EMBS Supplier Management System

Part 2: Global Supplier Manual

Appendix C – EMBS Process/Part Approval Process (APQP/PPAP)

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Scope

The APQP activity described in this appendix will apply to any product or process.
EMBS will assess the criticality of the part (e.g. critical function, significant impact on safety or on the supply chain, etc.).
The output of that, will define APQP/PPAP level which will be indicated within the Request for Quotation (RFQ) and/or the Purchase Order (PO).

NB. The supplier shall ensure that they understand and agree to comply with these requirements at the time of quotation and make suitable resources available to ensure that the APQP/PPAP is operated and delivered within the project time-lines.

Introduction

EMBS is structured to support the requirements of IATF 16949 and, while it is not a requirement of our suppliers to be accredited to IATF 16949, it is expected that suppliers shall plan and manage its processes to meet the requirements of this appendix.

This appendix outlines the phases of the Advanced Product Quality Planning (APQP) that EMBS will perform and the tools that the supplier must exercise as part of that process.

In addition, it also defines the process for Production Part Approval Process (PPAP) and the associated documentation to be submitted to meet EMBS requirements.

NB. Both these processes are written around the AIAG manuals in support of the requirements of IATF 16949. Suppliers shall familiarise themselves with these manuals, and all associated sub-process manuals, and integrate the associated processes into their own Business Management System.

All manuals can be obtained via http://www.aiag.org.

1. Requirements for APQP/PPAP

The supplier will be informed of their PPAP submission levels as part of the Request for Quotation, and, on successful formal placement of Purchase Order, the supplier shall commence the APQP process.

NB. This process is defined as the overall guideline. There may be some variances dependent upon the part and/or the process or where the project/customer dictates.

2. APQP Phase 1, 2, 3. Quotation, Product and Process design and development

Key Steps of APQP steps;

- *RFQ Process*

  Upon receipt of Request for Quotation, the supplier shall review the PPAP levels and consider all support activities listed below in their quote, including any requirements for additional resources and/or capital equipment.

- *New Suppliers*

  Where an RFQ is sent to a supplier not currently on EMBS global suppliers list, a supplier approval process will be made in parallel with this APQP process.

- *Product Design and Development*

  The product shall be designed in the way to meet Customer and market requirements and specifications.
  To achieve above target suppliers should use following tools and steps: feasibility study -> planning / collecting all technical information's, DFMEA, prototyping, testing&validation.

- *Process Design and Development*

  The process shall be planned in such a way that it is ready to meet the product requirements as well as the run at rate for volume.
  The supplier shall use all technical data as an input as well as the projected volume/call off rate.
  The process must be "engineered" to meet these requirements ahead of making any parts.

  The supplier shall utilise the following tools as a minimum to meet EMBS requirements.
  NB. This list is in the recommended order in which each process/document should be created.

  Process Flow Map – a graphical map showing the manufacturing points including process handovers (one process to another) and inspection/test points. Where the supplier sub-contracts any of these processes, this must be clearly indicated, by suitable means, in the PFM.

  NB. For Sub-contracted Critical or Special Processes (see below) EMBS may require that a separate APQP/PPAP be defined for each process.

  PFMEA – Process Failure Mode and Effect Analysis. This is an automotive tool that considers potential failures within a process that would result in non-conforming product. (See AIAG manuals for guidance)

(Pre-Launch) Process Control Plan – A control plan uses the Process Flow Map and the PFMEA as inputs to define controls for the process/product to prevent/detect non-conforming material and reduces the risks defined in the PFMEA.

NB. Both the PFMEA and the Control Plan are dynamic documents and should be adjusted as the process develops. Once the process has been proven the control plan is used to define the ongoing controls for volume production.

Measurement Plan (MSA) – The supplier shall review all critical/key characteristics and define how each shall be measured. These characteristics may be defined in agreement with EMBS or as stipulated within the technical documents/drawings.

The plan shall consider the measurement equipment to be used and shall have a resolution capable of measuring the features defined. Where appropriate, the supplier shall conduct Measurement System Analysis **(MSA)** or gauge R&R studies. (See AIAG manuals for guidance).

NB. Where validation is performed using check fixtures/aids a measurement plan/dimensional data shall be produced for the fixture/aid

- *(Sub-Contract) Critical Processes*

A critical Process is defined as any manufacturing or other process that adds value to the product. Where these are sub-contracted out, the suppler shall inform EMBS.

