

# APQP/PPAP for the Distributor

Advanced Product Quality Planning (APQP)  
and Production Part Approval Process (PPAP)

Jim Lee, CEO

# More and more aerospace customers are flowing down the requirements for:

- APQP (Advanced Product Quality Planning),
- PPAPs (Production Part Approval Process), or the
- AS9145 requirement for APQP/PPAP.

**Who has been asked for a PPAP?**

**Or a Process FMEA, or Control Plan?**

**What is a distributor to do?**



Airbus Group  
BAE  
Boeing  
Bombardier  
Eaton  
Embraer  
GE Aviation  
GKN Aerospace  
Hensoldt  
Honeywell  
Howmet Aerospace  
IHI  
L3Harris  
Leonardo  
Lockheed Martin  
MHI  
Moog  
MTU  
Northrop Grumman  
Oshkosh  
Parker Aerospace  
PCC Structural  
Rolls-Royce  
RTX  
-Raytheon  
-Collins Aerospace  
-Pratt & Whitney  
Safran Group  
Spirit AeroSystems  
Textron  
THALES  
Triumph Group  
Woodward

# Objectives



## Understanding APQP and PPAP

- Overview of APQP (Advanced Product Quality Planning)
- Overview of PPAP (Production Part Approval Process)
- Discuss the relevance of APQP and PPAP for aircraft parts distributors

## PPAP Strategies for Distributors

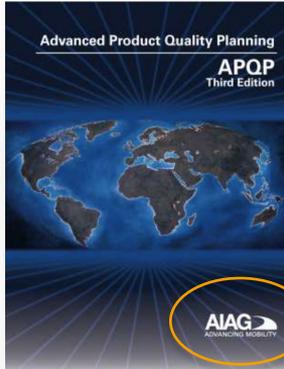
- How to handle
- What can be done
- PPAP Element strategies

## Resources, Tools, and Templates for PPAP

- Share sources for FREE tools and templates
- Provide distributor-centric examples for use

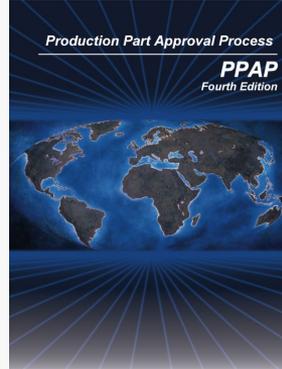
# Overview of APQP and PPAP

It's for manufacturers and service providers of production parts. Few portions apply to distributors.



## Advanced Product Quality Planning

APQP is a methodology used to ensure that a new product or service, or a change to an existing one, meets customer requirements and expectations throughout the product development and production process.



## Production Part Approval Process

A PPAP is required whenever a new part, process change, or significant production change is introduced to ensure parts meet requirements consistently. PPAP defines general requirements for production part approval by the customer. It is the final step in the APQP process. The PPAP approval allows production to begin and product to be shipped.

|  |                       |                |
|--|-----------------------|----------------|
| SAE<br>INTERNATIONAL   | AEROSPACE<br>STANDARD | AS9145™        |
|  |                       | Issued 2016-11 |
| Technically equivalent writings published in IAGG sectors.   |                       |                |
| Aerospace Series – Requirements for Advanced Product Quality Planning and Production Part Approval Process |                       |                |

### RATIONALE

This standard was created to define the aviation, space, and defense process requirements for Advanced Product Quality Planning (APQP) and Production Part Approval Process (PPAP). The APQP aspects of this standard define a methodology for ensuring that the product development processes deployed throughout the aviation, space, and defense industries are fully integrated phased processes that extend from concept and design through manufacturing process planning and execution, and on into product use, service, and customer feedback. The PPAP is an output of APQP confirming that the production process has demonstrated the potential to produce products that consistently fulfill all requirements at the customer demand rate.

### FOREWORD

To assure customer satisfaction, the aviation, space, and defense industry organizations must produce and continually improve safe, reliable products that equal or exceed customer and regulatory authority requirements. The globalization of the industry and the resulting diversity of regional/national requirements and expectations have complicated this objective. End-product organizations face the challenge of assuring the quality of and integration of product purchased from suppliers throughout the world and at all levels within the supply chain. Industry suppliers face the challenge of delivering product to multiple customers having varying quality expectations and requirements.

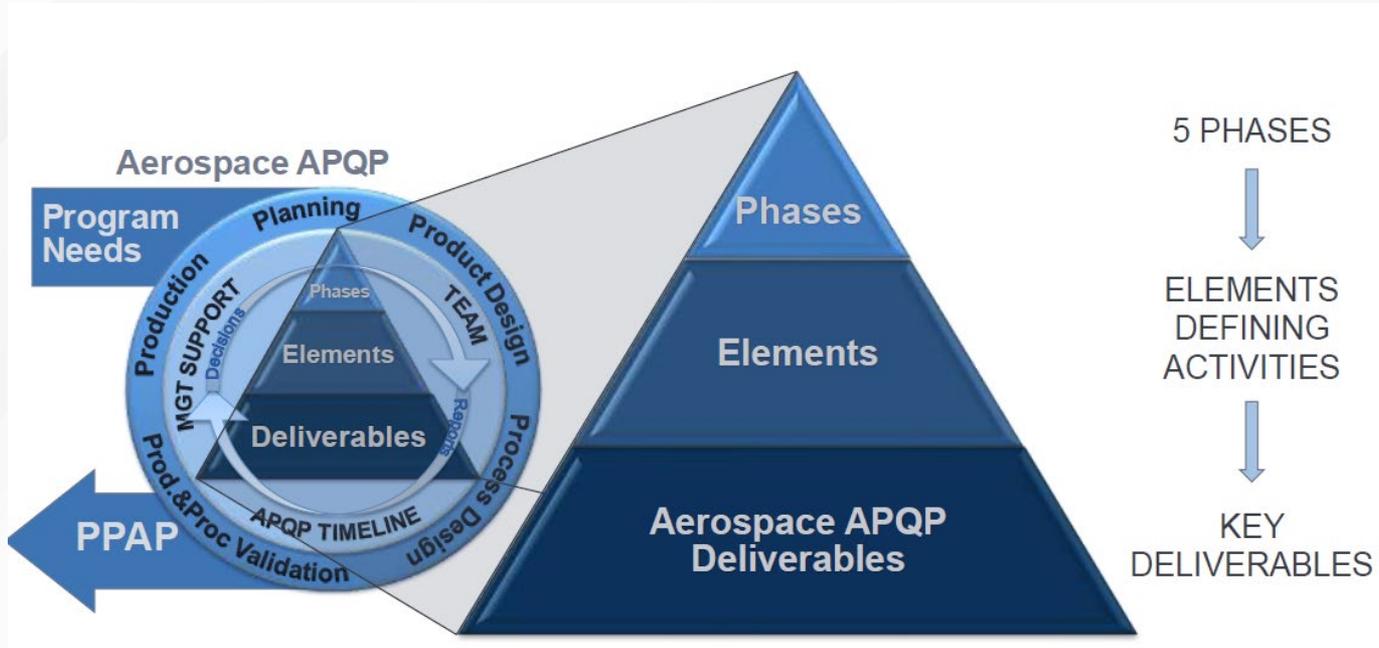
The aviation, space, and defense industry established the International Aerospace Quality Group (IAQG) for the purpose of achieving significant improvements in quality, delivery, safety, and reductions in cost, throughout the value stream. This organization includes representation from companies in the Americas, Asia/Pacific, and Europe.

