated in the Suppliers Standards Guide (Section 2.3.2) referencing Hazardous Materials.										(Circle) Yes / No	Signed by:
Blanket statements of conformance are unacceptable for any test results.											
PRINT NAME		SIGNATURE			TITLE			DATE			

# QC – 112, Appearance Approval

2.2.13	Appearance Approval	Y	N	N/A	Comments
2.2.13	Was an Appearance Approval Report submitted?		■		

# Print Notes – Plating

This is the document where the supplier shows what print standard, Industry standard, & process steps were used to plate the part

- The following tests & results are completed:
  - Plating thickness, composition of coating and salt spray testing
- The supplier should note they aren't using any hazardous material not allowed per the Supplier's Standard Guide (Yes or No should be circled & signed)
- Confirm name, signature, title and date are all included
- Confirm Plating Certificate of Compliance is also included

OSHKOSH									
DEFENSE PRINT NOTES - PLATING (PLATING TEST RESULTS)									
ORGANIZATION	SUPPLIER NAME				PART NAME/PART NUMBER				
SUPPLIER NUMBER	101112				PART NAME/PART NAME				
DATE	DATE				INSURANCE REVISION LEVEL				
Plating Method: Specify method used to identify all "PRINT" "NOTED" method Document Plating Method / Industry Standard used to prepare these components Method # / Plating Requirement on Drawing Plating Type Required Cleaning Requirements (If Applicable) Plating Supplier (If Any)									
Character	Standard	SPECIFICATION LIMITS		GAGE	QTY	SUPPLIER TEST RESULTS (DATA)			OK
		MIN	MAX	T-PE	TESTED	PIECE 1	PIECE 2	PIECE 3	OK
Plating Test Results (Attach all test records)									
Plating Thickness									
Composition of Coating									
Salt Spray									
<small>*Results will not be measured on coating of holes in excess of the maximum depth for a surface performance failure per MIL-CRT-3370, Sec 4.2.2.3.</small>									
Defect Segment: Compliant to the requirements stated in the Supplier's Standard Guide (Section 0.10) referencing Hazardous Materials. (Circle) Yes / No Signed by:									
<input type="checkbox"/> All test statements of conformance are unacceptable for any test results.									
PRINT NAME	SIGNATURE			TITLE	DATE				
ATTACH CERTIFICATE OF COMPLIANCE HERE									
<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;"><b>Supplier Name</b></p> <p style="font-size: small;">September 17, 2010 All Defense Print Notes (DPNs) Compliance</p> <p style="font-size: x-small;">This certifies in accordance with Oshkosh Corporation's policies that we are compliant with our obligations and other processes and procedures necessary for our supply with Oshkosh Corporation. We warrant that our products, materials, processes, and procedures are compliant with the requirements of the Defense Print Notes (DPNs) and that we are in compliance with the requirements of the DPNs.</p> <p style="font-size: x-small;">Responsible for this activity is the individual with the following information:</p> <p style="text-align: center;"> <small>               Name: [Blank]                Position: [Blank]                Title: [Blank]                Address: [Blank]                City: [Blank]                State: [Blank]                Zip: [Blank]                Phone: [Blank]                Email: [Blank]             </small> </p> </div>									

# PPAP Level 3 Elements and Requirements

# PPAP Part Submission Level Three Requirements

Default PPAP Submission Level 2 - Unless Otherwise Specified by Oshkosh Corporation (Segment Specific Requirements may vary)				
S = Supplier Must Send Items to Oshkosh Corporation for Approval				
* = Applicable material info required (material certification, Certificate of Compliance, or catalog page) with PSW				
N/R= Documents are not required for development or submission (unless otherwise noted by program ie NGDV)				
PPAP Submission Requirements and Detail Description	Submission Level			
	1	2	3	4
1.) Part Submission Warrant (PSW)	S	S	S	S
2.) Dimensional Results (Sub-Components Required - Refer to OSK-P2000 Production Part Approval Process (Sec 5.6); Weld dimensionals/documentation (such as WPS/PQR/Welder certs) to be noted on DIMENSIONAL - WELD tab	N/R	S	S	S
3.) Design Records (Bubble Print)	N/R	S	S	S
4.) PPAP Samples - first production order / upon request prior to production order	N/R	S	S	S
5.) Print Notes: (Attach copy of Raw Material Certification / Performance Test Report / Surface Finish, Paint Process)	*	S	S	*
6.) Supplier Change Request (OSK-F1000 / RCM) - if applicable	S	S	S	S
7.) Design Failure Modes effects Analysis (DFMEA) - if supplier is design responsible	N/R	N/R	S	N/R
8.) Process Flow Diagram (PFD)	N/R	N/R	S	N/R
9.) Process Failure Modes Effects Analysis (PFMEA)	N/R	N/R	S	N/R
10.) Initial Process Capability - for major / critical characteristics - if applicable	N/R	N/R	S	N/R
11.) Measurement System Analysis (MSA) - for major / critical characteristics - if applicable	N/R	N/R	S	N/R
12.) Process Control Plan	N/R	N/R	S	N/R
13.) Appearance Approval Report (AAR) - if applicable	N/R	N/R	S	N/R
14.) Checking Aids (Fixture, gage, template, etc) - if applicable	N/R	N/R	S	N/R
15.) Records of Compliance with Customer Specific Requirements - if applicable	N/R	N/R	S	N/R
16.) Photo Documentation (Master Sample of PPAP parts & Section J-Labeling)	S	S	S	N/R
17.) Tooling Photo Documentation - if applicable	N/R	S	S	N/R
18.) QC-112 PPAP Check List	N/R	N/R	S	N/R
Additional Submission Instructions below:				

## PPAP Level Three

- All elements of PPAP Level 2
- Supplier Change Request (OSK-RCM) – if applicable
- Design Failure Modes Effects Analysis (DFMEA) – if supplier is design responsible
- Process Failure Modes Effects Analysis (PFMEA)
- Process Flow Diagram (PFD)
- Measurement System Analysis (MSA)
- Initial process Capability
- Process Control Plan
- Checking Aids
- Records of Compliance with Customer Specific Requirements
- Photo Documentation
- Tooling Photo Documentation
- Commercial Off the Shelf (COTS+) – Defense specific

# Dimensional Results – PPAP Level 3

- Dimensional and Design Record consists of the Bubbled Print and Dimensional Results tab
- 100% dimensional inspection is required for a minimum of three (3) production representative parts for each PPAP Level 3 submittal
- One (1) piece dimensional results are required for any **subcomponent** outlined on the drawing being purchased for each Level 2 or Level 3 submittal

