APQP 4 Wind®

APQP4Wind Manual

APQP4Wind 手册

Advanced Product Quality Planning Manual for the Wind Industry

风电行业先期产品质量策划手册

VERSION 1.3 - MARCH 2024

版本 1.3 - 2024年 3月

APQP4Wind
Lysbrohøjen 24
8600 Silkeborg
Denmark

Mail: contact@apqp4wind.org
Website: www.apqp4wind.org
LinkedIn: APQP4Wind

Text and data:
Manual and Toolbox developed by the APQP4Wind organization

Layout and print:
PrimaPrint

Photo credit, front page:
Offshore Windpark Burbo Bank Extension
Copyright: © Ørsted A/S

Version:
Advanced Product Quality Planning Manual for the Wind Industry
Version 1.3 - March 2024

Contributors:
Bureau Veritas Certification
DNV
GE Vernova
Goldwind
GRI Renewable Industries
KK Wind Solutions
LM Wind Power
Siemens Gamesa Renewable Energy
TÜV Rheinland Greater China
Vattenfall
Vejby
Vestas Wind Systems
ZF Wind Power
Ørsted

APQP4Wind
Lysbrohøjen 24
8600 锡尔克堡
丹麦

邮箱：contact@apqp4wind.org
网址：www.apqp4wind.org
中文网址：www.apqp4wind.cn
领英：APQP4Wind

文本和数据：
手册和工具箱由 APQP4Wind组织开发

排版和印刷：
PrimaPrint 公司

封面照片来源：
Burbo Bank Extension 海上风力发电场
版权：© 沃旭能源

版本：
风电行业先期产品质量策划手册
版本 1.3 - 2024 年 3 月

参与公司：
必维国际检验集团
DNV
GE Vernova
金风科技
GRI可再生产业
KK风电解决方案
艾尔姆风电
西门子歌美飒可再生能源
德国莱茵TÜV大中华区
瑞典大瀑布电力
Vejby
维斯塔斯风力技术
采埃孚风电
沃旭能源

Introduction to APQP4Wind

At the beginning of 2014, the Danish Wind Industry Association (now Green Power Denmark) started a network group consisting of suppliers interested in quality assurance. To strengthen the network, wind turbine manufacturers and utility companies were invited to participate on equal footing with the suppliers.

In February 2014, the first meeting in the Danish Wind Industry Association's Quality Assurance network took place. This marked the very beginning of quality assurance cooperation between wind turbine manufacturers and suppliers within the Danish wind industry, and subsequently, the idea of APQP4Wind was born.

With facilitation from the Danish Wind Industry Association and support from the Danish Industry Foundation, Siemens Gamesa Renewable Energy and Vestas Wind Systems shared the leadership of the APQP4Wind project running from 2015 to 2018 in cooperation with KK Wind Solutions and LM Wind Power.

In August 2018, APQP4Wind was established as an independent organization with global reach and a board of directors that currently includes GE Vernova, GRI Renewable Industries, Goldwind, KK Wind Solutions, LM Wind Power, Siemens Gamesa Renewable Energy, Vattenfall, Vestas Wind Systems, ZF Wind Power, and Ørsted.

In 2024, in connection with utility companies joining APQP4Wind, the Manual was updated to cover the entire wind industry, changing focus from Customer - OEM - Supplier relationship to describing a Customer - Supplier relationship.

The Purpose of APQP4Wind

APQP4Wind is a common quality assurance methodology for the global wind industry. The background for the APQP4Wind Manual is the continuous quality improvement that is needed to improve performance, reduce risk, lower the costs of poor quality, and keep pace with the ongoing trend towards decreases in the Levelized Cost of Energy (LCoE) within the wind industry.

Advanced Product Quality Planning (APQP) is a well-known concept within the automotive industry and has been the backbone for maturing quality performance at Customers and Suppliers for decades. In the context of APQP4Wind, the concept of APQP in this Manual is adapted to the business areas and special conditions differentiating wind from automotive.

The APQP4Wind Manual aims to make the process of product quality assurance demands and the Production Part Approval Process (PPAP) as clear as possible. The Manual is made to fit the entire wind industry and set a common standard and best practice for planning and executing quality assurance in the whole value chain.

The standards made available in this Manual are made to substitute company-specific procedures and set aligned methods and procedures for all parties to reduce time to market and increase efficiency within the global wind industry.

The APQP4Wind Manual has been subjected to multiple reviews involving subject matter experts from the APQP4Wind Working Group, Board of Directors, and a certifying body.

All future activities, documents and references can be found at:
www.apqp4wind.org

The APQP4Wind Manual will refer several times to the APQP4Wind Toolbox consisting of a Workbook and Analysis Tool which can be found at:
www.apqp4wind.org

APQP4Wind简介

2014 年初, 丹麦风电行业协会(现丹麦绿色电力公司)召集对产品质量保证感兴趣的供应商公司合作, 成立了一个互动小组, 并为提升小组影响力, 邀请风力发电机制造商与公用事业公司, 以与供应商平等的身份一并加入。

2014 年 2 月, 丹麦风电行业协会质量保证小组召开首次会议。此次会议标志着丹麦风电行业的风力发电机制造商与供应商之间质量保证合作的开端, APQP4Wind项目的构思也随之诞生。

在丹麦风电行业协会和丹麦工业基金会的大力支持下, 西门子歌美飒可再生能源公司和维斯塔斯风力技术集团、KK 风能解决方案、艾尔姆风电合作, 于 2015 至 2018 年间共同领导APQP4Wind项目。

2018 年 8 月, APQP4Wind正式转型为全球性独立组织, 董事会目前由 GE Vernova、GRI可再生产业、金风科技、KK 风能解决方案、艾尔姆风电、西门子歌美飒可再生能源、瑞典大瀑布电力、维斯塔斯风力技术、采埃孚风电和沃旭能源的代表组成。

2024 年, 随着公用事业公司加入APQP4Wind, 本手册也进行了更新, 以涵盖整个风电行业, 将重点从客户-OEM-供应商关系转变为描述客户- 供应商关系。

APQP4Wind的目的

APQP4Wind是全球风电行业的通用质量保证方法。为提高性能, 减少风险, 降低不良质量成本, 追随风电行业平准化度电成本 (LCoE)不断下降的趋势, 风电行业亟须持续改进质量,《APQP4Wind手册》正是在这一背景下应运而生。

先期产品质量策划 (APQP) 是汽车产业广为人知的理念, 几十年来始终是客户与供应商改进质量绩效的基石。本手册中的APQP4Wind理念根据风能业务领域的具体情况和特殊条件, 对 APQP进行了调整, 以区分风能产业和汽车产业。

《APQP4Wind手册》旨在使产品质量保证需求流程和生产件批准过程 (PPAP) 尽可能地清晰化。本手册适用于整个风电行业, 为在整条价值链内计划和实施质量保证工作提供了通用标准和最佳实践。

本手册中制定的标准能替代公司的特定规程, 为所有相关方制定统一方法与程序, 以缩短产品上市周期, 提高全球风电行业效率。

《APQP4Wind手册》已经过多次评审, 评审人员包括来自APQP4Wind工作组、董事会以及认证机构的主题事项专家。

您可以通过以下网站了解APQP4Wind未来活动, 相关文件与参考资料:
英文网站 www.apqp4wind.org
中文网站 www.apqp4wind.cn

《APQP4Wind手册》中多次提及包括“工作手册”和“分析工具”在内的“APQP4Wind工具箱”, 详情请见:
www.apqp4wind.org & www.apqp4wind.cn

Table of Contents

目录

Introduction

The purpose of this document is to describe the relationship between a Customer and a Supplier in a common Advanced Product Quality Planning (APQP) Manual developed by the APQP4Wind organization. The Manual provides the information and requirements to develop a Product Quality Plan (PQP) that should enable the development and production of products or services that will fulfill the wind industry's requirements.

