Advanced Product Quality Planning Guideline

For

M&M Suppliers

Mahindra Quality System (A.S.)

Advanced Product Quality Planning Guideline for Suppliers.
MQS/APQP-S/GL01
First Edition, 15th Feb.05

This APQP Guideline is prepared by the MQS Team, located at-
2nd floor, A.D. Building, A.S. Kandivli.
For any further information, clarification or suggestions, you may contact the following:

Name	E-Mail	Tel. No./Extension
Naresh Patil	Patil Naresh	28467111
Manoj Nabar	Nabar Manoj	28467068
Nandakumar Walve	Walve Nandakumar	28467292
Vinayak Atre	Atre Vinayak	28467292
Sanjay Murzello (Nasik)	Murzello Sanjay	0253 –5608236
Uday Bhaskar	Uday Bhaskar (Z'bad)	08451-284241
M N Parelkar	Parelkar Murari	28871695/2480
Subir Das	Das Subir	28864300/2083

Table of Contents
APQP

Advanced Product Quality Planning Guideline for Suppliers.

1.0 Introductions

1.1 APQP Definition

Advanced Product Quality Planning (APQP) is a structured method for defining and executing the actions necessary to ensure a product satisfies the customer. APQP is required of all system, subsystem and component manufacturing locations.

1.2 Goal

The goal of APQP is to facilitate communication with all persons involved in a programme and ensure that all required steps are completed on time, at acceptable cost and quality levels.

1.3 Purpose

The purpose of this guideline is to establish:

- Common APQP expectations for all M&M activities.
- Common APQP process metrics.
- Common APQP deliverables.
- A common programme status-reporting format.
- Lead and Support roles and responsibilities for each APQP Element.

1.4 Approach

- APQP emphasise on Up-front planning, First three part of the P-D-C-A cycle are devoted to up-front product quality planning through product / Process Validation. The Act of implementation, the fourth part is the stage where the importance of evaluating the output serve two functions; to determine if customer are satisfied, and to support the pursuit of continuous improvement.

- This guideline focuses on 23 key APQP elements. Definitions, expectations, and deliverables for these elements are identified in Section 5.0 APQP Element Description of this guideline. The status for these disciplines is summarized on the APQP Status Report. This guideline provides a management tool for follow-up and timely completion of all 23 APQP Elements.

1.5 Applicability

APQP status reporting is a requirement of all M&M activities and must be applied to the following:

- New Product.
- Changed/ modified product.
- New manufacturing site.
- Significant process changes (new facilities/ toolings).
- High impact suppliers (Subcontractors).
- Carry over issues.
- Part Submission Warrant (PSW) requirement as per the Mahindra Production Part Approval Process (MPAP) Manual.

All direct material suppliers shall comply with this guideline. Head – PD & C / Supplier Upgradation must approve exceptions to this requirement via waivers. Waiver requests are to include duly filled up **Risk Assessment Form**.

The guideline intends to cover all situations normally occurring during Projects, ECN, PCRN implementation. However if there are any queries, Supplier should contact the Head – PD &C Office / Supplier Upgradation for guidance.

2.0 APQP Fundamentals

2.1 Teams

The first step in the Advanced Product Quality Planning Process is to assign lead responsibility for every APQP Element. This leader establishes a cross-functional team to complete the element requirements on time.

Effective Product Quality Planning requires a cross-functional team including representatives from Product Engineering, Manufacturing Engineering, Manufacturing Plants, Purchasing, Quality, Service, Sales, Suppliers, and M&M representatives, as appropriate.

2.2 Elements (Subcontractors)

This guideline focuses on 23 Key APQP disciplines, identified as APQP elements. These elements, when summarized and reported, communicate the quality planning status of a programme.

2.3 Adjustments

If the programme is considered to be low risk, the APQP leader may skip certain APQP elements. For example, if the product is carry-over with minor changes, existing control plans can be used and/ or packaging evaluations may not be required. The cross-functional team must agree to all deviations from the APQP process. If the team agrees that an element is not required, the function should write “N/A” for “not applicable” in the remarks section of the APQP Status Report (Figure 3).

2.4 Roles & Responsibilities

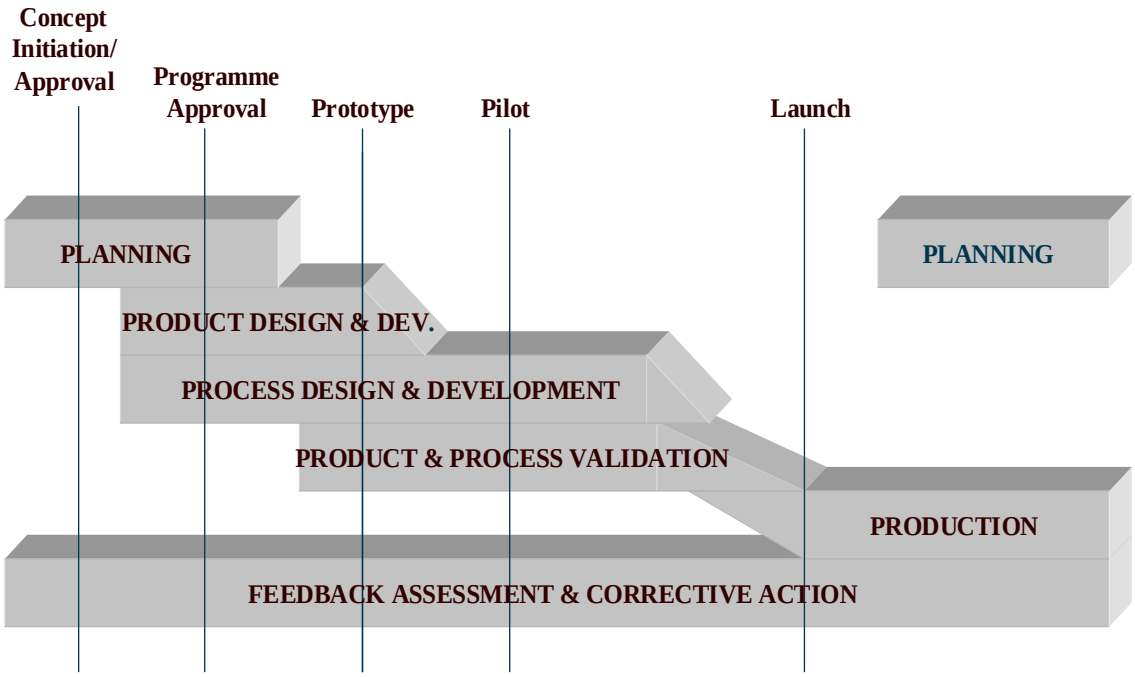
The APQP Lead/Support Responsibilities are documented in Section 5.0 APQP Element Description, of this guideline.

