

Webinar: A Closer Look at ...

APQP4Wind Manual 1.2

APQP4Wind

Endorsed by

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Welcome to the First APQP4Wind Webinar

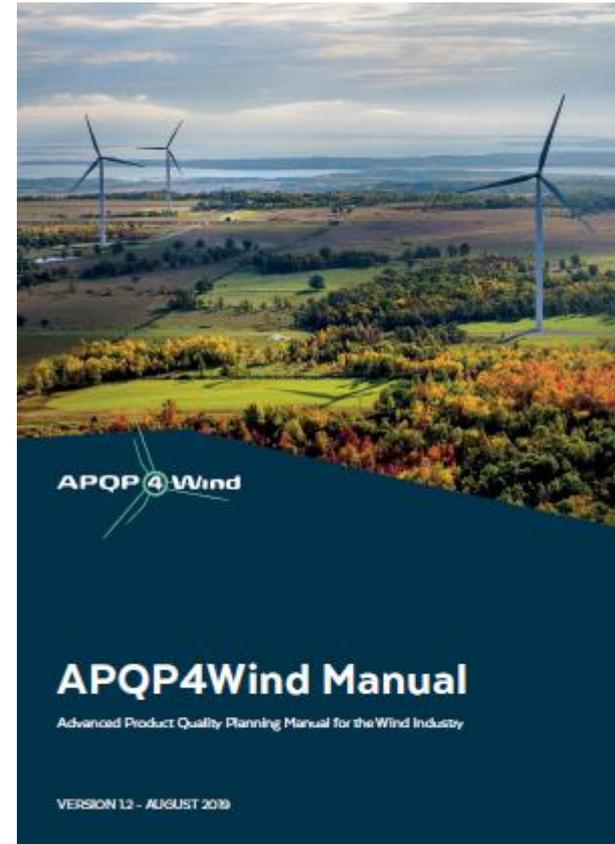
APQP4Wind



Henning Bach Jokumsen

Chairman of APQP4Wind Board of Directors

More than 20 years of experience within quality. Today, Henning Bach Jokumsen is Senior Specialist in Customer Quality in Global QSE in Vestas. Mr. Jokumsen has represented Vestas in the APQP4Wind Board of Directors as Chairman since 2018.



Agenda



- **Welcome**
Introduction to the APQP4Wind Organization and the webinar presenters
- **Webinar Instructions**
- **Presentation to APQP4Wind Manual 1.2**
Go through changes
- **Look into the Future**
- **Q&A Session**
- **Thank you!**

APQP4Wind Organization



APQP4Wind

Board of Directors



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Update

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Presenters



Dipl.-Ing. Henning Hecker
Quality Engineer and APQP Expert, Siemens Gamesa Renewable Energy GmbH & Co. KG.

Henning Hecker's expertise in the field of Quality Management includes being an APQP / PPAP Expert as Quality Engineer in the Automotive Industry, Industrial Safety Specialist, and Consultant IMS. Mr. Hecker holds a degree in Mechanical Engineering, TÜV Auditor DIN ISO 9001 Certificate, and Eco-Auditor Certificate.



Vinayan EP
Lead QSE Engineer within GQSE-Management System & Tools, Vestas

Vinayan EP is an experienced Quality Specialist with a demonstrated history of working in the Manufacturing and Energy industries. Vinayan's expertise in the field of Quality includes Problem Solving, Six Sigma, Continuous Improvement, Lean Manufacturing, and QMS. He holds a Bachelor's degree in Mechanical Engineering, the Six Sigma Black Belt, and an APQP4WIND Specialist Certificate.

Webinar Instructions

- Duration: 45 minutes
- You are welcome to write questions in the chat function during the presentation
- Questions will be answered in the Q&A session
- The webinar will be recorded and published on the APQP4Wind website together with the Power Point presentation

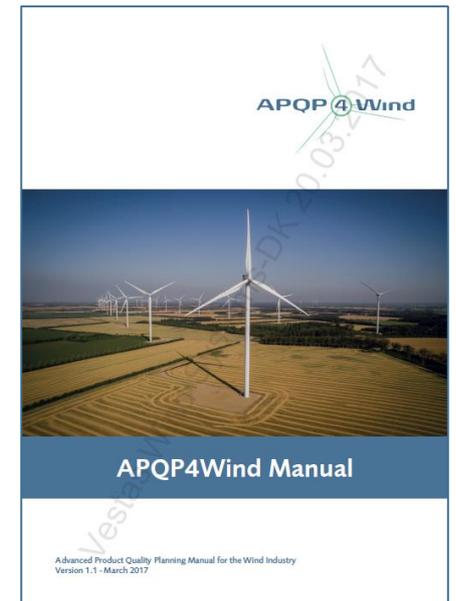
The Process

Why Did We Initiate a Version 1.2?

- Many things have changed since the release of the first Manual Version 1.1, January 2017
- We have all been in the course of implementing APQP4Wind and gotten many new ideas, inputs etc.
- APQP4WIND organization decided to consolidate last two years of learnings and prepare for level-up with the new Manual

Change Themes & Categories

- | | |
|---|--------------------------------|
| <input type="checkbox"/> Appendix | ✓ Requirement / Recommendation |
| <input type="checkbox"/> Manual Clarifications & Improvements | ✓ General Additions |
| <input type="checkbox"/> Graphics & Tables | ✓ Clarification |
| <input type="checkbox"/> Manual Layout | ✓ Improvement / Modification |
| <input type="checkbox"/> Manual Structure & Scope | ✓ Deletion |
| <input type="checkbox"/> PPAP Scoping / PSW | ✓ Correction |
| <input type="checkbox"/> Subscribers, Company Names & Logos | |
| <input type="checkbox"/> Spelling & Grammar | |



How to Get the Change Log

Manual and Toolbox

The core of the APQP4Wind is the APQP4Wind Manual and Toolbox.

