QAA1, Appendix 2

APQP Elements

Stand 01.07.2012

The objectives, expectations and requirements for documenting individual elements of the *APQP Status Reports* (see *QSR-1, Appendix 3*) are described as follows:

Customer order

Objective:
Formal placing of the order by the customer so that investments can be actioned in a timely manner at the supplier‘s.

Expectations:
The customer chooses a supplier and notifies him of the decision

Documentation from the supplier:
Nomination Letter
Individual order, specifying the project level for advanced product quality planning and submission level for sampling
Delivery plan

Submission to the customer:
Status in the *APQP Status Report*

1.1 Customer specifications

Customer specifications are for example requirements specification documents, drawings or specifications which are required at the start of the project.

Objective:
Avoidance of misunderstandings by means of clear specifications

Expectations:
The supplier must know the requirements for the product / project, e.g.:
Installation circumstances
Environmental conditions
Functional performance requirements
Sizes / dimensions
Weight
Material
Reliability (lifetime)
Warranty goals
Quality objectives for incoming parts (ppm rating, fault levels and fault rates)
Capacity data or volume

Milestones

- MS 1: Customer order received internally
- MS 2: Design approved
- MS 3: Design Freeze, prototype parts
- MS 4: Start of production reached (initial batch available)
- MS 5: Initial production sample available

Documentation from the supplier:

Requirements specification documents, drawings or specifications

List with version number for the individual documents

Submission to the customer:

Status in the *APQP Status Report*

List with version number for the individual documents

2.2 Contract review

Objective:
Implementation of a commercial and technical assessment of the documents provided by the customer for their completeness, relevance and feasibility.

Expectations:

Before making a delivery commitment with the customer, a contract review ensures that the product requirements are appropriately established and documented (e.g. drawings, specifications, requirements specification document), differing requirements clarified before tender or conclusion of the contract (e.g. drawing deviations, drawing modifications by the customer, delivery dates, price) and the capability to meet the established requirements is in evidence. The quotation is made after a cross-sector feasibility analysis.

Documentation from the supplier:

Feasibility confirmation

Capacity confirmation

Submission to the customer:

Status in the *APQP Status Report*

Feasibility confirmation, e.g. according to *QAA 1, Appendix 4*

Capacity confirmation according to *QAA 1, Appendix 5*

Appearance

Objective:
Determination of the properties in terms of appearance, feel, handling and acoustic.

Expectations:

The supplier must know and comply with the requirements for the above mentioned properties

Feature listings, reference samples etc. must be provided for checking the properties and agreed with the customer

Documentation:

Feature listings and reference samples

Submission to the customer:

Status in the *APQP Status Report*

Design FMEA

Only applicable for suppliers with sole responsibility for product development

A Design EMEA is a systematic procedure to ensure that in a cross-sector team potential developmental and design defects as well as their respective causes have been considered and processed with preventive actions.

In the Design FMEA, all functions of the product must be covered. Experiences and complaints must be taken into account.

Objective:
Avoidance of defects in product development

Expectations:

Problems are solved in the product design in good time with the result that sample and production start dates can be complied with

Review of progress as regards the *Design Verification Plan*

Previously unrecognised areas of potential failure which come to light during design review must be included in the Design FMEA and the design criteria altered in agreement with the customer

Review of possible improvement possibilities as regards product safety or manufacturing costs

Review of progress as regards the achievement of reliability, quality, cost and planning objectives

The possible causes of defects are described and evaluated and where necessary corrective actions are initiated and monitored by those responsible

Documentation from the supplier:

Design FMEA

Submission to the customer:

Status in the *APQP Status Report*

Cover sheet to Design FMEA with participants and date of issue

Design Review

Objective:
Prevention of misunderstandings and problems. Monitoring of the progress of measures and compliance with objectives.

