PURPOSE
This Product Part Approval Procedure for BU Cranes and BU Recylcing (PPAP) seeks to ensure that all HYVA engineering design and specification requirements are understood by HYVA suppliers and that all HYVA products consistently meet the requirements during an actual production run.

SCOPE
The PPAP is applicable to purchase of all new or changed direct materials including finished, semi-finished parts, components for HYVA as well as revalidation of existing PPAP documents for Hyva's BU Cranes and BU Recycling suppliers.

The PPAP is always required prior to the first production shipment of product in the following situations:

- **Initial submission**
- **Engineering change**
- **Change in material source**
- **Production following any change in part, process or method of manufacture. Other changes like re-release of inactive tooling**
- **Change in sub-supplier**

KEY PRINCIPLE
PPAP emphasizes the importance of understanding and meeting customer requirements and providing confidence to HYVA that the supplier is capable to provide products that consistently meet HYVA requirements.

Last updated: 2024 04 26

INTRODUCTION

The PPAP is used for the approval of a new Supplier, new Part or any change in a Part or a process as well as for the revalidation of an existing PPAP. The PPAP is mandatory and needs to be performed before any delivery of new Parts can start or delivery of existing Parts can continue.

1. DEFINITION OF TERMS

AAR:	Appearance Approval Report
Control Plan:	Written descriptions of the system controlling production Parts
ECR:	Engineering Change Request
FMEA:	Failure Mode Effect Analysis
MSA:	Measurement System Analysis
PO:	Purchase Order
PPAP:	Production Part Approval Process
Part:	A Part manufactured at the production site using the production tooling, gauging, materials, operators, environment and production settings
Process:	A set of interrelated or interacting activities which transforms inputs into outputs
Process Flow Diagram:	A schematic representation of the process flow
PSW:	Part Submission Warrant is a document consisting of two parts. One part is filled in by the Supplier where the Supplier declares the conformity of the Product with the requirements. The second part is filled in by HYVA where HYVA evaluates the submission.
Regular production tooling:	Tooling with which supplier intends to produce Production Parts
SCR:	Supplier Change Request
Site:	A location at which value-added manufacturing process occurs
Supplier	A third party that manufactures or sells Parts to HYVA
WPS:	Welding Procedure Specifications
WPQR:	Welding Procedure Qualification Record

2. RESPONSIBLES FOR IMPLEMENTATION

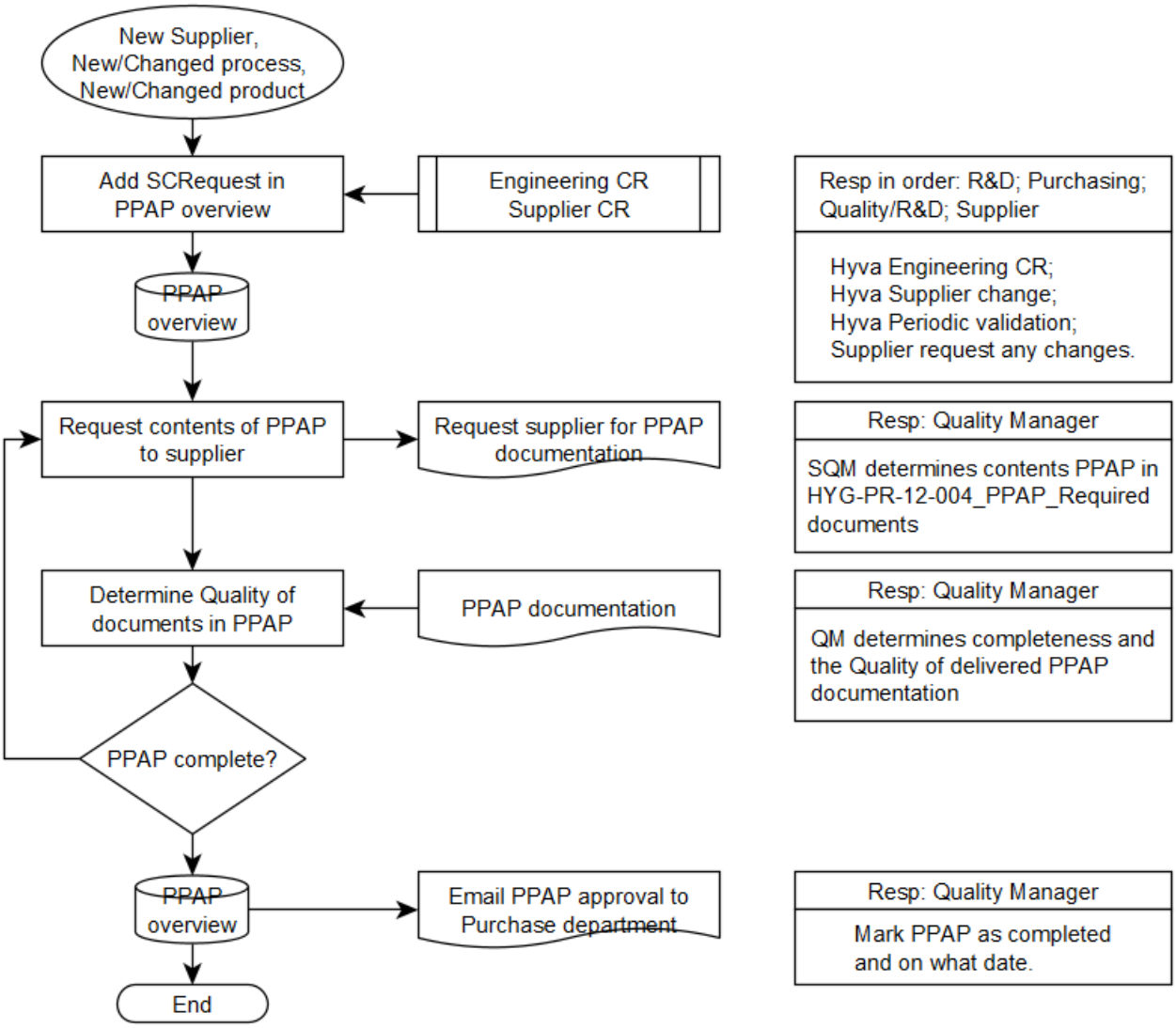
The Supplier, relevant BU Quality Manager and relevant BU Purchase Manager along with respective quality engineer and buyer are responsible for implementation of this procedure.