EMBS reserves the right to apply this Appendix to the sub-contractor where appropriate.

- *Special Processes*

A special process is defined as any process where the output of the product cannot readily be measured or can only be measured by indirect means.
Examples of these are processes such as;
Welding – can be checked for dimensions but critical properties such as penetration depth, fusion etc. can only be measured by destructive testing. Process Controls shall be managed by an approved weld procedure.
NDT (Non-Destructive Testing) – similarly, NDT itself cannot be measured as a process but is critical in assessing certain weld characteristics. Control shall be managed by adherence to international standards for NDT.
Heat Treatment – Mechanical properties of heat treated parts such as UTS, Yield, and micro hardness. Control can only be assured by Destructive Testing.
Painting/Coating – Thickness/ color/ gloss levels can all be measured but key properties such as corrosion resistance, adhesion etc. can only be measured by destructive testing.
Where a Special Process is identified, the supplier shall have written procedures to control process inputs. The inputs must be verified by means of a recognized test method relevant to the special process, e.g. destructive test.
The list is not limited to the examples above and any process that has a critical output shall be considered for inclusion as a special process on the basis of above.

3. APQP Phase 4 – Validation of Process and Product

- *Production Verification Run (PVR)*

The process shall be validated by means of a significant production run. The quantity and/or duration of the run shall be defined by the project/customer, and will be of a quantity deemed appropriate to be able to validate the process capability.

Regardless of the quantity, the production run shall be run using production tooling, processes, equipment, materials and, where practical, using production personnel that will conduct the volume manufacturing.
The process shall run at its nominal rate and the output confirmed to validate the volume "run at rate" as defined in the PO/contract.
The process shall use the Pre-launch version of the control plan to control the process and validate the outputs as defined.
In special cases for key components EMBS will perform at supplier side or require to do by supplier side an Process Release.

- Purpose of the Process Release.

  Purpose of the process release is the inspection and evaluation of processes for producing parts for EMBS.

- *Verification Documents*

  As a minimum the supplier shall document the following outputs from the verification run;
  Process Capability Study – Statistical analysis of the process based on key characteristics or process control parameters. This will confirm the capability of the process to meet the requirements of the product under volume conditions.
  Test/Measurement Data – A First article inspection report for all required parameters. This can be either dimensional or performance data relevant to the product. Where required, EMBS may also require material performance data where those properties are critical (see special processes).
  MSA – The measurement study for the test/measuring equipment.
  Run At Rate – The measured rate at which the volume was manufactured and at which it is able to run under volume conditions. Run at Rate can either required to do by supplier or performed by EMBS at supplier side.

- *Feedback and Control*

  Specifically, this relates to feedback during the PVR and shall be used as an input to finalize the PFMEA/Control Plan.
  Where appropriate, feedback may be used as an input to finalize the design of the product, however any design changes may result in a rerun of the PVR.
  Refer to appendix D for details

4. APQP Phase 4 - PPAP

On completion of the Production Verification Run the supplier shall compile all related documentation into a PPAP package for submittal to EMBS.
Unless otherwise specified, the default PPAP submission level will be to AIAG PPAP manual Level-3 requirements. EMBS has the option to change the approval process requirements.
EMBS requires that all PPAP documentation shall be completed and available for review, regardless of the submission level requested.
In addition to the level-3 submission, any applicable MSDS shall be included with PPAP submissions as well as all documentation for any customer specific requirements.
Where EMBS define, supplier shall submit with each delivery Certificate of Conformity (CofC), dimensional or specified test results, material certification and any other requested documentation.

Remark: *supplier is obligated to follow legal requirements, like submission of Reach and Rohs declarations (documentation need to be up to date).*
Additional specific customer requirements (e.g. any environmental, CSR) need to be taken into consideration and confirmed by supplier.

EMBS may require from suppliers material composition declarations (e.g. N2580 Bosch standard) as part of the International Material Data System (IMDS).
Details of the system and login will be supplied on request.

- *Document Types*

PPAP package per part number must be submitted to local purchasing/Supplier Quality representative using the following format. Either;

- A single "tabbed" excel spreadsheet with the PSW as the front sheet and named tabs for each document type, OR
- A zip file with each document within the zip file named according to its document type (e.g. Process Flow Map, PFMEA etc) and linked to its part number/project number.