This document standardizes the requirements for the Product Development Process (PDP) through the use of APQP and PPAP methodologies. The establishment of common requirements, for use at all levels of the supply chain, should result in the elimination or reduction of organization unique requirements, and the resulting variation inherent in the multiple expectations.

## AS9145: APQP & PPAP

Aerospace's version of the AIAG automotive tools. The APQP aspects of this standard define a methodology for ensuring that the product development processes deployed are fully integrated phased processes that extend from concept & design through manufacturing process planning and execution, and on into product use, service, and customer feedback.

# What is Advanced Product Quality Planning?



FREE information at <https://scmh.iaqg.org/> Supply Chain Management Handbook  
SCMH 7.2 Advanced Product Quality Planning (APQP) AS9145

# What is in the SCM<sup>H</sup>® for APQP?

## Supply Chain Management Handbook

### Webinars

- APQP Overview -Awareness (Recording 5 DEC 2018)
- APQP – Design Risk Analysis Awareness (8 OCT 2019 Recording)
- APQP – Process Flow and Process Failure Modes and Effects Analysis PFMEA (22 OCT 2019 Recording)
- APQP – Control Plan Awareness (Recording November 2019)
- APQP – Measurement Systems Analysis (Recording December 2019)
- APQP – Process Capability and Control (Variation Management) (Recording 7 January 2020)
- APQP – Production Part Approval Process (Recording 21 January 2020)



**Core Guidance**



**Toolbox**

FREE information at <https://scmh.iaqg.org/> Supply Chain Management Handbook  
[SCMH 7.2 Advanced Product Quality Planning \(APQP\) AS9145](https://scmh.iaqg.org/)

# What is in the SCM<sup>H</sup>® for APQP?



## Core Guidance

-  SCMH 7.2.2 APQP Introduction 10MAY2017
-  SCMH 7.2.3 Aerospace APQP PPAP Manual Rev B Dated 10MAY2017



## Toolbox

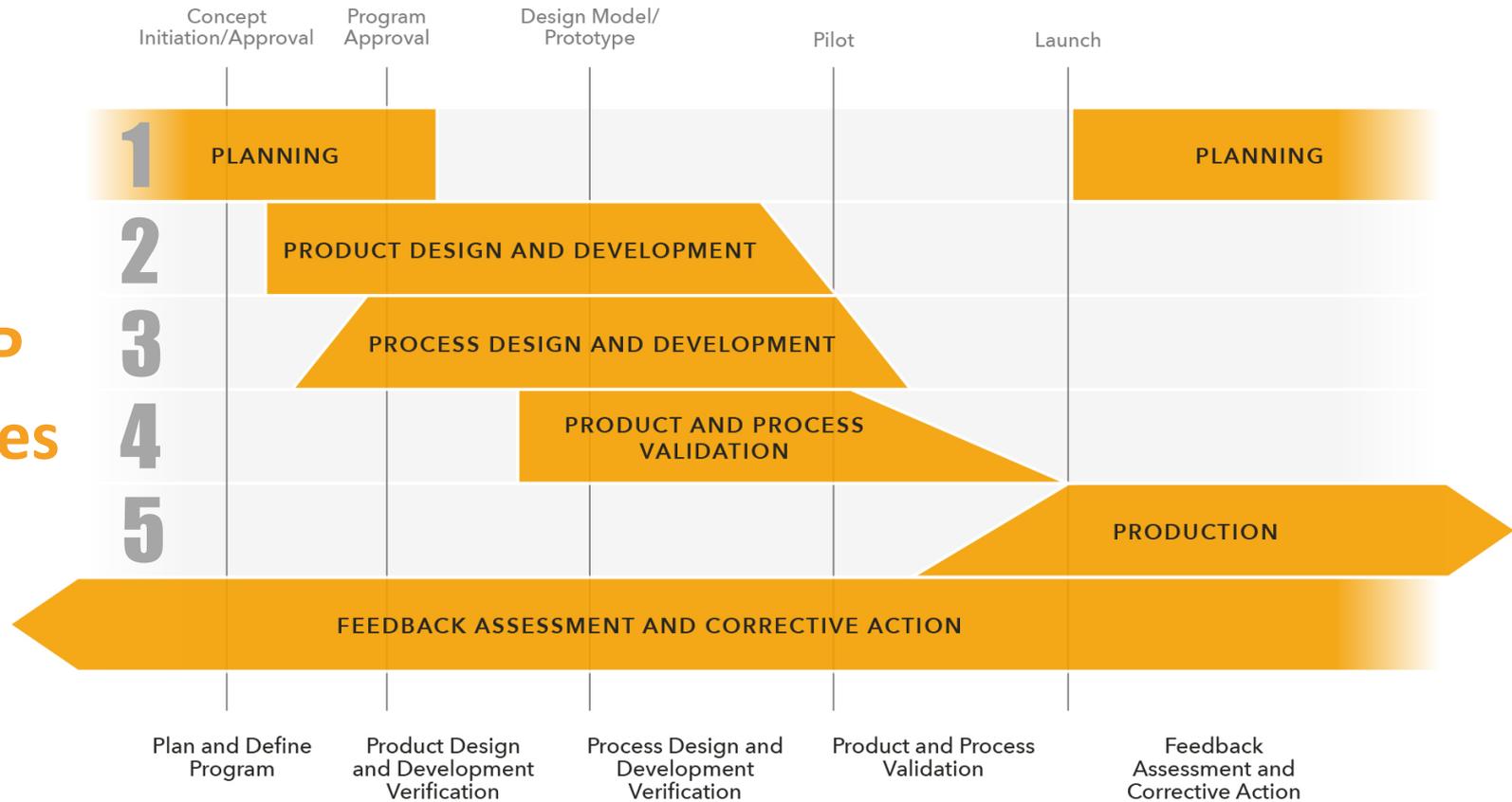
See listing for available webinar recordings.

-  SCMH 7.2.4 APQP Phase 1 Checklist Rev 1 Dated MAY2017
-  SCMH 7.2.5 APQP Phase 2 Checklist Dated 26OCT2018
-  SCMH 7.2.6 APQP Phase 3 Checklist Dated 26OCT2018
-  SCMH 7.2.7 APQP Phase 4 Checklist Dated 26OCT2018
-  SCMH 7.2.8 APQP Phase 5 Checklist Dated 26OCT2018
-  SCMH 7.2.9 Process Flow Diagram Template Dated 26NOV2019
-  SCMH 7.2.10 DFMEA Template Dated 28JAN2020
-  SCMH 7.2.11 PFMEA Template Dated 16DEC2019
-  SCMH 7.2.12 APQP Element Applicability Template Dated 10MAY2017
-  SCMH 7.2.13 Control Plan Template Rev A Dated 20FEB2024
-  SCMH 7.2.14 Maturity Matrix Rev New Dated 3SEP2019
-  SCMH 7.2.15 APQP Applicability Matrix Rev New Dated 27NOV2018
-  SCMH 7.2.16 KC Traceability Form Rev New Dated 13JUL2020
-  SCMH 7.2.17 KC Traceability Form Guidance Rev New Dated 13JUL2020
-  SCMH 7.2.18 Design Risk Analysis LINK to 2.8.1
-  SCMH 7.2.19 DFMEA Examples Rev New Dated 29JUN2020
-  SCMH 7.2.20 Packaging Preservation Labeling Approval Form Template Rev New Dated 15FEB2021
-  SCMH 7.2.21 APQP Presentation - ASQ Webinar 01MAY2024