We continually work to develop and update the tools to work the best for the industry. The development of the Workbook and Manual is handled by our dedicated 'Workbook and Manual Working group'.

Manual

The purpose of the APQP4Wind manual is to make the process of product quality assurance demands (APQP) as well as product release process (PPAP) as clear as possible.

Extended quality planning and release process helps to minimize the cost of ownership through the entire value chain and thereby contributes to lower the cost energy.

The manual is made to fit the entire wind industry and set the standard and best practice for how to do in the entire value chain, from utilities to suppliers of components. The manual is made to substitute company specific procedures and set aligned standards for all suppliers and sub suppliers nationally and internationally.

The manual is sold through our approved [training providers](#) in both hardcopy and protected e-manual.

[Preview the manual](#)

DOCUMENTS

Change log APQP4Wind 2.2

Download the Change Log here:
www.apqp4wind.org/manual-and-toolbox

Themes

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APQP4Wind

Appendix

Manual Clarifications & Improvements

Graphics & Tables

Manual Layout

Manual Structure & Scope

PPAP Scoping / PSW

Subscribers, Company Names & Logos

Spelling & Grammar

Themes

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New Appendix for FMEA

New Appendix

- General information
- FMEA
- DFMEA
- Risk Matrix & Prioritization

Appendix 2 - Failure Mode & Effect Analysis (FMEA)

FMEA is an analytical tool used to identify and mitigate possible failures in Design, Manufacturing, Product or Service. Ideally, FMEA begins during the earliest conceptual stages of design and continues throughout the life of the product or service. Discovering a failure early in Product and Process Development using FMEA provides the benefits of:

- Multiple choices for Mitigating the Risk.
- Higher capability of Verification and Validation of changes.
- Collaboration between design of the product and process.
- Improved Design for Manufacturing and Assembly.
- Lower cost solutions.

Ultimately, this methodology is effective at identifying and correcting product or process failures early on so that the costly consequences of poor performance can be avoided. Its most visible result is the documentation of the collective knowledge of cross-functional teams.

New Appendix for FMEA

New Appendix

- General information
- FMEA
- DFMEA
- Risk Matrix & Prioritization

Appendix 2 - Failure Mode & Effect Analysis (FMEA)

FMEA is an analytical tool used to identify and mitigate possible failures in Design

Design Failure Mode & Effect (DFMEA)

Design FMEA (DFMEA) is aimed at identifying all possible safety or regulatory concerns, product malfunctions, reduced product life and Customer dissatisfaction and how they can be prevented.

DFMEA can be performed on a product, component or tools:

- Product level DFMEA addresses high level design risks from system level, where a system may be comprised of different 'sub-systems' or 'components'.
- Component level DFMEA addresses design risk at component or sub-system level.
- Tool DFMEA addresses the risk associated with tool design and its effect on component or product.

New Appendix for FMEA

New Appendix

- General information
- FMEA
- DFMEA
- Risk Matrix & Prioritization

Appendix 2 - Failure Mode & Effect Analysis (FMEA)

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Design Failure Mode & Effect (DFMEA)

Risk and Prioritization

Engineering assessment for preventive/corrective action should be prioritized by considering the Severity, Occurrence and Detectability. Priority should be designated in the order of Safety Special Characteristics, Product/Process Special Characteristics and other characteristics designated by the team.

Prioritization helps the team to define focus areas and make decisions on whether corrective actions have to be taken for the failure mode in question. After the individual items are ranked by severity, occurrence and detection, it is recommended to prioritize the failure modes in following three categories and reduced accordingly (i.e. address all red items first, then yellow, etc.).



Risk & Prioritization

Risk based approach for preventive / corrective action prioritization included

Label		Criteria									
		Severity ≥ 9 and Occurrence ≥ 1 OR The Risk Number, RN ≥ 63 OR The Risk Priority Number, RPN ≥ 505									
		Risk number anything between RED and GREEN in below matrix									
		The Risk Number, RN ≤ 12									
Occurrence	10	10	20	30	40	50	60	70	80	90	100
	9	9	18	27	36	45	54	63	72	81	90
	8	8	16	24	32	40	48	56	64	72	80
	7	7	14	21	28	35	42	49	56	63	70
	6	6	12	18	24	30	36	42	48	54	60
	5	5	10	15	20	25	30	35	40	45	50
	4	4	8	12	16	20	24	28	32	36	40
	3	3	6	9	12	15	18	21	24	27	30
	2	2	4	6	8	10	12	14	16	18	20
	1	1	2	3	4	5	6	7	8	9	10
		Severity									



Severity Ranking

Severity Ranking Criteria for 10 and 9 in both DFMEA and PFMEA re-defined by differentiating between Safety - and Compliance Concern

DFMEA- SEVERITY RANKING		
<i>Severity: Effect of the failure mode on the product. Effect should be always evaluated both on component and turbine level, and the highest should be chosen.</i>		
Ranking	Effect	Criteria
10	Hazard	Affects safety of any party in the value chain. (turbine instability, blade collapse, electric shock, fire, hazardous chemical exposure, unsafe handling, etc.).
9	Non-compliance	Leads to noncompliance with government regulation and/or legal requirements.