2.5 APQP Process Flow

Figure 2 shows the generic APQP Process Flow

Figure 1

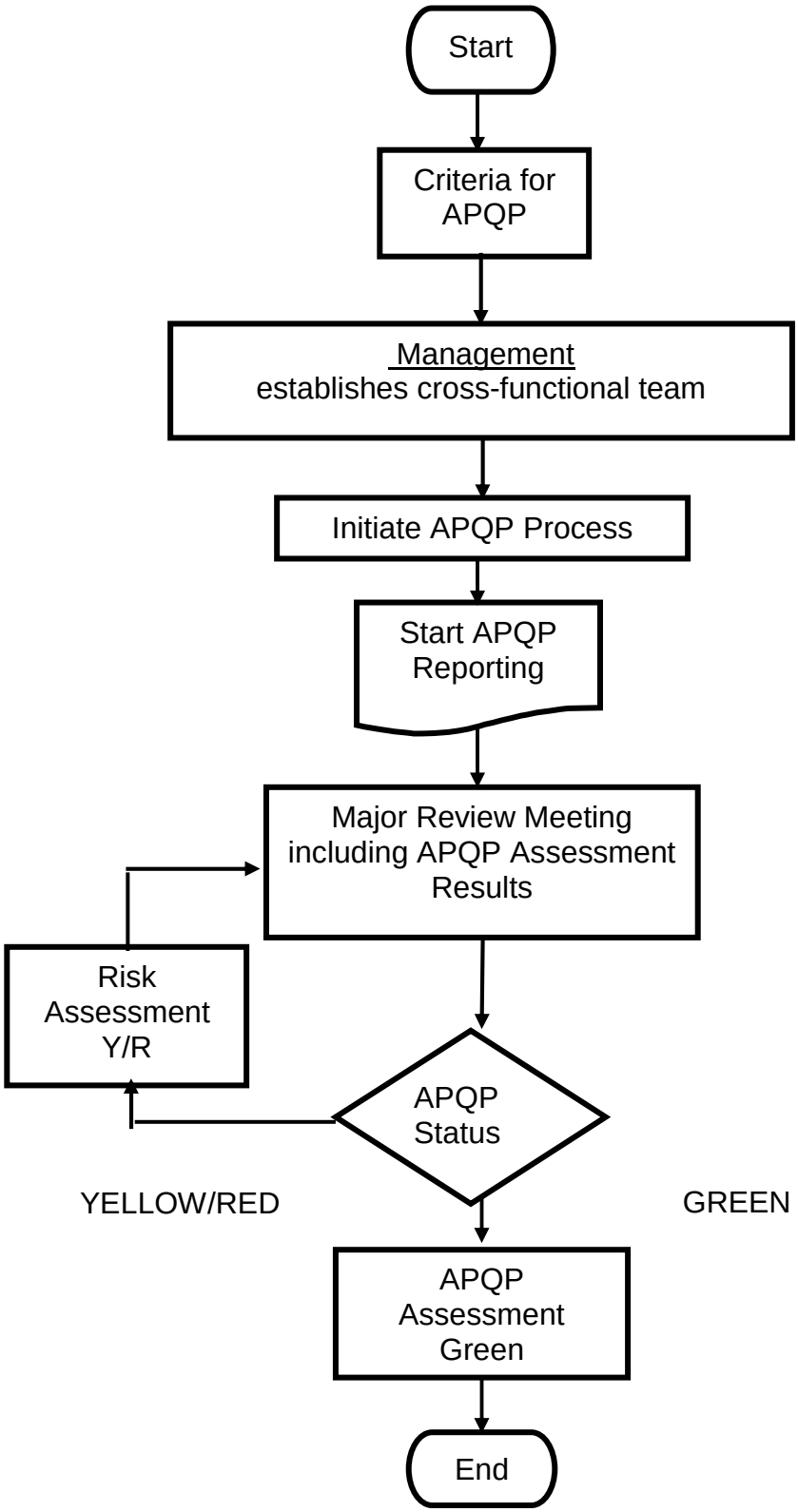
5 PHASES OF APQP



APQP process is based on P-D-C-A cycle, The Five phases of APQP which are

- Plan & Define
- Product Design and Development
- Process Design and Development
- Product & Process Validation
- Feedback Assessment and Corrective Action

Figure 2: Generic Process Flow – APQP



3.0 The APQP Status Report (Refer Figure 3)

3.1 Purpose

The APQP Status Report summarizes the status for the 23 APQP elements. The status report facilitates communication between Supplier & M&M. It also provides a dated record that future programmes can reference.

3.2 Status Reporting Responsibility

For each of the 23 elements, there is a lead responsibility defined. This lead function obtains the necessary input/support from other affected functions and consolidates it into a G/Y/R (Green/Yellow/Red) status (per element) on the APQP status report form.

3.3 Reporting Requirements

Each Team will be requested by Quality Department to submit an APQP status. The Quality/ Department consolidates the APQP status report and submits assessment results to the particular company for review. Whenever an element is assessed not Green a Risk Assessment (Refer Annexure 1A) must be submitted to the Quality Department.

Figure: 3 APQP Status Report

Date :
Review No:

Supplier		**Programme**	
Location		**Part No.**	
Supplier Code		**Part Desc.**	
		Ch. Let. No.	
		User Plant(s)	

Risk Assessment
New Site ☐ **Technology** ☐ **Process** ☐
Other Risks _____

Team Members	Company / Function	Contact N0. / E-mail

Build Level	MRD	Quantity	Concurred		PIST %	PIPC %
			No. of SC	No. of CC		

APQP Elements	GYR Status	Focus Element Rating	Program Need Date	Completion Date	Resp. Engineer Initial	Remarks
Sourcing Decision						
Customer Input Requirements						
Design FMEA						
Design Review(s)						
Design Verification Plan & Report						
Subcontractor APQP Status						
Facilities, Tools and Gages						
Prototype Build Control Plan						
Prototype Builds						
Drawing and Specifications						
Team Feasibility Commitment						
Manufacturing Process Flow Chart						
Process FMEA						
Measurement System Evaluation						
Pre-Launch Control Plan						
Operator Process Instructions						
Packaging Specifications						
Production Trial Run						
Production Control Plan						
Preliminary Process Capability Study						
Production Validation Testing						
Production Part Approval (PSW)						
PSW Part Delivery at MRD						
COMMENTS :						

APQP CO-ORDINATOR

4.0 Ratings and Assessment

4.1 G Y R Status

Green – Yellow – Red (GYR) Status communicates the progress towards the successful completion of an APQP element by the Programme Need Date. The Programme Need Date is the last possible date an element can be completed and not adversely affect quality or timing of the Programme. The " GYR Status " column of the report shows the assessment for each element. Definitions for Green, Yellow, and Red are as follows:

Green – "G" ratings are given before the Programme Need Date (PND) to indicate the element will meet the Programme Need Date and will meet all quality expectations. "G" ratings given on the PND indicates that the element is complete and meets all quality expectations (See Section 5 for element expectations/ deliverables).

Yellow – "Y" ratings are given prior to the Programme Need Date to indicate an element will not meet the PND or quality expectations. To be considered "Y", a risk assessment and a recovery plan must be in place for the element. "Y" ratings indicate a need for Programme management attention. A "Y" rating can only be given to an element prior to the Programme Need Date (PND).

Red – "R" ratings are given prior to the Programme Need Date to indicate an element will not meet the Programme Need Date or quality expectations. To be considered "R", a risk assessment and a recovery plan must be in place for the element. "R" signifies the Programme is at risk and needs immediate management attention. Any element rated "R" at its PND must carry the "R" rating through the remainder of the Programme. Completion of the element after the Programme Need Date does not change the status of the element; the element is late and must stay red. To reflect improvements of a RED element's status after the PND, progress to GREEN will be shown by a second entry in brackets.