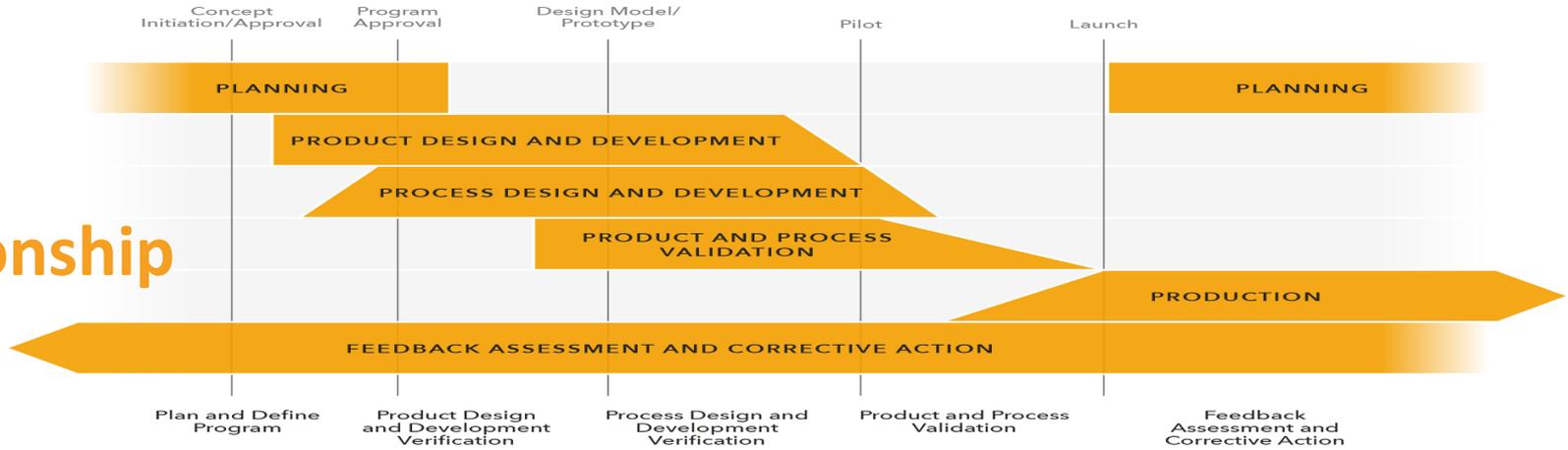
-  APQP Process Flow and PFMEA Webinar
-  APQP Webinar focused on Control Plan
-  APQP Control Plan Webinar Q&A
-  APQP Measurement Systems Analysis Webinar
-  APQP Process Capability and Control Webinar
-  APQP PPAP Overview Webinar

FREE information at <https://scmh.iagg.org/> Supply Chain Management Handbook [SCMH 7.2 Advanced Product Quality Planning \(APQP\) AS9145](#)

# Five APQP Phases

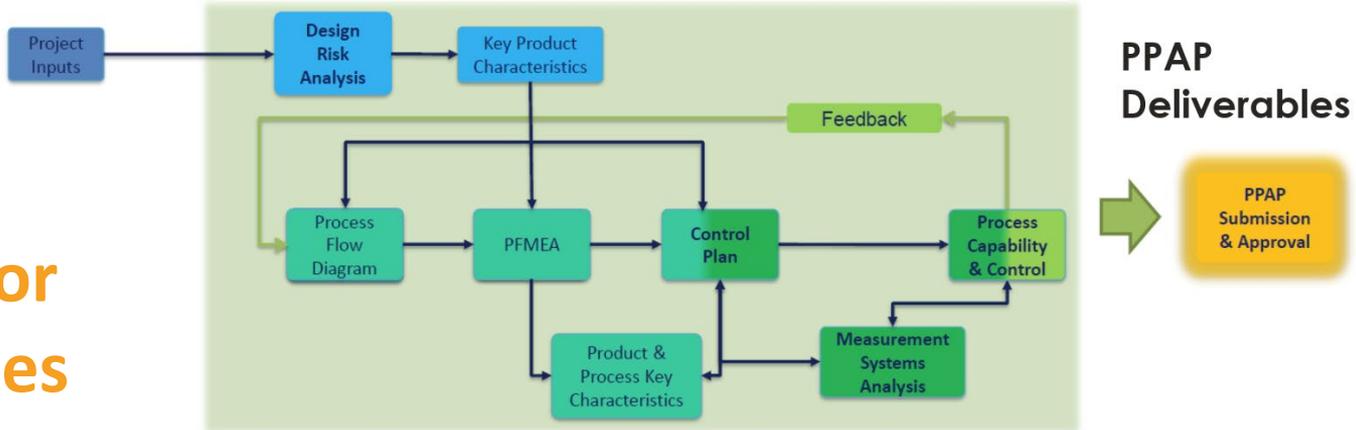


# APQP Relationship



To

# PPAP Elements or Deliverables



# PPAP Elements Aligned with APQP Phase

\* Only for companies which are responsible for product design

| PPAP ELEMENT   | APQP PHASE |
|--|------------|
| 1. Design Records*   | 2          |
| 2. Design Risk Analysis* (Design Failure Modes & Effects Analysis-DFMEA) | 2          |
| 3. Process Flow Diagram  | 3          |
| 4. PFMEA (Process Failure Modes & Effects Analysis)                      | 3          |
| 5. Control Plan  | 3          |
| 6. MSA (Measurement Systems Analysis – Gauge R&R Study)                  | 4          |
| 7. Initial Process Capability Studies                                    | 4          |
| 8. Packing, Preservation and Labeling Approvals                          | 3          |
| 9. FAIR (First Article Inspection Report)                                | 4          |
| 10. Customer Specific Requirements                                       | 4          |
| 11. PPAP Approval Form (or equivalent)                                   | 4          |

PPAP elements are evidence of APQP execution

# Aerospace PPAP versus Automotive PPAP

Fewer Requirements!

## Aerospace PPAP Deliverables

1. Design Records
2. Design Risk Analysis (DFMEA)
3. Process Flow Diagram
4. Process Failure Modes & Effects Analysis (PFMEA)
5. Control Plan
6. Measurement System Analysis Studies (GR&R)
7. Initial Process Capability Studies
8. Packing, Preservation and Labeling Approvals
9. First Article Inspection Report (FAIR)
10. Customer Specific PPAP Requirements
11. PPAP Approval Form (or Equivalent)

## Automotive PPAP Deliverables

1. Design Record
2. Engineering Change Documents
3. Customer Engineering Approval
4. Design FMEA
5. Process Flow Diagram
6. Process Failure Modes & Effects Analysis (PFMEA)
7. Control Plan
8. Measurement System Analysis Studies (GR&R)
9. Dimensional Results (same as FAIR)
10. Material, Performance Test Results
11. Initial Process Studies
12. Qualified Lab Documentation
13. Appearance Approval Report
14. Sample Product
15. Master Sample
16. Checking Aids
17. Records of Compliance with Customer Specific Requirements
18. Part Submission Warrant

# PPAP Strategies For Distributors

# 1

## Get a PPAP Waiver

Eliminate PPAP requirements with the customer. Try to explain it doesn't fully apply to a distributor, and get customer approval it isn't required.