Expectations:

Problems are solved in the product design in good time with the result that sample and production use dates can be complied with

Review of progress as regards the *Design Verification Plan*

Previously unrecognised areas of potential failure which come to light during design review must be included in the Design FMEA and the design criteria altered in agreement with the customer

Review of possible improvement possibilities as regards product safety or manufacturing costs

Review of progress as regards the achievement of reliability, quality, cost and planning objectives

Documentation from the supplier:

Minutes of meetings from the supplier or customer

Submission to the customer:

Status in the *APQP Status Report*

Design Verification Plan – DVP

Only applicable for suppliers with sole responsibility for product development.

Objective:
Systematic planning of all trials or calculations for checking whether the product or design is suitable for use.

Expectations:
The suitability of the product must be proven by means of planned trials or calculations
Determination of the responsibility for trials on mass-produced products (see *APQP Element 22*)

Documentation from the supplier:
Design Verification Plan
Trial reports, design calculations and tolerance studies

Submission to the customer:
Status in the *APQP Status Report*
Status for design verification (current status of the *DVP*)

Product quality planning for subcontractors

The suppliers must forward the *APQP* requirements to their subcontractors, check implementation and summarise the results in the *APQP Status Report*.

Objective:
Clear presentation of the project progress at the subcontractor's for processes / products with high risk or at the special request of the customer.

Expectations:
The supplier must carry out a risk assessment and determine the extent of the involvement of his subcontractors in the advance product quality planning process
The suppliers review the project progress on a regular basis with their subcontractors, especially if they deliver products with "special features"

Documentation from the supplier:
Status report from the subcontractors about project progress

Submission to the customer:
Status in the *APQP Status Report*
Detailed schedules as required by the customer

2.1 Equipment and tools

Objective:
Compliant / released operating materials

Expectations:
Planning (expediting) and provision of all necessary operating materials
The procurement / production of equipment or tools must be monitored as regards deadlines
The equipment and tools should be tested before trial product run
Documentation from the supplier:
Schedules, capacity planning, evidence of feasibility within the framework of initial production sampling

Submission to the customer:

Status in the *APQP Status Report*
Detailed schedules as required by the customer

Inspection methods and inspection equipment

Objective:
Inspection methods agreed with the customer as well as inspection equipment suitable for measurements.

Expectations:
The inspection methods must be agreed between the supplier and customer
The procurement or production of inspection equipment must be monitored as regards deadlines
The inspection capabilities and any inspection process suitability must be proven

Documentation from the supplier:
Specification in the control plan, capability certificates within the framework of initial production sampling

Submission to the customer:
Status in the *APQP Status Report*

Inspection plan / control plan for prototype parts

Objective:
Ensuring the quality of the prototype.

Expectations:
Type and scope of the inspections as well as the related inspection equipment for prototypes must be determined and agreed with the customer
All “special features” are included

Documentation from the supplier:
Control plan for prototypes

Submission to the customer:
Status in the *APQP Status Report*
Control plan for prototypes

Production and inspection of prototype parts

Objective:
Timely delivery of cost- and quality-compliant prototypes.

Expectations:
Dates and quantities for the production of prototypes must be planned, monitored and complied with
Delivery of the prototypes with inspection report (see *QAA 2*)
For non-conforming prototypes, the approval of the customer must be obtained before delivery

Documentation from the supplier:
Prototypes, inspection report

Submission to the customer:
Status in the *APQP Status Report*

Prototypes with inspection report

Design Freeze (drawings / specifications)

The drawings and specifications include all technical drawings, CAD data, material specifications and technical specifications from the customer / supplier.

Objective:

Timely provision (Design Freeze) of all necessary drawings and specifications to comply with the initial production sample date / start of production (SOP).