NB The package can share common documents of the process (PFMEA/Process Flow/Control Plan etc) however dimensional measurements/test data shall be unique to the part number/batch/tool/cavity.
Documents not in this format, or that do not contain the below noted information will not be accepted (unless by specific prior arrangement).
The document packages shall be identifiable by the following information;
Supplier Name, Part number(s) and project code. The supplier can use any numbering format provided this information is easily identified.

- *Sample Parts*

From the Production Verification Run (PVR), the parts may be used by EMBS for incorporation into finished product. However, as part of the PPAP sign off a minimum of 2 master samples shall be retained.
NB; where the part is made using fixed tooling, a sample part per tool/per cavity will be required.

One sample will be held by the supplier as a reference part and the second shall be submitted to EMBS for retention.
Storage and maintenance of these samples shall be suitable to ensure product integrity for the duration of the project.
Delivery of sample parts to EMBS shall be done in accordance with agreed packaging and shipping standards.

- *PPAP Approval Process*

The PPAP package will be reviewed by EMBS for completeness and once approved, a signed copy of the Part Submission Warrant (PSW) will be returned to the supplier for retention.

- *Concessions*

Should the parts/process not meet the requirements, but are deemed to meet fit/form/function without detrimental effect, the PPAP may be approved with concession.
Corrections should be made where practical, though requirements may also be amended to suit process capability where practical to do so.

The supplier must not commence volume production until the PPAP has been approved OR by written consent with EMBS projects.

5. APQP Phase 5 - Volume Manufacturing

Once PPAP is approved the volume manufacturing can start. The supplier must ensure that all associated controls are maintained and, where appropriate, improved.
The supplier shall ensure that the run at rate is maintained at the levels agreed within the PO. However the supplier should utilise techniques such as Lean Manufacturing to continuously improve the processes and to target cost reductions through the elimination of waste.
Upon reasonable request the supplier shall provide access to manufacturing, including sub-contract processes, for EMBS/Customer personnel for the purpose of periodic process reviews/audits.

- *Process/Product Changes*

  Any significant changes to the process/product must be agreed with EMBS prior to any such change taking place.
  These changes may result in a re-submission of the PPAP and associated tools/documents.
  See Appendix D of Supplier Handbook for further details/guidance.

- *Document Retention*

  Unless otherwise specified ,the supplier shall maintain all APQP/PPAP, production and technical documentation for a period that covers the project life cycle and, where appropriate, shall extend this period to include after sales support. In case specific customer requirement in this subject, supplier have to follow defined retention time accordingly.

- Labelling and Traceability

  Supplier shall ensure product is suitably identified through production and during shipment and delivery of product to EMBS. Shipping labels shall be legible and identified primarily by its part number and/or PO/batch number. It should also indicate the revision status, and updated PPAP as required.

  Where traceability is a requirement of the PO/Specification, suitable batch identification that can be traced back through its manufacturing history and, where required, back to its parent material/sub-components.

- Requalification inspection

  Unless otherwise specified, the products delivered to EMBS shall annually undergo a requalification inspection, in which all measurements, functional features and the material are inspected to check that they meet their requirements. Requalification inspection must be included in control plan, evidences must be kept. In case of any deviation notification, EMBS need to be immediate informed.

- Shipping and delivery

  Parts shall be delivered to EMBS using packaging and shipping methods that ensures product integrity and ease of handling. Where special handling instructions are necessary, these shall be included as part of the shipment.

  Special attention shall be given to any regulatory requirements for transportation (e.g. UN/dangerous goods) and/or where parts being shipped are deemed to have an environmental impact or are hazardous to health.

- *Project Tooling*

  Project specific tooling, including any test or measuring equipment, used to produce parts for any EMBS products shall be maintained by the supplier for the duration of the project life cycle, including after sales support.
  Where tooling has limited lifespan during a project (i.e. maximum shot tool) the supplier shall ensure that EMBS manufacturing is not interrupted by tool changes and shall inform EMBS in advance of the tool reaching end of life.

  NB: where appropriate, PPAP shall be restarted for any change of tool during a project.
  Where ownership of such items is either EMBS or customer, the supplier may be asked to asset mark and store the tooling. This will be defined within the supplier contract/PO where applicable.
  Equipment shall be stored and preserved in a way to protect the tool and subsequent products integrity.

- *Materials*

  Where EMBS choose to issue consignment material (Free Issue) the supplier shall apply the same controls as purchased materials, unless otherwise agreed.
  Obsolescence and disposal of these materials shall only be made in conjunction with EMBS.
