



S-372: Production Part Approval Process (PPAP) Requirements

Scope: This document defines Sun's Production Part Approval Process (PPAP). This is the method by which Supplier-manufactured parts are qualified and approved for use in standard saleable Sun products. Any Deviation from this process must be approved in writing by Sun Engineering and Sun Supply Chain.

1.0 Approval Requirement

The Supplier shall obtain full approval from Sun for:

- 1.1 A new part or product (i.e., a specific part, material, or color not previously supplied by the supplier to Sun).
- 1.2 Correction of a discrepancy on a previously submitted part.
- 1.3 Product modified by an engineering change (Supplier or Sun initiated) to design drawings, records, specifications, or materials.
- 1.4 Change of Sub-Supplier for components or engineered components.
- 1.5 New tooling or change of tooling.

2.0 Sample Requirements

- 2.1 Sample product for PPAP shall be taken from a significant production run. A significant production run is defined as the following: a continuous eight-hour production run or a minimum of 300 manufactured parts, whichever comes first. This run shall be manufactured at the production site using the tooling, gaging, 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.
Where multiple production machines, tooling, cavities, etc. will be used, the Supplier will segregate and mark these samples individually.

3.0 PPAP Requirements

- 3.1 The Supplier shall meet all specified requirements, e.g. design drawings, performance specifications, material specifications, etc. Any results outside specification must utilize every effort to correct the process, so all requirements are met. If the Supplier is unable to meet any of these requirements, Sun shall be contacted for determination of appropriate corrective action.
- 3.2 Any deviation from specification must be approved in writing by Sun Engineering.



4.0 Criteria for Submission

- 4.1 The Supplier shall perform a 100% lay-out for a specified number of parts. The quantity required will be per the discretion of Sun Quality personnel. If not otherwise specified, a minimum of 5 parts randomly selected from the significant production run shall be submitted. The Supplier shall provide the print with the dimensions numerically identified. The supplier shall also provide the measured parts to Sun Hydraulics with the PPAP submission and identify them so they can be aligned with the dimensional report.
- 4.2 The Supplier shall perform a capability study on all dimensions labeled with a special designation such as a key or critical symbol. This shall be performed on a minimum of 30 parts unless otherwise specified by Sun Engineering. If no key or critical features are designated, the Supplier shall select one or more dimensions that are critical to the manufacturing process and perform capability studies on those features.
- 4.3 The Supplier shall use the following as acceptance criteria for evaluating initial process study results:

<i>Results</i>	<i>Interpretation</i>
Cpk > 1.67	The process currently meets Sun requirements
1.67 >= Cpk >=1.33	The process is currently acceptable, but requires some improvement. Contact Sun Engineering for a review of the study results.
Cpk < 1.33	The process does not currently meet the acceptance criteria. Contact the appropriate Sun representative for a review of the study results

5.0 Part Submission Warrant

- 5.1 Upon satisfactory completion of all required measurements and tests by the Supplier, the Supplier shall record the required information on the Part Submission Warrant (PSW). A separate PSW shall be completed for each Sun part number per the requirement criteria defined in section 1.0, unless otherwise agreed to by Sun.
- 5.2 The Supplier shall verify that all of the measurement and test results show conformance with Sun requirements and that all required documentation is available.
- 5.3 A responsible Supplier official shall approve the PSW and submit to the appropriate Sun representative.
- 5.4 It is required to use the attached PSW template at the end of this document, or an equivalent template, for PPAP submission to Sun.



6.0 Data Submission to Sun

- 6.1 The Supplier shall provide Sun with the following documentation in AIAG format or similar:
 - 6.1.1 Part Submission Warrant (PSW), or an equivalent form.
 - 6.1.2 100% Dimensional Layout data from section 4.1 above (including the print and parts with the dimensions numerically identified)
 - 6.1.3 Capability Study on Key and Critical Characteristics from section 4.2 above
 - 6.1.4 Test and Performance Data if required per design record.
 - 6.1.5 Design Failure Mode Effect Analysis (DFMEA) - For supplier-designed parts
 - 6.1.6 Process Flow
 - 6.1.7 Control plan
 - 6.1.8 Process Failure Mode Effect Analysis (PFMEA)
 - 6.1.9 Measurement System Analysis (MSA) – For all dimensions identified as Key and Critical Characteristics or those used to perform capability studies from section 4.2 above
 - 6.2.0 Material Certification
 - 6.2.1 Secondary process certification (i.e., Heat Treat, plating, etc.)
 - 6.2.2 Packaging Approval
 - 6.2.3 Label Approval

7.0 Part Submission Status

- 7.1 **Full Approval** - indicates that the production part meets Sun Hydraulics specifications and requirements. The Supplier is therefore authorized to ship production parts subject to releases from Sun.
- 7.2 **Interim Approval** - permits shipment of parts for production requirements on a limited time or piece quantity basis. Interim approval will only be granted when the Supplier has:
 - 7.2.1 Acquired a Supplier Deviation that clearly defines the root cause of the non-conformities preventing production approval.



- 7.2.2 Prepared an interim approval action plan agreed upon by Sun. Re-submission to obtain “full approval” is required.
- 7.2.3 Material covered by an interim approval that fails to meet the agreed-upon action plan either by the expiration date or the shipment of the authorized quantity, will be rejected. No additional shipments are authorized unless a written extension of the interim approval is granted.
- 7.3 **Rejected** - means that the submission, the production lot from which it was taken, and accompanying documentation do not meet Sun requirements. Corrected product and documentation shall be submitted and approved before production quantities may be shipped.

8.0 Record Retention

- 8.1 Production part approval records, regardless of submission level, shall be maintained for the length of time that the part is active plus one calendar year.