OSHKOSH												
DIMENSIONAL RESULTS												
ORGANIZATION:		SUPPLIER NAME					PART NUMBER:		PART NUMBER			
SUPPLIER NUMBER:		101112					PART NAME:		PART NAME			
NAME OF INSPECTION FACILITY:							ENGINEERING REVISION LEVEL					
DATE:							ERL					
Supplier required to provide marked up drawing to identify items inspected												
ITEM	DIMENSION / SPECIFICATION	TOLERANCE		SPECIFICATION / LIMITS		GAGE TYPE*	QTY TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)			OK	
		-	+	MIN	MAX			Piece 1	Piece 2	Piece 3		
ex	4	1	1	3	5			8.00	3.00	2.00		
1				0	0							
2				0	0							
3				0	0							
4				0	0							
5				0	0							
6				0	0							
7				0	0							
ITEM	DIMENSION / SPECIFICATION	TOLERANCE		SPECIFICATION / LIMITS		GAGE TYPE*	QTY TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)			OK	NO-OK
		-	+	MIN	MAX			Piece 1	Piece 2	Piece 3		
ex	4	1	1	3	5			8.00	3.00	2.00		
1	450	0	50	450	500	TAPE MEASURE	3	476	475	475	X	
2	4.0, 1/2" TERMINAL (EMC 40591-1)			#VALUE!	#VALUE!	STUD GAUGE	3	CORRECT	CORRECT	CORRECT	X	
3	4.0, 3/8" TERMINAL (EMC 40381-1)			#VALUE!	#VALUE!	STUD GAUGE	3	CORRECT	CORRECT	CORRECT	X	
4	PART LABEL			#VALUE!	#VALUE!	VISUAL	3	CORRECT	CORRECT	CORRECT	X	
5	4/0 BLACK WELDING CABLE			#VALUE!	#VALUE!	VISUAL	3	CORRECT	CORRECT	CORRECT	X	
6	BLACK HEATSHRINK (EPS 300)			#VALUE!	#VALUE!	VISUAL	3	CORRECT	CORRECT	CORRECT	X	
7	BLACK HEATSHRINK (EPS 300)			#VALUE!	#VALUE!	VISUAL	3	CORRECT	CORRECT	CORRECT	X	
8	13.34	REF	REF	#VALUE!	#VALUE!	CALIPER	3	13.40	13.38	13.38	X	
9	10.29	REF	REF	#VALUE!	#VALUE!	CALIPER	3	10.37	10.37	10.34	X	

# Supplier Change Request Form

- Suppliers are responsible to ensure that all products supplied to Oshkosh Corporation meet the requirements of the current released drawing, to the current revision on the purchase order, and as documented in the Oshkosh PPAP (if required).
- This change request shall occur via the **Change Management** module within the Oshkosh Reliance Software.
- RCM number should be noted in PSW declaration

Change Request # RCM-014368

Main Internal Oshkosh Notes Access Control All Tabs

### Change Summary

Change Number: RCM-014368 Segment: Defense Production

Temporary or Permanent submissions must be approved by Oshkosh before any changes are made to the product or process.

Reason for Submission

Temporary Process Change
  Temporary Product Change
  Permanent Process Change
  Permanent Product Change
  SCRIP (Supplier Cost Reduction Idea Program)
  Obsolete Part

Submission by:  Internal Submission  Supplier Submission Requested By: Allen, Thomas (tallen@precisionrailandmtg.com)

Drawing Change Required:  Yes  No Temporary Deviation Duration (Date): Mar 20, 2020 Temporary Change Quantity: 1

Requested Implementation Date: Mar 20, 2020

Program: Supplier Reason:

PO #: PO Due Date: Buyer: Kelly LLOYD

Description of the Proposed Change (Change To): This one casting has porosity below -0.

---

Supplier Manufacturing Address: 6960 S. 10th Street Oak Creek WI. 53154

Supplier Contact(s): Allen, Thomas (tallen@precisionrailandmtg.com)

Email Address: tallen@precisionrailandmtg.com Telephone Number: 414-764-1131

Submitter Technical (Engineering) Contact Information

Submitter Technical Contact: Tom Allen Submitter Technical Contact Phone #: 414-764-1131 Submitter Technical Contact Email: tallen@precisionrailandmtg.com

Supplier Contact

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Oshkosh Purchase Level Part #: 4462851 Engineering Revision Level: C Part Name: Oshkosh Lower Level Part # Lower Level Part Revision: Lower Level Part Name: Production Part:  Yes  No Aftermarket Part:  Yes  No

Supplier Part #: Prototype Part:  Yes  No Safety/Government Regulation:  Yes  No  N/A Design Responsibility:  Oshkosh  Supplier  Other

Attachment

## Authorized Engineering Change Documents (AIAG PPAP 2.2.2)

- 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 must be signed approved by Oshkosh Design Engineering and a copy of the approved OSK Supplier Change Request (RCM) should accompany the PPAP Submittal
  - Some Oshkosh business units allow RCM Number to be reported on PSW declaration instead of attaching to PPAP

# QC-112, Authorized Engineering Change Docs

2.2.2 & 2.2.3	<b>Authorized Engineering Change Docs (RCM (Reliance Change Management)/Customer Engineering approval</b>	<b>Y</b>	<b>N</b>	<b>N/A</b>	<b>Comments</b>
2.2.3	Is there an approved Deviation Request, submitted to RCM (Reliance Change Management) system, included for all Dimensions, Notes, and Print Discrepancies that do not meet requirements?				
2.2.2 & 2.2.3	Is the approved Change Request valid for the order produced?				



# FMEA Severity Ranking Assignment

- FMEA Severity rank values shall be in accordance with Severity Rating Scale Table
- If there is any disagreement between criteria for assignment of Severity Rank in the table while performing the FMEA analysis, the more severe (higher) rank shall always be utilized

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

# FMEA Occurrence Ranking Assignment

- FMEA Occurrence rank values shall be in accordance with Occurrence Rating Scale Table
- If there is any disagreement between criteria for assignment of Occurrence Rank in the table while performing the FMEA analysis, the more severe (higher) rank shall always be utilized