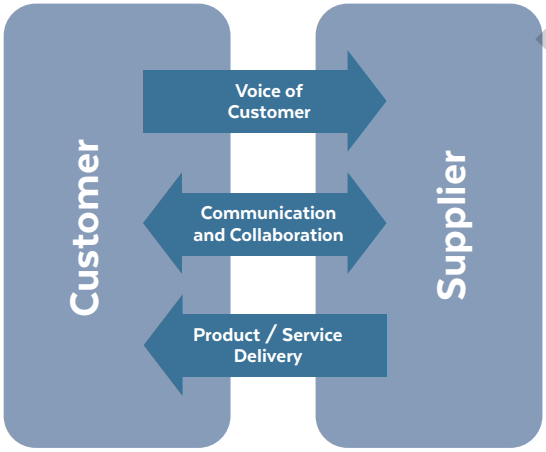
The main objective of the approach outlined in this Manual is to:

- Reduce variation to ensure stable and capable processes.
- Reduce the risk of defects and the costs of quality when introducing new products and services, thereby bringing down the costs of energy.
- Reduce complexity.
- Improve alignment of Product Quality Planning in the wind industry value chain.
- Provide an effective way of communicating quality requirements to Suppliers and Sub-Suppliers.
- Avoid problem/failure repetition.

By applying the approach described in this Manual, the wind industry will:

- Gain a preventive approach to quality.
- Shift from quality control to quality assurance.
- Enable the Supplier base to mature globally.
- Support standardization and simplification of processes to reduce time to market and increase efficiency.
- Support profitable growth.

This Manual aims to guide all parties on the quality requirements and enable organizations to develop appropriate communication forms. This Manual supports the quality requirements in the wind power industry by providing recommended formats and templates such as the Product Quality Plan (PQP). The Supplier shall comply with Customer-specific quality requirements specified in addition to this Manual.
The term 'product' used throughout this Manual should be interpreted as the system, subsystem, project, component, or service provided.



简介

本文旨在描述由APQP4Wind组织制定的通用《先期产品质量策划 (APQP) 手册》中客户与供应商之间的关系。本手册提供了制定产品质量计划 (PQP) 所需要的信息与条件，此类计划应能为产品或服务的开发与生产提供帮助，满足风电行业的要求。

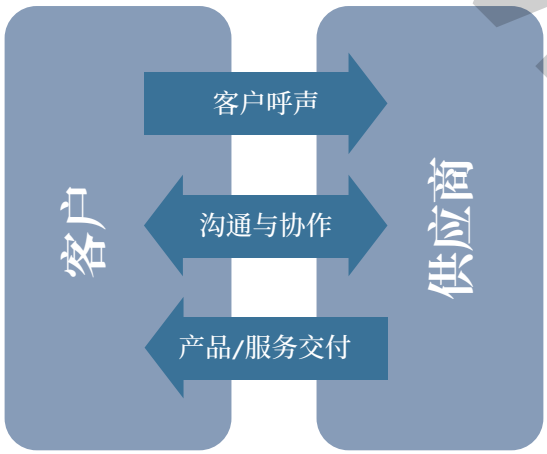
本手册介绍的方法主要用于：

- 减少变差，确保过程的稳定、有效。
- 引入新产品和服务时降低缺陷风险和质量成本，进而降低能源成本。
- 降低复杂性。
- 在风电行业价值链中增强产品质量策划的统一性。
- 提供一种向供应商和次级供应商沟通质量要求的有效方法。
- 避免反复出现同样的问题/失效。

通过运用本手册所述方法，风电行业将能够：

- 掌握质量预防方法。
- 由质量控制转向质量保证。
- 促进全球供应商基础发展成熟。
- 对过程进行标准化与简化，缩短产品上市周期，提高效率。
- 促进利润增长。

本手册致力于向所有相关方提供质量要求方面的指导，帮助组织制定适当的沟通方式。本手册通过提供产品质量计划 (PQP) 等推荐的格式和模板，支持风电行业的质量要求。除本手册外，供应商还应遵守本手册之外的客户特定质量要求。
本手册所用术语“产品”系指所提供的系统、子系统、项目、组件或服务。

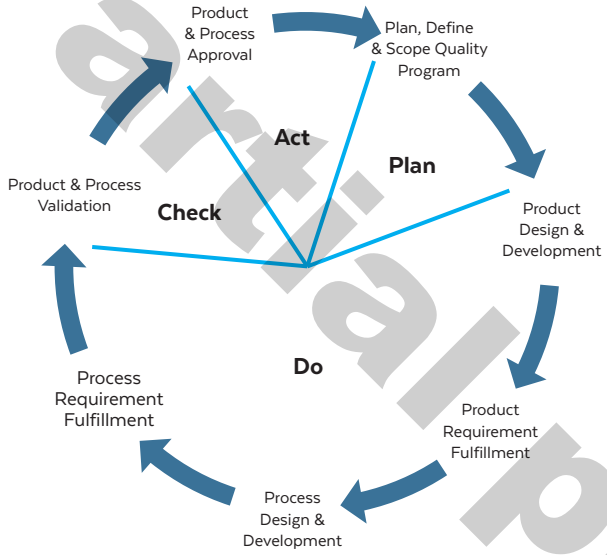


Product Quality Planning Cycle

The Product Quality Planning Cycle is shown below as a graphical illustration of the APQP4Wind Quality Program. The various phases are sequenced to represent planned timing and follow a typical Plan-Do-Check-Act (PDCA) cycle.

The purpose of the Product Quality Planning Cycle is:

- To set a clear path for planning, implementing, and verifying the product conformance to requirements through quality assurance activities.
- To enable Suppliers and Sub-Suppliers to deliver the right products with the required quality and quantity the first time and on time.



The Product Quality Planning Cycle emphasizes a cross-functional approach between the Customer and the Supplier, improving communication and collaboration in the entire product quality cycle.

Reference: Workbook Sheet: Product Quality Plan (PQP)

As an outcome of Product Quality Planning, all parties shall have quality plans which contains a list of quality deliverables that are outcomes of various quality assurance activities the organization executes.

