Production Part Approval Process (PPAP)

The purpose of PPAP is to determine if all customer engineering design record and specification requirements are properly understood by the Suppliers and that the manufacturing process has the capability to produce product consistently meeting these requirements during an actual production run at the quoted production rates.

WHAT IS PPAP?
Oshkosh PPAP Level Definitions

Level 1 PPAP:
- Part Submission Warrant (PSW) - One page document that “warrants” the part meets the design requirements

Level 2 PPAP: Includes Level 1 PPAP requirements PLUS...
- Part Submission Warrant
- Dimensional Results – 1 piece
- Design Records (Bubble Print)
- PPAP Samples – First production order / upon request prior to production order
- Print Notes (Attach copy of Raw Material Certification / Performance Test Report / Surface Finish / Labeling, Paint Process, Welding)
- Supplier Change Request (OSK-F1000) – if applicable

Level 3 PPAP: Includes Level 2 PPAP requirements PLUS...
- Dimensional Results – 3 pieces
- Process Flow Diagrams (PFD)
- Failure Mode and Effects Analysis’ (PFMEA / DFMEA)
- Process Control Plans
- Initial Process Capability Studies – if applicable
- Measurement System Analysis – if applicable
- Appearance Approval Reports (AAR) – if applicable
- Checking Aids – if applicable
- Records of Compliance with Customer Specific Requirements
- Master Sample Photo Documentation of PPAP parts
- Tooling Photo Documentation – if applicable
- Supplier Quality Engineer Approves

Level 4 PPAP
- Part Submission Warrant (PSW)
- Dimensional Results – 1 piece
- Design Records (Bubble Print)
- PPAP Samples
Example of PPAP Workbook


Click on: PPAP Workbook
INTRO:
Type in Part / Supplier Information, this will be transferred throughout the workbook.

PPAP REQUIREMENTS:
This outlines the PPAP submission requirements. (Informational only)

LABELING:
This is the label to be used to Identify the PPAP sample part when shipped to OSK

PSW:
This documents the warrant that the Part Meets the design Intent
This will be used to communicate back to the supplier the acceptance or rejection of the PPAP

DIMENSIONAL:
This is used in conjunction with a “bubble print” to document the actual dimensions of the PPAP part.

PRINT NOTES:
This is used to document all the remaining notes on print (Attach copy of Raw Material Certification / Performance Test Report / Surface Finish / Labeling, Paint Process, Welding)

Required where applicable:

PRINT NOTES – Performance Tests:
This is optional depending if there are Print Notes specifying performance requirements.

PRINT NOTES – Defense PAINT:
This is optional depending if there are Print Notes specifying paint requirements for Defense Product.

PRINT NOTES – Plating:
This is optional depending if there are Print Notes specifying coating requirements.

PRINT NOTES – APPEARANCE:
This is optional depending if there are Print Notes specifying paint requirements for non-Defense Product.

PRINT NOTES – WELDING:
This is optional depending if there are Print Notes / Welding requirements specified.
1. Part Information
2. Supplier Information

Note: This information will be transferred to all “like” fields in this PPAP Workbook.
1. Level 2 Submission is the Default PPAP level.

2. List of what is Required based on submission level (Level 1, 2, 3, 4)

**Note: Level 4 is commonly used for New Product Development (Prototype parts)**

Any deviation from Oshkosh requirements (specification, material, print notes, etc) must be approved by use of the F1000 form prior to PPAP submission!
1. All PPAP sample parts must be tagged with this label on the part and / or on the box.

2. Document all the appropriate Part / Supplier / PO information on the label.
Note: All fields must be completed. If an area is not applicable mark as "N/A". Below is a definition of what each "numbered" section is.