OCCURRENCE RATING SCALE				
LIKELIHOOD OF FAILURE	OCCURRENCE OF CAUSE FROM TESTING	OCCURRENCE OF CAUSE FOR DFMEA	OCCURRENCE OF CAUSE FOR PFMEA	RANK
<b>Very High</b>	Observed on over 50% of test assets.	New technology/new design with no history.	One occurrence per part/machine	<b>10</b>
<b>High</b>	Observed on >25-50% of test assets.	Failure is inevitable with new design, new application, or change in duty cycle/operating conditions.	One occurrence per shift *(1 in 5)	<b>9</b>
		Failure is likely with new design, new application, or change in duty cycle/operating conditions.	One occurrence per day *(1 in 5)	<b>8</b>
		Failure is uncertain with new design, new application, or change in duty cycle/operating conditions.	One occurrence per week *(1 in 25)	<b>7</b>
<b>Moderate</b>	Observed on >12.5-25% of test assets.	Frequent failures associated with similar designs or in design simulation and testing.	One occurrence every 2 weeks *(1 in 50)	<b>6</b>
		Occasional failures associated with similar designs or in design simulation and testing.	One occurrence per month *(1 in 100)	<b>5</b>
		Isolated Failures associated with similar design or in design simulation and testing.	One occurrence per 3 months *(1 in 300)	<b>4</b>
<b>Low</b>	Observed on up to 12.5% of test assets.	Only isolated failures associated with almost identical design or in design simulation and testing.	One occurrence per 6 months *(1 in 600)	<b>3</b>
<b>Very Low</b>	No occurrences observed during testing.	No observed failures associated with almost identical design or in design simulation and testing.	One occurrence per year *(1 in 1200)	<b>2</b>
		Failure is eliminated through preventive control.	Less than one occurrence per year *(1 in 1200)	<b>1</b>

*\*Occurrence frequency for PFMEA should be calculated based upon yearly production volumes (for example, if 1200 units are produced each year, one occurrence per month equals 1 in 100 units produced)*

# FMEA Detection Ranking Assignment

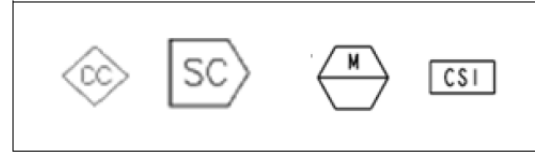
- FMEA Detection rank values shall be in accordance with Detection Rating Scale Table
- To determine the Risk Priority Number (RPN) values, the OSK standard table within the PPAP workbook shall be utilized

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)*

# FMEA Special Characteristics

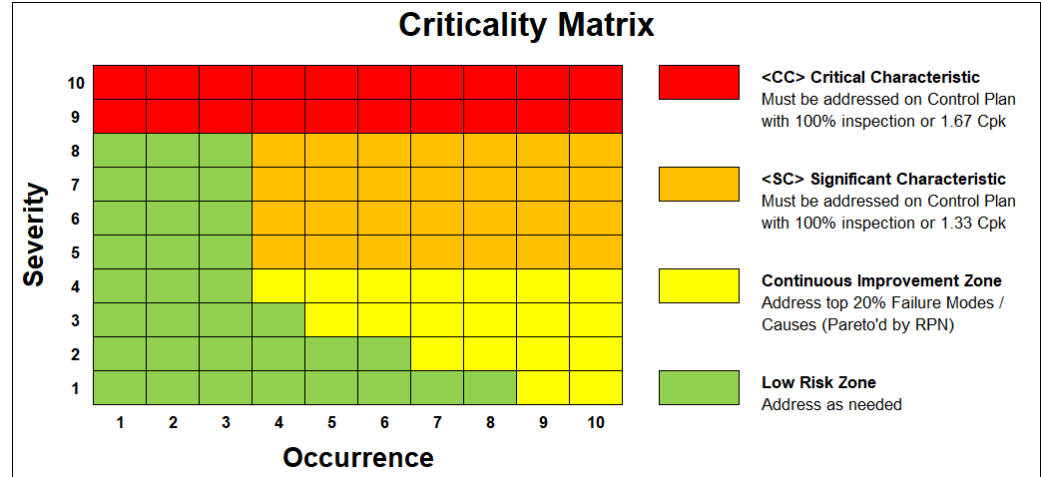
- Special Characteristics are defined as product characteristics or manufacturing process parameters which can affect safety or compliance with regulations, fit, function, performance or subsequent process of product.



- Two types of Special Characteristics
  - **Critical Characteristics (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 process of a product.
- Critical and Significant Characteristics shall be assigned based on the Severity, Occurrence and Detection
- If design is supplier owned, and supplier CC/SC is noted, it shall be reported in FMEA

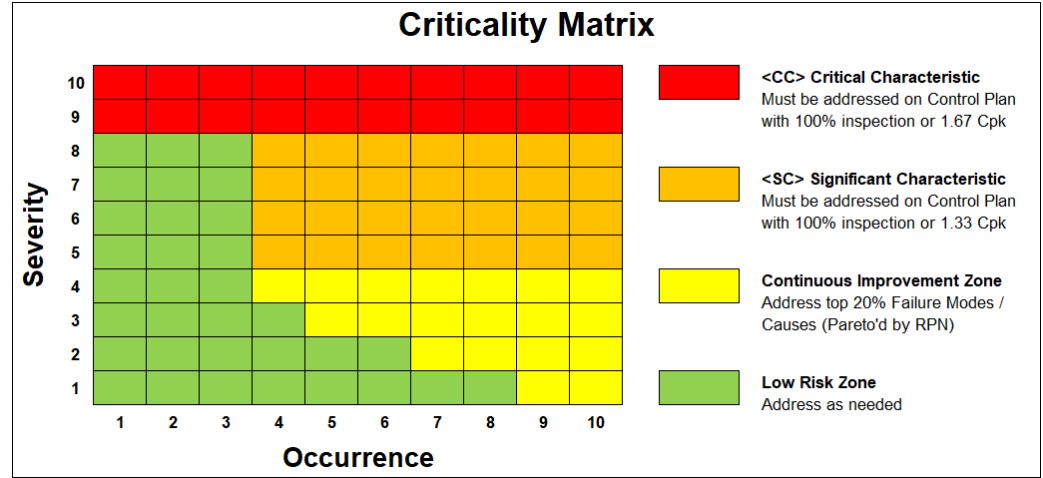
# Critical Characteristics

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



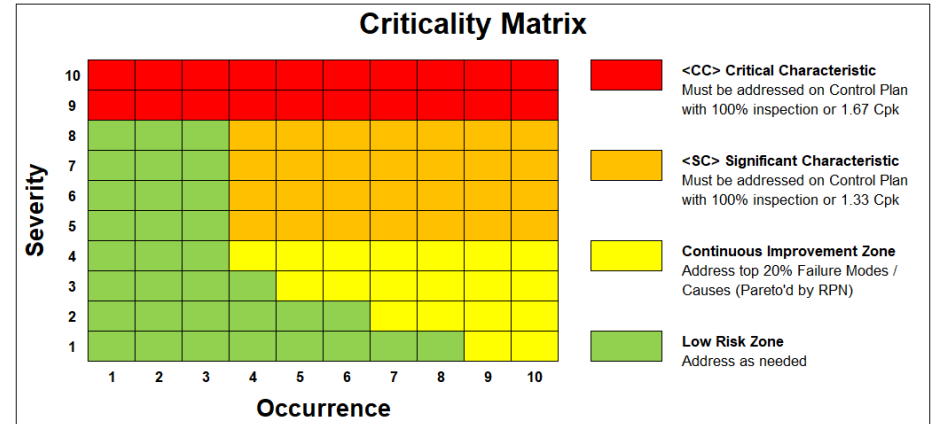
# Significant Characteristics

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



# 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 Criticality Matrix
- All Special Characteristics shall be documented on the control plan