3. COMMUNICATION TO SUPPLIERS

Relevant BU Purchasing team shall be responsible for informing any new Supplier about HYVA PPAP process. Relevant BU Purchasing team shall also be responsible for communicating this PPAP document to all existing Suppliers.

4. PROCEDURE

Step 1. Initiation of PPAP. The Party initiating the new Part sourcing or a change, i.e. HYVA or the Supplier, shall be responsible for initiating the PPAP process. If the change is initiated by the Supplier, the Supplier shall do so by sending out a Supplier Change Request (SCR) to the relevant BU Purchasing team. If the new project or the change is initiated by HYVA, the relevant BU Purchasing team shall contact relevant BU Quality team to initiate the PPAP.



SCR shall include the table below filled in by Supplier's R&D, Purchasing, Quality teams. SCR shall be sent to Supplier's HYVA contact.

PPAP no	Request date	Final date	Part No	Description	Supplier	Reason of Change
PP21001	01/01/2021	open	No	Product	name	Description

Step 2. Formulation of PPAP Requirements. After receiving the SCR from the Supplier or a request from relevant BU Purchasing team, relevant BU Quality team shall determine on the basis of **HYG-PR-12-004_PPAP_Required documents,** the list of documents required to be provided by the Supplier and a period for PPAP revalidation.

The following 6 items shall always be included in each PPAP:

- Ballooned drawing of the Production Parts from the Supplier;
- Feasibility meeting organized by relevant BU Quality team and report drafted by relevant BU Purchasing team;
- Process Flow Diagram from the Supplier;
- Control Plan from the Supplier;
- Dimensional results from the Supplier (check HYG-PR-12-004_PPAP_Required documents for quantity);
- AAR from the Supplier.

Step 3. Communication of PPAP Requirements. Relevant BU Purchasing team shall be responsible for informing the Supplier about the list of documents required to be provided by the Supplier for the purposes of PPAP. HYG-PR-12-004_PPAP_Required documents shall be shared with the Supplier during feasibility meeting.

Step 4. Provision of Documents. The Supplier is responsible for timely supply of the requested PPAP documentation. The Supplier is further responsible for notifying HYVA and resubmitting the required documentation whenever the Supplier makes a change to a Part or Process after the PPAP occurs.

Step 5. Part Submission Warrant
Upon completion of all PPAP requirements, the Supplier shall complete the Part Submission Warrant (PSW) where the Supplier shall confirm the compliance of the Product with all PPAP requirements. A separate PSW shall be completed for each customer Part number unless otherwise agreed with HYVA. A responsible official from the Supplier organization shall approve the PSW and shall provide the complete contact information.

