Husqvarna APQP Template Instruction

Instruction
Husqvarna Group
Global

PURPOSE & SCOPE

This instruction will give a brief description of the milestones and gates in the Husqvarna version of the APQP Template. This instruction is for both internal and external use.

DESCRIPTION

APQP (Advanced Part Quality Planning) is a process to make sure certain activities are followed up and completed before serial production. The purpose of an APQP is to have an approved PPAP and a stable serial production process.

The APQP process is developed by AIAG (Automotive Industry Action Group) and the Husqvarna version is very similar to it but adapted to better fit Husqvarna processes and routines.

Depending what is appropriate for the situation, the supplier or Husqvarna can manage the APQP checklist for follow up and updates. The template also serve as meeting minutes of the follow up meetings.

Note: The number of the headlines in this document are adapted to the same numerical order as the Husqvarna APQP Template. This means that some numbers by the headlines have been removed.

0 PCP – Husqvarna Specification Prerequisites

This section is for Husqvarna internal use only.

1 Planning and Definition

This section is about understanding customer requirements and adding extra value in the form of supplier experiences and expertise to meet and exceed customer expectations. It is also purposed to provide input for chapter two where the initial assessments and reviews will be refined into near finished forms of process features.

I.APQP Initiation Meeting

Supplier Quality Engineer at Husqvarna is responsible to organize an *APQP Initiation Meeting*. The purpose of this meeting is to establish a common understanding of APQP requirements and to review the project timeline and it's key milestones.

The initiation meeting should include participants from Husqvarna R&D, project sourcing, SQA and appropriate project members from the supplier side. During this meeting, the team should set the frame for the different APQP activities and frequency of the meetings.

1.1 Voice of Customer Data

"Voice of customer data" has an extensive scope. It can contain lessons learned from previous projects, general knowledge about critical functions, process experience etc. This should be taken into consideration when implementing a new part into production. Below follow some examples of which items to be reviewed:

- Historical data of claims and disturbances for similar parts, such as:
  - Claim statistics
  - 8D-reports
  - Known field incidents from product end users
  - Incidents that has caused disturbances on the customer production line
- The supplier should be informed of how the part functionality has influence on the end user, distributors/retailers and customer assembly. The information may include:
  - Safety critical product functions related to the part
  - How will a part failure influence product performance and the end user?
  - Will the appearance, form fit and function influence customer appeal in stores?
  - Features critical for assembly
- If available, the supplier should present lessons learned from other projects involving similar parts, part features or production processes etc.

1.2 Supplier Feasibility Study

The supplier need to make their own internal assessment to verify if the design is feasible for production or not. Notes and records from the feasibility study should be presented and discussed. This step is connected to point:

1.3 EDR – External Drawing Review

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Husqvarna R&D, SQE and the supplier review the specifications with using the EDR checklist. Below headlines in section 1.3 have to be reviewed by the supplier prior to the EDR.

1.3.1 Engineering Specifications Review

The supplier's preparations for the drawing review will make the EDR more efficient and will contain input about which specifications that are feasible or need to be adjusted to have a stable production process outcome. Look into following:

- Have all specifications and drawings been received?
- Can specifications be met, if not, what adjustments are needed?
- Are there any requirements that needs special equipment for part evaluation, such as pressure testing, burst tests, EoL test equipment etc?

1.3.2 Special Characteristics Review

Special Characteristics represents an important design feature. Because of this, these characteristics have their own dedicated stage in the APQP checklist where the process assurance and serial production routines needs to be established and agreed.

Special Characteristics have to be clearly identified in (P)FMEA and Control Plan.

Note: Traceability and documentation is required for some Special Characteristics. For more detailed information, see "Husqvarna Special Characteristics Manufacturing Requirements" at below link:

https://purchasing.husqvarnagroup.com/documentation#p37

1.3.3 Preliminary Process Flow Chart and BoM

Describe the process flow and discuss the different steps with Husqvarna. All processes; regular-, special- and outsourced processes must be included in this flow chart.