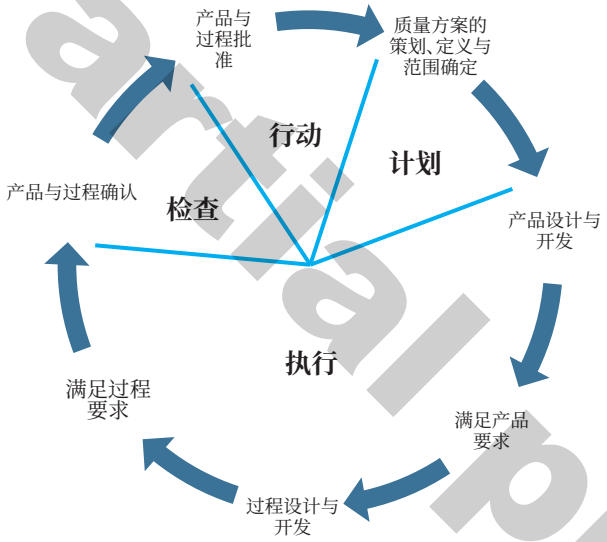
The level of activities in the Product Quality Plan (PQP) may vary based on the product being developed.

产品质量策划循环

产品质量策划循环如下方APQP4Wind质量方案图解所示。各阶段按顺序排列，表示策划的时间安排，遵循典型的“计划-执行-检查-行动”(PDCA) 周期。

产品质量策划循环旨在：

- 通过实施质量保证活动，为策划、实施和验证产品符合质量要求设定清晰的路径。
- 帮助供应商和次级供应商首次就能准时、保质、保量交付正确的产品。



产品质量策划循环强调客户与供应商之间的跨职能合作，增强整个产品质量循环的沟通和协作。

参考资料：
工作手册
表：产品
质量计划 (PQP)

作为产品质量策划的结果，所有相关方均应制定质量计划书，其中包含一份质量可交付成果清单，这些可交付成果是组织实施的各类质量保证活动的结果。

根据所开发产品的不同，产品质量计划 (PQP) 里的活动级别也可能有所不同。

Responsibility Matrix

This Responsibility Matrix intends to guide, while decisions and agreements on deliverables are made at the Kickoff meeting.

APQP4Wind Phases	Chapter	APQP4Wind Element	Supplier Nature			
			Design / Engineering	Design and Manufacturing	Manufacturing to specification	Service, Logistics, Installation
1.0 Plan, Define & Scope Quality Program	1.1	Voice of Customer (VoC)	x	x	x	x
	1.2	Design Goals	x	x	x	x
	1.3	Product & Process Benchmark Data	x	x	x	x
	1.4	Product & Process Assumptions	x	x	x	x
	1.5	Historical Data & Quality Information	x	x	x	x
	1.6	Sub-Supplier Screening	x	x	x	x
	1.7	APQP4Wind Kickoff	x	x	x	x
	1.8	Product Quality Planning Team	x	x	x	x
	1.9	Product Quality Plan (PQP)	x	x	x	x
2.0 Product Design & Development	2.1	Engineering Design Review (EDR)	x	x		x
	2.2	Drawing & Specification Review	x	x		x
	2.3	Team Feasibility Commitment (TFC)	x	x	x	x
	2.4	Capacity Planning & Contingency Planning	x	x	x	x
	2.5	Design Failure Mode & Effects Analysis (DFMEA)	x	x		x
	2.6	Special Characteristics	x	x		x
	2.7	Design for Manufacturability, Assembly, Transport & Service (DMATS)	x	x		x
	2.8	Design Verification Plan (DVP)	x	x		x
	2.9	New Equipment, Tooling, Gauge/Test & Facilities Requirement	x	x	x	x
	2.10	Preliminary Bill of Materials (BOM) & Bill of Materials (BOM) Management	x	x	x	x
	2.11	Sub-Supplier Assessments	x	x	x	x
	2.12	Engineering Change Management (ECM)	x	x	x	x
3.0 Product Requirement Fulfillment	3.1	Design Verification Report (DVR)	x	x		x
	3.2	Tool Design & Approval	x	x		x
	3.3	Out-Sourced Products with Special Characteristics	x	x	x	x
	3.4	Customer Engineering Approval	x	x		x
	3.5	Prototype/Model Control Plan	x	x		x
	3.6	Prototype/Model Builds	x	x		x
4.0 Process Design & Development	4.1	Preliminary Process Flow Chart & Floor Plan		x	x	x
	4.2	Process Failure Mode & Effects Analysis (PFMEA)		x	x	x
	4.3	Process Special Characteristics		x	x	x
	4.4	Measurement System Analysis (MSA) Plan		x	x	x
	4.5	Preliminary Process Capability Study Plan		x	x	
	4.6	Packaging & Transport Specifications		x	x	x
5.0 Process Requirement Fulfillment	5.1	Process Flow Chart & Floor Plan		x	x	x
	5.2	Production Tool Builds		x	x	x
	5.3	0-Series/First Production Run (FPR) Control Plan		x	x	x
	5.4	Work Instructions		x	x	x
	5.5	Preliminary Process Capability Study		x	x	
	5.6	Sub-Supplier Production Part Approval Process (PPAP) Completion		x	x	x
6.0 Product & Process Validation	6.1	0-Series/First Production Run (FPR)		x	x	x
	6.2	Performance Test Report & Certification		x	x	x
	6.3	Material Test Report & Certification		x	x	x
	6.4	Dimensional Report		x	x	x
	6.5	Appearance Approval Report		x	x	
	6.6	Measurement System Analysis (MSA) Report		x	x	x
	6.7	Product Validation Testing		x	x	x
	6.8	Form, Fit & Function (FFF)		x	x	x
	6.9	Production Control Plan		x	x	x
	6.10	Packaging & Transport Evaluation		x	x	x
7.0 Product & Process Approval	7.1	Production Part Approval Process Documentation (PPAP)	x	x	x	x
	7.2	Master Samples		x	x	
	7.3	Production Part Approval Process (PPAP) Submission & Part Submission Warrant (PSW)	x	x	x	x

Design/Engineering: Design responsible for physical products, engineering, and design, but not final physical products.
Design and Manufacturing: Responsible for physical product design and manufacturing.
Manufacturing to Specification: Manufacturing responsible who does not own the design of the physical product, but manufactures based on the Customer's drawings, specifications, and requirements. This category also includes Suppliers who perform specific processes, e.g., heat treatment, surface treatment, etc., to the Customers' materials based on the requirements provided by the Customer
Service, Logistics, Installation: Responsible for the design and execution of a non-physical product.

