



**TRANSITION TOGETHER**



**9145 - ADVANCED PRODUCT QUALITY PLANNING (APQP)  
AND PRODUCT PART APPROVAL PROCESS (PPAP)  
AVIATION SPACE AND DEFENSE INDUSTRIES**

**BERLIN SUPPLIER FORUM**

**18 OCTOBER 2019**

**PRODUCT & SUPPLY CHAIN IMPROVEMENT  
SUPPLY CHAIN MANAGEMENT HANDBOOK (SCMH)**

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# 9145 APQP & PPAP

The purpose of this presentation is to:

- **Introduce key concepts of APQP and PPAP and the benefits of application**
- **Implementation – First steps**
- **Guidance material and training**

# Introduction to 9145

# What is 9145?

**A** Advanced

**P** Product

**Q** Quality

**P** Planning

**Quality** refers to

**Good, effective**

**Enterprise-wide Planning**

# What is 9145?

9145 applies Advanced Product Quality Planning (APQP) and Production Part Approval Process (PPAP) to Product Development in the Aviation Space And Defense (AS&D) industry

## 5-Phase Product Development Process

1. Planning
2. Product Design and Development
3. Process Design and Development
4. Product and Process Validation
5. On-Going Production, Use, and Post-Delivery Service

## Success Drivers

- Management commitment
- Integrated cross-functional teams
- Effective project management
- Defined deliverables & outputs for each phase

# Why 9145?

## Improve Quality and Reduce Cost

- Prevention tools for risk reduction
- Early achievement of product maturity
- Reduced overall life-cycle costs
- Provides foundation for successful work transfers



# Why 9145?

Improve Quality and Reduce Cost by eliminating:

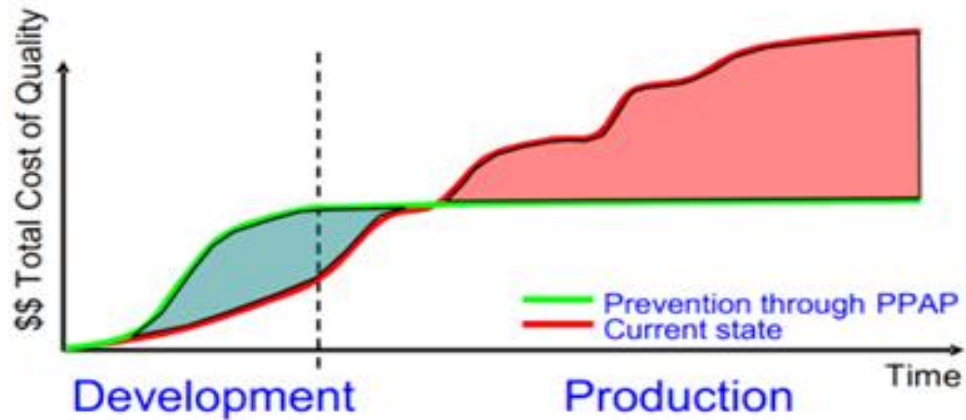
- Visible Costs:
  - Non Conformances
  - Rework / Repairs
  - Penalties
- Hidden Costs:
  - Design changes
  - Warranty costs
  - Loss of productivity
  - Field service costs
- The list goes on...



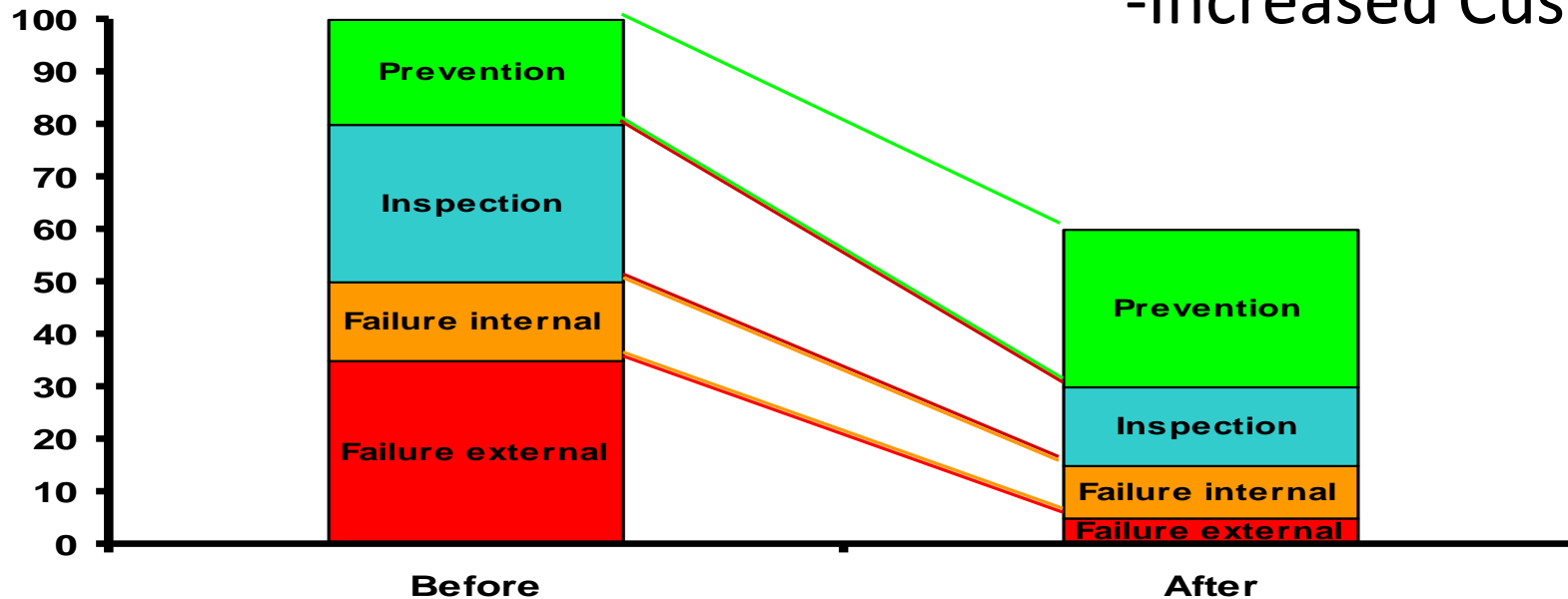
The iceberg effect...