4.2 The 8 Focus Elements :

For all 23 elements, quality expectations are defined in this Guideline. Out of the 23 elements, the following 8 elements are considered as Focus Elements :

1. Design FMEA
2. Design Verification Plan
3. Prototype Build Control Plan
4. Manufacturing Process Flow Chart
5. Process FMEA
6. Pre-Launch Control Plan
7. Operator Process Instructions
8. Production Control Plan

These elements when completed with Quality and On Time lay the foundation for Programme success. The 8 Focus Elements are assessed for Quality of Event using Focus Element Rating Checklist as shown in the Annexures.

4.3 Status Report Descriptions :

- **Build Level :** Indicates the level of Build such as Engineering Prototype, Verification Prototype, Production Trial Run, Job # 1, etc.
- **PIST :** Percentage of Inspection points that satisfy Specified Tolerance (all points).
- **PIPC :** Percentage of Indices which are Process Capable (Percentage of Critical & Significant Characteristics with Pp & Ppk greater than or equal to 1.67 for the pre-production phase and Cp and Cpk greater than or equal to 1.33 for production phase).
- **SC & CC (Special Characteristics) :** All products and processes have features described by characteristics which are important and need to be controlled. However, some characteristics called special characteristics require extra efforts to minimise the risk of potential adverse consequences.

  Special Characteristics consist of -

  1. **Critical Characteristics** are those product or process requirements that affect compliance with government regulation or safe vehicle/ product function AND which require special actions/ controls.

  Product or process requirements can include dimension, specification, tests, processes, assembly sequences, tooling, joints, torques, welds, attatchments, component usage etc.

  Symbol : <CC>, Severity Rating : 9 or 10.

2. **Significant Characteristics** are those product, process, and/ or test requirements which are important for customer satisfaction AND for which Quality Planning actions must be summarised on a Control Plan.

Symbol : <SC> , Severity Rating : 5 to 8 and Occurrence Rating : 4 and above

DFMEA Rating Tables :

Severity Ranking Table :

Design FMEA : Severity of Effect		
Effect	**Criteria**	**Ranking**
Hazardous without warning	Very high severity ranking when a potential failure mode affects safe vehicle operation and / or involves noncompliance with government regulation without warning.	10
Hazardous with warning	Very high severity ranking when a potential failure mode affects safe vehicle operation and / or involves noncompliance with government regulation with warning.	9
Very High	Vehicle / item inoperable, with loss of primary function.	8
High	Vehicle / item operable, but at reduced level of performance. Customer very dissatisfied.	7
Moderate	Vehicle / item operable, but Comfort / Convenience item(s) inoperable. Customer dissatisfied	6
Low	Vehicle / item operable, but Comfort / Convenience item(s) operable at reduced level of performance. Customer experiences some dissatisfaction.	5
Very Low	Fit & Finish / Squeak & Rattle item does not conform. Defect noticed by most customers.	4
Minor	Fit & Finish / Squeak & Rattle item does not conform. Defect noticed by average customers.	3
Very Minor	Fit & Finish / Squeak & Rattle item does not conform. Defect noticed by discriminating customers.	2
None	No effect.	1

Occurrence Ranking Table :

Probability of Failure	Possible Failure Rates	Ranking
Very High: Persistent Failures	>/= 100 per thousand vehicles/ items	10
	50 per thousand vehicles / items	9
High: Frequent Failures	20 per thousand vehicles / items	8
	10 per thousand vehicle / items	7
Moderate: Occasional Failures	5 per thousand vehicle / items	6
	2 per thousand vehicle / items	5
	1 per thousand vehicle / items	4
Low: Relatively Few Failures	0.5 per thousand vehicle / items	3
	0.1 per thousand vehicle / items	2
Remote: Failure is unlikely	</= 0.01 per thousand vehicle / items	1

Detection Ranking Table :

Detection	Criteria	Ranking
Absolute Uncertainty	Design Control will not and / or can not detect a potential cause /mechanism and subsequent failure mode; or there is no Design Control	10
Very Remote	Very remote chance the Design Control will detect a potential cause / mechanism and subsequent failure mode	9
Remote	Remote chance the Design Control will detect a potential cause / mechanism and subsequent failure mode	8
Very Low	Very remote chance the Design Control will detect a potential mechanism and subsequent failure mode	7
Low	Low chance the Design Control will detect a potential cause / mechanism and subsequent failure mode	6
Moderate	Moderate chance the Design Control will detect a potential cause / mechanism and subsequent failure mode	5
Moderately High	Moderately high chance the Design Control will detect a potential cause / mechanism and subsequent failure mode	4
High	High chance the Design Control will detect a potential cause / mechanism and subsequent failure mode	3
Very High	Very high chance the Design Control will detect a potential cause / mechanism and subsequent failure mode	2
Almost Certain	Design Control will almost certainly detect a potential cause / mechanism and subsequent failure mode	1

PFMEA Rating Tables:

Severity Ranking Table :

Effect	Criteria: Severity of Effect This ranking results when a potential failure mode results in a final customer and/or a manufacturing/assembly plant defect. The final customer should always be considered first. If both occur, use the higher of the two severities. (Customer Effect)	Criteria: Severity of Effect This ranking results when a potential failure mode results in a final customer and/or a manufacturing/assembly plant defect. The final customer should always be considered first. If both occur, use the higher of the two severities. (Manufacturing/Assembly Effect)	Ranking
Hazardous without warning	Very high severity ranking when a potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation without warning	Or may endanger operator (machine or assembly)without warning.	10
Hazardous with warning	Very high severity ranking when a potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation with warning	Or may endanger operator (machine or assembly)with warning.	9
Very High	Vehicle/item inoperable (loss of primary function).	Or 100% of product may have to be scrapped, or vehicle/item repaired in repair department with a repair time greater than one hour.	8
High	Vehicle/item operable but at a reduced level of performance. Customer very dissatisfied.	Or product may have to be sorted and a portion (less than 100%) scrapped, or vehicle/item repaired in repair department with a repair time between a half hour and an hour.	7

Severity Ranking Table Continued:

Moderate	Vehicle/item operable but Comfort/Convenience item(s) inoperable. Customer dissatisfied.	Or a portion (less than 100%) of the product may have to be scrapped with no sorting, or vehicle/item repaired in repair department with a repair time less than a half hour.	6
Low	Vehicle/item operable but Comfort/Convenience item(s) operable at a reduced level of performance	Or 100% of the product may have to be reworked, or vehicle/item repaired offline but does not go to repair department.	5
Very low	Fit and finish/Squeak and Rattle item does not conform. Defect noticed by most customers (greater than 75%).	Or the product may have to sorted, with no scrap, and a portion (less than 100%) reworked.	4
Minor	Fit and finish/Squeak and Rattle item does not conform. Defect noticed by 50% of customers.	Or a portion (less than 100%) of the product may have to be reworked, with no scrap, online but out of station.	3
Very Minor	Fit and finish/Squeak and Rattle item does not conform. noticed by discriminating customers(less than 25%)	Or a portion (less than 100%) of the product may have to be reworked, with no scrap, online but in station.	2
None	No discernible effect	Or slight inconvenience to operation or operator, or no effect.	1

Occurrence Ranking Table :