责任矩阵

此责任矩阵旨在提供指导;可交付成果的相关决定和协议要在启动会议上确定。

APQP4Wind 阶段	章节	APQP4Wind 要素	供应商性质			
			设计/工程	设计与制造	按规范制造	服务、物流、安装
1.0 质量方案的策划、定义与范围确定	1.1	客户呼声 (VoC)	x	x	x	x
	1.2	设计目标	x	x	x	x
	1.3	产品与过程标杆数据	x	x	x	x
	1.4	产品与过程假设	x	x	x	x
	1.5	历史数据与质量信息	x	x	x	x
	1.6	次级供应商筛选	x	x	x	x
	1.7	APQP4Wind启动	x	x	x	x
	1.8	产品质量策划小组	x	x	x	x
	1.9	产品质量计划 (PQP)	x	x	x	x
2.0 产品设计与开发	2.1	工程设计评审 (EDR)	x	x		x
	2.2	图纸与规范评审	x	x		x
	2.3	小组可行性承诺 (TFC)	x	x	x	x
	2.4	产能策划与应急策划	x	x	x	x
	2.5	设计潜在失效模式与后果分析 (DFMEA)	x	x		x
	2.6	特殊特性	x	x		x
	2.7	可制造性、装配、运输和服务设计 (DMATS)	x	x		x
	2.8	设计验证计划 (DVP)	x	x		x
	2.9	新设备、工具、量具/测试和设施要求	x	x	x	x
	2.10	初始材料清单 (BOM) 与材料清单 (BOM) 管理	x	x	x	x
	2.11	次级供应商评估	x	x	x	x
	2.12	工程变更管理 (ECM)	x	x	x	x
3.0 满足产品要求	3.1	设计验证报告 (DVR)	x	x		x
	3.2	工装设计与批准	x	x		x
	3.3	具有特殊特性的外包产品	x	x	x	x
	3.4	客户工程批准	x	x		x
	3.5	原型样件/模型控制计划	x	x		x
	3.6	原型样件/模型制造	x	x		x
4.0 过程设计与开发	4.1	初始过程流程图与平面布置图		x	x	x
	4.2	过程潜在失效模式与后果分析 (PFMEA)		x	x	x
	4.3	过程特殊特性		x	x	x
	4.4	测量系统分析 (MSA) 计划		x	x	x
	4.5	初始过程能力研究计划		x	x	
	4.6	包装与运输规范		x	x	x
5.0 满足过程要求	5.1	过程流程图与平面布置图		x	x	x
	5.2	生产工具制造		x	x	x
	5.3	小批量生产/首次生产运行 (FPR) 控制计划		x	x	x
	5.4	作业指导书		x	x	x
	5.5	初始过程能力研究		x	x	
	5.6	次级供应商完成生产件批准过程 (PPAP)		x	x	x
6.0 产品与过程确认	6.1	小批量生产/首次生产运行 (FPR)		x	x	x
	6.2	性能测试报告与认证		x	x	x
	6.3	材料测试报告与认证		x	x	x
	6.4	尺寸报告		x	x	x
	6.5	外观批准报告		x	x	
	6.6	测量系统分析(MSA)报告		x	x	x
	6.7	产品确认测试		x	x	x
	6.8	形式、配合及功能 (FFF)		x	x	x
	6.9	生产控制计划		x	x	x
	6.10	包装与运输评估		x	x	x
7.0 产品与过程批准	7.1	生产件批准过程文档 (PPAP)	x	x	x	x
	7.2	标准样品		x	x	
	7.3	生产件批准过程 (PPAP) 提交和零件提交保证书 (PSW)	x	x	x	x

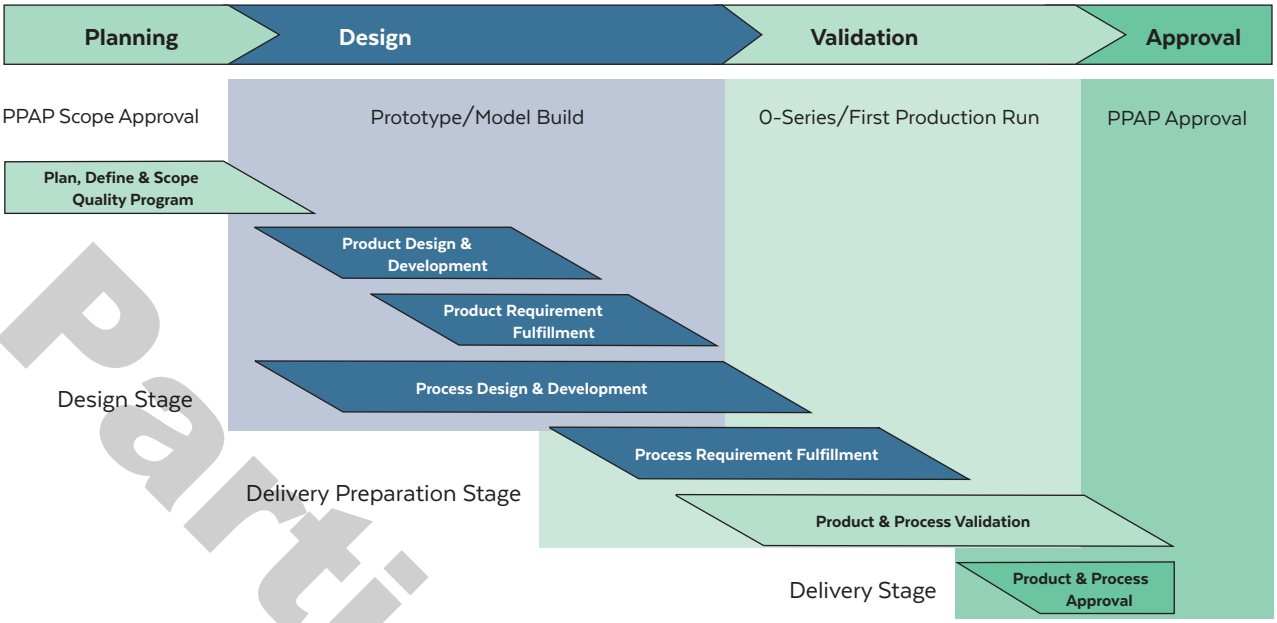
设计/工程: 对实物产品、工程和设计负责, 但不对最终实体产品负责的供应商。

设计与制造: 负责实体产品设计与制造的供应商。

按规范制造: 没有实体产品设计所有权, 仅基于客户图纸、规格和要求进行制造的供应商。这个类别还包括根据客户要求对客户材料实施特定过程(如热处理、表面处理等)的供应商。