Deliver quality products that satisfy customer expectations

# 9145 Benefits from Proactive Approach



- Reactive to proactive approach
- Improved product quality
- Reduce failure costs through prevention
- Increased Customer satisfaction



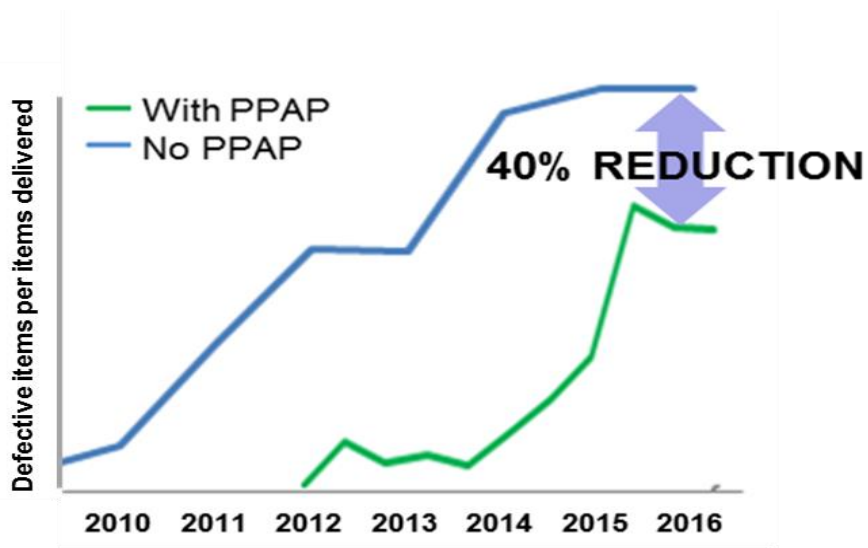
Upfront costs are offset by reduction in failure and inspection cost



# 9145 Benefits from Proactive Approach

Non-conformances reduced through PPAP  
(actual AS&D example)