1.) Name of part on drawing
2.) Oshkosh part number on PO/drawing
3.) Oshkosh part number on drawing
4.) Supplier part number if applicable (n/a if not)
5.) Engineering change level (ex. Rev B, this will be on the drawing / PO)
6.) Engineering date (ex. 4/7/11, this will be on the drawing / PO)
7.) Is this a Safety / Government regulation (ex. Drawing will indicate if it is FMVSS, or other industry standard safety regulation.
8.) PO number from Oshkosh driving demand for this part / PPAP.
9.) This section requires all applicable Supplier location information.
10.) Oshkosh Corporation – Segment Division (ie Oshkosh Corporation – Defense, Oshkosh Corporation – Pierce, etc)
11.) Buyer Name
12.) Materials Reporting, acknowledgment the parts meet the hazardous material restrictions outline per the drawing, Supplier Standards Guides or other contract Flow down requirements.
13.) Check the reason for the PPAP submission
14.) Check the Level of PPAP that was requested by Oshkosh Corp. and check what documents in the PPAP have been submitted that are applicable for this component.
15.) If Supplier has Oshkosh Corp. owned tooling document here.
16.) Supplier Point of Contact Information
17.) Oshkosh will complete this section and send back to the Supplier Point of Contact.

**DO NOT LEAVE ANY SECTIONS BLANK. N/A IS OK WHERE NECESSARY**
1. ITEM: Numbering needs to match Design Record / “Bubble Print”
2. DIMENSION / SPECIFICATION:
   - Mark the gage used to measure item
3. QTY TESTED: Mark how many parts measured
4. DATA: Mark actual results
5. OK / NOT OK: Check each measurement as good or bad by marking OK / NOT OK appropriately
6. SIGNATURE SECTION: Fill in Name, Signature, Title and Date for supplier sign off

All dimensions on the print must be verified as OK by the Supplier prior to submission!

**Key Note**
1. (1) Piece required for Level 2
2. (3) Pieces required for Level 3
### DIMENSIONAL RESULTS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DIMENSION / SPECIFICATION</th>
<th>MEASUREMENT TYPE</th>
<th>GAGE TYPE</th>
<th>ORGANIZATION</th>
<th>MEASUREMENT RESULTS (DATA)</th>
<th>QC</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>27.51</td>
<td>0.76</td>
<td>26.75</td>
<td>Micro-Vu Vertex 320</td>
<td>3</td>
<td>27.61</td>
<td>27.23</td>
</tr>
<tr>
<td>1B</td>
<td>27.51</td>
<td>0.76</td>
<td>26.75</td>
<td>Micro-Vu Vertex 320</td>
<td>3</td>
<td>26.75</td>
<td>27.39</td>
</tr>
<tr>
<td>2</td>
<td>19.8</td>
<td>0.76</td>
<td>20.04</td>
<td>Micro-Vu Vertex 320</td>
<td>3</td>
<td>20.51</td>
<td>20.67</td>
</tr>
<tr>
<td>3</td>
<td>57.18</td>
<td>0.76</td>
<td>56.42</td>
<td>Micro-Vu Vertex 320</td>
<td>3</td>
<td>57.58</td>
<td>56.87</td>
</tr>
<tr>
<td>4</td>
<td>76.2</td>
<td>0.76</td>
<td>75.44</td>
<td>Micro-Vu Vertex 320</td>
<td>3</td>
<td>75.80</td>
<td>76.07</td>
</tr>
</tbody>
</table>

*Traceable to NIST

Blanket statements of conformance are unacceptable for any test results.

<table>
<thead>
<tr>
<th>SIGNATURE</th>
<th>TITLE</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quality Manager</td>
<td>9/30/12</td>
</tr>
</tbody>
</table>

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**Required Always**

**Required where applicable**
Make sure Design Records (Bubble Print) Matches Dimensional Results’ numbering

Include Notes (word for word) in the specification section of “PRINT NOTES”
1. ALL DIMENSIONS ARE AFTER PLATING…
2. FINISH SPEC: PLATE ZINC…
3. ETC…
1. **ITEM**: Numbering needs to match the Design Record / “Bubble Print”.

2. **DIMENSION / SPECIFICATION**: Mark the low & high values in the MIN / MAX respectively.

3. **GAGE TYPE**: Mark the gage used to measure the item.

4. **QTY TESTED**: Mark how many parts were measured.

5. **DATA**: Mark actual results.

6. **OK / NOT OK**: Check each measurement as good or bad by marking OK / NOT OK appropriately.

