Overview of Production Part Approval Process "PPAP"

Factor Quality, Inc.

Purpose of the PPAP

- To determine if the supplier understands all customer requirements and if the production process has the potential to produce product that meets requirements.
- To develop thorough understanding of the manufacturing process of a component
    - Develop confidence
    - Control costs
    - Maintain a high level of quality

PPAP is widely used in the automotive industry but some other industries have adopted some of its practices (i.e. electronics, aerospace)

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What is a PPAP?

- Simply put the output of the PPAP is a series of documents/reports that provide the evidence that the supplier has met or exceeded the customer requirements and the process is capable of consistently reproducing quality parts.
- A full PPAP normally has 18 sections per the AIAG PPAP manual (4th Edition)
- Not all requirements are required per approval –"submission"
- There are 5 submissions levels

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When is A PPAP Submission Required

The supplier shall obtain full approval from the customer product approval activity for:

1. A new part or product (i.e., a specific part, material, or color not previously supplied to the specific customer).
2. The correction of a discrepancy on a previously submitted part.
3. When product is modified by an engineering change to design records, specifications, or materials.
4. Any significant change to the production process (per customer requirements).
5. Upon Customer request.

NOTE: If there is any question concerning the need for production part approval, contact the responsible customer product approval activity.

PPAP Submission Levels

LEVEL	REQUIREMENTS
Level 1	Warrant only submitted to the customer
Level 2	Warrant with Customer samples and limited supporting data
Level 3	Warrant, Customer samples and complete supporting data
Level 4	Warrant and requirements as defined by the customer
Level 5	Warrant, customer samples and complete supporting data available for review at the supplier’s manufacturing location

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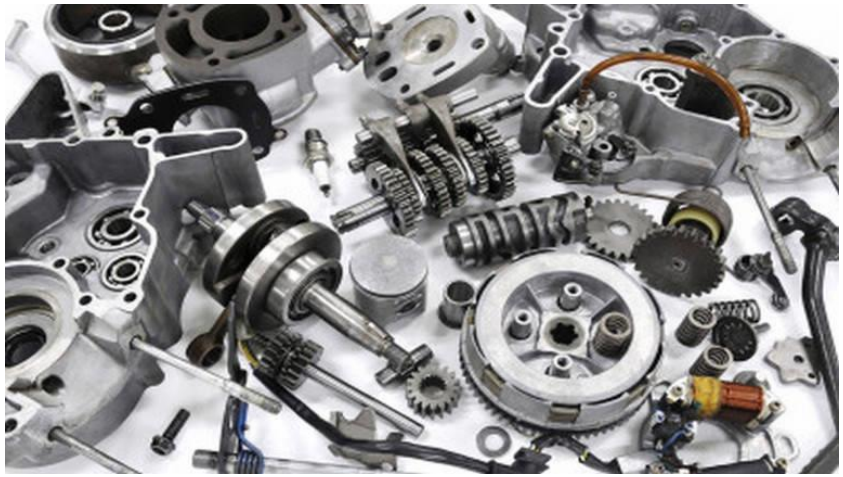
How to perform a PPAP

- Product and data for **PPAP** shall be taken from a significant/representative production run.
- This run shall be manufactured at the production site using the tooling, gauging, process, materials, and operators from the production environment.
- Parts from each unique production process, e.g. duplicate assembly line and/or work cell, each position of a multiple cavity die, mold, tool or pattern, shall be measured and representative parts tested.
- This production run shall be from one hour to eight hours of production, and with the specific production quantity to total a minimum of 300 **consecutive** parts, unless otherwise specified by the customer.

PPAP Elements



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PPAP Elements

1. Design Records: A printed copy of drawing needs to be provided. If the customer is responsible for the design, this is a copy of customer drawing(s) that is sent together with the Purchase Order (PO). If supplier is responsible for designing this is a released drawing in supplier's release system. "Each and every feature must be “ballooned” or “road mapped” to correspond with the inspection results (including print notes, standard tolerance notes and specifications, and anything else relevant to the design of the part). Material composition information is required to supply evidence that the material used manufacture the parts meets the customer’s specific requirements.

PPAP Elements

2. Engineering Change Documentation: If the PPAP is being required due to a request for a change to a part or product, the documentation requesting and approving the change must be included in the PPAP package. This documentation usually consists of a copy of the Engineering Change Notice (ECN), but it may be covered by the customer PO or any other engineering authorization.
3. Engineering Approval: This approval is usually the Engineering trial with production parts performed at the customer plant. A "temporary deviation" usually is required to send parts to customer before PPAP. Customer may require other "Engineering Approvals".