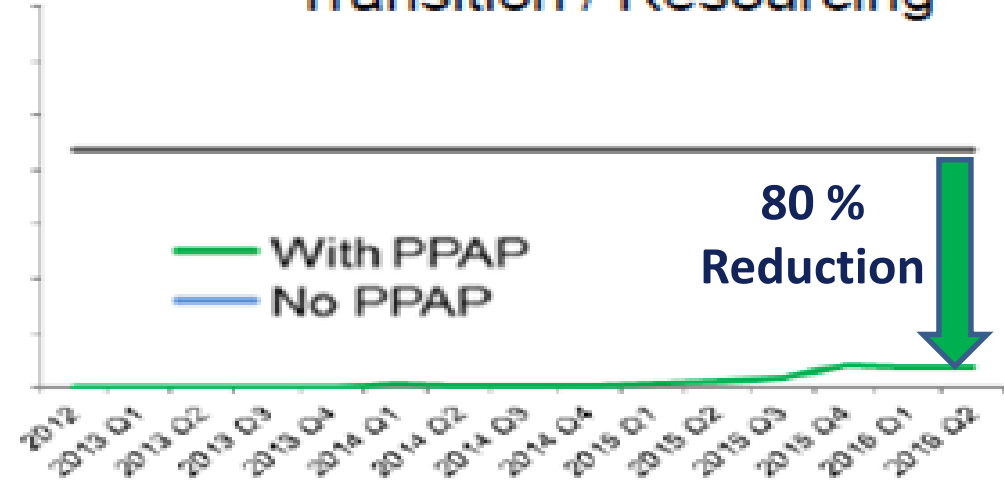
New Product introduction



Program to program comparison

Work Transfers

Transition / Resourcing



Across programs

First benefits of APQP can be achieved through PPAP deployment

# APQP Overview

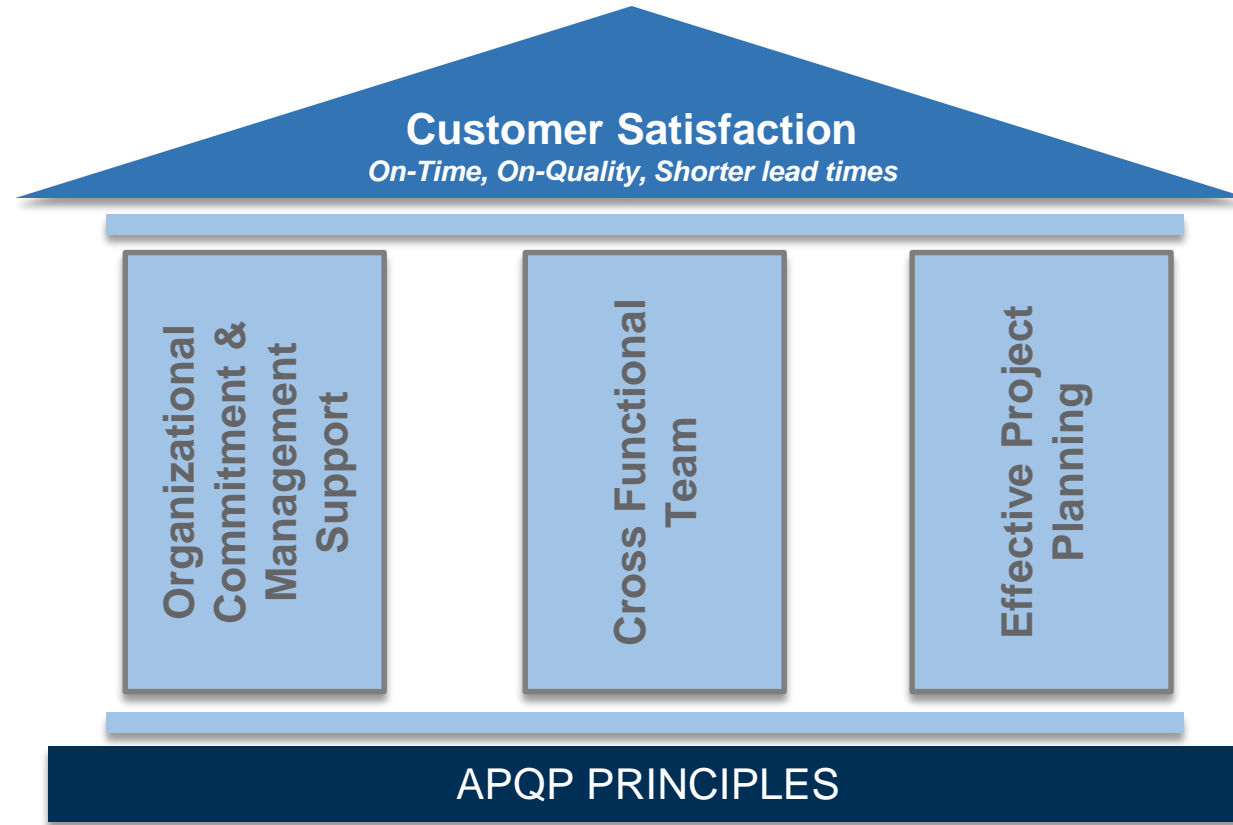
# What is Advanced Product Quality Planning?

APQP is a structured phased Product Development methodology that assures Customer satisfaction by:

- Ensuring that all activities are completed on-time and on-quality
- Facilitating effective communication
- Providing timely escalation and resolution of delays and risks