Changes in Appendix

Highlights

- New Appendix for FMEA
- Risk based action prioritization in FMEA
- New definition severity 10 and 9
- Recommendation on NDC
- Recommendation on gauge resolution
- Guideline on Type 1 / Type 2 MSA
- Clarification on 100% inspection
- Process capability requirement changed
- Standardization Special Characteristics terminologies

Themes

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Manual Clarifications & Improvements

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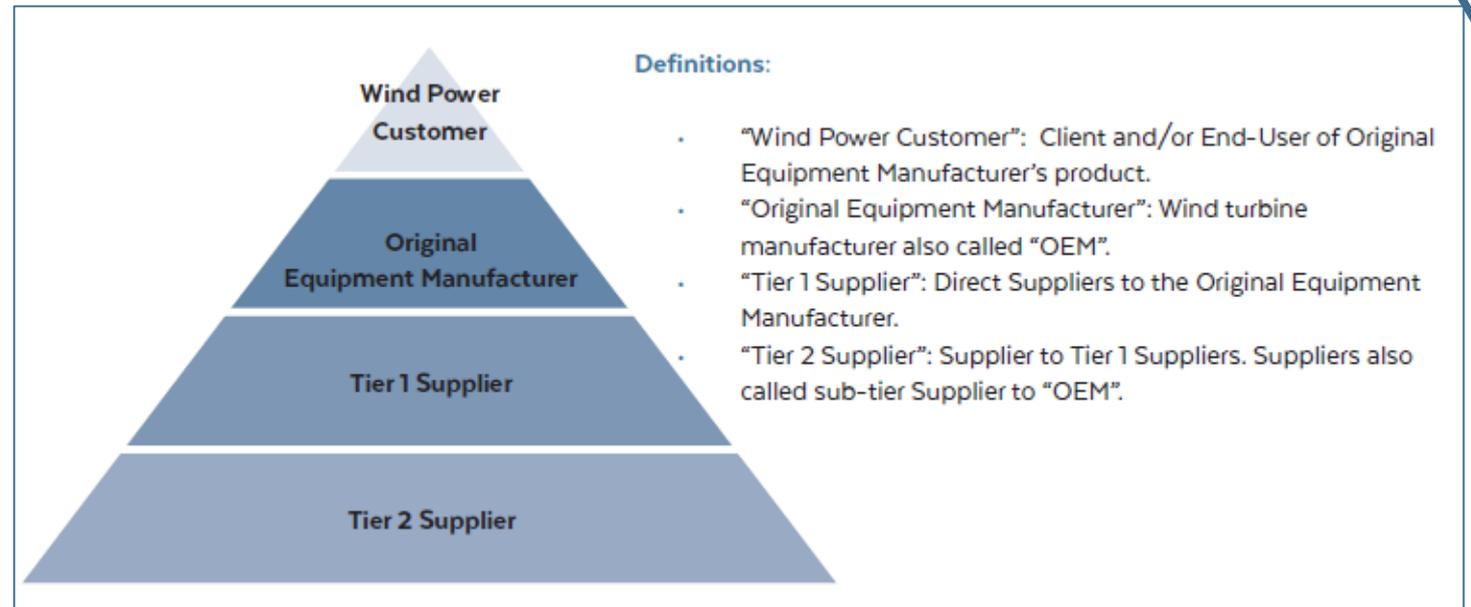
PPAP Scoping / PSW