# 2

## Charge a PPAP Fee

If the customer is insistent, try to charge extra fees to develop a PPAP. You may need to pay to have a dimensional layout performed as justification. The extra cost may dissuade them from needing a PPAP. This is not that uncommon.

# 3

## Do an Aerospace PPAP with Excluded Elements

Get acceptance to use the aerospace (AS9145) PPAP template. Get customer agreement to remove any PPAP deliverables that are not applicable for a distributor.

# Aerospace PPAP With Distributor Applicability

Fewer Requirements!

## Aerospace PPAP Deliverables

- 
- 1. Design Records
  - 2. Design Risk Analysis (DFMEA)
  - 3. Process Flow Diagram
  - 4. Process Failure Modes & Effects Analysis (PFMEA)
  - 5. Control Plan
  - 6. Measurement System Analysis Studies (GR&R)
  - 7. Initial Process Capability Studies
  - 8. Packing, Preservation and Labeling Approvals
  - 9. First Article Inspection Report (FAIR)
  - 10. Customer Specific PPAP Requirements
  - 11. PPAP Approval Form (or Equivalent)
- Not Applicable To Distributors**
- Should Not Apply To Distributors**

# Aerospace PPAP Template

## AS9145 (Aerospace Requirements for APQP and PPAP)

- APPENDIX D – PRODUCTION PART APPROVAL PROCESS APPROVAL FORM
- Purchased pdf

## <https://aesq.sae-itc.com/supplemental-material>

- PPAP Approval Form - AS13100 Aero Engine (Excel) – FREE download
  - Has additional elements, but modifications can be made to duplicate the AS9145 Form

## <https://bit.ly/APQP-PPAP-for-Distributors>

- Word file and Excel file – FREE download



## SCMH® has other PPAP element templates, just not the PPAP form

FREE information at <https://scmh.iaag.org/> Supply Chain Management Handbook  
[SCMH 7.2 Advanced Product Quality Planning \(APQP\) AS9145](#)



# PPAP APPROVAL

|                            |  |  |  |
|----------------------------|--|--|--|
| 1. Part Number:            |  | 6. Additional Changes:                 |  |
| 2. Part Name:              |  |  |  |
| 3. Part Revision Level:    |  |  |  |
| 4. Drawing Number:         |  | 7. Customer Purchasing Representative: |  |
| 5. Drawing Revision Level: |  | 8. Purchase Order Number:              |  |

## SUPPLIER INFORMATION

|  |                           |
|--|---------------------------|
| 9. Organization Name:                                    | 10. Supplier/Vendor Code: |
| 11. Address (Street, City, State, Country, Postal Code): | Country:                  |

12. Submission

Full Submission
  Initial Submission  
 Partial Submission
  Resubmission Reason: \_\_\_\_\_

| 13a. PPAP ELEMENTS PROVIDED |                          |                          |   | 13b. CUSTOMER PPAP ELEMENT ACCEPTANCE (Customer use only) |                          |                   |
|-----------------------------|--------------------------|--------------------------|---|---|--------------------------|-------------------|
| Yes                         | No                       | N/A                      | ELEMENT DESCRIPTION                                 | Yes   | No                       | CUSTOMER COMMENTS |
| <input type="checkbox"/>    | <input type="checkbox"/> |                          | 1. Design Records                                   | <input type="checkbox"/>                                  | <input type="checkbox"/> |                   |
| <input type="checkbox"/>    | <input type="checkbox"/> |                          | 2. Design Risk Analysis (e.g., DFMEA)               | <input type="checkbox"/>                                  | <input type="checkbox"/> |                   |
|                             | <input type="checkbox"/> | <input type="checkbox"/> | 3. Process Flow Diagram                             | <input type="checkbox"/>                                  | <input type="checkbox"/> |                   |
|                             | <input type="checkbox"/> | <input type="checkbox"/> | 4. Process FMEA                                     | <input type="checkbox"/>                                  | <input type="checkbox"/> |                   |
|                             | <input type="checkbox"/> | <input type="checkbox"/> | 5. Control Plan                                     | <input type="checkbox"/>                                  | <input type="checkbox"/> |                   |
| <input type="checkbox"/>    | <input type="checkbox"/> |                          | 6. Measurement System Analysis                      | <input type="checkbox"/>                                  | <input type="checkbox"/> |                   |
| <input type="checkbox"/>    | <input type="checkbox"/> |                          | 7. Initial Process Studies                          | <input type="checkbox"/>                                  | <input type="checkbox"/> |                   |
| <input type="checkbox"/>    | <input type="checkbox"/> |                          | 8. Packaging, Preservation, and Labelling Approvals | <input type="checkbox"/>                                  | <input type="checkbox"/> |                   |
| <input type="checkbox"/>    | <input type="checkbox"/> |                          | 9. First Article Inspection Report                  | <input type="checkbox"/>                                  | <input type="checkbox"/> |                   |
| <input type="checkbox"/>    | <input type="checkbox"/> |                          | 10. Customer Specific PPAP Requirements             | <input type="checkbox"/>                                  | <input type="checkbox"/> |                   |

*Note: "No" selections in Section 13a require an Action Plan item documented in Section 14 below*

*Note: "No" selections in Section 13a require an Action Plan item documented in Section 14 below*

| 14. Action Plan | Element # | Target Date |
|-----------------|-----------|-------------|
|                 |           |             |
|                 |           |             |
|                 |           |             |
|                 |           |             |
|                 |           |             |
|                 |           |             |
|                 |           |             |
|                 |           |             |
|                 |           |             |

**15. Declaration**

I, the supplier, submit this PPAP Approval form as declaration of having met all applicable requirements of the 9145 [standard](#), except as noted above, including having implemented the requirements at the sub-tier level where applicable. I further certify that our production process meets all defined product delivery, engineering and quality requirements. I understand that the approval of this form by the customer does not release me from responsibility or liability for any non-conformances.

Clearly Print Name and Sign \_\_\_\_\_ Title \_\_\_\_\_ Email Address \_\_\_\_\_ Date \_\_\_\_\_

**16. Customer Use Only**

Approved       Interim Approval       Rejected

Comments \_\_\_\_\_

Customer Authorization: Clearly Print Name and Sign \_\_\_\_\_ Title \_\_\_\_\_ Email Address \_\_\_\_\_ Date \_\_\_\_\_

# PPAP Elements



## 1. Design Records

- **Not Applicable**

- Mark “N/A” on the PPAP Approval Form because we are a distributor and do not have responsibility for design

## 2. Design Risk Analysis (e.g., DFMEA)

- **Not Applicable**

- Mark “N/A” on the PPAP Approval Form because we are a distributor and do not have responsibility for design

# PPAP Elements

## 3. Process Flow Diagram

- From receiving of product to shipment of product
- The flow may have more detail for serviceable parts, inspection steps, etc.
- [SCMH](#)® has a free template that is tailored for more detailed processes, but can be used for a distributor [SCMH-7.2.9-Process-Flow-Diagram-Template](#)
- <https://bit.ly/APQP-PPAP-for-Distributors>