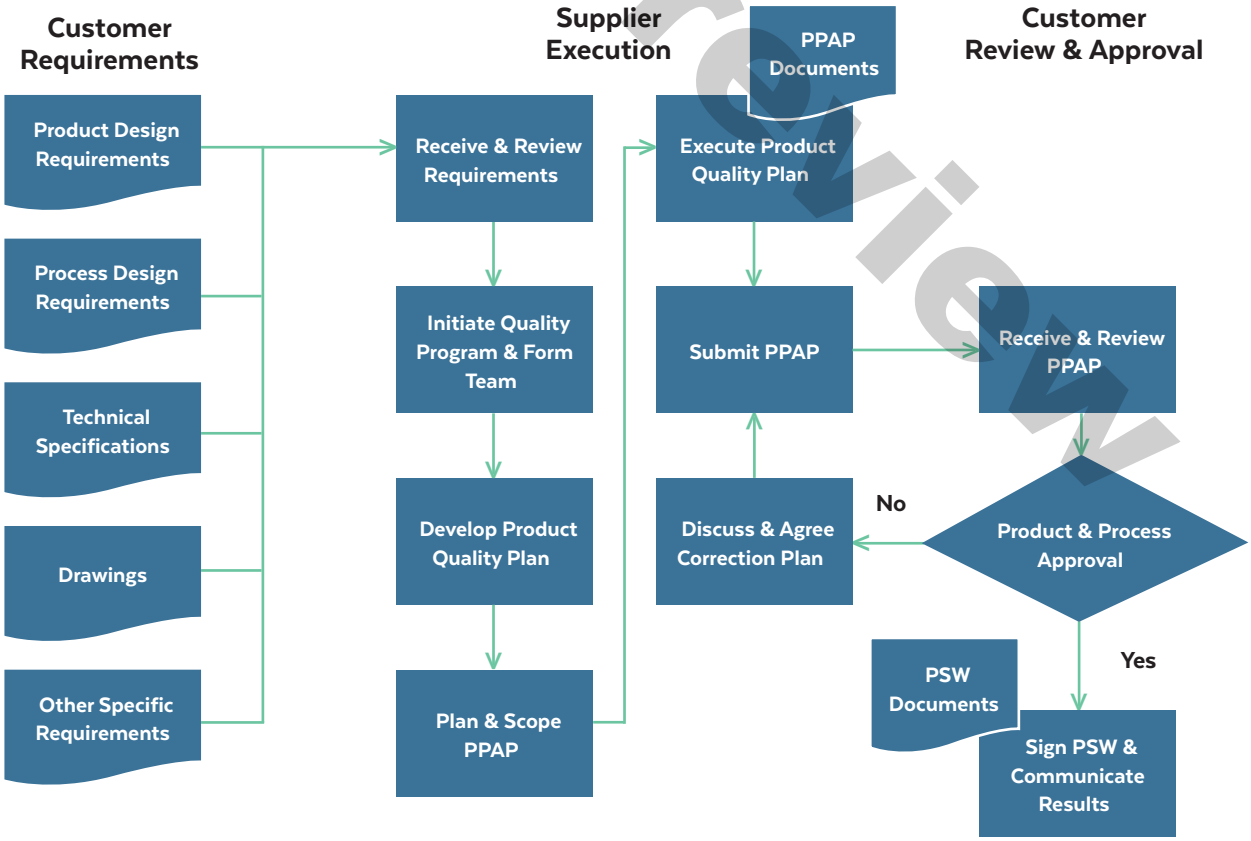
服务、物流、安装: 负责非实体产品的设计与执行的供应商。

APQP4Wind Framework

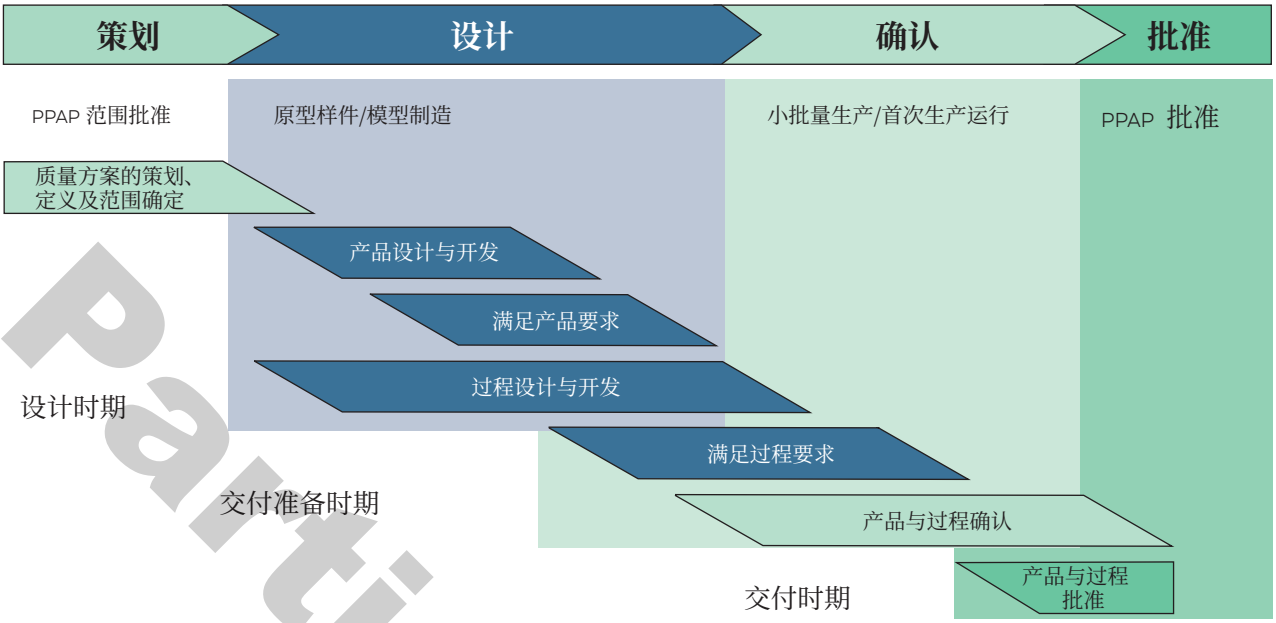


The above graphic shows the 3 stages of the 7 phases of APQP4Wind.
Each phase will be described in more detail in subsequent sections of this Manual.

