



# Advanced Product Quality Planning (APQP) and Production Part Approval Process (PPAP)

Supplier Overview Training

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# What is APQP?

## Advanced Product Quality Planning Cycle



- Advanced Product Quality Planning method to assure (обеспечить) that a product satisfies the customer (both internal (внутренний) and external/внешний)
- The goal of APQP is to:
  - **Plan** before acting
  - **Anticipate** (предусмотреть) and **prevent** (предотвратить) issues
  - **Validate** before moving forward
  - Facilitate (облегчить) **communication**

- Each Advanced Product Quality Plan is unique and is a **living document**

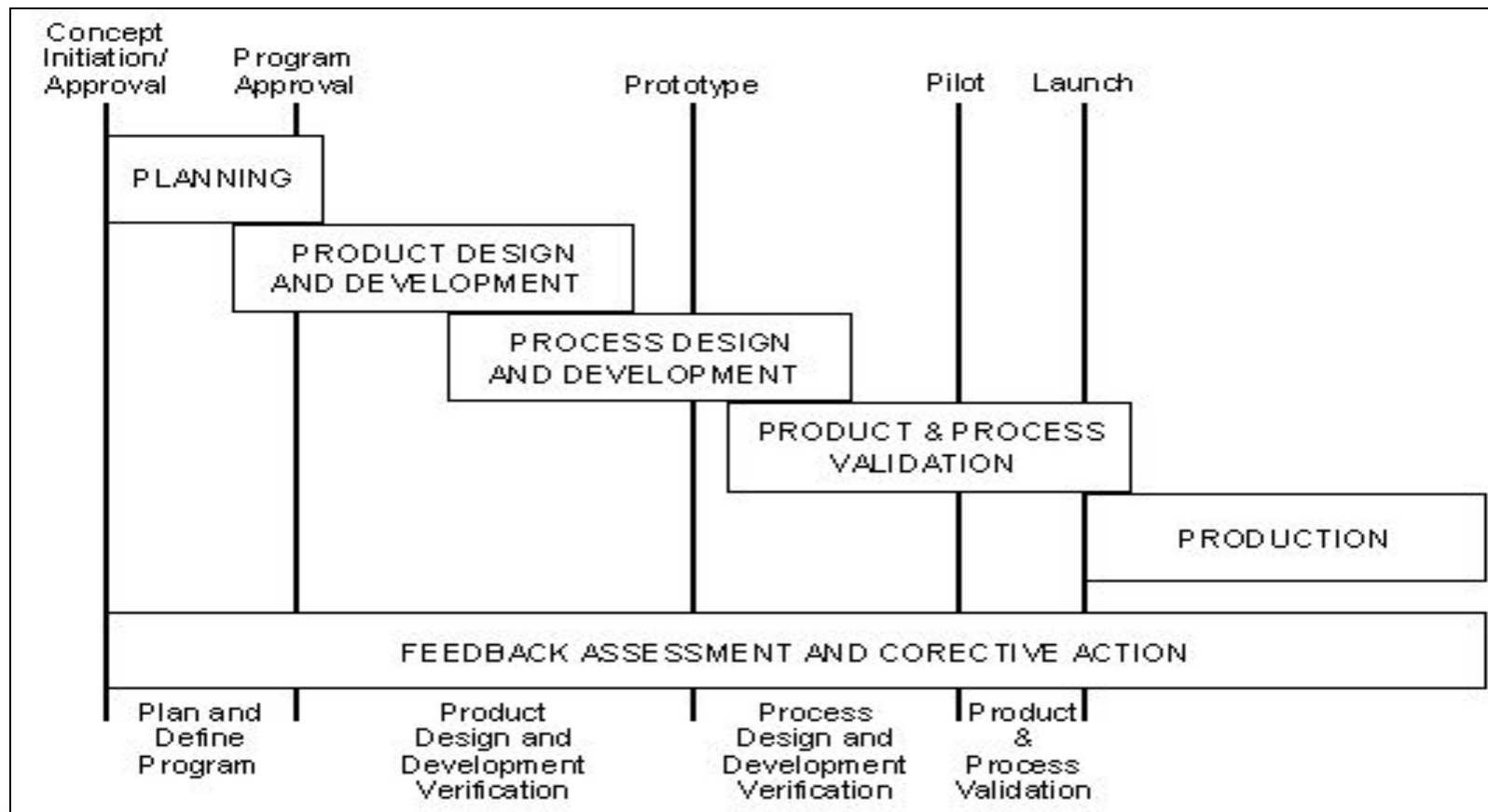
# APQP Background

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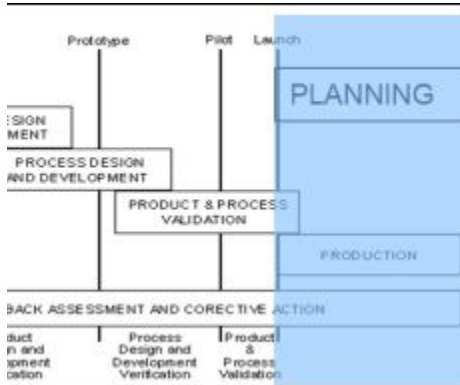
- Automotive industry challenges:
  - Innovation, more complex product
  - Reduce NPD times (сократить время разработки нов.продукта)
  - Complicated Supply chain (сложная цепочка поставки)
  - Increasing customer and quality requirements
- Solution:
  - Ford, GM, Chrysler APQP Task Force jointly (together) developed (разработали) the procedure in the late 80's to standardize their respective supplier quality systems.
- Continuous Improvement:
  - Many industries outside the Automotive industry have started to use the AIAG APQP process to achieve similar benefits

# APQP – timing chart and phases - AIAG

The Advanced Product Quality Planning process consists of (состоит из) **four** phases and **five** major activities (основных видов работ) and has some 20+ supporting tools (e.g. DFMEA, PFMEA, CTQ, Special Characteristics, Control Plan, SPC) along with (а также) ongoing feedback assessment (оценка обратной связи) and corrective action.