Populated example

| Doc (Line) # | Process Step | Process Description             | Operation | Setup | Move | Store | Inspect/Test | Other (Specify) | Rework |
|--------------|--------------|---------------------------------|-----------|-------|------|-------|--------------|-----------------|--------|
|              |              |                                 | ○         | ◻     | ⇒    | ▽     | □            | ●               | ⚠      |
| 1            | 10           | Receiving                       | ○         |       |      |       |              |                 |        |
| 2            | 11           | Receiving Inspection            |           |       |      |       | □            |                 |        |
| 3            |              | Move                            |           |       | ⇒    |       |              |                 |        |
| 4            | 20           | Warehouse                       |           |       |      | ▽     |              |                 |        |
| 5            | 21           | Optional Kitting                | ○         |       |      |       |              |                 |        |
| 6            | 22           | Optional Splitting              | ○         |       |      |       |              |                 |        |
| 7            | 23           | Optional Packaging              | ○         |       |      |       |              |                 |        |
| 8            | 25           | Optional Outside Repair Station | ○         |       |      |       |              |                 |        |
| 9            |              | Move                            |           |       | ⇒    |       |              |                 |        |
| 10           | 29           | Shipment Inspection             |           |       |      |       | □            |                 |        |
| 11           | 30           | Shipment                        | ○         |       |      |       |              |                 |        |
| 12           |              |                                 |           |       |      |       |              |                 |        |

# PPAP Elements



## 4. Process FMEA (Failure Modes & Effects Analysis)

- From receiving of product to shipment of product, matching identically the steps in the process flow diagram
- [SCMH](#)<sup>®</sup> has a free template ([SCMH-7.2.11-PFMEA-Template](#))
- <https://bit.ly/APQP-PPAP-for-Distributors>
  - Populated distributor example of a PFMEA





| Process Step | Process Description | Requirements                            | Potential Failure Mode   | Potential Effect(s) of Failure   | SEV | Potential Cause(s) of Failure  |
|--------------|---------------------|---|--|--|-----|--|
| 10           | Receiving           | Parts meet spec                         | Incorrect Parts Received - do not match the order                              | Delays in shipments, potential safety issues if incorrect parts are passed on to customer. | 9   | Supplier error, incorrect order entry, or mislabeling.                         |
| 10           | Receiving           | Parts meet spec                         | Damaged Parts  | Increased costs due to replacements, delays in shipments, and potential safety risks       | 9   | Inadequate packaging, rough handling, or transportation issues                 |
| 10           | Receiving           | Complete documentation and traceability | Missing Documentation  | Delays in receiving process, inability to verify part authenticity, and compliance issues  | 9   | Supplier oversight, miscommunication, or administrative errors.                |
| 10           | Receiving           | Correct quantity                        | Incorrect Quantity   | Shipment delays, inventory discrepancies   | 7   | Supplier error, miscounting, or order entry mistakes                           |
| 10           | Receiving           | Correct parts meeting spec              | Incorrect Part Identification - Parts are mislabeled or incorrectly identified | Use of incorrect parts to customer, potential safety risks                                 | 10  | Supplier error, labeling mistakes, or administrative errors, counterfeit parts |

## PFMEA - Severity

The team should agree on the criteria and ranking values. Select one way and consistently apply that scale.

| References  | Modified from J1739 / AS13004  |         |   |   |
|---|--|---------|---|---|
| Effect  | Severity of Effect on Product (Customer Effect)  | Ranking | Category  | Severity of Effect on Process (Manufacturing / Assembly Effect)   |
| Failure to meet safety and/or regulatory requirements | Potential failure mode affects safe operation and/or involves noncompliance with regulations without warning   | 10      | Failure to meet safety and/or regulatory requirements | May endanger operator, machine or assembly without warning.   |
|   | Potential failure mode affects safe operation and/or involves noncompliance with regulations with warning  | 9       |   | May endanger operator, machine or assembly with warning.  |
| Loss or degradation of primary function               | Loss of primary function (product inoperable, does not affect safe operation)  | 8       | Major disruption                                      | 100% of product may have to be scrapped. Line shutdown or stop ship.  |
|   | Degradation of primary function (product operable, but at a reduced level of performance)  | 7       | Significant disruption                                | A portion of the production run may have to be scrapped. Deviation from primary process; decreased line speed or added manpower). |
| Loss or degradation of secondary function             | Loss of secondary function (product operable but service life greatly reduced, convenience item(s) inoperable, customer dissatisfied)                | 6       | Moderate disruption                                   | 100% of production run may have to be reworked off line and accepted  |
|   | Degradation of secondary function (product operable but appearance affected, convenience item(s) operable at a reduced level, customer dissatisfied. | 5       |   | A proportion of the production run may have to be reworked off line and accepted  |
| Annoyance   | Appearance, fit and finish type items do not conform, defect noticed by most of the customers (>75%)   | 4       | Moderate disruption                                   | 100% of production run may have to be reworked in station before it is processed.   |
|   | Appearance, fit and finish type items do not conform, defect noticed by about half of the customers (50%)  | 3       |   | A proportion of the production run may have to be reworked in station before it is processed.                                     |
|   | Appearance, fit and finish type items do not conform, defect noticed by discriminating customers (<25%)  | 2       | Minor disruption                                      | Slight inconvenience to process, operation or operator.   |
| No effect   | No discernible effect  | 1       | No effect   | No discernible effect   |

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| Potential Failure Mode   | Potential Effect(s) of Failure   | SEV | Potential Cause(s) of Failure  | Current Prevention Controls  | OCC |
|--|--|-----|--|--|-----|
| Incorrect Parts Received - do not match the order                              | Delays in shipments, potential safety issues if incorrect parts are passed on to customer. | 9   | Supplier error, incorrect order entry, or mislabeling.                         | Purchase order verification system with part number and requirements. Use barcode scanning and automated matching of received parts to purchase orders.                                  | 3   |
| Damaged Parts  | Increased costs due to replacements, delays in shipments, and potential safety risks       | 9   | Inadequate packaging, rough handling, or transportation issues                 | Ensure proper packaging standards are communicated to suppliers  | 2   |
| Missing Documentation  | Delays in receiving process, inability to verify part authenticity, and compliance issues  | 9   | Supplier oversight, miscommunication, or administrative errors.                | Establish a checklist for required documentation. Use electronic document management systems to track and verify documents. Communicate documentation requirements clearly to suppliers. | 4   |
| Incorrect Quantity   | Shipment delays, inventory discrepancies   | 7   | Supplier error, miscounting, or order entry mistakes                           | Purchase order verification system with part number and quantity. Use barcode scanning and automated matching of received parts to purchase orders.                                      | 3   |
| Incorrect Part Identification - Parts are mislabeled or incorrectly identified | Use of incorrect parts to customer, potential safety risks                                 | 10  | Supplier error, labeling mistakes, or administrative errors, counterfeit parts | Purchase order verification system with part number and requirements. Use barcode scanning and automated matching of received parts to purchase orders. Counterfeit Parts training.      | 3   |