Step 6. PPAP Approval. SUPPLIERS SHALL NEVER SHIP PRODUCTS BEFORE RECEIVING PPAP APPROVAL. Relevant BU Purchasing team shall notify the Supplier about the PPAP approval by completing the second part of the Part Submission Warrant. The PPAP approval can be granted by relevant BU Quality and R&D which can give the following answers:

A. Production approval: indicates that the Part meets all specification and requirements. The Supplier is therefore authorized to ship production quantities.

B. Interim approval: permits shipment of material for production requirements on a limited time or piece quantity basis. Interim Approval will only be granted when the Supplier has:
- Clearly defined the root cause of the non-conformities preventing production approval and;
- Prepared an interim approval action plan agreed upon by HYVA. Resubmission to obtain the Production approval is required unless the Supplier is advised that HYVA has agreed to revise the drawings and or specifications to agree with the Part as manufactured.

C. Rejection: means that the PPAP submission, the production lot from which it was taken, and accompanying documentation do not meet HYVA requirements. Corrected product and documentation must be submitted and approved before production quantities may be shipped.

5. RECORD KEEPING & MASTER SAMPLE RETENTION

5.1 The Supplier shall retain a complete record of findings and other master sample(s) for each submission, including SPC results and, when applicable, appearance approval. This record should show conformance to all dimensional, chemical, metallurgical, physical, performance & other test specifications. Documentation required in this record includes copies of:

- Inspection results referenced to and accompanied by engineering approved design record for all dimensional requirements;
- Laboratory test reports covering all chemical, metallurgical, physical and performance tests specified for the material and Parts;
- Preliminary process capability results for all critical and significant characteristics;
- Measurement systems analysis (Gage R&R, accuracy, linearity, stability studies) results, Process Flow Diagrams, Process (and, when applicable, design) FMEAs, Control Plans, preliminary process studies, sub-contracted supplier warrants and supporting documentation, appearance approvals, and master samples.

5.2 If changes are made to documents that are required as a Part of the PPAP, revisions must be submitted to relevant BU Quality team. HYVA must be informed upfront in case of any revisions.

5.3 PPAP records shall be retained for the length of time that the Part is active for production and service requirements plus one calendar year.

5.4 Master samples shall be retained for the same period as the PPAP records or until a new master sample is produced for the same Part number for HYVA approval. Master samples are to be clearly identified as such and must identity the warrant approval date.

6. PRODUCTION PROCESS OF NEW PARTS

New parts, related to NPD, SPD or Resourcing shall be produced as per following steps. PPAP will be part of one of these steps which is Pre-series production:

Components status	Production condition	Use	PO Type	Control plan
1. PROTOTYPE	• Produced without definitive jigs. • p/n with design not yet frozen	• Prototype machine used only by technical dept	• Prototype order → PURCHASING	• 100% (agreed with technical dept)
2. PRE-SERIES	• Produced with definitive jigs and definitive process • Parts not yet approved.	• Process validation (**PPAP approval**) • Distructive test If the **PPAP** is approved, supplier is allowed to produce series production.	• Pre-series order →PURCHASING Quantity strictly necessary for PPAP approval. (not link to production needs)	• **PPAP docs as per category** • 1 pcs for distructive test • 1 pcs or realistics portion of it for SST
3. SERIES	• p/n approved	• Proto/0-series/Field/Pre-series • Series	• Mass production order → LOGISTICS	• As per incoming inspection • Free pass

7. PPAP DOCUMENTATION EXPLANATION

7.1 **Parts for PPAP shall be taken from a significant production run**
The significant production run shall be conducted at the production Site, using the production tooling, production gauging, production process, and production operators. The minimum quantity for the PPAP lot is indicated in the HYG-PR-12-004_PPAP_Required documents. HYVA's Quality team shall state on a case-by-case basis what additional data shall be required when the quantity is too low for statistical process control.

7.2 **Ballooned drawing**

The ballooned drawing is a drawing that the Supplier uses in the production run where the most critical dimensions are circled and agreed together with relevant BU R&D. This will make clear where intense checking shall be performed during production.

7.3 **Feasibility meeting report**

Feasibility meeting is a technical meeting to discuss all production steps attended by the HYVA BU, R&D, Quality, After Sales and the Supplier. Feasibility meeting shall take before any order is placed and the Supplier accepts any order from HYVA. The goal of the feasibility meeting is to check if it is feasible for the Supplier to produce the Part or whether any changes are needed to make production possible/ easier or more efficient.