APQP4Wind Process Flow

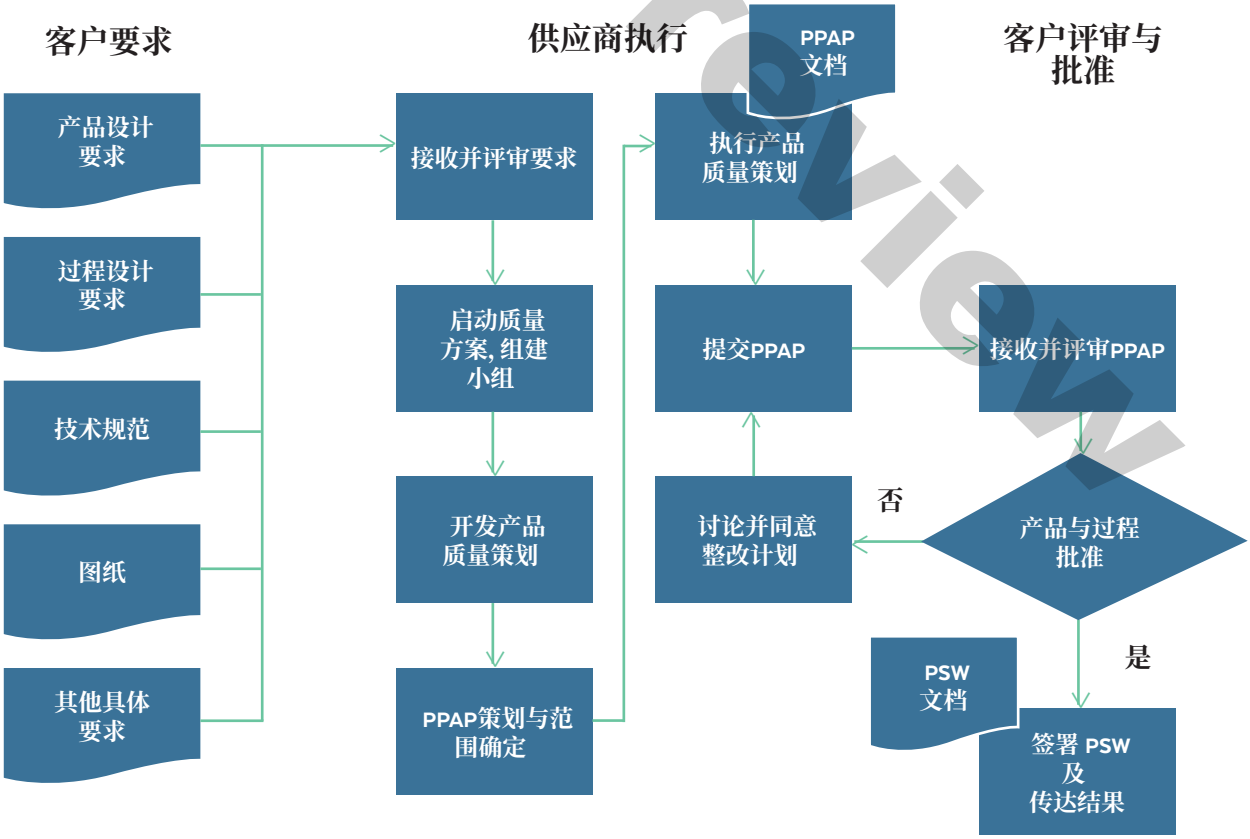


APQP4Wind框架



上图所示为APQP4Wind 的3个时期与7个阶段。
本手册后续章节将对各个阶段进行更为详尽的阐述。

APQP4Wind流程图



Phase Input & Output

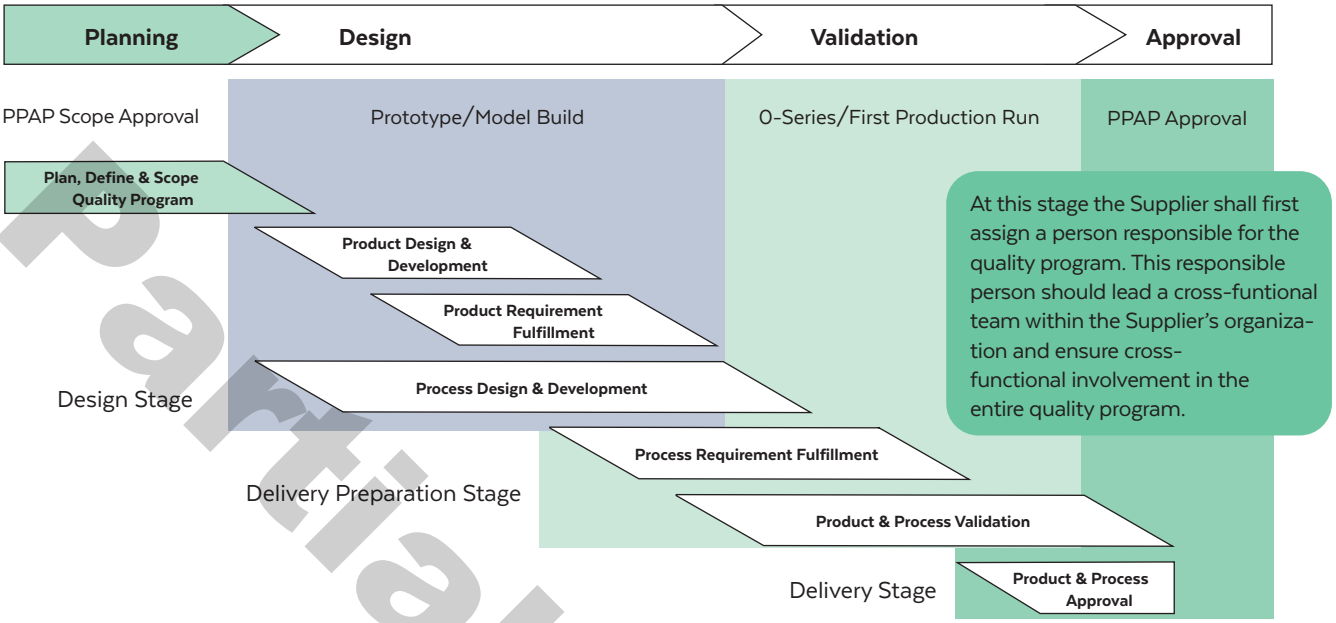
	Input		Output
1.0 Plan, Define & Scope Quality Program	1.1 Voice of Customer (VoC) 1.3 Product & Process Benchmark Data 1.4 Product & Process Assumptions 1.5 Historical Data & Quality Information	1.2 1.6 1.7 1.8 1.9	Design Goals Sub-Supplier Screening APQP4Wind Kickoff Product Quality Planning Team Product Quality Plan (PQP)
	Input		**Output**
2.0 Product Design & Development	1.2 Design Goals 1.6 Sub-Supplier Screening 1.7 APQP4Wind Kickoff 1.8 Product Quality Planning Team 1.9 Product Quality Plan (PQP)	2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 2.10 2.11 2.12	Engineering Design Review (EDR) Drawing & Specification Review Team Feasibility Commitment (TFC) Capacity Planning & Contingency Planning Design Failure Mode & Effects Analysis (DFMEA) Special Characteristics Design for Manufacturability, Assembly, Transport & Service (DMATS) Design Verification Plan (DVP) New Equipment, Tooling, Gauge/Test & Facilities Requirement Preliminary Bill of Materials (BOM) & Bill of Materials (BOM) Management Sub-Supplier Assessments Engineering Change Management (ECM)
	Input		**Output**
3.0 Product Requirement Fulfillment	2.1 Engineering Design Review (EDR) 2.2 Drawing & Specification Review 2.3 Team Feasibility Commitment (TFC) 2.4 Capacity Planning & Contingency Planning 2.5 Design Failure Mode & Effects Analysis (DFMEA) 2.6 Special Characteristics 2.7 Design for Manufacturability, Assembly, Transport & Service (DMATS) 2.8 Design Verification Plan (DVP) 2.9 New Equipment, Tooling, Gauge/Test & Facilities Requirement 2.10 Preliminary Bill of Materials (BOM) & Bill of Materials (BOM) Management 2.11 Sub-Supplier Assessments 2.12 Engineering Change Management (ECM)	3.1 3.2 3.3 3.4 3.5 3.6	Design Verification Report (DVR) Tool Design & Approval Out-Sourced Product with Special Characteristics Customer Engineering Approval Prototype/Model Control Plan Prototype/Model Builds
	Input		**Output**
4.0 Process Design & Development	2.1 Engineering Design Review (EDR) 2.2 Drawing & Specification Review 2.3 Team Feasibility Commitment (TFC) 2.4 Capacity Planning & Contingency Planning 2.5 Design Failure Mode & Effects Analysis (DFMEA) 2.6 Special Characteristics 2.7 Design for Manufacturability, Assembly, Transport & Service (DMATS) 2.8 Design Verification Plan (DVP) 2.9 New Equipment, Tooling, Gauge/Test & Facilities Requirement 2.10 Preliminary Bill of Materials (BOM) & Bill of Materials (BOM) Management 2.11 Sub-Supplier Assessments 2.12 Engineering Change Management (ECM) 3.1 Design Verification Report (DVR) 3.2 Tool Design & Approval 3.3 Out-Sourced Product with Special Characteristics 3.4 Customer Engineering Approval 3.5 Prototype/Model Control Plan 3.6 Prototype/Model Builds	4.1 4.2 4.3 4.4 4.5 4.6	Preliminary Process Flow Chart & Floor Plan Process Failure Mode & Effects Analysis (PFMEA) Process Special Characteristics Measurement System Analysis (MSA) Plan Preliminary Process Capability Study Plan Packaging & Transport Specifications
	Input		**Output**
5.0 Process Requirement Fulfillment	4.1 Preliminary Process Flow Chart & Floor Plan 4.2 Process Failure Mode & Effects Analysis (PFMEA) 4.3 Process Special Characteristics! 4.4 Measurement System Analysis (MSA) Plan 4.5 Preliminary Process Capability Study Plan 4.6 Packaging & Transport Specifications	5.1 5.2 5.3 5.4 5.5 5.6	Process Flow Chart & Floor Plan Production Tool Builds 0-Series/First Production Run (FPR) Control Plan Work Instructions Preliminary Process Capability Study Sub-Supplier Production Part Approval Process (PPAP) Completion
	Input		**Output**
6.0 Product & Process Validation	5.1 Process Flow Chart & Floor Plan 5.2 Production Tool Builds 5.3 0-Series/First Production Run (FPR) Control Plan 5.4 Work Instructions 5.5 Preliminary Process Capability Study 5.6 Sub-Supplier Production Part Approval Process (PPAP) Completion	6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 6.10	0-Series/First Production Run (FPR) Performance Test Report & Certification Material Test Report & Certification Dimensional Report Appearance Approval Report Measurement System Analysis Report (MSA) Product Validation Testing Form, Fit & Function (FFF) Production Control Plan Packaging & Transport Evaluation
	Input		**Output**
7.0 Product & Process Approval	6.1 0-Series/First Production Run (FPR) 6.2 Performance Test Report & Certification 6.3 Material Test Report & Certification 6.4 Dimensional Report 6.5 Appearance Approval Report 6.6 Measurement System Analysis Report (MSA) 6.7 Product Validation Testing 6.8 Form, Fit & Function (FFF) 6.9 Production Control Plan 6.10 Packaging & Transport Evaluation	7.1 7.2 7.3	Production Part Approval Process Documentation (PPAP) Master Samples Production Part Approval Process (PPAP) Submission & Part Submission Warrant (PSW)