## PFMEA - Occurrence

The team should agree on the criteria and ranking values. Select one way and consistently apply that scale

| References | J1739                 | AS13004                       |                             |             |                              | AIAG FMEA - 4th Edition             | J1739                               |
|------------|-----------------------|-------------------------------|-----------------------------|-------------|------------------------------|-------------------------------------|-------------------------------------|
| Ranking    | Likelihood of Failure | Low volume production         |                             | Process PPM | Time-Based Example           | High volume production              |                                     |
|            |                       | Likelihood of Cause           | Time-Based Example          |             |                              | Likelihood of Cause                 | Incidents per item/unit             |
| <b>10</b>  | Very High             | 100% of production            | ≥1 per occurrence per shift | 500,000     | ≥ 1 per occurrence per shift | 1 in 10                             | ≥ 100 per thousand                  |
| <b>9</b>   | High                  | 50% of production             | ≥1 per occurrence per day   | 50,000      | ≥ 1 per occurrence per day   | 1 in 20                             | 50 per thousand                     |
| <b>8</b>   |                       | 20% of production             | ≥1 per 2-3 days             | 20,000      | ≥1 per 2-3 days              | 1 in 50                             | 20 per thousand                     |
| <b>7</b>   |                       | 10% of production             | ≥1 per week                 | 10,000      | ≥ 1 per week                 | 1 in 100                            | 10 per thousand                     |
| <b>6</b>   |                       | 5% of production              | 1 per month                 | 5,000       | ≥1 per 2 weeks               | 1 in 500                            | 2 per thousand                      |
| <b>5</b>   | Moderate              | 0.5% of production            | 2 per year                  | 1,000       | ≥1 per quarter               | 1 in 2,000                          | .5 per thousand                     |
| <b>4</b>   |                       | 0.1% of production            | 1 per year                  | 100         | ≥1 per half year             | 1 in 10,000                         | .1 per thousand                     |
| <b>3</b>   | Low                   | 0.05% of production           | 1 per 5 years               | 10          | ≥1 per year                  | 1 in 100,000                        | .01 per thousand                    |
| <b>2</b>   |                       | 0.01% of production           | 1 per 10 years              | 1           | <1 per year                  | 1 in 1,000,000                      | ≤.001 per thousand                  |
| <b>1</b>   | Very Low              | Less than 0.01% of production | <1 per 10 years             | zero        | Never                        | eliminated thru preventive controls | eliminated thru preventive controls |



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Process Failure Mode and Effects Analysis

| Doc # | Process Step | Process Description   | Requirements                                       | 1<br>Potential Failure Mode  | 3<br>Potential Effect(s) of Failure  | SEV | 2<br>Potential Cause(s) of Failure   | Current Prevention Controls   | OCC | Current Detection Controls   | DET | SEV * OCC | RPN |
|-------|--------------|-----------------------|--|--|--|-----|--|---|-----|--|-----|-----------|-----|
| 1     | 10           | Receiving             | Parts meet spec                                    | Incorrect Parts Received - do not match the order                              | Delays in shipments, potential safety issues if incorrect parts are passed on to customer. | 9   | Supplier error, incorrect order entry, or mislabeling.                         | Purchase order verification system with part number and requirements. Use barcode scanning and automated matching of received parts to purchase orders.                                     | 3   | Visual Inspection. Bar code system with warehouse management system. Documents with parts.   | 3   | 27        | 81  |
| 2     | 10           | Receiving             | Parts meet spec                                    | Damaged Parts  | Increased costs due to replacements, delays in shipments, and potential safety risks       | 9   | Inadequate packaging, rough handling, or transportation issues                 | Ensure proper packaging standards are communicated to suppliers   | 2   | Visual inspections in receiving, the warehouse and at shipping   | 7   | 18        | 126 |
| 3     | 10           | Receiving             | Complete documentation and traceability            | Missing Documentation  | Delays in receiving process, inability to verify part authenticity, and compliance issues  | 9   | Supplier oversight, miscommunication, or administrative errors.                | Establish a checklist for required documentation. Use electronic document management systems to track and verify documents. Communicate documentation requirements clearly to suppliers.    | 4   | Visual Inspections with warehouse management system  | 7   | 36        | 252 |
| 4     | 10           | Receiving             | Correct quantity                                   | Incorrect Quantity   | Shipment delays, inventory discrepancies   | 7   | Supplier error, miscounting, or order entry mistakes                           | Purchase order verification system with part number and quantity. Use barcode scanning and automated matching of received parts to purchase orders.   | 3   | Visual Inspection. Bar code system with warehouse management system.   | 3   | 21        | 63  |
| 5     | 10           | Receiving             | Correct parts meeting spec                         | Incorrect Part Identification - Parts are mislabeled or incorrectly identified | Use of incorrect parts to customer, potential safety risks                                 | 9   | Supplier error, labeling mistakes, or administrative errors, counterfeit parts | Purchase order verification system with part number and requirements. Use barcode scanning and automated matching of received parts to purchase orders.                                     | 3   | Visual Inspection. Bar code system with warehouse management system.   | 3   | 27        | 81  |
| 6     | 20           | Warehousing / Storage | Special storage requirements                       | Improper Storage Conditions (e.g., temperature, humidity)                      | Parts degradation, reduced lifespan, and potential safety issues                           | 9   | Inadequate storage facilities, lack of proper procedures, or human error       | Controlled storage environments with temperature and humidity monitoring systems. Use appropriate storage solutions (e.g., climate-controlled areas for sensitive parts).                   | 2   | Visual inspection for correct storage location if not properly entered in the WMS. Monitoring and recording of temperature and humidity with visual checks daily. Alarms when limits exceeded. | 5   | 18        | 90  |
| 7     | 20           | Warehousing / Storage | Safeguard and protect parts in storage (incl. FOD) | Damage during storage  | Increased costs due to replacements, delays in orders, and potential safety risks          | 9   | Poor handling, inadequate storage solutions, or environmental factors          | Use proper storage equipment (e.g., shelving, racks) designed to prevent damage. Implement handling procedures and train staff on careful handling techniques.                              | 3   | Visual inspections in the warehouse and at shipping  | 7   | 27        | 189 |
| 8     | 20           | Warehousing / Storage | Accurate storage location                          | Misplacement of parts, incorrect storage locations                             | Delays in locating parts, increased labor costs, and inefficiencies in order fulfillment   | 4   | Human error, lack of proper labeling, or disorganized storage systems          | Use a standardized labeling and location system (e.g., barcode or RFID). Warehouse management system (WMS) to track part locations. Train staff on proper storage and retrieval procedures. | 2   | Visual Inspection. Bar code system with warehouse management system.   | 3   | 8         | 24  |

# Detection

## PFMEA - Detection

The team should agree on the criteria and ranking values. Select one way and consistently apply that scale.

