PPAP Elements Explanation

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Contents

1. Design Records

- A copy of the drawing. If AIE is responsible for designing, this is a copy of AIE drawing 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.

1a. Ballooned Drawing

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- A Ballooned drawing shows parts or assemblies in a drawing with numbered balloons that point to individual dimensions and requirements of the part. The numbers on the ballooned drawing matches the numbers in the dimension results data sheets. These may include;

- Dimensions and other geometric tolerances of the Part
- Physical and Mechanical Properties (Heat treat Hardness, Plating thickness, Tensile strength, Pull out force, etc.)
- Chemical properties (Cure time)
- Visual features (Colour, texture, flash)
- Electrical requirements (performance data, functional tests, etc.,)
- Any other specified requirement that you have the capability to measure or that is described in the print notes or referenced specification

2. Authorised Engineering Change Document

- A document that shows the detailed description of the change. Usually this document is called “Engineering Change Notice”, but it may be covered by the AIE PO or any other engineering authorisation.

3. Customer Engineering Approval

- This approval is usually the Engineering Trial with production parts performed at the AIE plant. A “temporary deviation” usually is required to send parts to AIE before PPAP. AIE may require other “Engineering Approvals”.

4. Design Failure Modes and Effects Analysis (DFMEA)

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- Design FMEA shows evidence that the potential failures modes and their associated risks have been addressed to eliminate or minimise their effects through product design changes and improvements.
- DFMEA should address all the Critical to Quality characteristics (CTQs) and any potential voice of AIE inputs identified in the project scope.

- The Severity, Occurrence and Detection ratings are used when performing FMEA activities.

- A copy of the Design Failure Mode and Effect Analysis (DFMEA), reviewed and signed-off by supplier and AIE.

5. Process Flow Diagram

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- Process Flow Diagrams are used to document and clarify all the steps involved in the manufacturing of a part. The primary process steps must match the process steps addressed in PFMEA and the Control Plan. Process flow should include the entire manufacturing process flow (receiving through shipping).

- The Process Flow Diagram should include all of the key steps in the process and the offline activities (such as inspection, measurement, handling, etc.). The flow of non-conforming parts such as rework parts, scrap parts should also be included. PFDs can be provided in any format used within the organisation.

6. Process Failure Modes and Effects Analysis (PFMEA)

- The PFMEA follows the Process Flow steps, and indicate “what could go wrong” during the manufacture and assembly of each component.
- This shows evidence that the potential failure modes and the associated risks have been assessed during the manufacturing process design stage to eliminate or minimise their effects on the part/product.
- Risk Priority Number (RPN) >=100 must have a correction action plan addressing the potential failure mode or potential cause for the failure mode.
- AIE also recommends any severity ranking 9 or 10 be addressed with a corrective action plan.

7. Control Plan

- The Control Plan follows the PFMEA steps, and provides more details on how the “potential failure modes” are checked in the incoming quality, assembly process or during inspections of finished products.

- It also provides the information on controls that are being established in the process to control the Product and Process characteristics for all the processes involved in the production of the part.

8. Measurement System Analysis (MSA)

- MSA usually contains the Gage R&R for the critical or high impact characteristics, and a confirmation that gauges used to measure these characteristics are calibrated.

9. Dimensional Results

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- 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 a minimum of 5 pieces is reported per product/process combination.
- If production parts are produced from more than one cavity, mold/ tool, Machine supplier shall submit dimensional reports from each cavity.

10. Records of Material / Performance Test Results

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- 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. If there is an Engineering Specification, usually it is noted on the print.

- The DVP&R shall be reviewed and signed off by both AIE and supplier engineering groups.

- 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 call on the print.

11. Initial Process Studies

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- 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 of the accredited laboratories that performed the tests reported on section 10.

- The qualified laboratory (internal or external) shall have a laboratory scope and documentation showing that the laboratory is qualified for the type of measurements or tests conducted.

- When an external/commercial laboratory is used, the organisation shall submit the test results on the laboratory letterhead or the normal laboratory report format. The name of the laboratory that performed the tests, the date (s) of the tests, and the standards used to run the tests shall be identified.

13. Appearance Approval Report (AAR)

- A copy of the AAI (Appearance Approval Inspection) form signed by AIE. Applicable for components affecting appearance only.

- Appearance report should contain the part images, Part Marking images, Painting test requirements like Adhesion test report, RAL shade card colour confirmation wherever applicable as per drawing and specification requirements.

14. Sample Product

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- A sample from the same lot of initial production run.
- Supplier shall submit the PPAP samples to AIE on request.
- It is advised to identify the PPAP samples appropriately while sending them to the AIE so that those parts can be traced better at AIE for further assembly trials/testing, etc,

15. Master Sample

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- A sample signed off by AIE and supplier, that usually is used to train operators on subjective inspections.

- It is recommended that supplier retain one or more samples of the PPAP parts at their location with appropriate identification and traceability as per their internal quality system requirements. This will be helpful for any future references.

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.

17. Records of Compliance With Customer-Specific Requirements

- AIE may have specific requirements to be included on the PPAP package.
- Prior to PPAP submission, supplier needs to submit samples of the new part to AIE engineering for validation and other testing. Engineering will provide approval based upon the satisfactory validation & Test results.

18. Part Submission Warrant (PSW)

- This is the form that summarises the whole PPAP package. This form shows the reason for submission (design change, annual revalidation, etc.) and the level of documents submitted to the AIE. There is a section that asks for “results meeting all drawing and specification requirements: yes/no” refers to the whole package.

- The PSW is the document through which the supplier confirms and gives assurance that the submitted parts meet all of the specifications, material, appearance and other requirements of AIE and has the capability to meet AIE requirements consistently.

- If the supplier is not able to meet any of the requirements, the details of the failure and deviation approval details are to be recorded in the relevant fields of PSW.