阶段输入与输出

阶段		输入		输出
1.0 策划、定义与确定其范围 质量方案	1.1	客户呼声 (VoC)	1.2	设计目标
	1.3	产品与过程标杆数据	1.6	次级供应商筛选
	1.4	产品与过程假设	1.7	APQP4Wind启动
	1.5	历史数据与质量信息	1.8	产品质量策划小组
			1.9	产品质量计划 (PQP)
		输入		输出
2.0 产品设计与开发	1.2	设计目标	2.1	工程设计评审 (EDR)
	1.6	次级供应商筛选	2.2	图纸与规范评审
	1.7	APQP4Wind启动	2.3	小组可行性承诺 (TFC)
	1.8	产品质量策划小组	2.4	产能策划与应急策划
	1.9	产品质量计划 (PQP)	2.5	设计潜在失效模式与后果分析 (DFMEA)
			2.6	特殊特性
			2.7	可制造性、装配、运输和服务设计 (DMATS)
			2.8	设计验证计划 (DVP)
			2.9	新设备、工具、量具/测试和设施要求
			2.10	初始材料清单 (BOM) 与材料清单 (BOM) 管理
			2.11	次级供应商评估
			2.12	工程变更管理 (ECM)
		输入		输出
3.0 产品要求满足	2.1	工程设计评审 (EDR)	3.1	设计验证报告 (DVR)
	2.2	图纸与规范评审	3.2	工装设计与批准
	2.3	小组可行性承诺 (TFC)	3.3	具有特殊特性的外包产品
	2.4	产能策划与应急策划	3.4	客户工程批准
	2.5	设计潜在失效模式与后果分析 (DFMEA)	3.5	原型样件/模型控制计划
	2.6	特殊特性	3.6	原型样件/模型制造
	2.7	可制造性、装配、运输和服务设计 (DMATS)		
	2.8	设计验证计划 (DVP)		
	2.9	新设备、工具、量具/测试和设施要求		
	2.10	初始材料清单 (BOM) 与材料清单 (BOM) 管理		
	2.11	次级供应商评估		
	2.12	工程变更管理 (ECM)		
		输入		输出
4.0 过程设计与开发	2.1	工程设计评审 (EDR)	4.1	初始过程流程图与平面布置图
	2.2	图纸与规范评审	4.2	过程潜在失效模式与后果分析 (PFMEA)
	2.3	小组可行性承诺 (TFC)	4.3	过程特殊特性
	2.4	产能策划与应急策划	4.4	测量系统分析 (MSA) 计划
	2.5	设计潜在失效模式与后果分析 (DFMEA)	4.5	初始过程能力研究计划
	2.6	特殊特性	4.6	包装与运输规范
	2.7	可制造性、装配、运输和服务设计 (DMATS)		
	2.8	设计验证计划 (DVP)		
	2.9	新设备、工具、量具/测试和设施要求		
	2.10	初始材料清单 (BOM) 与材料清单 (BOM) 管理		
	2.11	次级供应商评估		
	2.12	工程变更管理 (ECM)		
	3.1	设计验证报告 (DVR)		
	3.2	工装设计与批准		
	3.3	具有特殊特性的外包产品		
	3.4	客户工程批准		
	3.5	原型样件/模型控制计划		
	3.6	原型样件/模型制造		
		输入		输出
5.0 过程要求满足	4.1	初始过程流程图与平面布置图	5.1	过程流程图与平面布置图
	4.2	过程潜在失效模式与后果分析 (PFMEA)	5.2	生产工具制造
	4.3	过程特殊特性	5.3	小批量生产/首次生产运行 (FPR) 控制计划
	4.4	测量系统分析 (MSA) 计划	5.4	作业指导书
	4.5	初始过程能力研究计划	5.5	初始过程能力研究
	4.6	包装与运输规范	5.6	次级供应商完成生产件批准过程 (PPAP)
		输入		输出
6.0 产品与过程验证	5.1	过程流程图与平面布置图	6.1	小批量生产/首次生产运行 (FPR)
	5.2	生产工具制造	6.2	性能测试报告与认证
	5.3	小批量生产/首次生产运行 (FPR) 控制计划	6.3	材料测试报告与认证
	5.4	作业指导书	6.4	尺寸报告
	5.5	初始过程能力研究	6.5	外观批准报告
	5.6	次级供应商完成生产件批准过程 (PPAP)	6.6	测量系统分析(MSA)报告
			6.7	产品确认测试
			6.8	形式、配合及功能 (FFF)
			6.9	生产控制计划
			6.10	包装与运输评估
		输入		输出
7.0 产品与过程批准	6.1	小批量生产/首次生产运行 (FPR)	7.1	生产件批准过程文档 (PPAP)
	6.2	性能测试报告与认证	7.2	标准样品
	6.3	材料测试报告与认证	7.3	生产件批准过程 (PPAP) 提交和零件提交保证书 (PSW)
	6.4	尺寸报告		
	6.5	外观批准报告		
	6.6	测量系统分析(MSA)报告		
	6.7	产品确认测试		
	6.8	形式、配合及功能 (FFF)		
	6.9	生产控制计划		
	6.10	包装与运输评估		