1.3.4 New Equipment, Tooling and Facilities

The team need to review which equipment, tooling and facilities that are already installed and which that have to be procured to meet the capacity and producibility. New items need to be addressed with an investment time line to be followed up.

The equipment and tooling must be listed with individual id numbers.

1.3.5 New Gages, Fixtures and Testing Equipment

The team need to review which gages and testing equipment that are already installed and which that have to be procured to meet specifications and capability. New items need to be addressed with an investment time line to be followed up.

Color samples can be ordered from Husqvarna. It is the responsibility of the supplier to order these, to store them properly and to re-order color samples when necessary due to aging.

The gages, fixtures and testing equipment should be listed with the individual id numbers.

1.4 Initial Capacity Assessment

Review if the capacity will be sufficient for the preliminary forecasts and peak volumes.

Information about production manning, scrap rate, set up times and available set up specialists, supporting functions and measuring capacity should be considered.

1.5 Second Tier Supplier Audits

Review the audit status of the second tier suppliers and address an action plan for what suppliers that need to be audited. Audit nonconformities must be addressed with corrective actions, implementation date and date for follow up.

1.6 Second Tier Procurement Responsibilities

Procurement responsibilities for sample and pre series parts from second tier or further suppliers have to be clarified and agreed upon between first tier supplier and Husqvarna. Responsibilities for quantities, increased quantities etc. have to be discussed and settled.

This step is especially important if second tier supplier quantities are limited and pre ordered but need to be increased with short notice because of unexpected events such as additional engineering pilots etc.

If any components/materials are considered as critical from quality- or procurement reasons, it has to be communicated to Husqvarna.

II. APQP- and PPAP Training

Review if APQP- and PPAP training is needed and should be scheduled with the supplier.

2 Manufacturing Process Development

Section 2 is about the process assurance of production and what supporting equipment that is required to procure.

2.1 Packaging Standards and Specifications

Review the packaging requirements and the possibilities to fulfill them. If no packaging requirements are set by Husqvarna, supplier proposals need to be reviewed to avoid problems and damage like rust, weather, surface scratches, handle ability etc, during serial deliveries.

Below link is to Husqvarna packaging requirements:
https://purchasing.husqvarnagroup.com/general-requirements

2.2 Process Flowchart

The process flowchart must include all inhouse- and outsourced process steps. The process flowchart is part number specific where all steps have to be numbered and referenced in connected (P)FMEA and Control plan.

Trading companies and other suppliers that do not have an inhouse production have to add an extra flow chart showing their internal steps like; receiving inspection, handling, picking and dispatch etc.

2.3 (P)FMEA - Process Failure Mode and Effect Analysis

The (P)FMEA is the primary risk evaluation document in the process assurance process and is a method to estimate and address risks in the manufacturing process. The analysis must include all process steps, including risks connected to outsourced processes.

The rating must be done according to AIAG standard.

2.4 Pre-Launch Control Plan

A pre-launch control plan is a preliminary control plan where all inspection criterias are increased. This means that gaps for equipment or gages that have not arrived or tested successfully yet, have to be compensated with a higher inspection frequency and sample size.

2.5 Measurement Systems Analysis Plan

A plan to verify that measurement systems are validated and fit for their purpose.

Special attention needs to be paid to Special Characteristics where the equipment must be supported by a MSA analysis in a PPAP submission.

2.6 New Equipment, Tooling and Facilities Installed

Follow up the progress for procured equipment and address corrective actions where deliveries are delayed or need adjustment to work properly. Some equipment might need to be tested and verified before put in use. This is connected to previous point:

1.3.4 New Equipment, Tooling and Facilities

2.7 New Gages, Fixtures and Testing Equipment Installed

Follow up the progress for procured equipment and address corrective actions where deliveries are delayed or need adjustment to work properly. Some equipment might need to be tested and verified before put in use. This is connected to previous point:

1.3.5 New Gages, Fixtures and Testing Equipment

2.8 Setup Routines and Instructions Established

Setup procedures must be mapped and instructions created for procedures such as; machines, tools, test equipment, calibration of air gages etc.