# QC 112 - FMEA

2.2.4	DFMEA	Y	N	N/A	Comments
2.2.4	If the <b>supplier</b> is design responsible: Is the DFMEA is included within the PPAP_OR is there a record indicating it was reviewed & approved by OSK?				
2.2.4	Does the print indicate that the component is "Source Control" or "Vendor Item Control"? (no = NA)				
2.2.4	Is the DFMEA prepared using current AIAG guidelines?				
2.2.4	Are Significant Characteristics (Special/ Critical) identified and captured within the DFMEA (no= NA)?				
2.2.4	If <b>Oshkosh</b> is design responsible: Are there SC / CC's present on the print (no = NA)?				
2.2.4	If <b>Oshkosh</b> is design responsible <u>and</u> the part is manufactured by OSK: Are the sub-component level PPAP's present with submittal (no = NA)?				

2.2.6	PFMEA	Y	N	N/A	Comments
2.2.6	Has the PFMEA been constructed utilizing the OSK ranking worksheet for Severity and Occurrences?				
2.2.6	Are there SC / CC identified by the Supplier? "NO" = N/A (refer to Criticality Matrix in Global Supplier Quality Manual)				
2.2.6	In cases where SC/CC have been identified, does the supplier have SPC or 100% inspection for them noted in the "Control Method" column?				
2.2.6	Are Detection values correct for Visual Inspection per AIAG (Minimum 7 or 8)?				
2.2.6	Are Recommended Actions cited for the highest RPN?				
2.2.6	Does the PPAP documentation cite specific print note requirements (associated with product or process) in Flow / PFMEA/ Control Plan (For Example Mil-STD-130 Part Marking ID)?				

# Process Flow Diagram

- Process Flow Diagrams are required for all Level 3 Submittals

 <b>PROCESS/INSPECTION FLOWCHART</b> OSHKOSH™ (Format for example only; Supplier created templates may be used)			
Product Program		<u>MODEL / VEHICLE</u>	Issue Date _____ ECL <u>ERL DATE</u>
Supplier Name		<u>SUPPLIER NAME</u>	Part Name <u>PART NAME</u>
Supplier Location		<u>ADDRESS</u>	Part Number <u>PART NUMBER</u>
<b>Legend:</b>			
<input type="radio"/> Operation <input type="checkbox"/> Transportation <input type="checkbox"/> Inspection <input type="checkbox"/> Delay <input type="checkbox"/> Storage			
Step	Operation or Event <input type="radio"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Description of Operation or Event	Evaluation and Analysis Methods
	<input type="radio"/> Operation <input type="checkbox"/> Transportation <input type="checkbox"/> Inspection <input type="checkbox"/> Delay <input type="checkbox"/> Storage		

# QC – 112, Process Flow Diagram

2.2.5	Process Flow Diagram(s)	Y	N	N/A	Comments
2.2.5	Does the PPAP documentation cite specific print note requirements (associated with product or process) in Flow / PFMEA/ Control Plan (For Example Mil-STD-130 Part Marking ID)?				
2.2.5	Does the Flow Diagram reflect the entire process e.g. Receiving, outside processing?				
2.2.5	Are the process steps for the Process Flow, PFMEA and Control Plan aligned?				

# Measurement Systems Analysis (MSA)

- 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 Critical, Significant, Major or CSI (Critical Safety Item) identified on the Design Record or listed on the Control Plan
- Oshkosh requires suppliers to perform MSA in accordance with the AIAG MSA manual 4th edition



# Gage Repeatability and Reproducibility (GR&R)

- Gage R&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 performs them.
- Different tabs available in PPAP workbook based on type of data collected
  - Suppliers should reference AIAG for which format to use

GAGE REPEATABILITY AND REPRODUCIBILITY DATA SHEET VARIABLE DATA RESULTS (Format for example only. Supplier created templates may be used)											GAGE REPEATABILITY AND REPRODUCIBILITY DATA SHEET VARIABLE DATA RESULTS (Format for example only. Supplier created templates may be used)																																						
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APPRAISER/ TRIAL #	PART										AVERAGE	Measurement Unit Analysis						% Total Variation (TV)																															
1. A 1	1	2	3	4	5	6	7	8	9	10		Repeatability - Equipment Variation (EV)		Trials		K1		% EV = 100 (E/TV)																															
2. 2												EV = R x K <sub>1</sub>		2		0.8965		=																															
3. 3												=		3		0.5907		=																															
4. AVE											X <sub>̄</sub>	Reproducibility - Appraiser Variation (AV)						% AV = 100 (A/TV)																															
5. R											R	AV = {(X <sub>DIFF</sub> x K <sub>2</sub> ) <sup>2</sup> - (EV <sup>2</sup> /n)r} <sup>1/2</sup>						=																															
6. B 1												=						=																															
7. 2												=						=																															
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9. AVE											X <sub>̄</sub>	Repeatability & Reproducibility (GRR)						% GRR = 100 (GRR/TV)																															
10. R											R	GRR = {(E <sup>2</sup> + AV <sup>2</sup> ) <sup>1/2</sup>						=																															
11. C 1												Parts		K <sub>3</sub>		2		0.7087		=																													
12. 2												3		0.5236		3		0.4464		=																													
13. 3												4		0.4032		4		0.4032		% PV = 100 (P/TV)																													
14. AVE											X <sub>̄</sub>	Part Variation (PV)						=																															
15. R											R	PV = R <sub>p</sub> x K <sub>3</sub>						=																															
16. PART AVERAGE											X <sub>̄</sub>	Total Variation (TV)						=																															
											R <sub>2</sub>	TV = {(GRR <sup>2</sup> + PV <sup>2</sup> ) <sup>1/2</sup>						=																															
17. (R <sub>1</sub> + R <sub>2</sub> + R <sub>3</sub> ) / (# OF APPRAISERS) =											R <sub>̄</sub>	8						0.3378																															
18. X <sub>DIFF</sub> = (Max X - Min X) =											X <sub>DIFF</sub>	9						0.3247																															
19. * UCL <sub>R</sub> = R x D <sub>4</sub> =											UCL <sub>R</sub>	10						0.3145																															
*D <sub>4</sub> = 3.27 for 2 trials and 2.58 for 3 trials. UCL <sub>R</sub> represents the limit of individual R's. Circle those that are beyond this limit. Identify the cause and correct. Repeat these readings using the same appraiser and unit as originally used or discard values and re-average and recompute R and the limiting value from the remaining observations.											For information on the theory and constants used in the form see MSA Reference Manual, Third edition.																																						
Notes:																																																	