Probability	Likely Failure Rates	Ppk	Ranking
Very High: Persistent Failures	>/= 100 per thousand pieces	<0.55	10
	50 per thousand pieces	>/=0.55	9
High: Frequent Failures	20 per thousand pieces	>/=0.78	8
	10 per thousand pieces	>/=0.86	7
Moderate: Occasional Failures	5 per thousand pieces	>/=0.94	6
	2 per thousand pieces	>/=1.00	5
	1 per thousand pieces	>/=1.10	4
Low: Relatively Few Failures	0.5 per thousand pieces	>/=1.20	3
	0.1 per thousand pieces	>/=1.30	2
Remote: Failure is unlikely	</= 0.01 per thousand pieces	>/=1.67	1

Detection Ranking Table

Detection	Criteria	Inspection Type			Suggested Range of Detection Methods	Ranking
		A	B	C		
Almost Impossible	Absolute certainty of non-detection			X	Can not detect or is not checked	10
Very Remote	Controls will probably not detect.			X	Control is achieved with indirect or random checks only	9
Remote	Control have poor chance of detection.			X	Control is achieved with visual inspection only	8
Very Low	Controls have poor chance of detection			X	Control is achieved with double visual inspection only	7
Low	Controls may detect		X	X	Control is achieved with charting methods, such as SPC (Statistical Process Control)	6
Moderate	Controls may detect		X		Control is based on variable gauging after parts have left the station, or Go/No Go gauging performed on 100% of the parts after parts have left the station	5
Moderately High	Controls have a good chance to detect.	X	X		Error detection in subsequent operations, OR gauging performed on set up and first piece check (for set-up causes only).	4
High	Controls have a good chance to detect.	X	X		Error detection in station, OR error detection in subsequent operations by multiple layers of acceptance: supply, select, install, verify. Cannot accept discrepant aprt.	3
Very High	Controls almost certain to detect	X	X		Error detection in station(automatic gauging with automatic stop feature).Cannot pass discrepant part.	2
Very High	Controls certain to detect	X			Discrepant parts cannot be made because item has been error-proofed by process/product design.	1

5.0 APQP Element

APQP 23 elements are as follows:

1. Sourcing Decision
2. Customer Input Requirement
3. Design FMEA
4. Design Reviews
5. Design Verification Plan &Report
6. Subcontractor APQP Status
7. Facilities, Tools & Gauges
8. Prototype Control Plan
9. Prototype Builds
10. Drawing and Specifications
11. Teams Feasibility Commitment
12. Manufacturing Process Flow Charts
13. Process FMEA
14. Measurement System Evaluation
15. Pre-Launch Control Plan
16. Operator Process Instructions
17. Packaging Specifications
18. Production Trial Run
19. Production Control Plan
20. Preliminary Process Capability Study
21. Production Validation Testing
22. Production Part Approval (PSW)
23. PSW Part Delivery at Material Required Date (MRD)

The following pages include an in-depth view of the 23 APQP elements. Each element is split into five separate areas. These areas are :

- Definition – identifies the motivation behind the element**.**
- Expectations – defines the requirements for the element.
- Lead Responsibility – identifies the function responsible for lead reporting . Identifies function that all others will support in completion of the element.
- Support function – identifies the support functions that will provide input to the Lead Responsibility.
- Deliverables – indicates the items that must be completed during three separate time frames for the element.

The following are the three phases that have deliverables :

Initial - deliverables that must be completed upon initiation of the element or before the element enters the intermediate phase.

Intermediate - deliverables that must be completed during the process of the element. These deliverables may be started during the initial phase but must be completed before the final phase.

Final - deliverables that must be completed before the process moves on to the next element.

1 Sourcing Decision

Definition

Sourcing Decision is a formal customer commitment to work on a timely basis with internal and external suppliers on the programme.

Expectations

- The Sourcing Decision is completed and communicated to internal and external suppliers before the Programme Need Date as given M & M.
- The sourcing need dates for all components, systems are established.

Lead Responsibility

- Part Development & Certification (PD &C) / Supplier Upgradation
- Supplier's Purchase Department for Tier 2 Suppliers (Subcontractors).

Support Functions

- Strategic Sourcing / Supplier Upgradation.
- Product Development
- Supply Module

Deliverables

Initial

- Establish a Timing Plan for completion of Sourcing Decision.

Intermediate

- Evaluate the percent of completion for the Sourcing Decision Element at the defined frequency.
- Sourcing Decision for long-lead items is completed and communicated.
- Open issues are identified and agreed upon by APQP CFT.

Final

- The Sourcing Decision is completed and communicated.

Note: Supplier will need to follow similar guideline for identifying their subcontractors.

2. Customer Input Requirement

Definition

- The Customer Input Requirements Element is used to initiate the Quality planning process through identification of design criteria and programme requirements.
- Quality Function Deployment, (QFD) is the mechanism to generate the Customer Input Requirements.

Expectations

- Design goals (specified through customer survey) are translated into tentative and measurable design objectives.
- The Programme Team must receive initial system and component designs and specifications from Product Development including
  - Product Assumptions
  - Functional Performance
  - Weight
  - Material
- Reliability and Quality goals are established by the CFT based on
  - Prior model product and process concern history
  - Customer wants and expectations
  - Programme objectives
  - Reliability bench-marks

  The reliability and quality goals must include the following:
  - Useful life Reliability Targets
  - Warranty Targets (R/1000)
  - Incoming quality targets (parts per million, defect levels, scrap rates)
  - Functional Targets

  Note: The above targets should be supplied as appropriate to the system, subsystem, or component.
- Affordable cost targets have been communicated for the system, sub-system and components.
- Capacity Planning volumes have been provided to the supplier (external and internal)

Lead responsibility

- PD&C, M&M / Supplier Upgradation.
- Supplier's for Internal & External Suppliers.

Support Functions

- Product Development, M&M.
- Supply Module, M&M
- Marketing, M&M
- Quality & Engineering, M&M

The Assembly Plant prepares a want list of preferable product and process improvements. The Wants List is prepared based on M & M data and manufacturing process capabilities of current running production models. When necessary, quality, cost, and timing data shall be presented to lead activities.

Deliverables

Initial

- Establish Plans to develop:
  - Design goals
  - Reliability and Quality goals
  - Programme Timing as per M&M – Material Required Date (MRD)
  - Cost Targets
  - Capacity Planning Volume
  - Key Contact Personnel
- The Programme CFT recognizes and supports the criteria identified in the expectations.
- A manufacturing strategy is identified and available.

Intermediate

- The Programme CFT is identified.
- Resources are identified and committed by all affected functions.
- The Total Programme Work Plan (TPWP) is developed and agreed upon by the CFT including APQP deliverables.
- The manufacturing requirements (must/ wants) are available, consolidated and submitted to the CFT.

Final

- Objectives, Targets and Plans for the above desired expectations are completed, confirmed and communicated to all sources and planning activities.
- The TPWP (including APQP deliverables) is signed off.

Note: Supplier will need to follow similar guideline for their Suppliers.

3. Design FMEA

Definition

A Design or Concept FMEA is a systematic approach (used by the design responsible team) which assures that potential design failure modes and associated causes are considered and addressed.

Expectations

- D/FMEAs are led by Product Engineering, prepared with a cross-functional team, and follow the guidelines laid down in the MQS FMEA Manual.
- D/FMEAs prepare for new product features, technologies, and product development quality concerns unresolved during the previous model lifetime.
- D/FMEAs are essential in developing Prototype Build Control Plans and the Manufacturing P/FMEAs.
- Unanticipated failure modes encountered during design verification testing must be addressed in the D/FMEA.
- Potential Special Characteristics <CC> & <SC> are identified.