2.9 Work- and Inspection Instructions Established

In some countries the items work- and inspection instructions are described by the same noun; work instruction. To be thorough, we use both terms in this document.

Work- and inspection instructions need to be created, also for supporting processes such as material handling and packaging etc.

2.10 Training Plan

Identify the need of training for new parts, processes, tools, machines etc and establish a training plan. This also include supporting functions such as material handling, logistics, shipping, customer support (deviations management) etc. Any process of which the supplier has little or no experience of is of extra relevance.

It is recommended to use a competence matrix to conclude current competence level and find any gaps. A training plan needs to be presented before closing 2.10.

2.11 Second Tier Parts Process Assurance

Process assurance responsibility for second tier and further suppliers have to be clarified and agreed upon between first tier supplier and Husqvarna.

Normally, the 1st tier supplier is responsible to process assure parts from 2nd tier suppliers. For a Husqvarna appointed supplier, the responsibility will be settled case by case. For more information, see Husqvarna PPAP Requirements:

https://purchasing.husqvarnagroup.com/general-requirements

Assess the need for 2nd tier APQP and if a plan with scheduled activities to assure part quality is necessary. Examples of items to follow up are; drawing review, feasibility study, control plan, work instructions, final inspection in series production, etc.

2.12 Husqvarna Preliminary Delivery Plan Communicated

Husqvarna should send the forecast and preliminary delivery schedules in good time so all lead times can be met with good margins. The supplier should confirm the delivery schedules and that their material planning supplier system is set up correctly so that production and dispatches will be made accordingly and delivery schedules are generated and transmitted to tier 2 suppliers.

2.13 Second Tier Preliminary Delivery Plan Communicated

The 1st tier supplier need to make sure the preliminary delivery plans are received by 2nd tier suppliers in good time so all lead times can be met with good margins.

3 Husqvarna Engineering Pilot and Design Samples

Section 3 is about the near finished design of parts and verification of them. The parts supplied to an Engineering Pilot (EP) will provide both Husqvarna and supplier data of how well the parts match the technical requirements.

3.1 Design Samples Verification

Design Sample (DS) is a Husqvarna term for parts that are still in the development phase for technical validation. Design Samples are handled by the R&D department and call offs are made by the project. As far as possible, the DS must be produced by intended serial equipment and tools and when submitted, the DS have to be verified by measurement records. In case of nonconformities, the supplier have to address corrective actions.

Husqvarna R&D will provide feedback on the sample status.

3.2 MSA - Measurement System Analysis

If relevant, the measuring devices and systems should be evaluated and verified prior or during the production of samples to the EP. The article status for parts used in an EP can vary from DS, pre-PPAP, interim to PPAP approved.

3.3 Engineering Pilot

Engineering Pilot (EP) is a pre series during the development phase. Depending on situation and technical progress, there might be several EPs during a project.

III. Husqvarna Feedback of EP Parts

Husqvarna R&D should provide feedback to the supplier about the parts used in an EP.

4 Production Trial Run at Supplier

The Production Trial Run is a limited quantity production run where the process assurance will be verified before serial production. The minimum quantity to be produced is decided by/with Husqvarna. The outcome of a Production Trial Run is the PPAP submission and the samples connected to it.

The production trial run must follow the requirements described in “Husqvarna PPAP Requirements”:
https://purchasing.husqvarnagroup.com/general-requirements

The production trial run is also known as; Significant production run, run at rate, full run test, trial run etc.

VI. SQE Follow Up of Production Trial Run

If possible and when deemed necessary, the SQE should follow up the Production Trial Run on site. The preliminary PPAP documentation should be provided to the SQE in good time prior to the visit.