| References | Modified from J1739 / AS13004                         |  | Mistake-proofed | Gauged | Manual Inspection     |   |   |
|------------|---|--|-----------------|--------|-----------------------|---|---|
| Ranking    | Likelihood of Detection by Process Control - Category | Likelihood of Detection by Process Control - Criteria  |                 |        |                       |   |   |
| <b>10</b>  | Absolute Uncertainty                                  | No current process control; Cannot detect or compliance analysis is not performed.   |                 |        | 100% Human Inspection |   |   |
| <b>9</b>   | Difficult to Detect                                   | Defect (Failure Mode) and/or Error (Cause) in not easily detected (e.g. Random audits).  |                 |        |                       |   |   |
| <b>8</b>   | Defect Detection Post Processing                      | Defect (Failure Mode) detection post-processing by operator through visual/tactile/audible means with no boundary samples.   |                 |        |                       |   |   |
| <b>7</b>   | Defect Detection at Source                            | Defect (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.) with no boundary samples.   |                 |        |                       |   |   |
| <b>6</b>   | Defect Detection Post Processing                      | Defect (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.) with boundary samples.   |                 |        |                       |   |   |
| <b>5</b>   | Defect Detection at Source                            | Defect (Failure Mode) or Error (Cause) detection in-station by operator through use of variable gauging or by automated controls that will detect discrepant part and notify operator (light, busser, etc.). Gauging performed on setup and first-piece check (for setup causes only). |                 |        |                       |   |   |
| <b>4</b>   | Defect Detection Post Processing                      | Defect (Failure Mode) detection post-processing by automated controls that will detect discrepant part and lock part to prevent further processing.  |                 |        |                       | Controls in place for mistake proofing the assembly | Manual gauging is used on every part                    |
| <b>3</b>   | Defect Detection at Source                            | Defect (Failure Mode) detection in-station by automated controls that will detect discrepant part and automatically lock part in station to prevent further processing.  |                 |        |                       |   |   |
| <b>2</b>   | Error Detection and/or Defect Prevention              | Error (Cause) detection in-station by automated controls that will detect error and prevent discrepant part from being made.   |                 |        |                       |   | Automatic gauging or controls to detect discrepant part |
| <b>1</b>   | Detection not applicable                              | Error (Cause) prevention as a result of fixture design, machine design or part design.   |                 |        |                       |   |   |



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# Missing ESD, kitting, splitting, what else?

| Doc (Line) # | Process Step | Process Description   | Prevention Controls   | OCC | Current Detection Controls   | DET | SEV * OCC   | RPN |    |     |
|--------------|--------------|-----------------------|---|-----|--|-----|---|-----|----|-----|
| 9            | 20           | Warehousing / Storage | Correct quantity of parts<br>Inventory records do not accurately reflect the actual stock levels<br>Stockouts, overstocking, and difficulties in fulfilling orders  | 4   | Human error, outdated systems, or lack of regular audits<br>Implement a warehouse management system (WMS) to streamline retrieval processes. Conduct regular inventory audits and cycle counts. Train staff on accurate data entry, inventory management procedures.                             | 3   | Visual Inspection. Bar code system with warehouse management system.                            | 3   | 12 | 36  |
| 10           | 20           | Warehousing / Storage | Secured warehouse access<br>Security breaches leading to theft or tampering<br>Loss of valuable parts, compromised safety, and financial losses   | 6   | Inadequate security measures, lack of surveillance, or poor access control<br>Installed security systems, including surveillance cameras and access control measures. Conduct regular security audits and risk assessments. Train staff on security protocols and emergency response procedures. | 4   | Security system with controlled access records and camera recordings. Real time monitoring.     | 6   | 24 | 144 |
| 11           | 20           | Warehousing / Storage | Efficient layout and storage solutions<br>Inefficient space utilization - not used efficiently, leading to clutter and reduced accessibility<br>Reduced operational efficiency, increased labor costs, and potential safety hazards   | 3   | Poor layout design, lack of proper storage solutions, or inadequate planning<br>Optimize warehouse layout for efficient space utilization and accessibility. Use vertical storage solutions and modular shelving systems.  | 3   | Visual inspection for improper storage and clutter.   | 8   | 9  | 72  |
| 12           | 30           | Shipping              | Correct parts meeting spec<br>Incorrect Parts Shipped<br>Delays in aircraft maintenance, potential safety risks, customer dissatisfaction   | 9   | Human error, incorrect labeling, miscommunication<br>Automated WMS/IMS and barcode scanning systems. Training on parts ID and shipping procedures.   | 2   | Visual Inspection in shipping   | 8   | 18 | 144 |
| 13           | 30           | Shipping              | Undamaged parts<br>Packaging Issues<br>Potential damage to parts, potential safety risks, customer dissatisfaction  | 9   | Inadequate protection, incorrect packaging materials, failure to follow packaging guidelines<br>Train employees and adhere to ATA Specification 300 or equivalent.   | 3   | Visual Inspection in shipping   | 8   | 27 | 216 |
| 14           | 30           | Shipping              | Undamaged parts<br>Damage during shipping<br>Parts unusable upon arrival, increased costs due to replacements, delays in service  | 8   | Inadequate packaging, rough handling, environmental factors<br>Train staff on proper handling techniques. Use secure packaging methods (ATA Specification 300).  | 3   | Visual Inspection in shipping   | 8   | 24 | 192 |
| 15           | 30           | Shipping              | Shipment arrives at its destination<br>Lost Shipments<br>Delays in delivery, increased costs, customer dissatisfaction  | 7   | Incorrect address, carrier issues, theft<br>Implement address verification processes to ensure accuracy. Obtain insurance coverage to protect against losses   | 1   | Visual Inspection in shipping   | 8   | 7  | 56  |
| 16           | 30           | Shipping              | Complete documentation and traceability records<br>Missing, incomplete or incorrect paperwork (8130, CoC, MSDS, PL, trace docs, etc.)<br>Parts may be rejected upon arrival, delays, potential safety risks, customer dissatisfaction | 9   | Human error, miscommunication, inadequate training<br>Automated systems to generate and verify documentation. Provide training on documentation requirements and procedures.   | 2   | Visual inspection, Quality control checks to verify the accuracy and completeness of paperwork. | 7   | 18 | 126 |

# PPAP Elements

## 4. Process FMEA (Failure Modes & Effects Analysis)



| RPN | Classification | Recommended Action(s) | Responsibility | Target Date | Actions Taken & Results | Actual Completion Date | Action Result SEV | Action Result OCC | Action Result DET | Action Result RPN |
|-----|----------------|-----------------------|----------------|-------------|-------------------------|------------------------|-------------------|-------------------|-------------------|-------------------|
| 81  |                |                       |                |             |                         |                        |                   |                   |                   | 0                 |
| 126 |                |                       |                |             |                         |                        |                   |                   |                   | 0                 |
| 252 |                |                       |                |             |                         |                        |                   |                   |                   | 0                 |
| 63  |                |                       |                |             |                         |                        |                   |                   |                   | 0                 |
| 81  |                |                       |                |             |                         |                        |                   |                   |                   | 0                 |
| 90  |                |                       |                |             |                         |                        |                   |                   |                   | 0                 |

# PPAP Elements



## 4. Control Plan

- From receiving of product to shipment of product, matching identically the steps in the process flow diagram
- [SCMH](#)<sup>®</sup> has a free template ([SCMH-7.2.13-Control-Plan-Template](#))
- <https://bit.ly/APQP-PPAP-for-Distributors>
  - Populated distributor example of a Control Plan