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Spelling & Grammar

Customer – Supplier Relationship

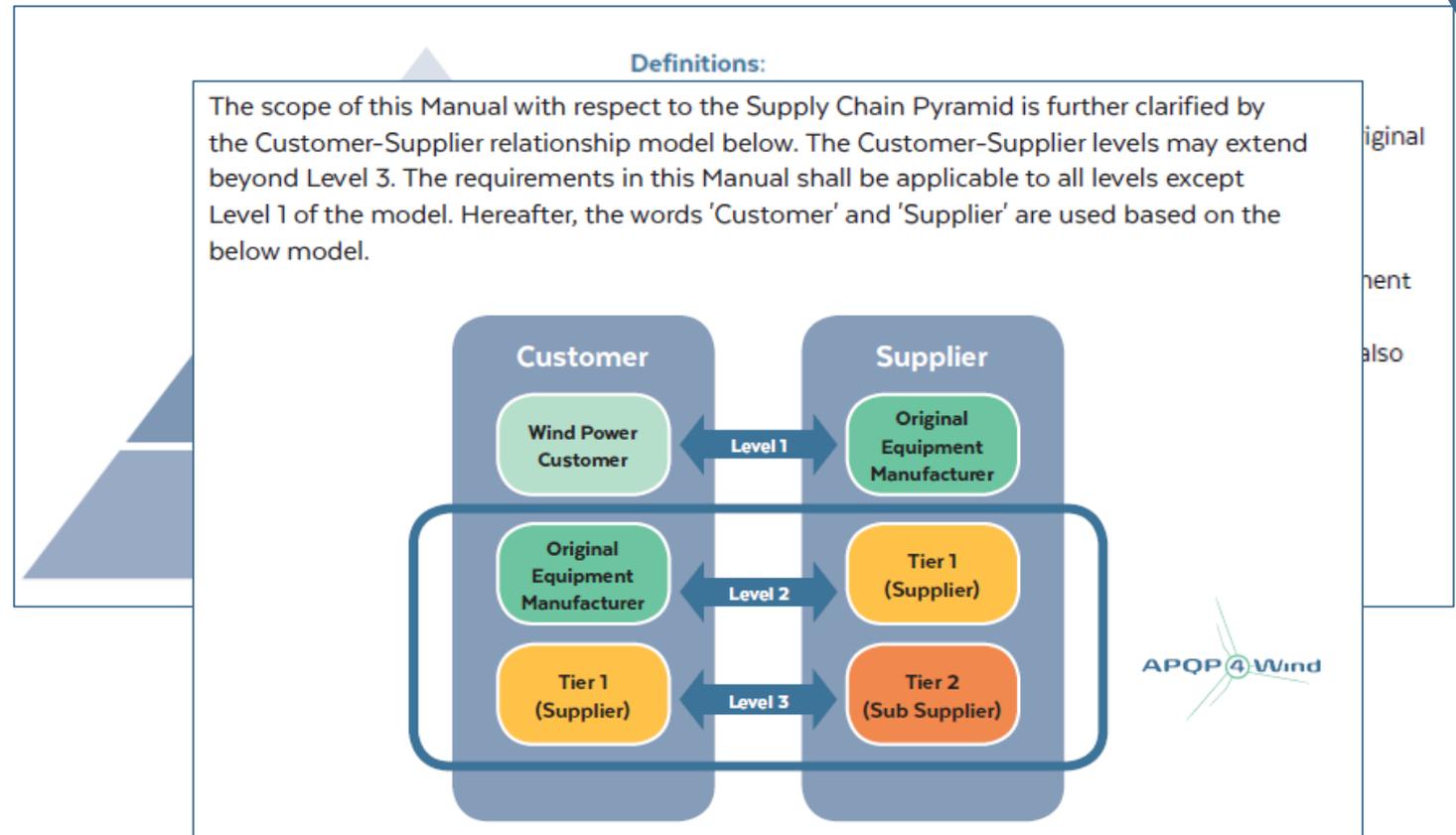
- Supplier - Customer Model clarified with common terminologies like “Wind Power Customer”, “Original Equipment Manufacturer” etc.
- Word “Manufacturer” replaced with “Customer” and standardized throughout
- Scope of APQP4Wind Manual clarified





Customer – Supplier Relationship

- Supplier - Customer Model clarified with common terminologies like “Wind Power Customer”, “Original Equipment Manufacturer” etc.
- Word “Manufacturer” replaced with “Customer” and standardized throughout
- Scope of APQP4Wind Manual clarified



PQP Received More Attention

- Use of Product Quality Plan emphasized
- Purpose clarified
- Recommendation related to PQP included

1.9. Product Quality Plan (PQP)

Product Quality Plan is an essential tool to plan, monitor and provide the status of the quality deliverables of the project. The Product Quality Plan contains information about:

- Product/Process description.
- Responsibility.
- Time line and due date.
- Status.

The Supplier shall be responsible for the development of a Product Quality Plan against the quality deliverables agreed with the Customer. The type of product, complexity and Customer's expectations should be considered in selecting the timing elements that should be planned and documented. All team members should agree with each event, action, and timing. A well-organized timing chart should list tasks, responsible persons, and target date (due date) for completion. Also, the plan should provide the planning team with a consistent format for tracking progress and setting meeting agendas. To facilitate status reporting, each event should have a "start" and a "completion" date, with the actual point of progress recorded. Effective status reporting identifies items that require special attention in advance to successfully complete the project on time. The product quality plan shall define the PPAP deliverables and shall ensure that the PPAP scope is in agreement with the Customer and Supplier.

APQP4Wind Kick Off Meeting: How to Perform (List of Action Items)

4 step guideline for a structured APQP4Wind Kick Off meeting included in the Manual

1.7. APQP Kick Off

The APQP Kick Off is a formal meeting between the Supplier and Customer in which the Product Quality Planning activities are initiated. The various quality deliverables and timelines defined by the Customer shall be discussed and agreed upon in this meeting. It is mandatory for the Supplier to document the outcomes of this meeting. A common procedure for a successful Kick Off meeting can be divided into four steps:

- Presentation of ideas, sketches, drawings, technical data, requirements, specifications, etc.
- Development of an adequate Pre-Product Quality Plan with milestones (timeline) for Prototype, O-Series and Series-Stage.
- Clarification of documentation transfer and reporting (contacts, frequency, type of information, escalation plan).
- Content of PPAP.

TFC: What to Include..

(Added List of Recommended Actions)

- Documentation requirement as part of TFC clarified
- Emphasis on Capacity Commitment

2.3. Team Feasibility Commitment (TFC)

The Supplier's product quality planning team should assess the feasibility of the proposed design or product or requirement of the Customer. The team may also consider input from risk management like FMEA, and shall ensure that the proposed product could be manufactured, assembled, tested, packaged, and delivered in satisfying quantity, at an acceptable cost to the Customer as per agreed schedule or delivery rate. The team consensus that the proposed design is feasible should be documented and demonstrated to the Customer along with supporting reports, calculations, list of additional requirements, fulfilment plan and all open issues that require resolution.