Expectations:

The supplier names the last possible date for modifications to series production drawings and specifications to the customer to guarantee the initial production sampling on the planned date

If the responsibility for development lies with the supplier, all drawings and specifications must be agreed with the customer at this time

Predetermined “special features” must be considered accordingly as part of the product and process planning

Documentation from the supplier:

Drawings

Specifications

Submission to the customer:

Status in the *APQP Status Report*

Feasibility confirmation

As part of contract review, a cross-sector team must evaluate the feasibility of the envisaged product. Even if the customer is responsible for the design, the supplier must evaluate the feasibility of the products both in the tender / prototype planning phase and also in the mass production process planning phase.

Objective:

Evaluation of the feasibility of the production / (series production) as regards envisaged design.

Expectations:

The team must be satisfied that the product is suitable for its intended use and can be checked, inspected, packaged and delivered to the customer on time in sufficient quantity, at a competitive price and of the requested quality

For subcontractors whose activities impact on the “special features”, it is the decision of the supplier to request a feasibility confirmation

Documentation from the supplier:

Feasibility confirmation

Submission to the customer:

Status in the *APQP Status Report*

Feasibility confirmation, e.g. according to *QAA 1, Appendix 4*

Process flow diagram and layout of production run

The flow diagram for the series production process is a graphical representation of the planned workflow.

Objective:
Basis for investment planning, process FMEA, production plan, control plan and visual aid

Expectations:
Sequence of all series production and inspection steps from goods receipt to goods issue

Documentation from the supplier:
Process flow diagram
Machine control plan

Submission to the customer:
Status in the *APQP Status Report*
Process flow diagram

Process FMEA

A Process FMEA is a systematic procedure to ensure that in a cross-sector team potential production defects as well as their respective causes have been considered and processed with preventive actions.

In the Process FMEA, e.g. according to *VDA 4* or similar, all production and inspection steps must be covered. Experiences and complaints must be taken into account.

Objective:
Avoidance of defects in process development.

Expectations:
All production and inspection steps are listed and analysed
The possible causes of defects are described and evaluated and where necessary corrective actions are initiated and monitored by those responsible
Significance numbers/figures are agreed with the customer

Documentation from the supplier:
Process FMEA
Action plan for high risk priority number (RPN)

Submission to the customer:
Status in the *APQP Status Report*
Cover sheet to the Process FMEA with participants and date of issue
Pareto analysis of the risk priority numbers (Top 20 of the RPN)

Inspection equipment capability

Objective:

Evaluation of the suitability of the envisaged inspection equipment using measuring system analysis / capability study, e.g. according to the *MSA* procedure of the *AIAG*.

Expectations:
Capability studies must be carried out to check the suitability of the inspection equipment.
The customer must be given the opportunity to review these results
If necessary inspection / measuring methods must be agreed in good time with the customer (see *APQP Element 8.2*). The capability studies must be repeated in the events of modifications to the inspection and measuring equipment.

Documentation from the supplier:

Capability certificates with individual values e.g. by means of print-outs of the statistics program used

Submission to the customer:
Status in the *APQP Status Report*
Capability certificates with individual values as part of the *production process* and *product release procedure.*

Pre-production run / start of production inspection plan

Objective:
Compliance with the process and product requirements in pre-production run or during the start of production, e.g. through increased inspection frequency, additional inspection characteristics.

Expectations:
Type and scope of the inspections as well as the relevant inspection equipment for pre-production / start of production phase are determined and agreed with the customer
Reaction plans for the case of deviations are defined
All “special features” are included.

Documentation from the supplier:
Control plan for pre-production run / start of production

Submission to the customer:
Status in the *APQP Status Report*
Control plan for pre-production run / start of production

Process instructions

All instructions for the production personnel, e.g. production plans, work and inspection instructions, maintenance plans, defect catalogues, process parameters.

Objective:
Ensuring quality and quantity.

Expectations:
Instructions that are easy to understand (national language of the production site) and accessible at the place of work ensure that processes are complied with and requirements of the process and the product are implemented
Procedure for controlling defective products are described
All employees must be appropriately trained and instructed in their duties. Training certificates must be maintained to regulate skills

Documentation from the supplier:
Process instructions
Training certificates

Submission to the customer:
Status in the *APQP Status Report*

3.1 Logistics concept

Objective:
Ensuring the delivery capacity in coordination with the customer's competent contact person.