# 5. Control Plan

| Process Step | Process Description   | Machine, Device, Jig, Tools For Mfg.        | Characteristics |                     |                              |                | Methods   |                                      |  |   |   | Reaction Plan   |
|--------------|-----------------------|---|-----------------|---------------------|------------------------------|----------------|---|--------------------------------------|--|---|---|---|
|              |                       |   | Reference       | Product             | Process                      | Classification | Product / Process Specification/ Tolerance                | Evaluation Measurement Technique     | Sample                                 |   | Control Method  |   |
|              |                       |   |                 |                     |                              |                |   |                                      | Size                                   | Frequency                                     |   |   |
| 10           | Receiving             | WMS   | 10.1            | Part Number         |                              |                | Purchase Order WMS  | Bar code-WMS, Visual                 | each part                              | 100%  | Inspection per Receiving Inspection Procedure                                   | Notify manager & purchasing, Nonconformance Procedure |
| 10           | Receiving             | WMS   | 10.2            | Serial Number       |                              |                | Purchase Order WMS  | Bar code-WMS, Visual                 | each part                              | 100%  | Inspection per Receiving Inspection Procedure                                   | Notify manager & purchasing, Nonconformance Procedure |
| 10           | Receiving             | WMS   | 10.3            | Quantity            |                              |                | Purchase Order WMS  | Bar code-WMS, Visual                 | each part                              | 100%  | Inspection per Receiving Inspection Procedure                                   | Notify manager & purchasing, Nonconformance Procedure |
| 10           | Receiving             | WMS   | 10.4            | Damage              |                              |                | Purchase Order WMS  | Visual                               | each part                              | 100%  | Inspection per Receiving Inspection Procedure                                   | Notify manager & purchasing, Nonconformance Procedure |
| 10           | Receiving             | WMS   | 10.5            |                     | Documentation                |                | Purchase Order WMS, AC 00-56 App                          | Doc Scan, Visual                     | each part                              | 100%  | Inspection per Receiving Inspection Procedure                                   | Notify manager & purchasing, Nonconformance Procedure |
| 20           | Warehousing / Storage | HVAC system                                 | 20.1            |                     | Environmental control        |                | Temp/Humidity control (60°F to 75°F, 30% to 50%)          | temperature and humidity data logger | continual reporting<br>once            | 24/7<br>at shift start                        | Inspection of records and current readings per Environmental Controls Procedure | Notify manager, Nonconformance Procedure              |
| 20           | Warehousing / Storage | ESD workstation and ESD testers             | 20.2            |                     | ESD control                  |                | Electronic products, PCBs and electronic assemblies       | ESD workstations, ESD testers        | once                                   | at first use and after each break while using | ESD procedure and tracking checksheet   | Notify manager, Nonconformance Procedure              |
| 20           | Warehousing / Storage | Forklifts, storage racks, shelving, pallets | 20.3            | Damage (FOD)        | racking, movement, transport |                | No damage (or FOD)  | Visual                               | each part<br>each carton/<br>container | 100%<br>100%                                  | Material Handling Procedure   | Notify manager, Nonconformance Procedure              |
| 30           | Shipping              | WMS   | 30.1            | Part Number         |                              |                | Purchase Order WMS  | Bar code-WMS, Visual                 | each part                              | 100%  | Inspection per Shipping Procedure   | Notify manager, Nonconformance Procedure              |
| 30           | Shipping              | WMS   | 30.2            | Quantity            |                              |                | Purchase Order WMS  | Bar code-WMS, Visual                 | each part                              | 100%  | Inspection per Shipping Procedure   | Notify manager, Nonconformance Procedure              |
| 30           | Shipping              | WMS, label machine                          | 30.3            | Label and packaging |                              |                | Per customer spec, ATA Specification 300, WMS             | Bar code-WMS, Visual                 | each package                           | 100%  | Inspection per Shipping Procedure   | Notify manager, Nonconformance Procedure              |
| 30           | Shipping              | WMS   | 30.4            | Damage              |                              |                | No damage (or FOD)  | Visual                               | each part<br>each carton/<br>container | 100%<br>100%                                  | Inspection per Shipping Procedure   | Notify manager, Nonconformance Procedure              |
| 30           | Shipping              | WMS   | 30.5            |                     | Documentation                |                | Correct and complete paperwork per AC 00-56 App (0120 CoC | WMS, visual                          | each part                              | 100%  | Inspection per Shipping Procedure   | Notify manager, Nonconformance Procedure              |

Missing kitting, splitting, what else?

# PPAP Elements

## 6. Measurement System Analysis (Gauge R&R Studies)

- Anywhere in the control plan where there is a measurement device used to measure a product characteristic, there must be a Measurement System Analysis performed (Gauge R&R study)

### MSA Records

- **Not Applicable**
- Mark “N/A” on the PPAP Approval Form because we are a distributor that does not perform any measurement on parts.

**Most distributors are not measuring part dimensions,  
or using go/no-go, pass/fail gauges**

If you are:

FREE information at <https://scmh.iaqg.org/> Supply Chain Management Handbook  
[SCMH 3.11 Measurement System Analysis \(MSA\)](#)



# PPAP Elements



## 7. Initial Process Studies

- **Not Applicable**
- Mark “N/A” on the PPAP Approval Form because we are a distributor and do not have manufacturing responsibility. Additional justification is below.
  - The initial process capability studies are the responsibility of the manufacturer. As a distributor, your role is to supply parts rather than manufacture them. PPAP requirements, including initial process capability studies, are typically designed for manufacturers to ensure their production processes can consistently produce parts that meet specifications.
  - Initial process capability studies are intended to assess the stability and capability of a manufacturing process over a significant production run. For distributors selling only one or two parts, conducting such studies is impractical and unnecessary since there is no ongoing production process to evaluate. A typical quantity for establishing process capability is at least 25 parts.

<https://aesq.sae-itc.com/supplemental-material>

# PPAP Elements



## 8. Packaging, Preservation, and Labeling Approvals

- **Not Applicable**
- Mark “N/A” on the PPAP Approval Form because customer approval is not required. Customers are specifying compliance with ATA Specification 300 or equivalent, or distributors are utilizing the packaging and labeling that was received with the part.

[SCMH<sup>®</sup>](#) has a free template ([SCMH-7.2.20-Packaging-Preservation-Labeling-Approval-Form-Template](#))

# PPAP Elements

## 9. First Article Inspection Report (FAI or FAIR)

- **Not Applicable**
- Mark “N/A” on the PPAP Approval Form because we are a distributor and do not have manufacturing responsibility. Additional justification is below.
  - The purpose of the FAI is to provide objective evidence, based on an assessment of the first production article produced during the initial production run, that all engineering, design, and specification requirements are correctly understood, accounted for, recorded, verified, and fulfilled.
  - First Article Inspection is a complete, independent, and documented physical and functional inspection process to verify that prescribed production processes have produced an acceptable item as specified by engineering drawings, purchase order, engineering specifications, and/or other applicable design documents. This element must comply with the requirements of **Aerospace Standard 9102** when contractually required by the customer.



# PPAP Elements

## 10. Customer Specific PPAP Requirements

- **Not Applicable**
- Mark “N/A” on the PPAP Approval Form because we are a distributor and do not have additional Customer Specific PPAP Requirements.
  - The Customer may specify activities and/or artifacts that exceed those required in AS9145. These items are referred to as Customer Specific (PPAP) Requirements in the PPAP submission.



# Summary



## Understanding APQP and PPAP

- Relevance of APQP and PPAP for aircraft parts distributors

## PPAP Strategies for Distributors

1. Obtain Waiver from PPAP
  - a) Charge a PPAP fee
2. Perform an AS9145 style PPAP
  - a) Get customer approvals for those elements that are Not Applicable
  - b) PPAP Approval Form with as many exclusions as possible

## Element Strategies for Distributors

- Templates with examples for a Process Flow Diagram, PFMEA, and Control Plan

## Resources, Tools, and Templates for PPAP

- <https://bit.ly/APQP-PPAP-for-Distributors>  
Distributor-centric examples for use – FREE download



# Thank you!

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866-827-0402 ext 201



simpleQuE.com

<https://bit.ly/APQP-PPAP-for-Distributors> for all APQP examples. Free download.