To demonstrate capacity feasibility, the following documents can be required:

- Capacity overview (incl. all additional facilities, tools and equipment).
- List of tools and fixtures.
- Run @ Rate calculation and investigation reports.

Shall, Should, Can & May: Checking Aid are in Glossary

- Glossary updated with latest information
- Use of shall, should, can, and may revisited and definition included in glossary to avoid confusion

Statistical Process Control - Application of statistical methods and procedures (such as control charts) to analyze the inherent variability of a process or its outputs to achieve and maintain a state of statistical control, and to improve the process capability.

Note!

- | | | |
|---------------|---|---|
| Can | - | Whenever 'can' is used in this Manual, it indicates a possibility or a capability. |
| May | - | Whenever 'may' is used in this Manual, it indicates an optional requirement or suggestion. |
| Shall | - | Whenever 'shall' is used in this Manual, it indicates a requirement that is necessary to follow. |
| Should | - | Whenever 'should' is used in this Manual, it indicates a recommendation that is recommended to follow the Manual. |

APQP4Wind Manual

Clarifications & Improvements



APQP4Wind

Highlights

- Customer – Supplier relationship clarified
- PQP received more attention, focus set on internal and external PQP improved
- Kick Off meeting: How to perform (List of action items)
- TFC: What to include ... (Added list of recommended actions)
- Shall, should, can, and may: Checking aid are in glossary
- Links to APQP4Wind Workbook and Analysis Tool
- Objective added: Avoid problem/failure repetition

Themes

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Spelling & Grammar



Responsibility Matrix

“Manufacture to Spec”
and “Material Processing”
supply nature combined
to one column

Responsibility Matrix

Supply Nature

APQP4Wind Phases	APQP Chapter	APQP4Wind Element	Design Responsible Supplier	Manufacture to Spec Supplier
1.0 Plan, Define & Scope Quality Program	1.1	Voice of Customer	x	x
	1.2	Design Goals	x	
	1.3	Product & Process Benchmark Data	x	x
	1.4	Product & Process Assumptions	x	x
	1.5	Historical Data & Quality Information	x	x
	1.6	Sub Supplier Screening	x	x
	1.7	APQP Kick Off	x	x
	1.8	Product Quality Planning Team	x	x
	1.9	Product Quality Plan (PQP)	x	x
2.0 Product Design & Development	2.1	Engineering Design Review (EDR)	x	
	2.2	Drawing & Specification Review	x	x
	2.3	Team Feasibility Commitment (TFC)	x	x
	2.4	DFMEA (Design Failure Mode & Effect Analysis)	x	
	2.5	Special Characteristics	x	x
	2.6	Design for Manufacturability, Assembly, Transport & Service	x	
	2.7	Design Verification Plan (DVP)	x	
	2.8	New Equipment, Tooling, Gauge/Test & Facilities Requirement	x	x
	2.9	Preliminary BOM & BOM Management	x	x
	2.10	Sub Supplier Assessments	x	x
	2.11	Engineering Change Management (ECM)	x	x



Responsibility Matrix

“Manufacture to Spec”
and “Material Processing”
supply nature combined
to one column