7. **SIGNATURE SECTION**: Fill in Name, Signature, Title, and Date for supplier sign off.

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**Note:** All dimensions on the print must be verified as OK by the Supplier prior to submission!

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**Print Notes**

(Attach copy of Raw Material Certification, Surface Finish, Performance Tests & Part Identification)

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**Required Always**

Required where applicable
1. Design Record Requirement
2. ASTM Chemical Requirement
3. ASTM Mechanical Requirement
4. PPAP document to outline requirement and actual's per the print and Industry standard (ASTM)
1. Use Chemical Weighted % from material cert. and transfer to print notes PPAP Page.
2. Mechanical Results to be transferred to print notes PPAP Page.
3. Signature on Cert. approving material
PRINT NOTES – Performance Tests
(ATTACH COPY OF PERFORMANCE TESTS)

1. ITEM: Numbering needs to match Design Record / “Bubble Print”
2. DIMENSION / SPECIFICATION: Mark the low & high values in the MIN / MAX respectively
3. GAGE TYPE: Mark the gage used to measure item
4. QTY TESTED: Mark how many parts measured
5. DATA: Mark actual results
6. OK / NOT OK: Check each measurement as good or bad by marking OK / NOT OK appropriately
7. SIGNATURE SECTION: Fill in Name, Signature, Title and Date for supplier sign off

All dimensions on the print must be verified as OK by the Supplier prior to submission!

Note: This sheet to be used to document all Print Note requirements via the “bubble print” and reference any applicable Test report numbers in the PPAP Package.
1. Design Record Requirement
2. ASTM Performance Requirement
3. PPAP document to outline requirement and actual’s per the print and Industry standard (ASTM)
### PRINT NOTES – Defense PAINT

**Includes Paint & Coating Test Results**

1. Document what print standard, Industry Standard, & Process Steps that were used to coat the part.


3. Top Coat Verification: Permeability, Adhesion, Thickness Salt Spray Results, Ambient Cure Time & Oven Cure Time.

4. Acknowledge process isn’t using Any hazardous material that is not Allowed per the Supplier’s Standard Guide or Contract requirements. **Make sure to circle Yes or No and sign**

5. Supplier Sign Off

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#### PERFORMANCE TESTS

<table>
<thead>
<tr>
<th>Performance Test</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime Coat</td>
<td>Permeability, Adhesion, Thickness, Salt Spray Results, Ambient Cure Time &amp; Oven Cure Time</td>
</tr>
<tr>
<td>Top Coat</td>
<td>Permeability, Adhesion, Thickness, Salt Spray Results, Ambient Cure Time &amp; Oven Cure Time</td>
</tr>
</tbody>
</table>

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**Defense Paint Tab**

[Diagram of Defense Paint Tab]

- **Required Always**
- **Required where applicable**
1. Print Note Paint Note Requirement

2. Document what print standard or Industry Standard the part has been painted to.

3. Prime Coat Verification
   1. Reference standard for each process step
   2. Document blast profile
   3. Document actual thickness including profile
   4. Ensure that the thickness spec includes blast (1.0mil blast profile + 1.3 mil primer = 2.3 mil thickness including blast profile)

4. Top Coat Verification

5. Compliant to hazardous material restrictions (Sign off)

6. Supplier Sign off
1. Plating Type Required: From Design Record (Print)

2. Document what print standard, Industry Standard, & Process Steps that were used to coat the part

3. Plating Supplier (If Tier 2): If tier 2, plating supplier needs to be noted

4. Document plating / coating process Utilized to manufacture this part (Attach certificate of compliance here)

5. Acknowledge process isn’t using Any hazardous material that is not Allowed per the Supplier’s Standard Guide or Contract requirements. **Make sure to circle Yes or No and sign**

6. Tier 1 Supplier Sign Off
1. Plating Type Required: From Design Record (Print)

2. Document what print standard, Industry Standard, & Process Steps that were used to coat the part

3. Plating Supplier (If Tier 2): If tier 2, plating supplier needs to be noted

4. Document plating / coating process Utilized to manufacture this part (Attach certificate of compliance here)

5. Acknowledge process isn’t using Any hazardous material that is not Allowed per the Supplier’s Standard Guide or Contract requirements. **Make sure to circle Yes or No and sign**