7.4 **Appearance Approval Report (AAR)**

The Supplier shall provide the AAR which shall include photographs clearly showing how the part shall look like when arriving to HYVA (so visually and stated what protective agent is used). The AAR shall contain instructions for the removal of the agent and, if necessary, for usage. There should be a picture where the Part is also shown in the packaging with labels. The packaged Part shall also be shown inside the packaging box (with labels) and on the pallet (labeled) so that HYVA knows how the total packaging looks like.

7.5 **Dimensional data/ Material inspection and Performance testing**

Dimensional data/ Material inspection and Performance testing shall be performed on all Parts and product materials with dimensional requirements to determine conformance with all relevant design record specifications (prints and /or specifications). Material tests shall be performed for all materials when chemical/physical/ metallurgical requirements are specified. In addition, performance test shall be performed for all Parts as required by design record specifications:

7.5.1 All dimensions (except reference dimensions), characteristics, and specifications as noted on the design record and Control Plan are to be listed and results recorded in the PPAP file.

7.5.2 Blank or general statements of conformance are unacceptable. Statements must be detailed and document each test which has been done to demonstrate compliance.

7.5.3 When third Party inspection services are used, the results must be submitted on their letterhead or HYVA Part Submission Warrant. The name of the inspection service that measured the Part(s) must be indicated, including completion date of test(s).

7.5.4 It is the Supplier's responsibility to meet all applicable specifications. In case the results of tests show non-compliance with specifications, the Supplier shall be obliged not to submit such Parts and/ or documentation unless it is explicitly agreed with HYVA in writing. If the Supplier is unable to meet any of these requirements, HYVA Purchasing and Quality team shall be contacted for further instructions.

7.5.5 For Parts with HYVA developed material specifications and approved source list, Suppliers must procure materials and/or services (e.g. plating, heat-treating) from suppliers on that list.

7.6 **Preliminary process capability studies**

The Supplier shall conduct process capability studies for all key characteristics designated by HYVA or the Supplier. An acceptable level for preliminary process capability must be determined in agreement with HYVA:

7.6.1 Preliminary process studies are short term and will not predict the effects of time and variation in people, materials, methods, equipment, measurement systems and analyse the data in the order they are produced.

7.6.2 It is only necessary to perform a measurement system analysis (Gage R&R, accuracy, linearity, and stability studies) if Cpk/ Ppk levels are too low.

7.6.3 For those characteristics that can be studied using X-Bar and R charts, a short- term study should be based on 25 or more subgroups of data containing at least a total of 100 individual readings. *Note that the Particular sampling plan used can influence the appearance of stability.

7.6.4 The acceptance criteria for evaluating preliminary process capability studies shall be as follows:

Results	**Interpretation**
Capability index > 1.67	The process currently meets acceptance criteria
1.33 > Capability index < 1.67	The process may be acceptable. Contact HYVA representative for review of the results
Capability index < 1.33	The process does not meet the acceptance criteria. Causes should be identified, evaluated and wherever possible, eliminated. Use 100% inspection and increased SPC sampling until ongoing stability with a Cpk of 1.33 is demonstrated. A revised Control Plan for these interim actions must be approved by HYVA

7.6.5 Control charts and process capability studies should be examined for signs of instability. If there are signs of instability, corrective action should be taken. If stability cannot be achieved, the Supplier shall contact relevant BU Purchasing and Quality team and jointly determine appropriate action.

7.7 **Coating testing (Salt Spray testing)**

The salt spray test shall be performed by testing:

1) The complete finished Part in salt spray cabinet (as long as it fits in the salt spray test chamber/room) or
2) Slices cuts out from the finished product when dimensions are exceeding the salt spray test chamber/room. It is mandatory to include the following:
   a. All specimens containing geometrical shapes/corners where painting is difficult to adhere;
   b. All specimens containing different materials (eg. .cast iron Parts vs steel metal sheets);
   c. All specimens containing welding junctions.