# GR&R Results

- The Gage R&R process uses statistical methods to determine the variation due to the measurement system
- Results are given as a few key values:
  - %GRR (TV)
  - %GRR (Tol)
  - Number of Distinct Categories (NDC)

GAGE REPEATABILITY AND REPRODUCIBILITY DATA SHEET VARIABLE DATA RESULTS												GAGE REPEATABILITY AND REPRODUCIBILITY DATA SHEET VARIABLE DATA RESULTS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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C</td> <td>1</td><td>8.00</td><td>8.02</td><td>8.03</td><td>8.04</td><td>8.05</td><td>8.06</td><td>8.07</td><td>8.09</td><td>8.10</td><td>8.11</td> <td>8.056</td> </tr> <tr> <td>12.</td> <td>2</td><td>8.00</td><td>8.02</td><td>8.03</td><td>8.04</td><td>8.05</td><td>8.06</td><td>8.07</td><td>8.08</td><td>8.10</td><td>8.10</td> <td>8.055</td> </tr> <tr> <td>13.</td> <td>3</td><td>8.01</td><td>8.02</td><td>8.03</td><td>8.04</td><td>8.05</td><td>8.06</td><td>8.07</td><td>8.08</td><td>8.09</td><td>8.11</td> <td>8.056</td> </tr> <tr> <td>14.</td> <td>AVE</td> <td>8.00</td><td>8.02</td><td>8.03</td><td>8.04</td><td>8.05</td><td>8.06</td><td>8.07</td><td>8.08</td><td>8.09</td><td>8.11</td> <td>X<sub>̄</sub> = 8.056</td> </tr> <tr> <td>15.</td> <td>R</td> <td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td> <td>r<sub>s</sub> = 0.003</td> </tr> <tr> <td>16. PART AVERAGE</td> <td></td> <td>8.01</td><td>8.02</td><td>8.03</td><td>8.04</td><td>8.05</td><td>8.07</td><td>8.08</td><td>8.09</td><td>8.10</td><td>8.11</td> <td>X<sub>̄</sub> = 8.060 R<sub>̄</sub> = 0.100</td> </tr> <tr> <td>17.</td> <td colspan="11">(r<sub>s</sub> + r<sub>p</sub> + r<sub>c</sub>) / (# OF APPRAISERS) =</td> <td>R = 0.003</td> </tr> <tr> <td>18.</td> <td colspan="11">X<sub>DIFF</sub> = (Max X - Min X) =</td> <td>X<sub>DIFF</sub> = 0.009</td> </tr> <tr> <td>19.</td> <td colspan="11">* UCL<sub>R</sub> = R x D<sub>4</sub> =</td> <td>UCL<sub>R</sub> = 0.007</td> </tr> </tbody> </table>												APPRaiser	PART										AVERAGE	TRIAL #	1	2	3	4	5	6	7	8	9	10		1. A	1	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	8.10	8.11	8.064	2.	2	8.01	8.02	8.03	8.05	8.06	8.07	8.08	8.09	8.10	8.12	8.064	3.	3	8.01	8.03	8.04	8.05	8.06	8.07	8.08	8.09	8.10	8.12	8.064	4.	AVE	8.01	8.03	8.04	8.05	8.06	8.07	8.08	8.09	8.10	8.11	X <sub>̄</sub> = 8.064	5.	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	r <sub>s</sub> = 0.002	6. B	1	8.01	8.02	8.03	8.04	8.05	8.07	8.07	8.09	8.10	8.11	8.059	7.	2	8.01	8.02	8.03	8.04	8.05	8.07	8.08	8.09	8.10	8.11	8.060	8.	3	8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.09	8.10	8.11	8.059	9.	AVE	8.01	8.02	8.03	8.04	8.05	8.07	8.08	8.09	8.10	8.11	X <sub>̄</sub> = 8.059	10.	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	r <sub>s</sub> = 0.002	11. C	1	8.00	8.02	8.03	8.04	8.05	8.06	8.07	8.09	8.10	8.11	8.056	12.	2	8.00	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.10	8.10	8.055	13.	3	8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	8.11	8.056	14.	AVE	8.00	8.02	8.03	8.04	8.05	8.06	8.07	8.08	8.09	8.11	X <sub>̄</sub> = 8.056	15.	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	r <sub>s</sub> = 0.003	16. PART AVERAGE		8.01	8.02	8.03	8.04	8.05	8.07	8.08	8.09	8.10	8.11	X <sub>̄</sub> = 8.060 R <sub>̄</sub> = 0.100	17.	(r <sub>s</sub> + r <sub>p</sub> + r <sub>c</sub> ) / (# OF APPRAISERS) =											R = 0.003	18.	X <sub>DIFF</sub> = (Max X - Min X) =											X <sub>DIFF</sub> = 0.009	19.	* UCL <sub>R</sub> = R x D <sub>4</sub> =											UCL <sub>R</sub> = 0.007	<table border="1"> <thead> <tr> <th colspan="4">Measurement Unit Analysis</th> <th colspan="4">% Total Variation (TV)</th> </tr> </thead> <tbody> <tr> <td colspan="8"><b>Repeatability - Equipment Variation (EV)</b></td> </tr> <tr> <td>EV</td> <td>=</td> <td>R x K<sub>1</sub></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>=</td> <td>0.003 x 0.5907</td> <td></td> <td></td> <td></td> <td></td> <td>% EV = 100 (EV/TV)</td> </tr> <tr> <td></td> <td>=</td> <td>0.002</td> <td></td> <td></td> <td></td> <td></td> <td>= 100(0.002/0.032)</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>= 4.77</td> </tr> <tr> <td