6. Supplier Sign Off
Welding specification

1. Document the Welding Symbol / Weld Description from From “bubble print”.
2. Document WPS / PQR (if not prequalified)
3. Document visual verification of weld size, Weld length, Weld Quantity.
4. Supplier Sign Off

Note: WPS’s, PQR’s and welder certifications may be requested and must be provided upon request.
Example: Welding specification

1. Document the Welding Symbol / Weld Description from From “bubble print”.
2. Document the Welding Specification / Weld Symbol from “bubble print”.
3. Document WPS / PQR (if not prequalified)
4. Document visual verification of weld size, Weld length, Weld Quantity.
5. Supplier Sign Off

Note: WPS’s, PQR’s and welder certifications must be provided upon request.
PPAP Workbook – Level 3 Requirements

LEVEL 2 - PPAP

LEVEL 3 - PPAP

- Same Requirements as Level 2 with the following additional requirements:
  - **DFMEA**
    - Design Failure Mode Effects Analysis is required if the Supplier is design responsibly
  - **FLOW DIAGRAM**
    - Process Flow diagram is required to outline and standardize the production process that is being approved. This should outline the entire process that is being used to manufacture the component & assembly.
  - **PFMEA**
    - Process failure Mode Effects Analysis is required to be conducted to understand all the potential failure modes and mitigate known failure modes.
  - **CONTROL PLAN**
    - The control plan is to be used to document and be used on the shop floor to monitor and control the standardized manufacturing process being approved.
  - **MASTER SAMPLE**
    - This is used to document visually how the parts are being marked and pictures of the PPAP parts.
  - **TOOLING**
    - This sheet is used to visually document any Oshkosh owned tooling.
  - **CAPABILITY STUDY**
    - This sheet is to be used to show evidence the production process is capable to meet the design intent. This is required when Critical Characteristics are identified on the print or otherwise specified by Oshkosh Corporation.
  - **GAGE R&R**
    - This sheet is to be used to show evidence that the measuring method used for the capability studies is repeatable and reproducible.
Design Failure Mode Effects Analysis is required ONLY if the Supplier is design responsible.
Process Flow Diagram is required to outline and standardize the production process that is being approved. This should outline the entire process that is being used to manufacture the component / assembly.
Process failure Mode Effects Analysis is required to be conducted to understand all the potential failure modes and mitigate any known failure modes.

** To be used by Oshkosh SQE during 8D Problem Solving / PIP / etc **
PFMEA

When is the FMEA used?

- When new systems, products and processes are being designed
- When existing designs or processes are being changed or improved

When is the FMEA updated?

- When a change is being considered to a product or process Related to:
  - Design
  - Application
  - Environment
  - Material
  - Manufacturing or Assembly processes
- After actions are taken to:
  - Reduce the occurrence of the causes/failure modes
  - Increase the ability to prevent a failure mode from occurring
PFMEA

- Used to improve the process before failures occur and focus on prevention of product and process problems
- *Used to prioritize action items for corrective action* and ensure alignment with the needs of the customer
- A tool to document actions taken
- Useful when *new systems, products and processes* are being *designed* or *existing designs or processes* are being *changed*
- Updated when a change is being considered or when action items have been completed
- A tool that leads to future tool usage:
  - Data collection plans and experimentation
  - Control plans
The control plan is to be used to document and be used on the shop floor to monitor and control the standardized manufacturing process being approved.

** To be used by Oshkosh SQE during 8D Problem Solving / PIP / etc **
Control Plan

What is it?

• The control plan provides the method of monitoring, controlling, and inspection needs to create ongoing conforming product in the system
• It also provides the reaction plan to be followed for suspected non-conforming product

Why create it?

• Identifies process characteristics and control methods for sources of variation (input variables), which cause variation in the product characteristics (output variables)

When to create it?