Responsibility Matrix

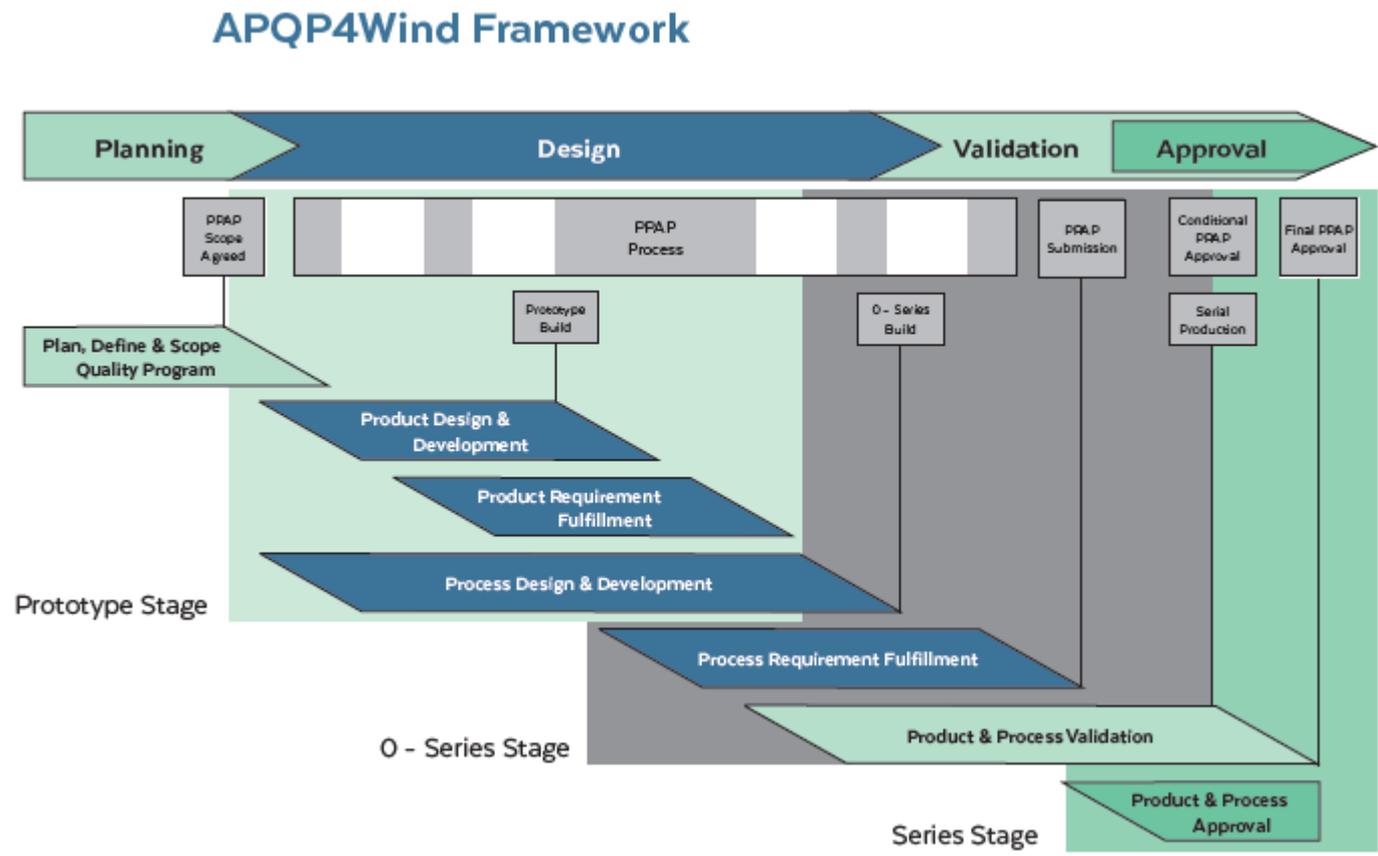
Supply Nature

APQP4Wind Phases	APQP Chapter	APQP4Wind Element	Design Responsible Supplier	Manufacture to Spec Supplier
1.0 Plan, Define & Scope Quality Program	1.1	Voice of Customer		
	1.2	Design Goals		
	1.3	Product & Process Benchmark Data		
	1.4	Product & Process Assumptions	X	X
	1.5	Historical Data & Quality Information	X	
	1.6	Sub Supplier Screening	X	X
	1.7	APQP Kick Off		
	1.8	Product Quality Planning Team	X	X
	1.9	Product Quality Plan (PQP)	X	X
2.0 Product Design & Development	2.1	Engineering Design Review (EDR)	X	X
	2.2	Drawing & Specification Review	X	X
	2.3	Team Feasibility Commitment (TFC)	X	X
	2.4	DFMEA (Design Failure Mode & Effect Analysis)	X	X
	2.5	Special Characteristics	X	X
	2.6	Design for Manufacturability, Assembly, Transport	X	X
	2.7	Design Verification Plan (DVP)		
	2.8	New Equipment, Tooling, Gauge/Test & Facilities	X	
	2.9	Preliminary BOM & BOM Management	X	
	2.10	Sub Supplier Assessments	X	X
	2.11	Engineering Change Management (ECM)	X	X