# APQP Principles



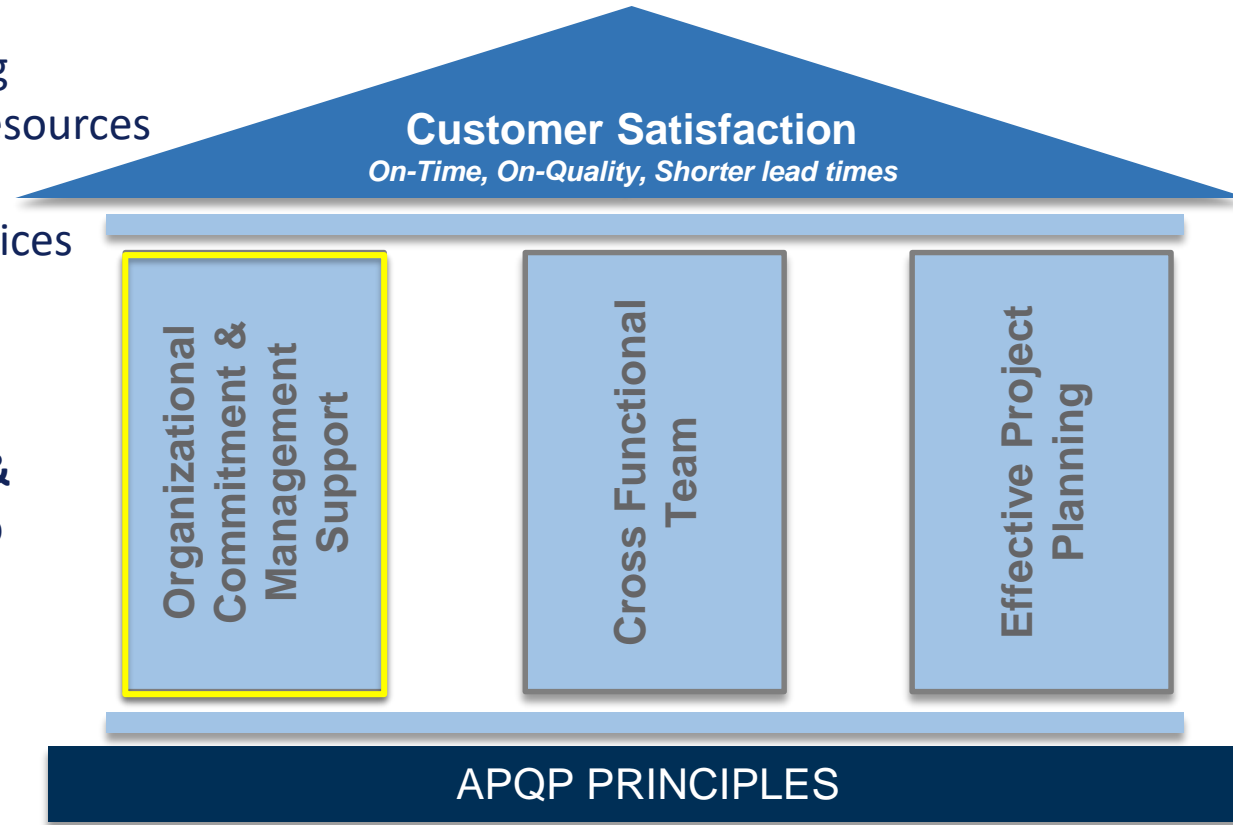
## Pillars of success

# APQP Principles

**Top Management demonstrates commitment by...**

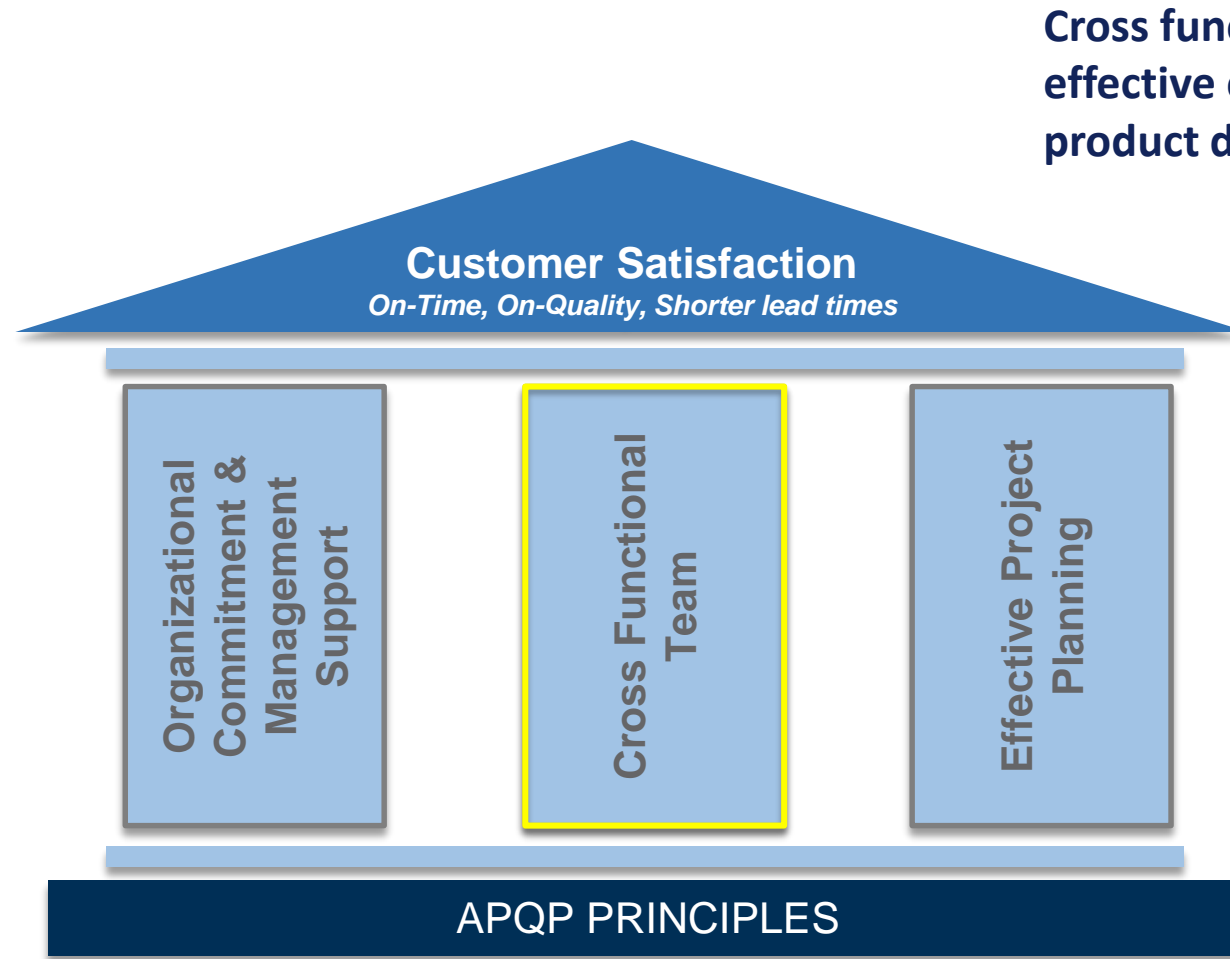
- Completing APQP training
- Allocating and training resources
- Leading reviews
- Standardizing APQP practices
- Removing roadblocks

**Management engagement & commitment from launch to closure is key!**



## Pillars of success

# APQP Principles



**Cross functional teams enable effective communications and faster product development**

**Teams should consist of...**

- Engineering
- Procurement
- Manufacturing
- Quality
- Sales
- Suppliers
- Customers
- Customer Support