Phase 1. Plan, Define & Scope Quality Program

This phase describes the requirements to initiate a quality program by understanding the Customer's needs, requirements, and expectations, as well as scoping and planning the Product Quality Planning activities.



As a minimum, the Supplier shall:

- Understand the Customer's expectations.
- Identify potential constraints and risks in fulfilling the Customer's requirements.
- Identify cost and timeline for on-time delivery of product.
- Determine any assistance required from the Customer.
- Identify potential Suppliers, Sub-Suppliers, and processes to fulfill requirements.

The Customer shall provide the Supplier with all necessary documents pertaining to the requirements and specifications. These may include, but are not limited to, technical specifications, drawings, and standards. The Supplier shall analyze and review the requirements and expectations and use this review as a vital input to plan the quality program.

1.1. Voice of Customer (VoC)

The Voice of Customer (VoC) is a collective insight into the Customer's needs, expectations, perceptions, and preferences gained through information obtained from the Customer and the Supplier's knowledge and experience.

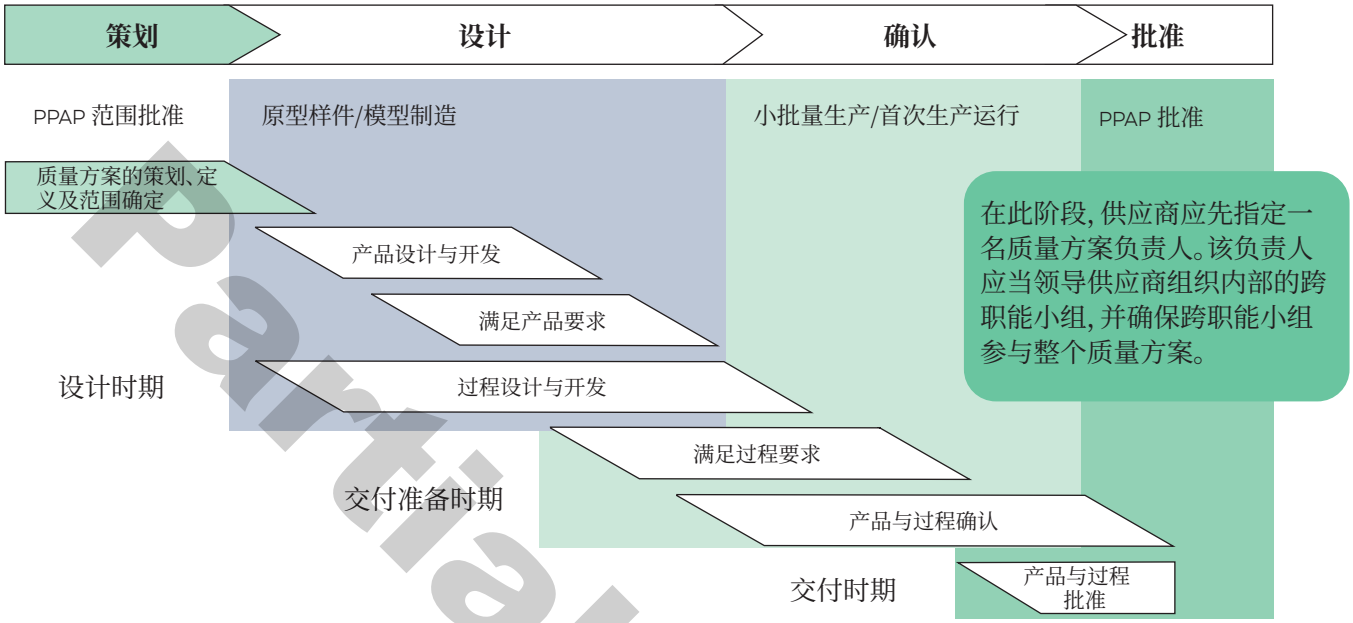
Means used to capture this information include:

- Surveys.
- Stakeholder interviews.
- Things Gone Right (TGR) report & Things Gone Wrong (TGW) report.
- Management comments and direction.
- Lessons Learned records.

The information discovered should be translated into meaningful objectives that help in closing any gaps between the Customer's expectations and the Supplier's offerings.

第1阶段 质量方案的策划、定义与范围确定

产品质量策划的这一阶段描述了如何根据客户的需求、要求和期望启动质量方案，确定产品质量策划活动的范围并进行规划。



供应商至少应：

- 理解客户期望。
- 识别满足客户要求所面临的潜在障碍和风险。
- 确定按时交付产品所需要的成本和时间。
- 确定客户所需的帮助。
- 确定满足客户要求所需要的供应商、次级供应商以及过程。

客户应向供应商提供必要文件，以说明客户的要求和规范。这些文件可包括但不限于技术规范、图纸和标准。供应商应针对客户要求和期望进行分析和评审，并以此作为制定质量方案的重要依据。

1.1.客户呼声 (VoC)

客户呼声 (VoC) 是指，通过收集客户信息，并基于供应商的知识与经验，全方位洞察客户的需求、期望、认知和偏好。

信息收集方法包括：

- 调查。
- 利益相关者访谈。
- 运行情况良好 (TGR) 报告与运行情况不良 (TGW) 报告。
- 管理层意见与指示。
- 经验教训记录。

应当将收集到的信息转化为有意义的目标，以弥补客户期望与供应商产品之间的差距。