Lead Responsibility

- M&M Product Development for M&M Design.
- Supplier's Design Department for Design Responsible Supplier.

Support Functions

- M&M - PD&C / Supplier Upgradation

Deliverables

Initial

- Establish a list of Concepts, Systems, Sub-systems etc on which DFMEA needs to be conducted and write out a DFMEA Timing Plan.

Intermediate

- Review percentage of D/FMEA completion as per M&M's programme need date.

Final

- 100% of the D/FMEAs are complete and all necessary actions to minimise quality risks are implemented.
- Potential <CC> & <SC> are identified.

For further details, please refer Potential Failure Mode & Effect Analysis Manual or contact concerned M&M personnel

Note: Suppliers will need to follow similar guideline for their suppliers.

4. Design Reviews

Definitions

Design Reviews are regularly scheduled meetings led by the design responsible activity and must include any affected areas, such as Engineering, Manufacturing personnel etc. The review process includes the following:

- A series of verification activities that are more than engineering inspection.
- An effective method to prevent problems and misunderstandings.
- Provide a mechanism to monitor progress and report to the management (including the review of APQP open issues)

Expectations

- The Design Feasibility concerns are resolved in time to support each M&M programme date.
- Review the progress of the Design Verification Plan and Report (DVP&R)). Unanticipated failure modes encountered during design verification testing must be addressed in the D/ FMEA.
- Review any open APQP issues.
- Review the progress toward achieving reliability, quality, cost and timing targets.

Lead Responsibility

- M&M Product Development for M&M Design.
- Supplier's Design Department for Design Responsible Supplier.

Support Functions

- M&M -PD&C / Supplier Upgradation

Deliverables

Initial

- Develop a Design Review Plan.
- Define roles and responsibilities
- Develop a Design Review work plan one month prior to the initial Design Review

Intermediate

- Evaluate the progress of DVP&Rs
- Review the significant and critical characteristics identified in the Engineering Specifications.
- Concerns are identified as per M&M feedback form time to time.
- 100% of the open design issues are resolved
- The 'Design Teams' and the 'Programme CFT' present the lessons learned from the Programme.

Note: Suppliers will need to follow similar guideline for their suppliers.

5. Design Verification Plan &Report

Definition

The Design Verification Plan & Report (DVP&R) is a document listing the engineering evaluations, tests, and reports required to establish a design fit for use in the intended environment and meets the customer driven objectives and the intent with which the product / process was designed. The design verification plan has a correlation with the Customer Input Requirement given by M&M.

Expectations

- The DVP&R is a team approach
- Identification of specific tests, methods, equipment, acceptance criteria, sample sizes, design level and timing must be contained in the DVP&R.
- Tests must include variation within tolerance on team selected product characteristics.
- The Design Verification must include:
  - Test requirements for design, material, or manufacturing process that apply to the production trial.
  - Tests, which address for the customer usage profile and duty cycle.
  - Tests which address the useful life of the product.
  - Tests which address the effects of the external environment (climate, road surface conditions etc)
  - Tests which address the effects of physical interfaces between components or systems.

Lead Responsibility

- M&M Product Development for M&M Design.
- Supplier's Design Department for Design Responsible Supplier.

Support Functions

- M&M -PD&C / Supplier Upgradation
- M&M - Manufacturing Department.

Support Functions have skilled personnel assigned to review and confirm the DVP&R results and specification settings for significant and critical characteristics.

Applicability

Design Verification Plans and Reports are used for the following schedules,

- Development Prototypes.
- Product Validation.
- Product Life Cycle.

Design Verification Plans and Reports include the following tests

- Engineering Development Tests: Performed during product design for functional development, for detecting time dependent failures.
- Design Verification Tests : Performed to demonstrate that the design samples meeting production intent environmental, functional, reliability and durability requirements
- Production Validation Tests: Performed to demonstrate that the design samples from the production environment meet all requirements similar to Design Verification tests and assure that no adverse variables have been introduced.
- Continuous Conformance Tests: Performed on an on going basis to assure contained compliance to all Product &Process requirements.

Deliverables

Initial

- Develop the DVP&R and appropriate review process

Intermediate

- The DVP&R is complete and the identified metrics enable comparison with target metrics at Engineering Prototype review.
- DVP&R is updated and a draft of the Engineering specification is available at the Programme Completion

Final

- The DVP&R is complete in order to support the Verification Prototype (VP).
- All Engineering specifications, up to and including job #1 design level are confirmed and released.
- All verification and validation tests are completed.

Note: Suppliers will need to follow similar guideline for their suppliers.

6. Subcontractor APQP Status

Definition

The Subcontractor APQP Status identifies and reports on the condition of an external Supplier or Subcontractor's APQP process. It is required of Supplier to cascade APQP requirements to their suppliers or subcontractors and conduct APQP reviews as appropriate. The results of these reviews are summarized on line 6 of the APQP Status Report.

Expectations

- All suppliers must assess risk and specify the level of their suppliers APQP participation.
- Subcontractors that affect significant and critical characteristics must follow all APQP disciplines.
- Suppliers will allocate sufficient resources to work with their subcontractors as part of the cross-functional APQP effort.
- Suppliers will hold regularly scheduled APQP status reviews with their subcontractors.
- Concerns are reported to the customer and action plans are developed for elements that do not meet quality, cost and timing objectives.

Lead Responsibility

- M&M - PD&C / Supplier Upgradation

Support Function

- Supplier's Purchase Department.

Deliverables

Initial

- Communicate to all relevant suppliers the expected APQP deliverables in line with APQP Timing Plan.

Intermediate

- Provide a Subcontractor APQP status.
- 100% of approved PSW parts delivered as per APQP Timing Plan.

Final

- 100% of the supplier's open issues are resolved to support on-going production

Note: Suppliers will need to follow similar guideline for their suppliers.

7. Facilities, Tools & Gauges

Definition

The Facilities, Tools and Gauges element identifies the new, additional, refurbished and relocated resources necessary to manufacture the M&M specified product at designated quantity and quality levels.

Expectations

- Facilities, planning approval, drawings and utilities must be included on the Product Timing Plan and funding approval must be complete.
- Statistical requirements and acceptance criteria must be team approved before sourcing of Facilities, Tools or Gauges can be approved.
- Trial runs should occur at the machine builder's location to qualify all Facilities, Tools and Gauges.
- All corrective actions for Facilities, Tools and Gauges not meeting customer requirements must be completed prior to the Production Trial Run.
- Facilities, Tools and Gauges must be delivered, installed and approved prior to the Production Trial Run.

Lead Responsibility

- Supplier's Engineering Department.

Support Functions

- Supplier's Manufacturing Department.
- Supplier's Purchase Department.
- M&M - PD&C / Supplier Upgradation.

Deliverables

Initial

- Establish a Manufacturing Strategy.

Intermediate

- New Technologies are identified.
- Hard points for manufacturing process facilities and complexity are established.
- Long lead funding is identified for major Facilities, Tools and Gauges at project initial stage.

- Tooling for the verification prototype build is confirmed and made available.
- Readiness for 1PP(First Production Proveout) assembly is confirmed

Final

- Facilities, Tools and Gauges are installed &listed in the Process Sheets.
- Equipment safety is verified.
- Concerns are resolved.