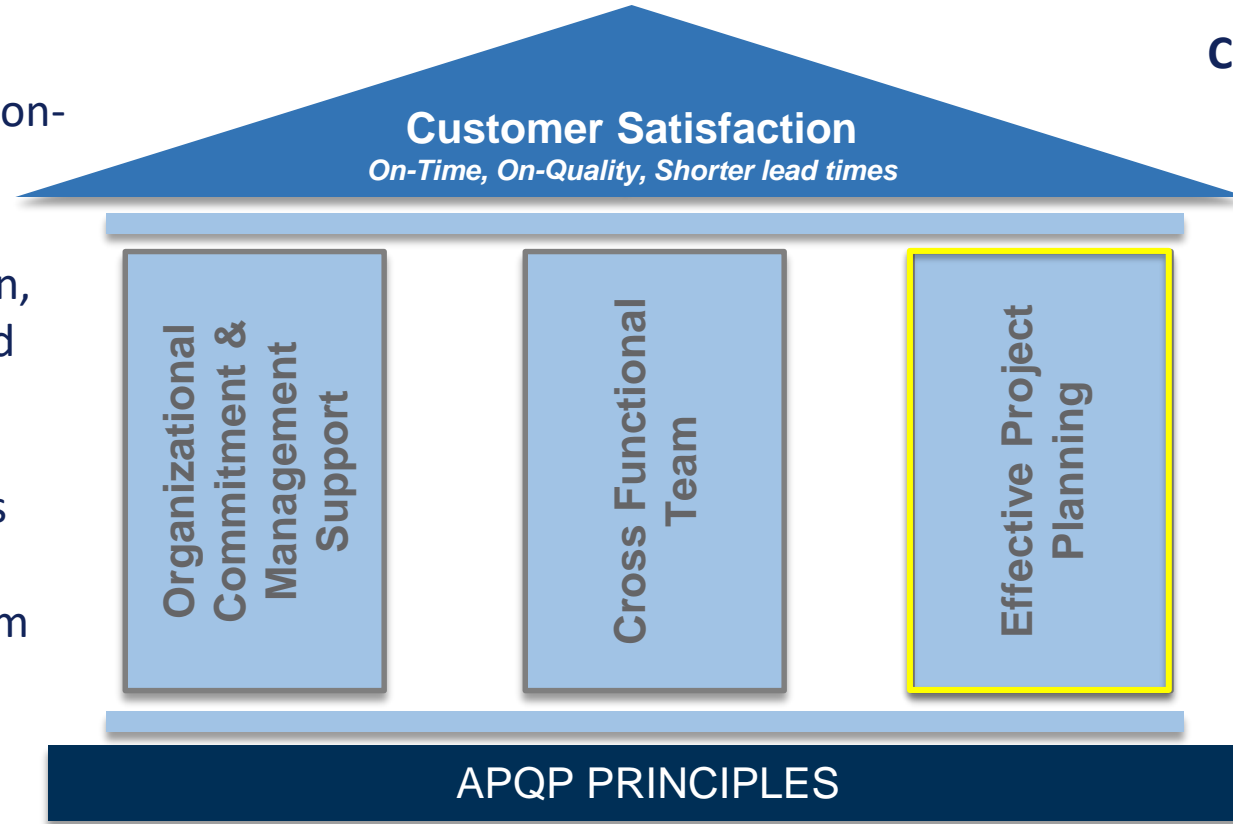
**Pillars of success**

# APQP Principles

## Effective project planning and management...

- Schedule tasks, assign responsibility and drive on-time completion
- Continually monitor plan, communicate risks and remove roadblocks
- The APQP plan cascades program key targets through the value stream

**Commitment to a firm APQP plan is a critical success factor!**

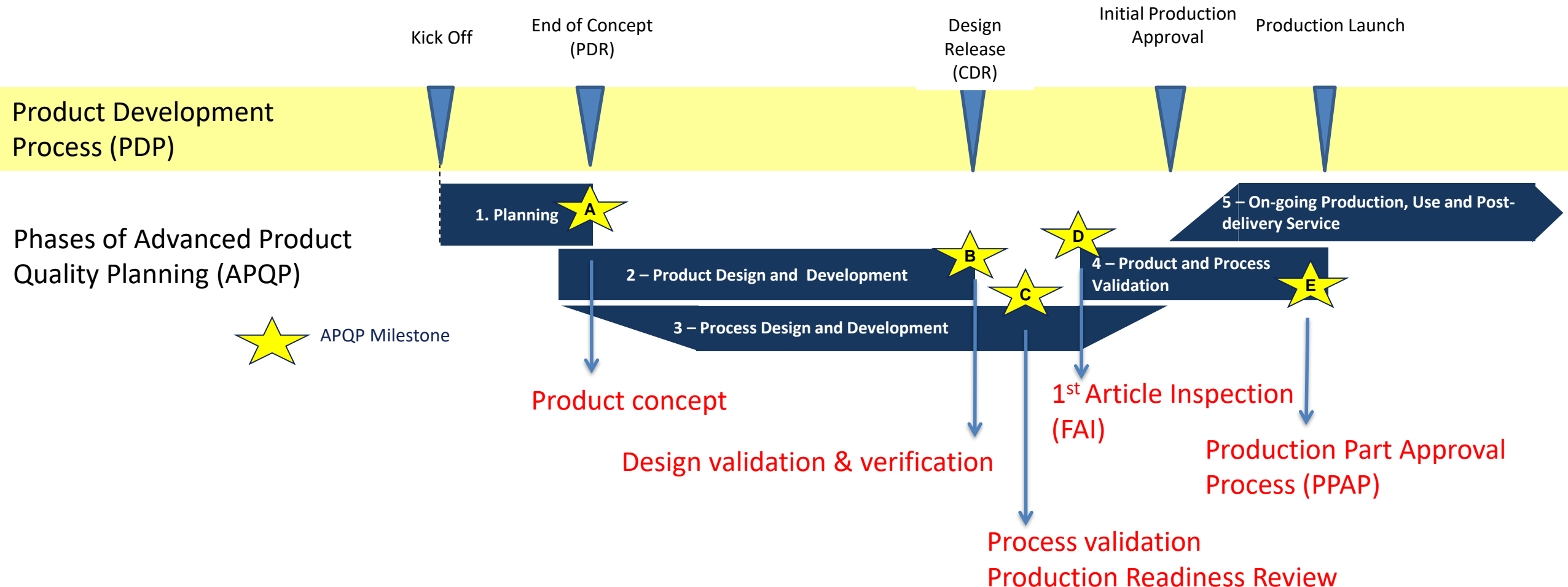


## Pillars of success

# PDP and APQP Phase Alignment

## Phase Milestones

APQP has 5 phases starting with product concepts and extending through the product life cycle