• After the process flow diagram and PFMEA have been developed and recommended actions created. Before pilot/production builds are conducted
CONTROL PLAN

EFFECTIVENESS

• Plans are *reviewed / updated every time there are changes / improvements* to the process that effect the measurement system and control methods.

• Control plans DO NOT replace detailed operator/work instructions
  – Work Instructions should be developed using the control plan

• A single control plan may apply to a group or family of products that are produced by the same or similar parts

*In theory, you only need 3 Master Control Documents within a facility: Process Flow, PFMEA and Control Plan*

INTENT

• Minimize process variation consistently .

• Minimize process tampering.

• Verify / Validate that the process improvements have been implemented.
  – Need that link to the quality management systems (ISO, QMS, etc.)

• Provide for adequate training in all procedures.

• Include required maintenance/audit schedules.

**CONTROL PLANS MUST BE REVIEWED REGULARLY FOR EFFECTIVENESS!!**
1. This section for visually documenting how the parts are being labeled

2. This section for visually documenting how the PPAP parts look
Tooling – Oshkosh Owned

This sheet is used to visually document any Oshkosh owned tooling. It is required to attach a picture of tooling as well as the tooling identification method.
Capability Studies

This sheet is to be used to show evidence that the production process is capable to meet the design intent. This is required when Critical Characteristics are identified on the print or otherwise specified by Oshkosh Corporation.
There are multiple examples of Gage R&R forms to use. Use the appropriate form to provide evidence that the measuring method used for the Capability Study is repeatable and reproducible.
Intro:
- Type in Part / Supplier Information, this will be transferred throughout the workbook.

PPAP Requirements:
- This outlines the PPAP submission requirements. (Informational only)

Labeling:
- This is the label to be used to Identify the PPAP sample part when shipped to OSK

PSW:
- This documents the warrant that the Part Meets the design Intent
- This will be used to communicate back to the supplier the acceptance or rejection of the PPAP

Dimensional:
- This is used in conjunction with a “bubble print” to document the actual dimensions of the PPAP part.
PPAP – DEFENSE: Submission / Notification Process

- Oshkosh Purchasing FTP Site Homepage
  - Upload **ALL** PPAP’s to the FTP Site

- Email Notification of Documents on FTP site
  - Email for Level 1 & 2 PPAPs: PPAP@defense.oshkoshcorp.com
  - Email for Level 3 PPAPs: assigned SQE’s email
  - (Defense IPS) Email for all Level PPAPs: PPAP@defense.oshkoshcorp.com

**NOTE** Do not email DEFENSE PPAPs.
Load Defense PPAPs to FTP Site due to ITAR regulations.
Send PPAP documentation with the first order.

- Not required to send to FTP Site
- Not required to notify via email

**NOTE** Do not email DEFENSE PPAPs. Load Defense PPAPs to FTP Site due to ITAR regulations if not sent with first order.
Oshkosh Purchasing FTP Site Homepage: https://ftp.oshkoschcorp.com/thinclient/
Supplier should load PPAP's into APQP folder.

**If no APQP PPAP folder exists, create one using 1. NEW FOLDER button**
Suppliers are required to load PPAP packages to the Purchasing FTP site using the following naming convention:

PN_SUPPLIER NAME_MMDDYY_REV
Email PPAP Documents to:
PPAP@piercemfg.com
Email PPAP Documents to:

PPAP@McNeilusco.com
PPAP - ACCESS: Submission / Notification

- Oshkosh Purchasing FTP Site Homepage
  - Upload **ALL JLG Military** PPAP’s to the FTP Site: https://ftp.oshkoshcorp.com/thinclient/
  - Send notification email for JLG Military Level 1, 2 & 3 PPAPs: PPAP@jlg.com

- For non-JLG Military PPAPs, email PPAP Documents to the applicable region parts are shipped to (or where Purchasing POC indicates):
  - ppap@jlg.com, ppapchina@jlg.com, ppapeame@jlg.com, ppapbrazil@jlg.com

**NOTE** Do not email JLG Military PPAPs. Load PPAPs to FTP Site due to ITAR regulations.
Email PPAP Documents to segment supplier quality point of contact (POC)
GPSC Academy
Leaders Teach & Leaders Learn

THE END