8. Prototype Control Plan

Definition

Prototype Control Plan (PCP) is a description of the control factors that will be used to manufacture and assemble a prototype build. In the control plan evaluation process, PCP is the first summary document. This document is necessary to align the responsible activities process steps to both the significant / critical product characteristics and M & M targets.

Expectations

- A cross-functional team led by the Product Engineering develops the Prototype Control Plan.
- The Prototype Control Plan is to be reviewed at each Design Review and is an essential part of the Team Feasibility Commitment.

Lead Responsibility

- M&M - PD&C / Supplier Upgradation.

Support Functions

- M&M - Product Engineering / Engineering Department
- Supplier's Engineering Department.
- Supplier's Manufacturing Department.

Deliverables

Initial

- Establish a work plan for Prototype Control Plan development.

Intermediate

- Review the percentage of Prototype Control Plan completion at each design review.
- The Preliminary Prototype Control Plan is made available.
- A draft of the engineering specifications needed for the PCP is made available.
- All relevant drawing and engineering specification results, upto and including Job # 1, is summarized in the Prototype Control Plan.

Final

- All significant/critical characteristics are reviewed during the prototype build phase.
- Lessons learned are identified.

- Feasibility commitment of final Prototype Control Plan characteristics is available.

9. Prototype Builds

9A. EP (Engineering Prototype)

Definition

The Prototype Element entails the manufacture or assembly of components, systems or sub-systems, and assembled vehicles that will be supplied to M & M for builds occurring prior to the Prototype phase.

Expectations

- All M & M prototype material will meet the following requirements by the

  In Plant Date.

  - Correct level parts
  - M & M specification data.
  - M & M approval for all non-conformance.
- The Prototype Control Plan was followed in the manufacture or assembly.

Lead Responsibility

- M&M Product Development for M&M Design.
- Supplier's Design Department for Design Responsible Supplier.

Support Functions

- M&M -PD&C / Supplier Upgradation
- M&M - Manufacturing Department.
- Supplier's Purchase Department.

Deliverables

Initial

- Timing Plan for Prototype builds is established.

Intermediate

- 100% of the parts are made available.

Final

- All planned Prototypes are in line with the Timing Plan.
- Quality level is verified based on the requirements established in the Prototype Control Plan.
- Concerns are identified and documented.

9B. VP (Verification Prototype)

Definition

This entails the manufacture or assembly of components, subsystems, systems and assembled vehicles that will be used for verification testing at M & M

Expectations

- All customer prototype material will meet the following requirements by the In Plant Date
  - Correct level parts
  - M & M specifications data
  - M & M approval for all non conformance
- The Prototype Control Plan was followed in the manufacture or assembly.
- To the extent feasible "make like production" parts and assemblies to be used (tools, process sheets etc)

Lead Responsibility

- M&M -Product Development for M&M Design.
- Supplier Design Department for Design Responsible Supplier.

Support Functions

- M&M -PD&C / Supplier Upgradation
- M&M - Manufacturing Department.

Deliverables

Initial

- Timing Plan for Verification Prototype is established.

Intermediate

- PSW status is fully identified for all parts necessary for each prototype build.

Final

- All planned Prototype Builds are in line with the Timing Plan
- Quality level is verified based on the requirements established in the Prototype Control Plan.
- Concerns are identified and documented.

10. Drawing and Specifications

Definition

The Drawing and Specifications Element refers to all engineering drawings, CAD data, material specifications and engineering specifications.

Expectations

- The Programme Need Dates must be communicated to M&M.

  Note: the Drawing and Specifications Programme Need Date is the last possible date the supplier can accept a design change and support PSW (Part Submission Warrant) delivery at the Material Required Date.

- Drawings and specifications must include
  - Engineering specification tests
  - Product Validation Test requirements.
- The Product Development / Manufacturing Engineering personnel who will be assessing drawings and specifications to meet Programme Affordable Cost and Quality requirements are identified.
- The drawing information and engineering specifications will be used as a prerequisite to the Prototype Control Plan.

Lead Responsibility

- M&M -Product Development for M&M Design.
- Supplier's Design Department for Design Responsible Supplier.

Support Functions

- M&M - PD&C / Supplier Upgradation
- M&M - Manufacturing Department.

Deliverables

Initial

- Establish a Timing Plan to support all activities and build phases with Drawings and Specifications.
- Assess the percent of completed drawings and specifications.
- The Bill of Materials is established.
- CAE analysis is complete and all necessary drawings are available for the Engineering Prototype Review.

- All necessary drawings are up dated and a draft of the Engineering Specification is available.
- The Bills of Materials is loaded into Engineering Release System.
- 100% of the drawings and Engineering Specifications are updated up to and including Job#1 design level, are made available

Final

- 100% of the Drawings and Engineering Specifications are updated.

11. Teams Feasibility Commitment

Definition

The Team Feasibility Element determines whether the proposed design can be manufactured within the guidelines. A cross-functional design review team is charged with assessing design feasibility. Once workability is established, the Programme CFT undertakes the responsibility of following the design review process and reassessing feasibility for any design or part change that may occur during part development.

Expectations

- The design review team must be satisfied with the following conditions:
  - The design is fit for intended use
  - The design can be manufactured, assembled, tested, packaged and delivered in sufficient quality to the customer on schedule.
- Major feasibility concerns must be resolved prior to the Production Trial Run.
- The manufacturing or subcontractor plant must assess risk and determine which of their suppliers must complete a feasibility assessment. Subcontractors who affect significant/ critical characteristics must complete a feasibility assessment.
- A Team Feasibility Commitment is given if all activities agree to be able to produce a product within specification of significant / critical characteristics outlined in the relevant control plan.
- The team must establish a formal feasibility document.

Lead responsibility

- Supplier - Engineering Department

Support Functions

- M&M - PD&C / Supplier Upgradation
- Supplier's Manufacturing Department.
- Supplier's Purchase Department.

Deliverables

Initial

- The Team feasibility commitment is scheduled in accordance with the Design Review Timing Plan as based on Customer Input Requirement with M & M.

Intermediate

- The team feasibility commitment is to be reviewed at each Design Review.
- Review the Prototype Control Plan Characteristics.

Final

- All activities agree to be able to produce the product in line within the specification of significant / critical characteristics outlined in the relevant control plan.
- All feasibility concerns are resolved and necessary product and process changes are scheduled to be completed prior to the 1 PP (First Production Proveout) phase.

12. Manufacturing Process Flow Charts

Definition

The Manufacturing Process Flow Chart is a graphic representation of the current or proposed sequence of manufacturing process flow.

Expectations

- A Manufacturing Process Flow Chart is developed as input to P/FMEAs by a cross-functional team led by Engineering.

Lead Responsibility

- Supplier – Engineering Department.

Support Functions

- M&M - PD&C / Supplier Upgradation.
- Supplier's Manufacturing Department.

Deliverables

Initial

- Develop a plan to establish process flow charts for new processes / technologies, in line with the P/FMEA schedule.
- Process sheets initiated.

Intermediate

- Manufacturing Process Flow Charts are available to initiate P/FMEAs

Final

- 100% of Manufacturing Process Flow Charts are available.
- Final Process Sheet are available.