# PPAP Overview

# PPAP Overview

PPAP is an aerospace APQP element finalizing “Product and Process Validation”



PPAP combines First Article Inspection and Process qualification

# What is Production Part Approval Process?

## PPAP confirms...

that the production process has demonstrated the potential to produce products.....

that consistently fulfill all requirements.....

while operating at the customer demand rate



# Production Part Approval Process (PPAP)

## Key aspects PPAP

- Follows successful completion of the first 4 phases APQP
- Defines the standard deliverables for production part approval
- First Article Inspection (FAI) is the first milestone of Production Validation
- PPAP elements are updated as process and/or product changes occur

Products used for PPAP are from initial production run(s)



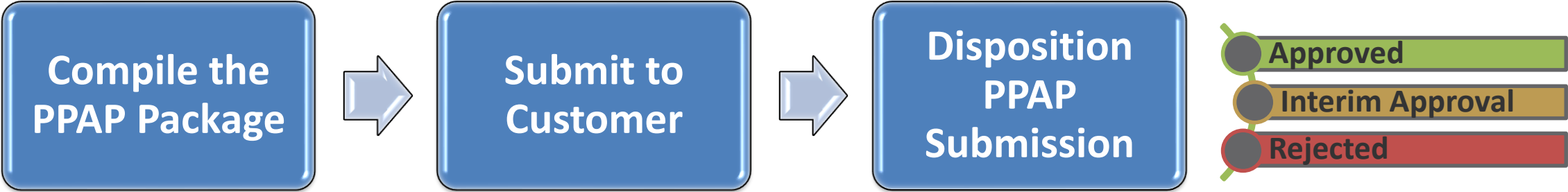
# PPAP Elements & Phase Alignment

PPAP elements are the output and evidence of APQP execution

PPAP ELEMENT	APQP PHASE
1. Design Records*	2
2. Design Risk Analysis*	2
3. Process Flow Diagram	3
4. PFMEA	3
5. Control Plan	3
6. MSA	4
7. Initial Process Capability Studies	4
8. Packing, Preservation and Labeling Approvals	3
9. FAIR	4
10. Customer Specific Requirements	4
11. PPAP Approval Form (or equivalent)	4

\* Responsibility of design responsible organization

# Production Part Approval Process (PPAP)

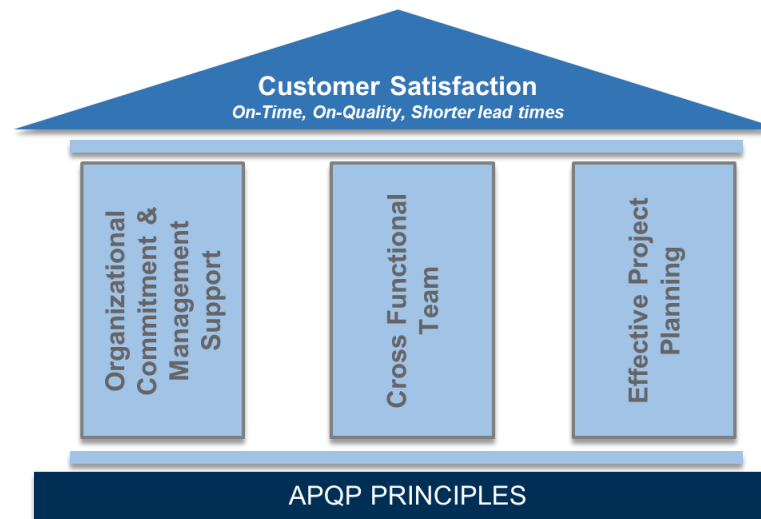


PPAP Approval Form - 9145 Appendix D

Maintain the PPAP file throughout product lifecycle

# Aviation Space And Defense APQP & PPAP Summary

- 9145 is the internationally harmonized Aerospace standard for APQP and PPAP
- APQP Principles are keys to success
- APQP has defined deliverables aligned to each of the 5 phases
- PPAP approval is the output of APQP
- APQP and PPAP apply throughout the life of the product



# Implementation



# Implementation Strategy

- Benchmark other companies
- Perform Self-Assessment (Maturity Assessment from SCM<sup>H</sup>)
  - Identify strengths and weaknesses
- Training
  - Determine what training is needed based off Maturity Matrix
  - Develop a plan to address training needs
- Incorporate 9145 into the Product Development Process
  - Align infrastructure to support 9145
  - Understand and incorporate customer requirements
  - Develop/update internal procedures
  - Establish conformance to the 9145 & customer requirements