colspan="8"><b>Reproducibility - Appraiser Variation (AV)</b></td> </tr> <tr> <td>AV</td> <td>=</td> <td colspan="5">((X<sub>DIFF</sub> + K<sub>2</sub>)<sup>2</sup> - (EV<sup>2</sup>/nr))<sup>1/2</sup></td> <td></td> <td>% AV = 100 (AV/TV)</td> </tr> <tr> <td></td> <td>=</td> <td colspan="5">((0.01 x 0.5236)<sup>2</sup> - (0.00<sup>2</sup>/(10 x 3)))<sup>1/2</sup></td> <td></td> <td>= 100(0.004/0.032)</td> </tr> <tr> <td></td> <td>=</td> <td colspan="5">0.004</td> <td></td> <td>= 14.19</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>n = parts</td> <td>r = trials</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>Appraisers</td> <td>2</td> <td>3</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>K<sub>2</sub></td> <td>0.7087</td> <td>0.5236</td> <td></td> <td></td> </tr> <tr> <td colspan="8"><b>Repeatability &amp; Reproducibility (GRR)</b></td> </tr> <tr> <td>GRR</td> <td>=</td> <td colspan="5">((EV<sup>2</sup> + AV<sup>2</sup>))<sup>1/2</sup></td> <td></td> <td>% GRR = 100 (GRR/TV)</td> </tr> <tr> <td></td> <td>=</td> <td colspan="5">((0.002<sup>2</sup> + 0.004<sup>2</sup>))<sup>1/2</sup></td> <td></td> <td>= 100(0.005/0.032)</td> </tr> <tr> <td></td> <td>=</td> <td colspan="5">0.005</td> <td></td> <td>= 14.97</td> </tr> <tr> <td colspan="8"><b>Part Variation (PV)</b></td> </tr> <tr> <td>PV</td> <td>=</td> <td colspan="5">R<sub>̄</sub> x K<sub>3</sub></td> <td></td> <td>% PV = 100 (PV/TV)</td> </tr> <tr> <td></td> <td>=</td> <td colspan="5">0.100 x 0.3145</td> <td></td> <td>= 100(0.031/0.032)</td> </tr> <tr> <td></td> <td>=</td> <td colspan="5">0.031</td> <td></td> <td>= 98.87</td> </tr> <tr> <td colspan="8"><b>Total Variation (TV)</b></td> </tr> <tr> <td>TV</td> <td>=</td> <td colspan="5">((GRR<sup>2</sup> + PV<sup>2</sup>))<sup>1/2</sup></td> <td></td> <td>ndc = 1.41(PV/GRR)</td> </tr> <tr> <td></td> <td>=</td> <td colspan="5">((0.005<sup>2</sup> + 0.031<sup>2</sup>))<sup>1/2</sup></td> <td></td> <td>= 1.41(0.031/0.005)</td> </tr> <tr> <td></td> <td>=</td> <td colspan="5">0.032</td> <td></td> <td>= 9</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td><i>Gage discrimination acceptable</i></td> </tr> </tbody> </table>												Measurement Unit Analysis				% Total Variation (TV)				<b>Repeatability - Equipment Variation (EV)</b>								EV	=	R x K <sub>1</sub>							=	0.003 x 0.5907					% EV = 100 (EV/TV)		=	0.002					= 100(0.002/0.032)								= 4.77	<b>Reproducibility - Appraiser Variation (AV)</b>								AV	=	((X <sub>DIFF</sub> + K <sub>2</sub> ) <sup>2</sup> - (EV <sup>2</sup> /nr)) <sup>1/2</sup>						% AV = 100 (AV/TV)		=	((0.01 x 0.5236) <sup>2</sup> - (0.00 <sup>2</sup> /(10 x 3))) <sup>1/2</sup>						= 100(0.004/0.032)		=	0.004						= 14.19										n = parts	r = trials									Appraisers	2	3						K <sub>2</sub>	0.7087	0.5236			<b>Repeatability &amp; Reproducibility (GRR)</b>								GRR	=	((EV <sup>2</sup> + AV <sup>2</sup> )) <sup>1/2</sup>						% GRR = 100 (GRR/TV)		=	((0.002 <sup>2</sup> + 0.004 <sup>2</sup> )) <sup>1/2</sup>						= 100(0.005/0.032)		=	0.005						= 14.97	<b>Part Variation (PV)</b>								PV	=	R <sub>̄</sub> x K <sub>3</sub>						% PV = 100 (PV/TV)		=	0.100 x 0.3145						= 100(0.031/0.032)		=	0.031						= 98.87	<b>Total Variation (TV)</b>								TV	=	((GRR <sup>2</sup> + PV <sup>2</sup> )) <sup>1/2</sup>						ndc = 1.41(PV/GRR)		=	((0.005 <sup>2</sup> + 0.031 <sup>2</sup> )) <sup>1/2</sup>						= 1.41(0.031/0.005)		=	0.032						= 9								<i>Gage discrimination acceptable</i>
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<p>* D<sub>4</sub> = 3.27 for 2 trials and 2.58 for 3 trials. UCL<sub>R</sub> represents the limit of individual R's. Circle those that are beyond this limit. Identify the cause and correct. Repeat these readings using the same appraiser and unit as originally used or discard values and re-average and recompute R and the limiting value from the remaining observations.</p> <p>Notes: _____</p>												<p>For information on the theory and constants used in the form see MSA Reference Manual, Third edition.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														