13. Process FMEA

Definition

A Process FMEA is a systematic approach used by a manufacturing responsible team to assure that potential process related failure modes and their associated causes have been considered and addressed.

Expectations

- All P/FMEAs are prepared by a cross-functional team led by Manufacturing Engineering following the MQS FMEA manual / MQS FMEA manual.
- Quality risks identified from D/FMEAs, which can not be resolved through Product design changes, require the initiation of a P/FMEA.
- P/FMEAs must be established for all major quality concerns not resolved during the current production model year, all new processes/ technologies, and new product features.
- A finalised D/FMEA is not a mandatory prerequisite to perform a P/FMEA.

Lead Responsibility

- Supplier's Engineering Department.

Support Functions

- M&M - PD&C / Supplier Upgradation.
- Supplier's Product Engineering.
- Supplier's Manufacturing Department.

Deliverables

Initial

- Establish a P/FMEA plan in line with the above described expectations.
- Initial P/FMEAs are established for new or critical systems.

Intermediate

- 100% P/FMEAs are performed in line with the development plan and necessary actions are identified and planned.

Final

- 100% P/FMEAs are performed and all identified actions are implemented.
- A list of confirmed <CC> & <SC> is available.

For further details, please refer Guideline on Potential Failure Mode & Effects Analysis, and, concerned M&M personnel.

14. Measurement System Evaluation

Definition

Measurement Systems Evaluation assesses the variation of the measurement system and determines whether the measurement system is acceptable for monitoring the process.

Expectations

- The appropriate Measurement Systems Evaluation methods, standard acceptance levels, and statistical and analytical requirements will be performed following the guideline provided by M&M personnel.
- All measurement systems (gauges and test equipment) must be modified to reflect the latest engineering part level prior to the Production Trial Run.
- The Measurement systems development plan must follow the evolution of the Control Plans (Prototype, Pre-launch and Production)
- The user must be given the opportunity to review and concur with the gauges and test equipment study results prior to the Production Trial Run.
- The Measurement System Evaluation must be repeated and approved following all gauge and test equipment modifications.

Lead Responsibility

- Supplier- Engineering Department.

Support Function

- M&M - PD&C / Supplier Upgradation.
- Supplier's Manufacturing Department.

Deliverables

Initial

- Establish measurement systems development plan in line with Prototype Build Control Plan characteristics.
- Develop a Timing Plan for measurement equipment modifications and implementation of new systems.
- The Measurement Systems Evaluation is in line with the programme build schedule

Intermediate

- 100% Measurement Systems are evaluated for carry over parts and necessary modifications are identified.

- 100% Measurement Systems are identified.
- 100% Measurement Systems Evaluation is performed and necessary modifications are identified.

Final

- 100% measurement capability approval of all measurement system covering all significant / critical characteristics as outlined in the Production Control Plan.

15. Pre-Launch Control Plan

Definition

The Pre-Launch Control Plan is a written description of the dimensional measurements and material and functional tests that will occur after prototype build and before full production.

Expectations

- Development of the Pre-Launch Control Plan is led by Engineering, prepared with a cross-functional team and will follow the outline provided in the MQS APQP and Control Plan Manual.
- The Pre-Launch Control Plan is prepared during the prototype build phase.
- Results from the Prototype Build Control Plan and D/FMEA provide an outline for the Pre-Launch Control Plan.

Lead responsibility

- Supplier - Engineering Department.

Support Functions

- M&M - PD&C / Supplier Upgradation.
- Supplier's Manufacturing Department.

Deliverables

Initial

- Develop a Timing Plan to establish Pre-Launch Control Plans.

Intermediate

- Assess the completion status of the Pre-Launch Control Plan against the Programme Need Date.

Final

- The Pre-Launch Control Plan is 100% complete to support the 1PP build phase.

16. Operator Process Instructions

Definition

Operator Process Instructions describe the details of controls and actions that operating personnel must perform to produce quality products.

Expectations

- Operator Process Instructions are developed by a cross-functional team led by Manufacturing Engineering.
- Operator Process Instructions describe all process steps necessary to produce a quality product, and include all essential visual aids and/ or detailed instructions to support the production operators.

Lead Responsibility

- Supplier - Manufacturing Department.

Support Functions

- M&M - PD&C / Supplier Upgradation

Deliverables

Initial

- Develop a Timing Plan for release of Process Instructions.
- Plants begin reviewing Manufacturing Engineering processes to identify necessary visual aids for production.

Intermediate

- The Assembly Process is available for specific, critical or new systems.
- Assess the progress of Operator Process Instructions in line with the Timing Plan to ensure availability of a Preliminary Process at the 1PP build phase.
- Verify and finalize the Operator Process Instructions.
- Plants have all visual aids identified.

Final

- Operator Process Instructions are 100% in place.

17. Packaging Specifications

Definition

The supplier of a product must ensure that individual packaging for shipment (including interior partitions) is designed and developed. M & M packaging standards should be used wherever available.

Expectations

- Packaging requirements are agreed upon by the supplier and M & M plant as per Customer Input Requirements / P.O.
- Packaging evaluation must test the packaging under the expected conditions of transport and material handling.
- The packaging design must ensure that the product performance and characteristics will remain unchanged during packing, shipping and unpacking.
- Feasibility of packaging is assured during Design Reviews.

Lead Responsibility

- Supplier's Engineering Department.
- M&M - PD&C / Supplier Upgradation.

Support Functions

- M&M - Product Engineering.
- Supplier's Manufacturing Department.

Deliverables

Initial

- Develop a Timing Plan for packaging development.

Intermediate

- Packaging design is reviewed for appropriateness to the expected part quality level.
- All necessary packaging trials are conducted during the 1PP Production Trial Run.
- Open issues are resolved.
- Design of packaging is completed.

Final

- All packaging specifications are available. All packaging facilities are in place at the suppliers and for M & M plants.

18. Production Trial Run

Definition

The production trial run is a validation of the effectiveness of the manufacturing and assembly processes using production tooling, equipment and environment (including production operators), facilities and cycle times. Output of the Production Trial Run is used for Production Part Approval and Quality Planning Sign-Off.

Expectations

- The Pre-launch Control Plan is followed during the Production Trial Run.
- The Production Trial Run must be used to confirm or add linkages between product and process characteristics.
- Preliminary Operator Process Instructions are followed during the Production Trial Run.
- Corrective design and process actions must be established for concerns identified during the Production Trial Run.

Lead Responsibility

- Supplier's Manufacturing Department.
- M&M – PD&C / Supplier Upgradation.

Support Functions

- M&M - Product Engineering

Deliverables

Initial

- A Timing Plan for the Production Trial Run is established.
- A Timing Plan for operator training is established.

Intermediate

- 100% PSW Status is identified for each trial.
- All product and process concerns are resolved.
- Completion of operator training is reviewed frequently.

Final

- Facilities, tools and gauges are implemented.
- All product and process concerns are resolved.
- Operator Process Instructions are finalised and in place.

- The Production Control Plan is finalised and in place.
- Production validation testing is completed.
- Approved PSW parts are delivered and operator training is completed.

19. Production Control Plan

Definition

The Production Control Plan is a written description of the systems for controlling parts and processes during full production.

Expectations

- The production Control Plan is developed by a cross functional team led by Engineering, and is to follow the outline provided in the MQS Dynamic Control Planning Manual.
- The outcome of the prototype builds and pre-launch control plan provides a basis for the Production Control Plan.