# Guidance Material & Training



# Aerospace APQP SCMH Section 7.2

**Standard Published  
Nov 2016**

**Webinars are  
located here**

**SCMH7.2.2**

**Production Presentation**

**SCMH7.2.3**

**APQP Manual**

**Phase Checklists**

**Maturity Assessment**

Assessment date: _____									
Name of organization being assessed by (Name/Company): _____									
Contact of organization being assessed by (Name/Company): _____									
Total Overall Weighted Score: <b>8.0%</b>									
2.0 Philosophy: Management Awareness and Commitment									
Item	Content	Level 1 (10%)	Level 2 (20%)	Level 3 (30%)	Level 4 (40%)	Level 5 (50%)	Weight	Score	Comment/Evidence
1.1	Advanced Product Quality Planning (APQP) Philosophy & Knowledge of Requirements	No knowledge of APQP. Not integrated into product development process.	Basic knowledge and basic understanding of requirements and risks needed to deploy.	Implementation in place for integrating APQP into product development process. Strategic communications and objectives driving the APQP methodology.	APQP is defined and fully integrated into product development process. Strategic communications and objectives driving the APQP methodology.	Operational structure and systems in place to support APQP. Continuous improvement plans to ensure the APQP philosophy continues to drive culture change.	30%		
1.2	Organizational Support	Limited support and no APQP resources. Leadership directives.	Acknowledged and supported in isolated (e.g. design engineering).	Leadership function (e.g. engineering, procurement, etc.) understood and support APQP. Organization trained and aware of tool & process to.	Support at all levels and relevant functional organizations of the organization and leading to the tactical objectives.	Leadership objectives met and tactical objectives implemented. Results analysis driving improvements and closing gaps.	70%		
<b>Raw Score: Overall Weighted Category Score</b>							<b>8.0%</b>		
2.0 Philosophy: Organizational Alignment and Effective Communication									
Item	Content	Level 1 (10%)	Level 2 (20%)	Level 3 (30%)	Level 4 (40%)	Level 5 (50%)	Weight	Score	Comment/Evidence
2.1	Ownership of APQP process	Ownership in silos and not top down.	Multiple owners. Philosophy driven by multiple functions. Direction not assigned. There are pockets of tools being used.	Structure owner is established and implemented. Organizational structure to support APQP process to be defined.	Multi-organizational structure established and decisions making process in place.	Resources are assigned and there is a process in place to re-allocate as needed.	40%		

- 7.2.9 Process Flow Diagram
- 7.2.10 DFMEA
- 7.2.11 PFMEA
- 7.2.12 Element Applicability
- 7.2.13 Control Plan

**SCMH 7.2.4-7.2.8**

**SCMH 7.2.14**

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# Self Assessment – Maturity Assessment



1.0 Philosophy: Management Awareness and Commitment										
Item	Content	Level 1 (1 pt)	Level 2 (2 pt)	Level 3 (3 pt)	Level 4 (4 pt)	Level 5 (5 pt)	Weight	Score	Comment / Evidence	
1.1	Advance Product Quality Planning (APQP) Philosophy & Knowledge of the Requirements	No knowledge of APQP. Not integrated into product development process.	Basic knowledge and awareness of APQP and basic understanding of requirements and skills needed to deploy.	Implementation plan in place for integrating APQP into Product Development process. Key personnel trained in the APQP methodologies.	APQP is defined and fully integrated in product development process. Strategic communications and objectives driving the APQP philosophy.	Organizational structure and systems in place to support APQP. Continuous improvements plans to ensure the APQP philosophy continues to drive culture change.	30%	2		
1.2	Organizational Support	Limited support and no APQP executive leadership directive.	Acknowledged and supported in isolated sectors of the organization. (e.g. driven by quality and/or engineering)	Leaders of function roles (e.g. engineering, quality, operations, procurement, etc.) understand and support APQP. Organization trained and some use of tools & process is evident.	Buy-in at all levels and relevant functional organizations of the organization and working to achieve the tactical objectives.	Leadership objectives met and tactical objectives implemented. Results analysis driving improvements and closing gaps.	70%	2		
							<b>Raw Score</b>	<b>Overall Weighted Category Score</b>		
							40.0%	40.0%		

## What is It?

- A tool used to visually represent an organization's strengths and weaknesses within APQP

## Objective or Purpose

To evaluate and assess the maturity of an organization's Advanced Product Quality Planning philosophy

- Management awareness/commitment
- Organizational alignment and effective communication
- Project/risk management
- Use of tools
- Readiness of external suppliers