Expectations:
Retrieval system, e.g. Web EDI
Definition of the transport routes
Customs clearance (if applicable)
Stock management, e.g. consignment stock, safety stock

Documentation from the supplier:
Logistics agreement, minimum stock planning

Submission to the customer:
Status in the *APQP Status Report*

Packaging

Objective:
Maintaining product quality by using suitable packaging.

Expectations:
Suitable packaging is determined for

- Transport to or from the subcontractor
- Internal transport / storage
- Shipment to the customer

Packaging specifications and corrosion protection for shipment to the customer are agreed with him
Applicable packaging requirements of the customer are met
Employees ensure that the product quality is not impaired during packaging, shipping, storage and retrieval

Documentation from the supplier:
Determined packaging specifications and corrosion protection

Submission to the customer:
Status in the *APQP Status Report*
Packaging specification and corrosion protection agreed with the customer

Trial production run

Objective:
Review the performance of the series production process.

Expectations:
Use of series production systems, machines, tools, inspection equipment, environment (including standard personnel) even with subcontractors
Use of series production material
Verification of the required product quality and the planned production targets (capacity)
Verification of the series production process

The production quantity consists of at least a representative batch size for the production process (usually one day's requirement from the overall annual quantity)
Retrieval of the initial production samples from this batch
Participation of the customer if previously determined

Documentation from the supplier:
Protocol and/or capability certificates

Submission to the customer:
Status in the *APQP Status Report*

Series production inspection plan / control plan

Objective:
Compliance with the process and product requirements in the production run.

Expectations:
Type and scope of the inspections as well as the relevant inspection equipment are determined and agreed with the customer
Reaction plans for the case of deviations are defined
All "special features" are included.

Documentation from the supplier:
Control plan for production run

Submission to the customer:
Status in the *APQP Status Report*
Control plan for production run

Preliminary process capability study

Process capability studies prove with statistical methods that the product can be manufactured according to specifications. The capabilities of "special" features as well as any other features determined with the customer within the framework of advanced product quality planning are to be demonstrated.

Objective:
Statistical evidence of capable processes.

Expectations:
Preliminary process capability under series production conditions, e.g. according to *VDA Volume 4*, with Pp/Ppk > 1,67 (at least 25 x 5 parts) or machine capability (50 parts) Cm/Cmk > 1,67
For non-capable processes, appropriate corrective actions must be initiated to achieve process capability. Until then, a 100% inspection must be carried out

Documentation from the supplier:
Capability certificates with individual values

Submission to the customer:
Status in the *APQP Status Report*
Capability certificates with individual values as part of the *production process and product release procedure*
If necessary action plan for achieving the required process capability

Technical tests on mass-produced parts - PVP

Objective:
Evidence that the mass-produced product meets the customer requirements using a structured *Process Verification Plan (PVP)*.

Expectations:
Technical tests with products from the trial production run if determined in the *Design Verification Plan* or in the specification

Documentation from the supplier:
Protocol and/or test reports

Submission to the customer:
Status in the *APQP Status Report*
Certificates as part of the *production process and product release procedure*

Initial production sampling

Documented evidence that the product produced under series production conditions meets the customer requirements. The *production process and product release procedure* is described in detail in the QAA 2.

Objective:
Evidence of product and process release.

Expectations
Timely production of the initial production samples; creation of the documentation for all elements required in accordance with the *production process and product release procedure* of the customer
Timely provision of the documentation; scope depending on determined submission level

Documentation from the supplier:
Initial production sample report, initial production sample
Documentation for all elements required in accordance with the *production process and product release procedure*

Submission to the customer:
Status in the *APQP Status Report*
Scope depending on the determined submission level