ADVANCED PRODUCT QUALITY PLANNING (APQP)

Based on AIAG “Advanced Product Quality Planning and Control Plan” Reference Manual

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Product Quality Planning Cycle
OBJECTIVES

• Identify the inputs / outputs of the 5 APQP phases.

• Use the process information to assist with Capstone Projects.
The AIAG APQP Model

What is APQP?

- Advance Product Quality Planning is a structured method of defining and establishing the steps necessary to assure that a product satisfies the customer.

- The goal of product quality planning is to facilitate communication with everyone involved to assure that all required steps are completed on time.

- Effective product quality planning depends on a company’s top management commitment to the effort required in achieving customer satisfaction.
Why is a Plan Important?

- The cost of a product is committed at the early stages of a development cycle even though they are not expended until later.

- The cost of fixing a design and faulty decisions at later stages is exponentially greater than at an earlier stage.

- The opportunity costs of being late to market are very high.

- Cross-functional teams typically provide a better quality solution to complex dynamic product development problems than single individuals.

- Early simultaneous involvement in product development by cross-functional teams using structured development process saves time and money over the product life cycle.
Fundamentals of Quality Planning

- Organize the team
- Define the scope
- Team-to-Team Communication
- Training
- Customer, supply base involvement
- Simultaneous Engineering
- Control plans
- Concern Resolution
- Timing plan and chart
Product Quality Planning Timing Chart

PRODUCT QUALITY PLANNING TIMING CHART

- Concept Initiation/Approval
- Program Approval
- Prototype
- Pilot
- Launch
- Planning
- Product Design and Development
- Process Design and Development
- Product and Process Validation
- Feedback Assessment and Corrective Action
- Production

PLAN AND DEFINE PROGRAM
PRODUCT DESIGN AND DEVELOPMENT VERIFICATION
PROCESS DESIGN AND DEVELOPMENT VERIFICATION
PRODUCT AND PROCESS VALIDATION
FEEDBACK ASSESSMENT AND CORRECTIVE ACTION
PHASE 1: Plan and Define

**Objective:**

Develop a Plan that meets customer’s requirements

**INPUTS**

- Voice of the Customer
- Market Research (Build Timing and Volume Expectations)
- Historical Warranty and Quality Information
- Team Experience
- Business Plan Marketing Strategy
- Product/Process Benchmark Data
- Product/Process Assumptions
- Product Reliability Studies
- Customer Inputs

**OUTPUTS**

- Design Goals
- Reliability and Quality Goals
- Preliminary Bill of Material
- Preliminary Process Flow Chart
- Preliminary List of Special Product and Process Characteristics
- Product Assurance Plan
- Management Support (program timing and support resources required)
PHASE 2: Design and Development

Objectives:
Detailed Review of Engineering Requirements
Feasibility Analysis

INPUTS
- Design Goals
- Reliability and Quality Goals
- Preliminary Bill of Material
- Preliminary Process Flow Chart
- Preliminary List of Special Product and Process Characteristics
- Product Assurance Plan
- Management Support (program timing and support resources required)

OUTPUTS
- Design Failure Mode and Effects Analysis (DFMEA)
- Design for Manufacturability and Assembly
- Design Verification
- Design Reviews
- Prototype Build (Including a Control Plan)
- Engineering Drawings (Including Math Data)
- Engineering Specifications
- Material Specifications
- Drawing and Specification Changes
PHASE 3: Process Design and Development

**Objective:**

Develop an Effective Manufacturing System

**INPUTS**
- Design Failure Mode and Effects Analysis (DFMEA)
- Design for Manufacturability and Assembly
- Design Verification
- Design Reviews
- Prototype Build (Including a Control Plan)
- Engineering Drawings (Including Math Data)
- Engineering Specifications
- Material Specifications
- Drawing and Specification Changes

**OUTPUTS**
- Packaging Standards
- Product/Process Quality System Review
- Process Flow Chart
- Floor Plan Layout
- Characteristics Matrix
- Process Failure Mode and Effects Analysis (PFMEA)
- Pre-Launch Control Plan (Including Error Proofing Devices)
- Process Instructions
- Measurement Systems Analysis Plan
- Preliminary Process Capability Study Plan
- Management Support (Including operator staffing and training plan)
PHASE 4: Product and Process Validation

Objective:
Validate Manufacturing Process

INPUTS
- Packaging Standards
- Product/Process Quality System Review
- Process Flow Chart
- Floor Plan Layout
- Characteristics Matrix
- Process Failure Mode and Effects Analysis (PFMEA)
- Pre-Launch Control Plan (Including Error Proofing Devices)
- Process Instructions
- Measurement Systems Analysis Plan
- Preliminary Process Capability Study Plan
- Management Support (Including operator staffing and training plan)

OUTPUTS
- Production Trials
- Measurement System Evaluation
- Preliminary Process capability Study
- Production Part Approval
- Production Validation Testing
- Packaging Evaluation
- Production Control Plan
- Quality Planning Sign Off and Management Support
PHASE 5: Feedback, Assessment and Corrective Action

INPUTS

- Production Trials
- Measurement System Evaluation
- Preliminary Process capability Study
- Production Part Approval
- Production Validation Testing
- Packaging Evaluation
- Production Control Plan
- Quality Planning Sign Off and Management Support

Objective:
Evaluate Manufacturing Output

OUTPUTS

- Reduced Variation
- Improved Customer Satisfaction
- Improved Delivery and Service
- Effective Use of Lessons Learned