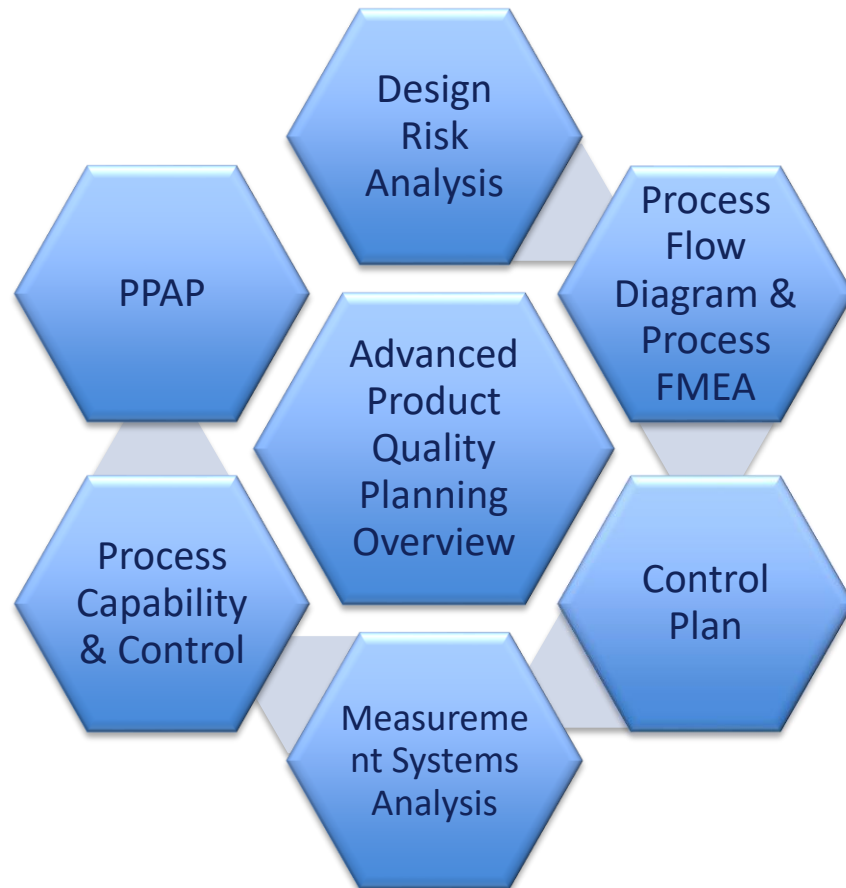
## When to Use It

- Prior to deployment within your organization
- Prior to deployment of your external suppliers
- As needed to monitor and develop continuous improvement



# APQP and PPAP Webinar Series

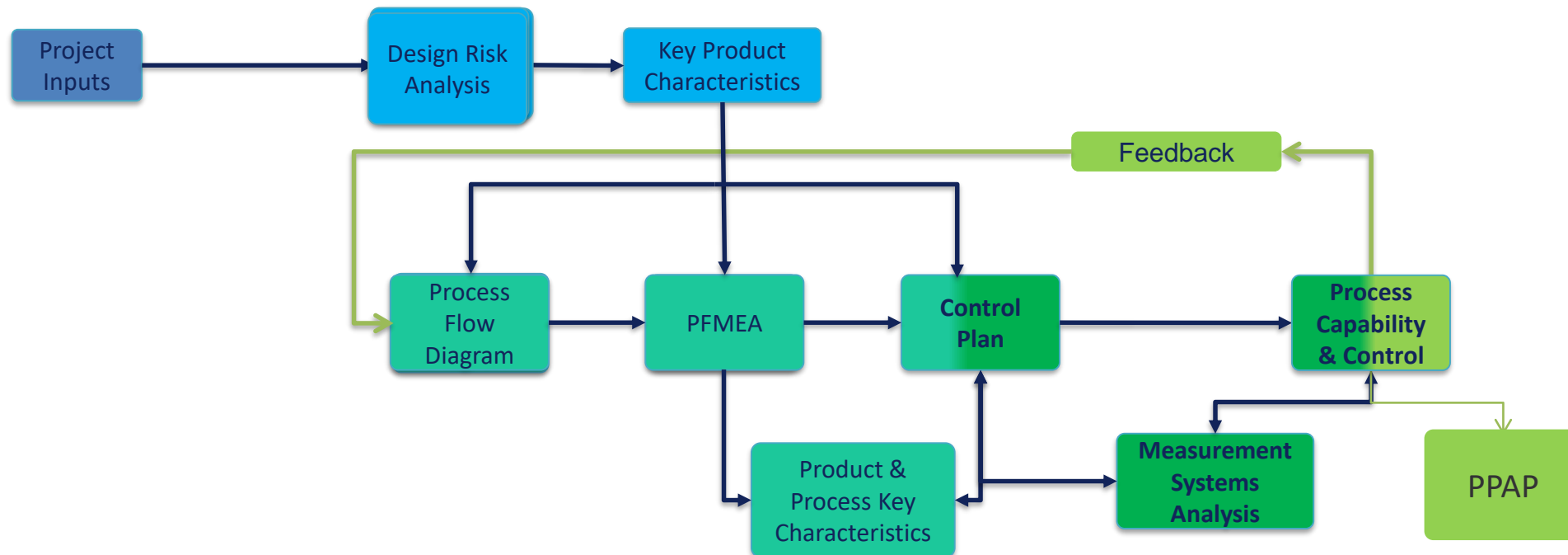
## Topics



## Objectives

- Provide high level understanding
- Introduce APQP and PPAP tools and show their relation to 9145
- Share benefits & best practices
- Provide sources for additional information

# APQP Relationship Webinar Series



**\*Reference 9145 Table 2 – Production part approval process file contents**

# 2019 - 2020 IAQG 9145, APQP & PPAP Webinar Series

Webinar Topic	Date & Time	Who Should Attend
Advanced Product Quality Planning (APQP) Overview	Sept 17 <sup>th</sup> 2019 2:00 PM GMT	Top leadership and leaders of all function engaged in product development process
Design Risk Analysis – Critical Items	Oct 8 <sup>th</sup> 2019 2:00 PM GMT	Systems, Design, Manufacturing and Quality Engineers
Process Flow/ Process Failure Modes and Effects Analysis (PFMEA) – Process Characteristics	Oct 22 <sup>nd</sup> 2019 2:00 PM GMT	Design, Manufacturing and Quality Engineers, Operations Management
Control Plan	Nov 12 <sup>th</sup> 2019 2:00 PM GMT	Design, Manufacturing and Quality Engineers, Operations Management
Measurement Systems Analysis MSA	Dec 3 <sup>rd</sup> 2019 2:00 PM GMT	Design, Manufacturing and Quality Engineers, Calibration Management
Process Capability & Control (Variation Management)	Jan 7 <sup>th</sup> 2020 2:00 PM GMT	Manufacturing and Quality Engineers, Operations Management
Production Part Approval Process (PPAP)	Jan 21 <sup>st</sup> 2020 2:00 PM GMT	Manufacturing and Quality Engineers

2:00 PM GMT = 9:00AM EST = 11:00 PM KST(+9GMT)



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