# Feedback, Assessment, Corrective actions



## INPUTS:

- Production Trial Run / цикл испытания производства
- Measurement Systems Evaluation / оценка систем измерения
- Preliminary Process Capability Study / предварительный анализ производственной мощности процесса
- Production Part Approval
- Production Validation Testing
- Packaging Evaluation
- Production Control Plan
- Quality Planning Sign-off and Management Support

## OUTPUTS:

- Reduced Variation
- Improved Customer Satisfaction
- Improved Delivery and Service
- Effective use of best practice, lessons learned
- Maximum ROI
- Minimum Waste

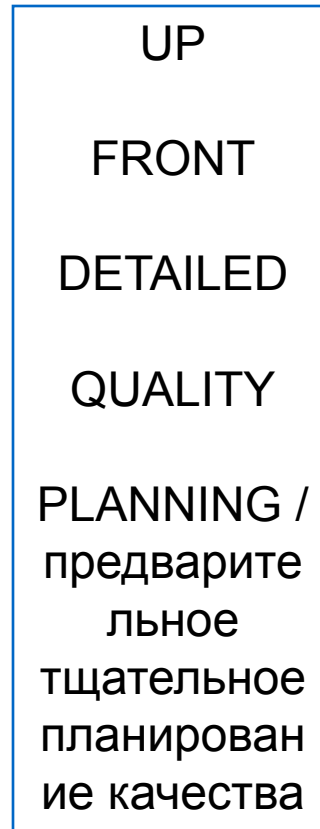
**Evaluate outputs, effectiveness of the product quality planning efforts.**

# APQP Summary:

## What we do:

- Design Quality / качество с конструкторской т.з
  - DFMEA / PFMEA / DFM/A
- Manufacturing Quality / качество производства
  - Process Flows (карта технологического процесса)
  - Capability Analysis (анализ произв. мощностей)
  - Process Validation
  - Run at rate / испытание на непрерывном производстве
- Supplier Qualification & Quality Requirements / аудит поставщика
- Product Qualification
  - 1st Article Inspection / поверка 1-ой годной детали
  - PPAP
  - Tooling & Gauges / оснастка и калибры
  - Testing

## How we do it: APQP



## What we get:

- Defect Free Launches / запуск с нулевым уровнем брака
- Reduced Warranty Claims / сокращение числа обращений по гарантии
- Customer Satisfaction
- Robust Products / качественная продукция
- Greater Supplier Control
- Reduced supplier cost



# Production Part Approval Process (PPAP)

# What is PPAP?

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- Production Part Approval Process
- Standard used to formally reduce risks prior to product release / до выпуска изделия, in a team oriented manner using well established tools and techniques
- Initially developed by AIAG (Auto Industry Action Group) in 1993 with input from the Big 3 - Ford, Chrysler, and GM
- AIAG's 4th edition effective June 1, 2006 is the most recent version
- PPAP has now spread to / распространился many different industries beyond automotive



# When is PPAP Required? / Когда нужен PPAP

- New part
- Engineering change(s)
- Durable Tooling: transfer, replacement, refurbishment, or additional /  
Оснастка с высокой стойкостью: перенос, замена, ремонт и т.п.
  - Tooling inactive > one year
- Correction of discrepancy / исправление вариаций в процессе
- Change to optional construction or material
- Sub-supplier or material source (источник) change
- Change in part processing
- Parts produced at a new or additional location

**PPAP is required with any significant change to product or process!**

# PPAP Element #4: Design Failure Mode and Effects Analysis (DFMEA)

- Provide potential cause and effect (причина и следствие) relationships for the basic design of the product
- Helps to plan design needs for:
  - Materials selection
  - Tolerance stack-up / наложение допусков друг на друга
  - Software
  - Interfaces
  - DVP&R (life cycle tests – испытания производственного цикла)
- Employs R.P.N rating system / ПЧР
  - High R.P.N's and Severity > 8 need recommended Corrective Actions (CA)
- PROLaunch element
  - Initial DFMEA in Phase 2
  - Complete DFMEA in Phase 3

# Process Map and APQP

- During which APQP phase would you first create a process map? / На каком этапе APQP нужно составить карту процесса?
  - ✓ APQP: Phase 1 – Planning
- Why not wait until later in the process? / Почему не позже?
  - A basic understanding of the process assists in cost estimating/ quoting (составление финансовой сметы и RFQ)
- Why would volumes and lead-times be important to know? / Почему важно знать объёмы и сроки исполнения заказов?
  - Volumes and lead-times might influence the manufacturing processes you select (i.e. automated processes for high volume)

# FMEA Origins

- Initially developed by the US Military as Failure Mode Effects and Criticality Analysis (FMECA) / Первоначально разработан военным ведомством США как инструмент анализа последствий неисправностей и критичности)
- Widely adopted by NASA during the 1960s to prevent errors on the Apollo program / широко применялся НАСА в 60-е для предотвращения неисправностей в программе Аполлон
- Brought over to the automotive industry by Ford after issues with Pinto fuel tanks / взят на вооружение автопромом после проблем с бензобаком Pinto.

•Apollo 1 Failure

•Ford Pinto