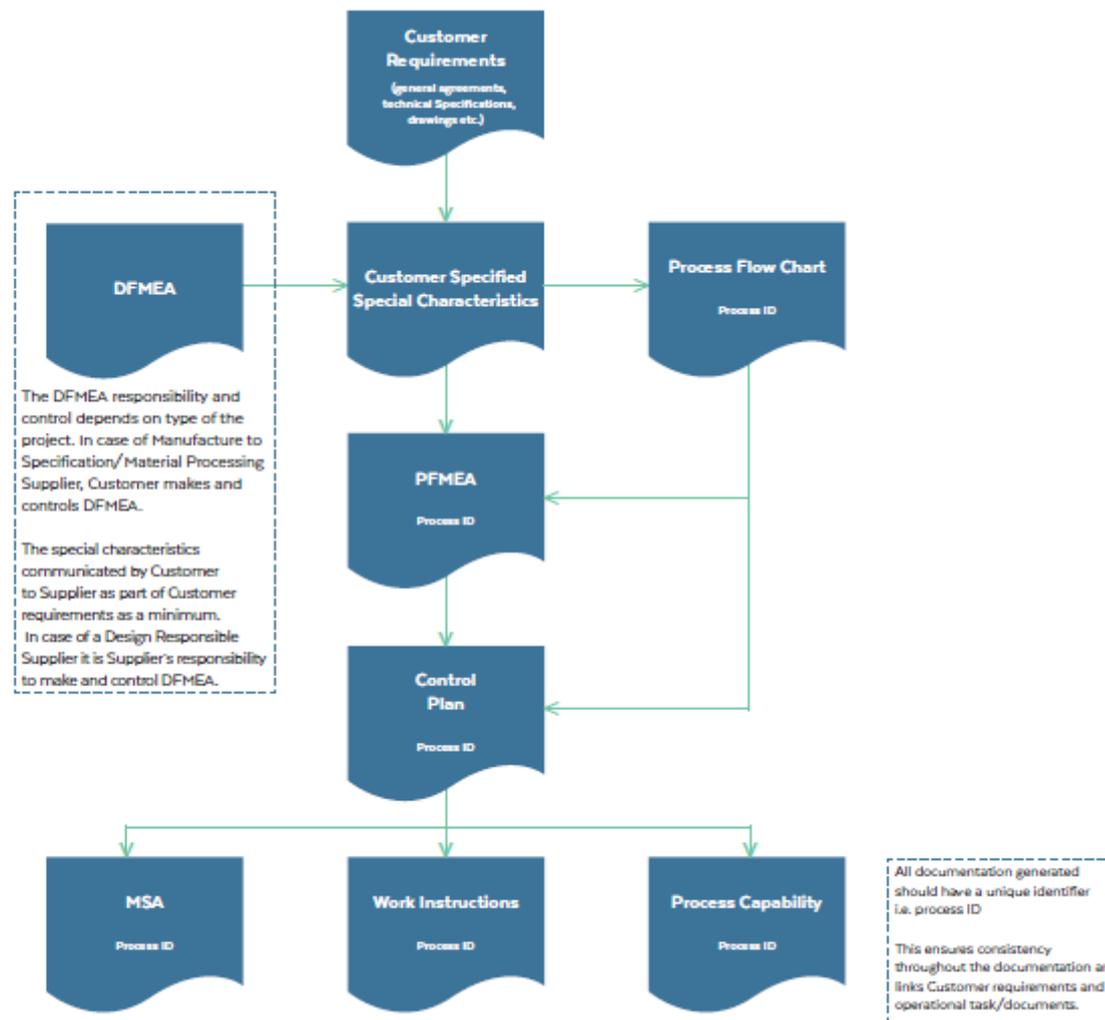
APQP Framework: Additional Stages

- APQP Framework
further detailed with 3 stages:
- Prototype
 - 0-Series
 - Series



New Relationship Diagram

- New workflow to illustrate the connection with DFMEA and PFMEA
- Other milestones added



Graphics & Tables

The logo for APQP4Wind is a circular emblem with a dark blue border. Inside the circle, the text "APQP4Wind" is written in a dark blue, sans-serif font. The number "4" is enclosed in a small white circle with a dark blue outline. The text is centered within the circle. Several dark blue lines radiate from the right side of the circle, extending towards the right edge of the slide.

APQP4Wind

Highlights

- Responsibility Matrix has changed
- APQP Framework got Additional Stages (Prototype, O-Series, and Series)
- New Relationship Diagram
- Process Flow Diagram has changed

Themes

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Manual Layout

Reference to Workbook in the Manual changed from Template/Sheet numbers to Template Names

For further details:
Appendix 3

Reference:
Workbook
Sheet: Process
Capability Studies

Reference:
Workbook
Sheet: Packaging
Test Report

4.4. Preliminary Process Capability Study Plan

The Supplier shall ensure the development and implementation of a Preliminary Process Capability Study Plan and Preliminary Control Plan. The Preliminary Control Plan shall stay active until the process capability has been documented and accepted by the Customer. Following this approval, the Preliminary Control Plan may be replaced by the final control plan, sampling data or running Statistical Process Control (SPC) to provide regular capability reporting, as per Customer request. For low volumes, 100% inspection of the special characteristics shall be required by the Control Plan until the capability is determined. Process capability studies shall be applicable to all special characteristics.

4.5. Packaging & Transport Specifications

The Supplier should develop and maintain internal procedures/methods to ensure that the packaging and transport specifications are understood and that the requirements can be fulfilled. The intention is to ensure product quality using suitable packaging methods and material.

As a minimum the Supplier shall ensure that suitable packaging materials have been defined for:

- Transport from or to the Sub Supplier.
- Internal transport/storage.
- Dispatch to Customer.
- If dependent on multiple methods of transportation, all areas should be considered.

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PPAP Documentation Mapping

PPAP documentation mapping

- Table shows the linkage between PPAP Templates
- APQP4Wind Phases/Elements included

APQP4Wind Phase	APQP Chapter	APQP4Wind Element	Workbook link
1.0 Plan, Define & Scope Quality Program	1.8	Product Quality Planning Team	C) PPAP Details F) Product Quality Team
	1.9	Product Quality Plan (PQP)	1) Product Quality Plan
2.0 Product Design & Development	2.3	Team Feasibility Commitment	2) Team Feasibility Commitment (TFC)
	2.4	DFMEA (Design Failure Mode & Effect Analysis)	3) D-FMEA
	2.5	Special Characteristics	3) D-FMEA 8) P-FMEA
	2.6	Design for Manufacturability, Assembly, Transport & Service	2) Team Feasibility Commitment (TFC)
3.0 Product Requirement Fulfillment	2.11	Engineering Change Management (ECM)	5) Customer Engineering Appr.
	3.3	Sub Supplier Product Quality Plan	1) Product Quality Plan
	3.4	Customer Engineering Approval	5) Customer Engineering Appr.
	3.5	Prototype Control Plan	9) Control Plan
	4.0 Process Design & Development	4.1	Preliminary Process Flow Chart & Floor plan
7) Factory Floor Plan			



List of Templates in Appendix 5

- All Templates of APQP4Wind Workbook removed from Manual
- A list shows the available Templates in Workbook and Analysis Tool added to Appendix 5

APQP4Wind - Workbook Templates

Sheet	1	Product Quality Plan
Sheet	2	Team Feasibility Commitment
Sheet	3	Design Failure Mode & Effect Analysis
Sheet	4	Part History
Sheet	5	Customer Engineering Approval
Sheet	6	Process Flow Chart
Sheet	7	Factory Floor Plan
Sheet	8	Process Failure Mode & Effect Analysis
Sheet	9	Control Plan
Sheet	10	Process Capability Studies
Sheet	11	Performance Test Report
Sheet	12	Material Test Report
Sheet	13	Dimension Test Report
Sheet	14	Appearance Approval Report
Sheet	15	Measurement System Analysis
Sheet	16	Packaging Test Report
Sheet	17	Product and Master Sample
Sheet	18	Part Submission Warrant, PSW
Sheet	19	Part Submission Warrant Deviation Sheet
Sheet	20	Material Safety Data Sheet
Sheet	21	Form, Fit & Function
Sheet	22	Qualified Laboratory Documentation
Sheet	23	List of Checking Aids
Sheet	24	Sub Supplier Source Detail

