# PRODUCTION PART APPROVAL PROCESS

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**Abstract**

The paper describes Production Part Approval Process(PPAP), which defines generic requirements for production part approval, including production and bulk materials.
In firts part of contribution is describes general requirements for PPAP submision and second part contains signification approval process which is related with quality planning.

**Key words**

PPAP, Control plan, Dimensional Results, Capability, Samples

## PRODUCTION PART APPROVAL PROCESS

Production Part Approval Process(PPAP) defines generic requirements for production part approval, including production and bulk materials. The purpose of PPAP is to determine if all customer enginnering design record and specification requirements are properly understood by the organization and that the manufacturing process has the potential to produce product consistently meeting these requirements during an actual production run at the quoted production rate.
PPAP shall apply to internal and external organization sites supplying production parts, service parts, production materials, or bulk materials. For bulk materials, PPAP is not required unless specified by the authorized customer representative.
The organization shall obtain approval from the authorized customer representative for:

- A new part or product ( a specific part, material, or color nat previously supplied to the specific customer
- Correction of a discrepancy on a previously submitted part
- Product modified by an engineering change to design records, specifications, or materials.
- If there is any question concerning the need for production part approval, contact the authorized customer representative

## PPAP REQUIREMENTS

The organization shall meet all specified PPAP requirements and shall also meet all customer – specific PPAP requirements. Production parts shall meet all customer engineering design record and specification requirements ( including safety and regulatory requirements).

a) *Design Record*
The organizatin shall have the design record for the saleable product/part, including design records for components or details of the seleable product/part

b) *Authorized Engineering Change documents*
The organizaton shall have any authorized change documents for those changes not yet recorded in the design record but incorporated in the product, part or tooling.

c) *Customer Engineering Approval*
Where specified by the customer, the organization shall have evidence of customer engineering approval.

d) Design Failure Mode and Effects Analysis (DFMFA)
The product design – responsible organization shall develop a DFMEA in accordance with, and compliant to, customer – specified requirements

d) *Process Flow Diagram*
The organization shall have a process flow diagram in an organization – specified format that clearly describes the production process steps and sequence, as appropriate and meets specified customer needs, requirements and expectations.

e) *Process Failure Maode ande Effects Analysis (PFMEA)*
organization shall develop a PFMEA in accordance with, and compliant to, customer – specified requirements

f) *Control Plan*
Defines all methods used for process control and compliens with customer – specified requirements.

g) *Measurment System Analysis Studies*
Applicable MSA studies, gage R/R, linearity, stability, for all new or modified gages, measurment and test equipment.

h) *Dimensional Results*
The organization shall provide evidence that dimensional verifications required by the design record and the Control Plan have been completed and results indicate compliance with specified requirements( dimensional results for each unique manufacturing process.

i) *Records of Material or performance test results for tests specified on the design record or Control Plan.*

j) *Initial Process Studies*
The level of initial process capability or performance shall be determined to be acceptable prior to submission for all Special Characteristic designated by the customer or organization. The organization shall obtain customer concurrence on the index for estimating initial process capability prior to submission/MSA to understand how measurment error affects the study measurments/.

k) *Qualified Laboratory Documentation*
Inspecion and testing for PPAP shall be performed by a qualified laboratory as defined by customer requirements ( an accreditad laboratory). The qualified laboratory (internal or external to the organization shall have a laboratory scope and documentation showing that the laboratory is qualified for the type of measurments or tests conducted.

l) *Appearance Approval Report (AAR)*
A separate AAR shall be completed for each part or series of parts if the product/part has appearance requirements on the design record.

m) *Sample Production Parts – provide sample product as specified by the customer.*

n) *Master Sample*

o) *Checking Aids*
If requestes by the customer, the organization shall submit with the PPAP submission any part – specific assembly or component checking aid. – certify that all aspect of the

checking aid agree with part dimensional requirements. The organization shall document all released engineering design changes that have been incorporated in the checking aid at the time of submission (preventive maintanance of any checking aids for the life of the part.

*p) Customer – Specific Requirements*

The organization shall have records of compliance to all applicable customer – specific requirements.

*q) Part Submission Warrant(PSW)*

Upon completion of all PPAP requirements, the organization shall complete the Part Submission Warrant ( a separate PSW for each customer part number unless otherwise agreed to by the authorized customer representative [2].

## QUALITY PLANNING

In the next part of contribution I will try to bring near information or steps between organization and customer which are needed for succesful PPAP submission.