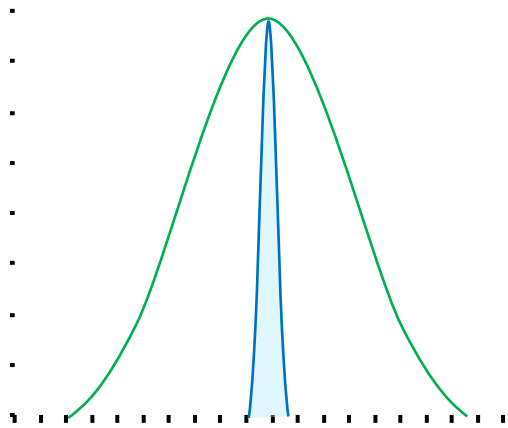
# Gage Repeatability and Reproducibility (GR&R)

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

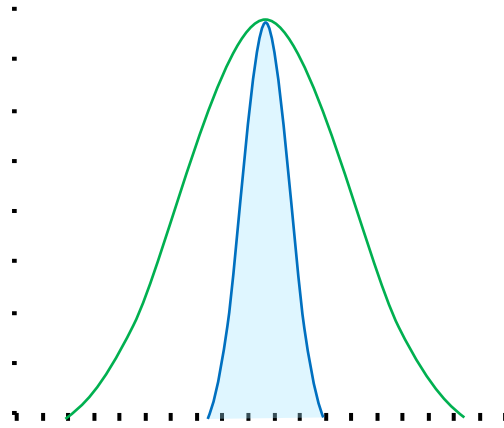
*Table VIII-A: GR&R Criteria*

# MSA Results

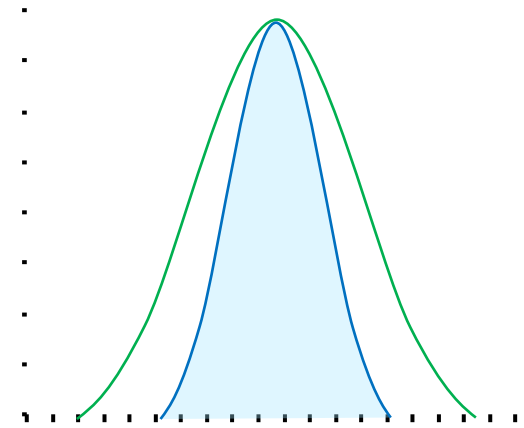
## Examples



*%GRR (TV) = 10%*  
*Acceptable*



*%GRR (TV) = 30%*  
*Marginal*



*%GRR (TV) = 60%*  
*Unacceptable*

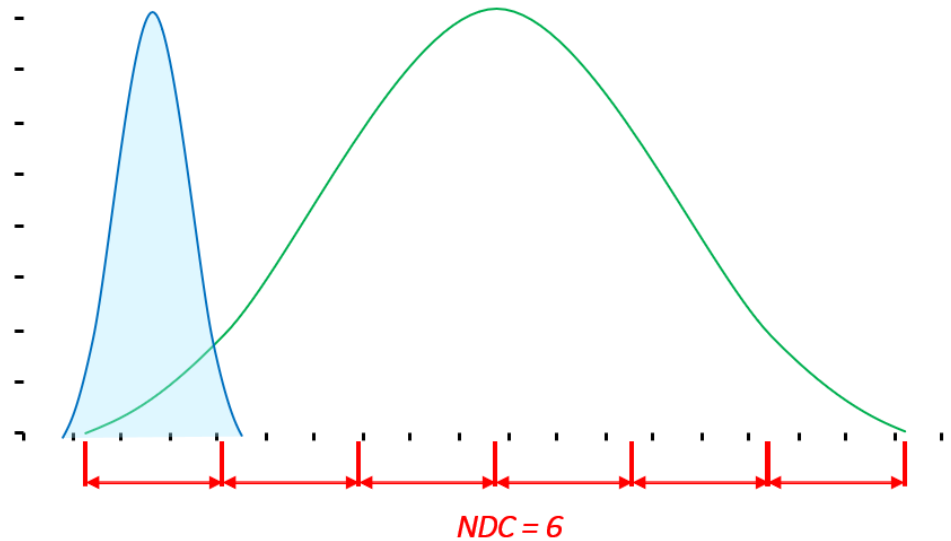
# MSA Results

## Number of Distinct Categories (NDC)

Very similar to Gage Resolution

Roughly tells you how many different values you will be able to detect

*You need a NDC of 5 or greater*

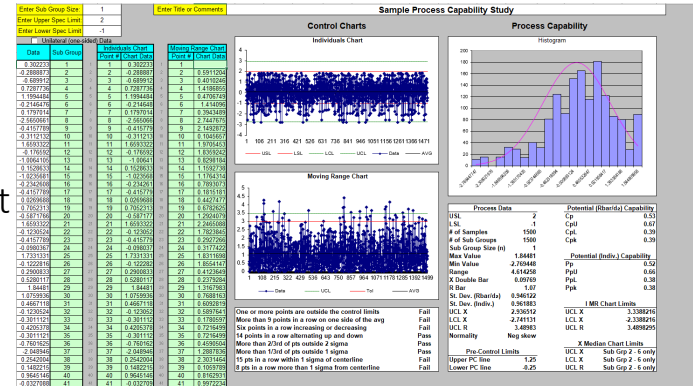


# QC – 112 MSA

2.2.8	MSA	Y	N	N/A	Comments
2.2.8	Are there SC/CC's identified (on print or supplier process) and MSA is included in PPAP?				
2.2.8	Has the MSA been constructed using the <i>Defense Segment MSA Instruction Guide</i> (located: <a href="https://osn.oshkoshcorp.com">https://osn.oshkoshcorp.com</a> )?				
2.2.8	Was the MSA Report / Checklist used to ensure completeness (included within the <i>Defense Segment MSA Instruction Guide</i> )?				
2.2.8	Does the PPAP package contain a photo of the measurement tool?				

# Initial Process Capability

- Initial Process Studies are required for all Level 3 PPAP submissions where Critical, Significant, Major or CSI Characteristics are identified on the Design Record or listed in the Control Plan
- Process Capability Indices such as Cp and Cpk are used to measure how likely a process is to provide parts within the print specifications.
- 100% Inspection is required until minimum Cpk is achieved
  - Inspections to be reflected within the supplier's Process Control Plan
  - Records as evidence of 100% inspection are to be maintained and submitted upon request



# QC – 112 Initial Process Studies


2.2.11	Initial Process Studies	Y	N	N/A	Comments
2.2.11	If there are SC/CC identified (on print or supplier process): Does the supplier meet Cpk of 1.33 for Significant Characteristics and/or Cpk of 1.67 for Critical Characteristics?				
2.2.7	If there are SC/CC identified (on print or supplier process) and the supplier conducts 100% inspection instead of Capability Studies, is inspection included on the Control Plan?				
2.2.7	Were the initial process studies conducted using the required number of samples and using production processing, gauging and materials?				

# Process Control Plan

- Process Control Plans are required for all PPAP Level 3 submittals
- Process Flow Diagrams, PFMEA & Control Plans should all correlate
- These documents tell the story of
  - What is the process (Process Flow)?
  - What could go wrong (FMEA)?
  - How will it be controlled (Control Plan)?

PART/PROCESS NUMBER		PROCESS NAME/OPERATION DESCRIPTION	MACHINE, DEVICE, JIG, TOOLS FOR MFG.	CHARACTERISTICS			SPECIAL CHAR. CLASS	METHODS				REACTION PLAN	
				NO.	PRODUCT	PROCESS		PRODUCT/PROCESS SPECIFICATION/TOLERANCE	EVALUATION/MEASUREMENT TECHNIQUE	SAMPLE SIZE FREQ.		CONTROL METHOD	