Lead Responsibility

- Supplier's Engineering Department.
- Supplier's Manufacturing Department.

Support Function

- M&M -PD&C / Supplier Upgradation.

Deliverables

Initial

- Develop a Timing Plan for the development of the Production Control Plan

Final

- The Production Plan is ready for on-going production.
- All engineering specifications are reviewed
- All significant / critical product and process characteristics controlling the manufacture of parts and vehicle assembly (including paint) are included in the Production Control Plan.

20. Preliminary Process Capability Study

Definition

The Preliminary Process Capability Study is a statistical assessment of the ability to produce product within specification.

Expectations

- Preliminary Process Capability studies are to be performed following the MQS Guideline.
- The statistical and analytical techniques used to determine capability must be acceptable to M & M.
- Preliminary Process Capability studies must be performed as documented in the Pre-Launch Control Plan.
- Preliminary Process Capability studies must be completed and the customer given the opportunity to review, before Production Part Approval.

Lead Responsibility

- Supplier's Manufacturing Department.
- Supplier's Engineering Department.

Support Functions

- M&M -PD&C / Supplier Upgradation

Deliverables

Initial

- Begin the process capability assessment for similar processes.
- Develop a Timing Plan to perform statistical studies

Interim

- 100% necessary statistical studies are identified and the Timing Plan is confirmed.
- 80% capability assessment is performed.

Final

- 100% capability assessment is performed.
- Concerns are identified and necessary changes for the product and processes are concerned.

21. Production Validation Testing

Definition

Production Validation Testing refers to engineering tests that validate that products made from production tools and processes meet engineering standards.

Expectations

- Parts for Production Validation Testing must be selected from the Production Trial Run, as per the sample sizes and frequencies outlined in the Pre-Launch Control Plan.
- All M & M specified dimensional, material, functional and reliability tests must be completed prior to Production Part Approval. If not, appropriate action plans and customer approvals are required.

Lead Responsibility

- M&M - PD&C / Supplier Upgradation.
- Supplier's Engineering Department.

Support Function

- M&M -Product Engineering.
- Supplier's Manufacturing Department.

Deliverables

Final

- All required Engineering Specifications are tested and approval for acceptance is available.

22. Production Part Approval (PSW)

Definition

Production Part Approval is the documented verification that all customer engineering design requirements are met by the internal or external supplier and the process has the potential to produce to these requirements, where applicable during an actual production run.

Expectations

- All items of the MQS "Mahindra Production Part Approval Process" Manual must be completed and the required documentation provided to the customer with the Part Submission Warrant.
- Production Part Approval is complete before the Material Required Date (MRD) for the M & M Plant's Production Trial Run or First Production Proveout (1PP) Build Phase.

Lead Responsibility

- M&M - PD&C / Supplier Upgradation.
- Supplier's Manufacturing Department.

Support Functions

- Supplier's - Engineering Department.

Deliverables

Initial

- A Timing Plan for the Production Part Approval Process is established.

Intermediate

- 100% PSW approval process is initiated and the total Programme PSW (Part Submission Warrant) status is evaluated.

Final

- 100% PSW is approved.

23. PSW Part Delivery at Material Required Date (MRD)

Definition

PSW part delivery at the Material Required Date (MRD) is the final date that fully approved (PSW) material must be received at the M & M plant to support their Production Trial Runs.

Expectations

- The M & M Material Required Date must be included in the supplier's Timing Plan.
- Production Part Approval requirements must be completed prior to the MRD of the user plant.

Lead Responsibility

- Supplier's Engineering Department.
- Supplier's Purchase Department.
- Supplier's Manufacturing Department.
- M&M - PD&C / Supplier Upgradation

Deliverables

Initial

- Develop the material In Plant timing for production.
- Establish a MRD review process.

Intermediate

- Assess PSW part delivery rate at each stage.

Final

- 100% approved PSW parts are available.

Formats & Software

Formats	Format No.
• APQP Status Report • Customer Input Requirement • Part Submission Warrant • Design Verification Plan & Report	MQS/APQP/F/01 MQS/APQP/CIR/F/02 MQS/MPAP/PSW/F/03 MQS/APQP/F/05
• FTG Tracking • Manufacturing Must & Wants • Programme Need Date (PND) Guide	MQS/APQP/FTG/C-017 MQS/APQP/M&W/L-018 MQS/APQP/PND/C-019
• Supplier APQP Status Monitoring • Team Feasibility Commitment Sign-off	MQS/APQP/F09
• Process Flow Diagram	MQS/MPAP/PFD/F/04
• Design Failure Mode & Effect Analysis • Rating Tables Handout	MQS/MPAP/DFMEA/F/05 MQS/ MPAP/DFMEA / M/01
• Process Failure Mode & Effect Analysis • Rating Tables Handout	MQS/MPAP/PFMEA/F/06 MQS/MPAP/PFMEA/M/02
• Control Plan	MQS/MPAP/CP/F/07
• Dimensional Results Recommended Format)	MQS/MPAP/DR/F/08
• Material Test Result (Recommended Format) • Material Master Check Sheet For Metallic Parts (Recommended Format) For Non-metallic Parts (Recommended Format)	MQS/MPAP/MTR/F/09 MQS/MPAP/MMCS/F/10 MQS/MPAP/MMCS/F/11
• Performance Test Results (Recommended Format)	MQS/MPAP/PTR/F/12
• Initial Process Studies Summary Report • Control Chart • Variables • Attributes • M&M Software for variables Normality Pp / Ppk Cp / Cpk • Process Capability Plan	MQS/MPAP/SR/F/13 MQS/MPAP/CC-V/F/14 MQS/MPAP/CC-A/F/15 MQS/MPAP/COQ - SPC SOFTWARE MQS/MPAP/ PCP /F/16
• Measurement System Analysis Studies (GRR)	

• M&M Software For MSA - GRR	MQS/MPAP/ MSA-GRR SOFTWARE
• Checking Aids List	MQS/MPAP/ CAL /F/17
• Appearance Approval Report	MQS/MPAP/ AAR /F/18
• Incoming Material Control Plan For Raw Material & Bought-out parts	MQS/MPAP/ I.M - CP /F/19
• Product Quality Assurance Plan For Final Inspection	MQS/MPAP/ PQAP /F/20
• Risk Assessment • Risk Assessment (Supplier) Form	MQS/APQP/F/16
• MPAP Summary & Sign - Off	MQS/MPAP/QPSO/F/24
• Lesson Learned	MQS /LL/F01
• Customer Specific Requirements Fitment Trial Report SOP Product Dimensional Control Plan (Current CQA (VP) Formats) For Bought out parts For Assembly parts For in - house manufacturing parts	 MQS/MPAP/ FTR /F/21 MQS/MPAP/ SOP /F/22 MQS/MPAP/ PD - CP /F/23/1 MQS/MPAP/ PD - CP /F/23/2 MQS/MPAP/ PD - CP /F/23/3

Guidelines to be referred:

- Mahindra Part Approval Process (MPAP).
- Dynamic Control Planning Guideline.
- PFMEA Reference Manual.
- SC / CC Identification Guideline.
- MSA Manual.
- SPC Manual

Formats:

For APQP / MPAP updated formats, Suppliers are requested to contact respective PD & C / Supplier Upgradation representative.