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PPAP Elements

4. Design Failure Mode and Effect Analysis (DFMEA): A copy of DFMEA, reviewed and signed-off by supplier and customer. If customer is design responsible, usually customer may not share this document with the supplier. However, the list of all critical or high impact product characteristics should be shared with the supplier, so they can be addressed on the PFMEA and Control Plan.
5. Process Flow Diagram: A copy of the Process Flow, indicating all steps and sequence in the fabrication process, starting at incoming components thru shipping

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PPAP Elements

6. Process Failure Mode and Effect Analysis (PFMEA): A copy of PFME), reviewed and signed-off by supplier and customer. The PFMEA follows the Process Flow steps, and indicates "what could go wrong" during the fabrication and assembly of each component.
7. Control Plan: A copy of the Control Plan, reviewed and signed-off by supplier and customer. The Control Plan follows the PFMEA steps, and provides more details on how the "potential issues" are checked in the incoming quality, assembly process or during inspections of finished products.

PPAP Elements

8. Measurement System Analysis Studies (MSA): MSA usually contains a gauge study (typical-Gauge R&R) for the critical or high impact characteristics, and a confirmation that gauges used to measure these characteristics are calibrated.
9. Dimensional Results: A list of every dimension noted on the ballooned drawing. This list shows the product characteristic, specification, the measurement results and the assessment showing if this dimension is "ok" or "not ok". Usually at least 30 pieces are selected.

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PPAP Elements

10. Records of Material/Performance Tests: A summary of every test performed on the part. This summary is usually on a form of DVP&R (Design Verification Plan and Report), which lists each individual test, when it was performed, the specification, results and the assessment pass/fail. In addition, this section lists all material certifications (steel, plastics, plating, etc.), as specified on the print. The material certification shall show compliance to the specific requirement on the drawing or specification.

PPAP Elements

11. Initial Process Study: Usually this section shows all Statistical Process Control charts affecting the most critical characteristics. The intent is to demonstrate that critical processes have stable variability and that is running near the intended nominal value.
12. Qualified Laboratory Documentation: Copy of all laboratory certifications (e.g. A2LA, TS, NABL) of the laboratories that performed the tests reported on section 10.
13. Appearance Approval Report: A copy of the Appearance Approval Inspection form signed by the customer. Appearance requirements could include information regarding the color, textures, finish, etc. Applicable for components affecting appearance only.

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PPAP Elements

14. Sample Production Parts: A sample from the same lot of initial production run are sent to the customer. The PPAP package usually includes a picture of the sample and where samples are kept (customer or supplier).
15. Master Sample: A sample signed off by customer and supplier, that usually is used to train operators on subjective inspections. It is also used as a benchmark for comparison if any quality questions arise.
16. Checking Aids: When there are special tools for checking parts, this section shows a picture of the tool and calibration records, including dimensional report of the tool.

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PPAP Elements

17. Customer Specific Requirements: Each customer may have specific requirements to be included on the PPAP package. It is a good practice to ask the customer for PPAP expectations before even quoting for a job. North America auto makers OEM (Original Equipment Manufacturer) requirements are listed on the IATF website.
18. Part Submission Warrant: This is the form that summarizes the whole PPAP package. This form shows the reason for submission (design change, annual revalidation, etc.) and the level of documents submitted to the customer. There is a section that asks for "results meeting all drawing and specification requirements: yes/no" refers to the whole package. If there is any deviations the supplier should note on the warrant or inform that PPAP cannot be submitted.

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To PPAP or not to PPAP?

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PPAP Requirements

- Customer Notification
  - The organization shall notify the authorized customer representative of any planned changes to the design, process or site.
  - Upon notification and approval of the proposed change by the authorized customer representative, and after change implementation, PPAP submission is required unless otherwise specified.
  - Examples: Use of other construction or material, production from new or modified tools (dies, molds, patterns, etc.), production upgrade or rearrangement of tooling equipment, transfer of tooling or equipment from/to another plant site, change of supplier, product after tooling has been inactive over 12 months, product or process changes at site/supplier, change in inspection method.

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No re-PPAP

1. Changes to component level drawings, manufactured internally or manufactured by subcontractors, that do not impact the design record ***for the product supplied to the customer.***
2. Tool movement within the same plant (used in equivalent equipment, no change in process flow, no disassembly of the tool) or equipment movement within the same plant (same equipment, no change in process flow).
3. Changes in equipment (same process flow with same basic technology or methodology).
4. Identical gage replacement.
5. Rebalance of operator job content with no change in process flow.
6. Changes resulting in reduced RPN on PFMEA (with no change to process flow).

Always Check Customer Notification Requirements

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