4.1 Husqvarna Production Trial Run Template

The Husqvarna production trial run template should be used to record the data from the trial run and later also be attached in the PPAP submission.

4.2 PPAP Samples

The PPAP samples must be randomly picked from the trial run and represent all tool cavities or assembly combinations of different cavities when deemed necessary.

4.3 Measurement System Analysis

Verify the capability of gages and measurement equipment. The MSA for required characteristics must be finalized during this step.

4.4 Preliminary Process Capability Study

All required capability studies need to be finalized during the production trial run. If the capability proves too low, then issue appropriate corrective actions for serial production.

4.5 Scrap Yield and Corrective Actions

Nonconformities in the Production Trial Run must be recorded and sorted in an appropriate way. Root causes must be analyzed and corrective actions issued.

4.6 Capacity Verified

The cycle time and capacity should be verified during the production trial run. The verification will indicate if the calculated capacity is available or if actions are required.

4.7 Production Control Plan

Verify that the control plan is complete, updated and according to latest specifications and corresponds to FMEA, work- and set up instructions.

4.8 Training of Personnel Completed

Verify that all operators are trained as required and defined in 2.10, including supporting functions. There should be a skill matrix or similar to show current status of training.

4.9 Packaging Requirements Verified

To ensure part integrity, the packaging need to be verified. Verify that the packaging and unit loads are accepted by receiving Husqvarna site. The packaging should be suitable from a quality perspective, ensure effective transportation and be compatible with material handling systems and storages at each Husqvarna site. See also 2.1.

4.10 Master Samples Stored at Supplier

When master samples are required, Husqvarna and the supplier must agree on how these are to be handled and stored.

A possible way of managing master samples is to have an agreed number of signed master samples stored by Husqvarna and equal signed samples stored by the supplier. It also need to be agreed in detail what is governed by the master samples and what is not. Brightness, porosity, scratches are some examples.

5 PPAP Submission to Husqvarna

Section 5 is a checklist of all PPAP documentation that should be provided in a level 3 PPAP. The submitted PPAP must be according to specifications at its first submission. For more explanations, see “Husqvarna PPAP Requirements”:

https://purchasing.husqvarnagroup.com/general-requirements

V. Husqvarna PPAP Review and Disposition

The submitted PPAP will be registered upon arrival and then reviewed:

- In case of any nonconformities and remarks, they have to be clearly described in the PSW or in an attachment.
- If technical tests remain to be conducted, the PPAP review response will take several weeks.
- When technical tests and PPAP documentation review have been finished, the result will be distributed to supplier and related Husqvarna departments.

6 Start of Serial Production and Delivery

Section 6 is about the closure of the project by summarizing lessons learned and initiate continuous improvements in serial production where needed.

6.1 Statistical Process Control

Statistical Process Control (SPC) should be considered as a tool where process variations need to be monitored to ensure stability or the need of corrective actions.

6.2 Confirm Husqvarna Delivery Plan

Husqvarna delivery schedules should be compared with the supplier MPS output to confirm that the schedules are received and processed correctly.

6.3 Confirm Second Tier Supplier Delivery Plan

Confirm that schedules are transmitted to the 2nd tier suppliers and that they are able to receive and plan production and shipping accordingly.

6.4 Lessons Learned and Best Practice

The final point before closing the project would be to gather to a concluding meeting to evaluate and record the performance of the project. If possible, in addition to the team members, invite key stakeholders for their views and opinions.

Review the project's progress concerning both strengths and improvement points. Document the conclusions and distribute them in an appropriate way to minimize similar risks for the next project.

Version History

The version is managed automatically by How We Work. There is no need for manual modification.

Version number	Tracking of changes in the document	Date
Version history - SharePoint	Review / Compare function of Microsoft Office	Version history – SharePoint
1.0	The document and its contains has been reviewed, adapted to the HWW template and adjusted.	20201028