APQP4Wind - Analysis Tool

Sheet	1	MSA Type 1
Sheet	2	MSA Type 2 (ANOVA)
Sheet	3	MSA Attribute
Sheet	4	MSA Supplier Format
Sheet	5	Capability study

Manual Structure & Scope

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APQP4Wind

Highlights

- PPAP Documentation Mapping
- List of Templates in APQP4Wind Workbook and Analysis Tool are now in Appendix 5
- No more Templates in APQP4Wind Manual
- All Chapters numbers are prefixed with “Phase”

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PQP is now Part of PPAP Deliverable

In accordance with emphasis on PQP, Documentation, and Submission Requirement updated

Default PPAP documentation matrix ¹⁾		High Risk		Medium Risk		Low Risk	
Template/ Workbook Ref.	PPAP Element	Documen- tation	Submit/ Retain	Documen- tation	Submit/ Retain	Documen- tation	Submit/ Retain
1	Product Quality Plan ²⁾	M	S	M	S	O	*
2	Team Feasibility Commitment, TFC	M	S	M	S	O	*
3	Design Failure Mode & Effect Analysis, DFMEA ³⁾	M	R	O	*	O	*

Requirement Related to SDS & Regulations Added

Identification and Communication requirements related to SDS and Government Regulations specified

2.2. Drawing & Specification Review

Drawings and specifications refer to the documents provided by the Customer. The drawings and specifications review is a cross functional process, which should ensure that the Customer's requirements are understood and are able to be met by the Supplier. The concerns/issues identified during the review shall be documented and appropriate actions initiated.

All necessary documents, relating to:

- Safety Regulations.
- Government Regulations.
- Information about restricted and reportable substances shall be identified and communicated accordingly.

Themes

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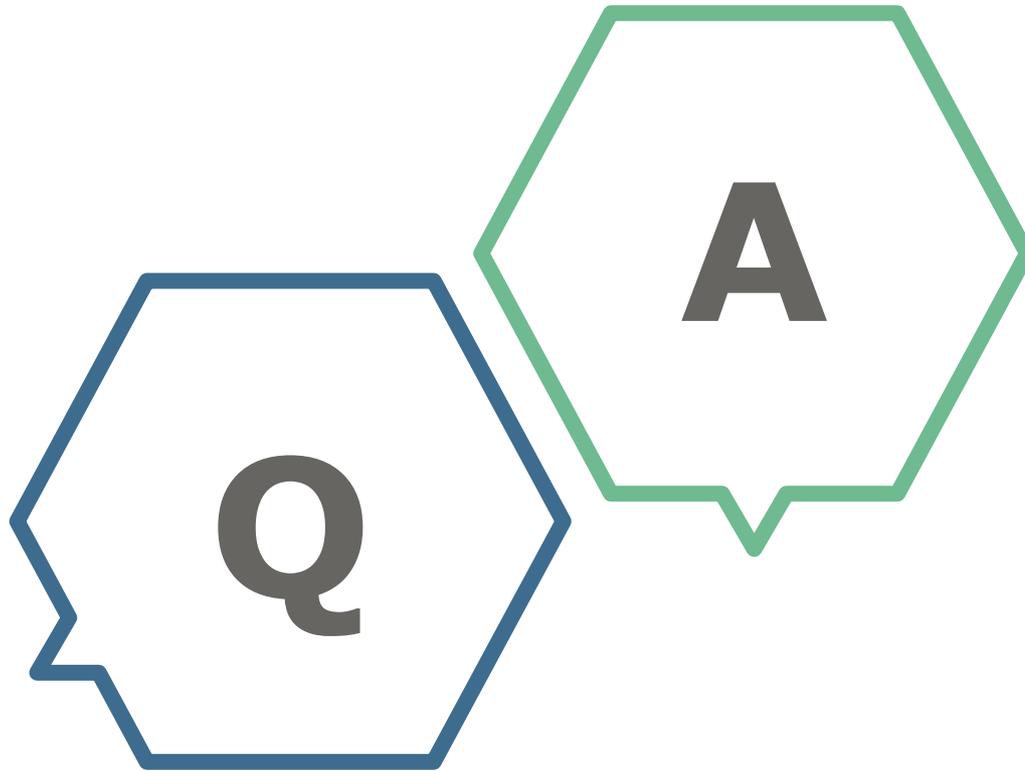
Spelling & Grammar

A Look into the Future



- The updated APQP4Wind Manual Version 1.2 is now available
- APQP4Wind Company Membership
- Manual and Toolbox (Workbook & Analysis Tool) will be translated into Chinese
- Roadmap for further development of the Manual and Toolbox (Workbook & Analysis Tool)

Time for Questions and Answers





APQP4Wind

Thank you !

Check out our website:
www.apqp4wind.org

 Follow us on LinkedIn
[APQP4Wind](https://www.linkedin.com/company/APQP4Wind)

Contact us:
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