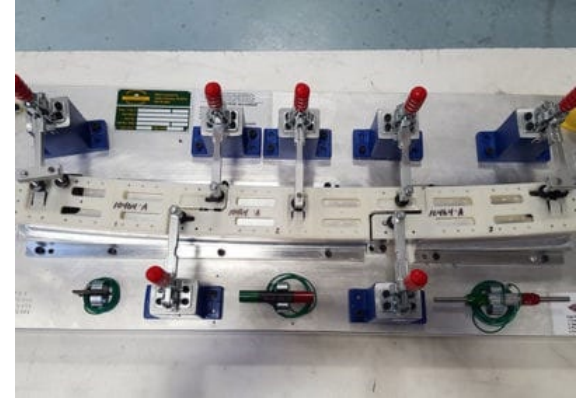
		<b>CONTROL PLAN</b>										
(Format for example only; Supplier created templates may be used)												
<input type="checkbox"/> Prototype <input type="checkbox"/> Pre-Launch <input type="checkbox"/> Production												
Control Plan Number				Key Contact/Phone				Date (Orig.)		Date (Rev.)		
								1/1/1996		1/1/1996		
Part Number/Latest Change Level				Core Team				Customer Engineering Approval/Date (If Req'd.)				
PART NUMBER												
Part Name/Description				Supplier/Plant Approval/Date				Customer Quality Approval/Date (If Req'd.)				
PART NAME												
Supplier/Plant			Supplier Code	Other Approval/Date (If Req'd.)				Other Approval/Date (If Req'd.)				
			101112									

# QC – 112 Process Control Plan

Control Plan	Y	N	N/A	Comments
Has the supplier indicated the Control Plan type? e.g. Prototype / Production				
Are Product and Process Characteristics properly identified (in the correct columns) per the AIAG definitions?				
Does the Control Plan cover all activities from receiving inspection to shipment?				
Are all Special Product/Process Characteristics included in the Control Plan?				
Are Control Method tools such as SPC or 100% inspection for the Special Characteristics defined?				
Does the PPAP documentation cite specific print note requirements (associated with product or process) in Flow / PFMEA/ Control Plan (For Example Mil-STD-130 Part Marking ID)?				

# Checking Aids

- Checking aids include all dedicated instruments, templates, attribute and variable gages, fixtures, or jigs that are used to determine acceptance/rejection of product characteristics.
  - If a device is specially made for the part being verified (not available as a catalog item) it is a “checking aid.”
  - Pictures of checking aids should be included in PPAP workbook
- The supplier shall certify that all aspects of the checking aid agree with the part dimensional requirements.
  - Gauges should be maintained in calibration process / schedule
- 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.



# QC-112, Checking Aids

2.2.16	Checking Aids	Y	N	N/A	Comments
2.2.16	Are all product specific checking aids, fixtures, test stands and Mylar listed on the Control Plan?				

# Customer Specific Requirements


- If Component First Article Test (CFAT) is required per the Design Record, CFAT testing documentation shall be included with the PPAP submission.
- Individual government contracts have unique instructions on timelines for Test Plans, Test Reports and formal notifications to OSK/Government.
- The supplier shall conduct the appropriate CFAT testing as outlined on the Design Record.
- CFAT test items(s) must be from the first 10 units manufactured (unless otherwise specified).
- The test plan must include an intended schedule, test(s) to be preformed, test method, test location and the test authority.
- When CFAT is required for Revision changes, the level of re-testing may be limited to only verify performance requirements related to the change.

# CFAT Conditional Acceptance

- Conditional acceptance of a CFAT will follow the procedure as applying for interim PPAP approval.
- Conditional acceptance of a CFAT can be granted pending successful completion of a CFAT if the supplier agrees to the following:
  - To be willing to complete all CFAT tests
  - To be willing to rectify all deficiencies/discrepancies in each component that is identified during subsequent CFAT testing, regardless of the location of the component at no cost to Oshkosh Corporation and/or the government.

# Tooling Photo Documentation

- If Tooling used, provide photo in PPAP workbook
- Some Oshkosh business units use asset tags provided by Oshkosh buyers
  - Please confirm if needed prior to PPAP submission

Oshkosh Corporation Classification - Restricted			
TOOLING & FIXTURES - PROPERTY OF OSHKOSH CORP.			
ORGANIZATION:	SUPPLIER NAME:	PART NUMBER:	PART NUMBER:
SUPPLIER NUMBER:	101112	PART NAME:	PART NAME:
TOOL / FIXTURE NUMBER:		DESIGN RECORD CHANGE LEVEL:	E R L D A
DATE:			
Supplier is required to identify all Oshkosh Owned Tools & Fixtures and document with Photo in PPAP workbook			
PHOTO OF OSHKOSH OWNED TOOLS AND FIXTURES			
			
PRINT NAME:	SIGNATURE:	TITLE:	DATE:
1 of 1			
PPAP: Revision 2.0 Date: 04/08/19			

## Commercial Off the Shelf (COTS+) – Transport segment specific

- COTS components are items that are commercially available, unaltered, procured through distributors
- For COTS+ parts, the supplier is expected to submit all 18 elements of PPAP
- Review Oshkosh Defense & NGDV Addendums for more information
- In some cases, 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 documents or Certificates of Conformance by supplying the following minimum PPAP elements:
  - Design Record & Dimensional Results
  - Engineering Change Documents – RCM (if applicable)
  - Customer Engineering Approval (If applicable)
  - Print Note Verification
  - Sample Production Parts
  - Master Sample Photos
  - Customer Specific Requirements – Component First Article Testing (CFAT)
  - Part Submission Warrant (PSW)
  - Catalog Page or equivalent from Original Equipment Manufacturer (OEM) to demonstrate commerciality (if available)



# PPAP Elements Checklist QC – 112 for COTS

AIAG-PPAP Section	PPAP Element	PPAP Submission Comments			
*Commercial Off the Shelf (COTS) - (If Applicable on Purchased Part Level)		Y	N	N/A	Comments
1	Is this component <b>Commercial Off the Shelf</b> (commercially available to the general public, <u>unaltered, and under the manufacturers' EXACT part number</u> ) as defined in the <i>Defense Segment Addendum, Section 14</i> ?				
1A	If the answer to question 1 is yes, are the minimum PPAP elements for a COTS part (including a catalog page or equivalent, verbatim to <u>address all OSK specifications</u> ) provided in accordance to the COTS section in the <i>Defense Segment Addendum, Section 14</i> , <u>and</u> in accordance to the <i>OSK Certificate of Conformance form</i> ?				
2	Is this component <b>COTS plus</b> (commercially available <u>but</u> with additional performance / print requirements) as defined in the <i>Defense Segment Addendum, Section 14</i>				
2A	If the answer to question 2 is yes, have you provided objective evidence that the part meets all of the OSK print requirement? (see <i>Defense Segment Addendum, Section 14</i> )				

## Summary – Supplier Expectations

- Remain current with OSKs requirements
  - Achieve PPAP First-Pass-Yield (FPY) of 100%
  - Avoid common mistakes & oversights
- Reach-out to AQE / SQE for direction – Improve part quality & customer satisfaction
- Focus on one submittal, one approval (FPY of 100%)
- Encourage new employees to attend OSK training to drive consistency in PPAP