7.8 **Welding testing**

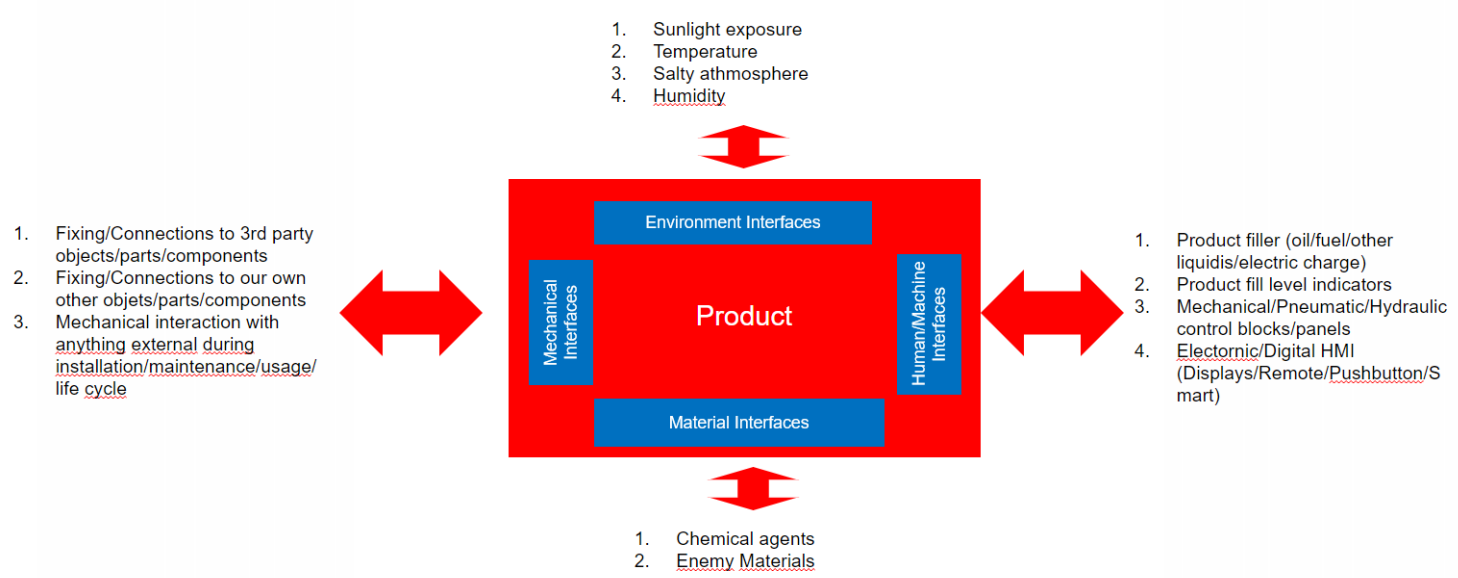
The welding validation shall be performed by testing:

1) Complete finished Part tested with NDT (VT-MT-UT);
2) Each significant* portion cut from the entire structure: Macrografic analysis and Hardness
3) All specimens containing different materials (eg. cast iron Parts vs steel metal sheets)

7.9 **Interfaces review**

Special attention is required for interfaces between the product and the truck. The areas of interest are the physical connections of the product/Part to the hydraulic system; the connection to the truck of the product/ Part and the connection to other products/ Parts.

Interfaces review must be done once in PPAP process for sourcing of Parts of HYVA own production plants and sourcing of wet kit components. It is aimed to draw the attention of project team to the fact that interfaces between the Part/product subject to approval process and the «rest of the world» are in full a one off to be considered Part of the product development/approval itself. In the «interfaces» very high risks are present: each of HYVA Parts and product is at the end requested to interact with other Parts/components/products, as well as with environmental conditions, as well as with users (or during installation/or during maintenance/or during usage).



7.10. **Other requirements**

7.10.1 Whenever appearance requirements are documented on HYVA Prints and/or related engineering documents, the appearance criteria must be identified on the Component Inspection Report.

7.10.2 If production is from more than one cavity, mold, tool, die or pattern, a complete dimensional evaluation is required on one Part from each cavity, mold etc. This must be identified on the Part Submission Warrant.

7.10.3 The Supplier is responsible for providing the required test equipment necessary to complete all testing. It is the Supplier's responsibility to use gauging traceable to national or international standards. The Supplier shall also be able to demonstrate the gauge suitability for use in the measurement application through means of Gage R&R, accuracy, linearity and stability studies.

7.10.4 For submissions due to engineering changes, the inspection and testing requirements are determined by the extent of the change. For example, if certain dimensions are changed, the dimensional evaluation may be limited to those areas affected by the change. For guidance on specific changes, the Supplier shall contact relevant BU Quality or R&D.

8. DELIVERABLES

All PPAP documents shall be sent by the Supplier to the e-mail address of Supplier's HYVA contact.

The PPAP file name shall be:
PPAP_Supplier name_Part number_