Project begins with nomination of supplier and Supplier Statement of Work. This document has to ensure that the supplier has the correct information to develop the product to achieve cost and quality objectives over the product life. This statement should be complete and signed by both side. After that follows the letter of nomination, is the authority for the supplier to commit spending to a defined limit that should be defined on the LON. Next important step is Drawing, specification review and quality objectives. The reason is, Supplier understands design completely and potential control characteristics are identified.

Potential improvements and cost reduction opportunities shall be identified and agreement of all special characteristics.

Design verification plan and report is a summary of all development testing required to ensure the product conforms to defined customer needs and requirements. Testing results are incorporated into the document as they become available - Complete DV Plan is in place and accepted by customer. Unless the supplier is design responsible is important clarify customer specification in DFMEA.

If Supplier agrees requirements can be manufactured to required quality in serial conditions to the planned volume confirm it in Team feasibility commitment. This document should be reviewed and resigned for each revision update. All important characteristic must be measured and monitored. In next step is needed to ensure that the supplier has the capacity to produce product at the quoted values and all other components on specified process are also included.

Tooling or process manufactured must be designed to produce expected quality parts for product life. All SC & CC should have Poke Yoke included in design to eliminate concerns - tool tracking method or approved alternative is in place and monitored. Once tooling is completed it is key to ensure the tooling or equipment can produce a correct part, the manufacturer must provide data to confirm the part produced from the tooling is dimensionally correct before delivery.

Supplier should has a plan to manufacture parts for key build dates and understands delivery requirements. Purchase orders are in place to cover all pre series and testing parts. The gauges and fixtures used to determine quality, should be available for 1st off tool parts. SC & CC should be measurable from the gauges and used in the capability studies.

Where special gauges, fixtures, or test equipment are required per the control plan, verify gauge repeatability and reproducibility (GR&R) and proper usage.Process flow chart and manufactoring floor plan is element to establish the manufacturing route plan and the movement and storage that could have impact on quality and delivery.

This forms the structure to develop the PFMEA. Any part of process that has implications on safety should be clearly identified. In conjunction with the PFMEA all the key RPN issues have controls applied to ensure the failure does not appear in production. This includes all measurement equipment and frequency of checks likely to detect failure. The pre-launch containment plan, is required to prevent defect parts being sent to the customer during a period where the process knowledge is developing. It contains all information necessary to ensure customer understanding of the quality delivered product.

This should include, but is not limited to:

Dimensional validation of delivered parts, including key measurements including SCs & CCs

All deliveries are approved by a person who validates all quality checks have been performed before despatch.

For production parts, product for PPAP shall be taken from a significant production run. This significant 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 authorized customer representative. This significant production run shall be conducted at the production site, at the production rate using the production tooling, production gauging, production process, production materials, and production operators. Parts from each unique production process, e.g., duplicate assembly line and/or work cell, each position of a multiple cavity die, mould, tool or pattern, shall be measured and representative parts tested. Dimensional report is important for confirmation that the produced part conforms to the drawing. 6 parts from Run at rate are measured according to agreement from Design review and the master samples should be taken from these. The dimensional results for all 6 parts must be recorded separatly.

Validation that each of the SC & CC applied to dimensions is capable of achieving its intended tolerance for product life. For Capability studies with fewer measurements then thePpk value will be higher min 25 values Ppk =2.2 Initial capability on 100 values must achieve a Cpk of 1.67 minimum with no special causes evident in control chart. The supplier process sign-off (SPSO) verifies the effective implementation of supplier quality systems and evaluates supplier’s manufacturing readiness. The SPSO is initiated prior to the supplier part submission to customer. The quality representative (or designate) will schedule and lead the SPSO using the supplier process sign-off form.

The target should always be to not need Interim PPAP but if there is no alternative, with agreement of Customer an Interim PPAP can be signed with DA.

The purpose of PPAP is to determine if all customer engineering design record and specification requirements are properly understood by the organization and that the manufacturing process has the potential to produce product consistently meeting these requirements during an actual production run at the quoted production rate. An organization supplying standard catalogue production or service parts shall comply with PPAP unless formally waived by the authorized customer representative.

Without Fit and Functional report of product/part, which is required from the receiving organization signed by production and quality to confirm parts supplied are suitable for manufacturing cannot be approved.

This contribution was originated on base PPAP manual and work experience.

**References**


[1] CHRYSLER CORPORATION, FORD MOTOR COMPANY AND GENERAL MOTORS CORPORATION, *Advanced Product Quality Planning Reference Manual,* June 1994.

[2] CHRYSLER CORPORATION, FORD MOTOR COMPANY AND GENERAL MOTORS CORPORATION, *Production part approval process (PPAP),* March 2006

[3] INTERNAL DOCUMENTS