



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

Supplier Overview Training

Document CQD-116; Rev 1; 1/15/15

What is APQP?

Advanced Product Quality Planning Cycle



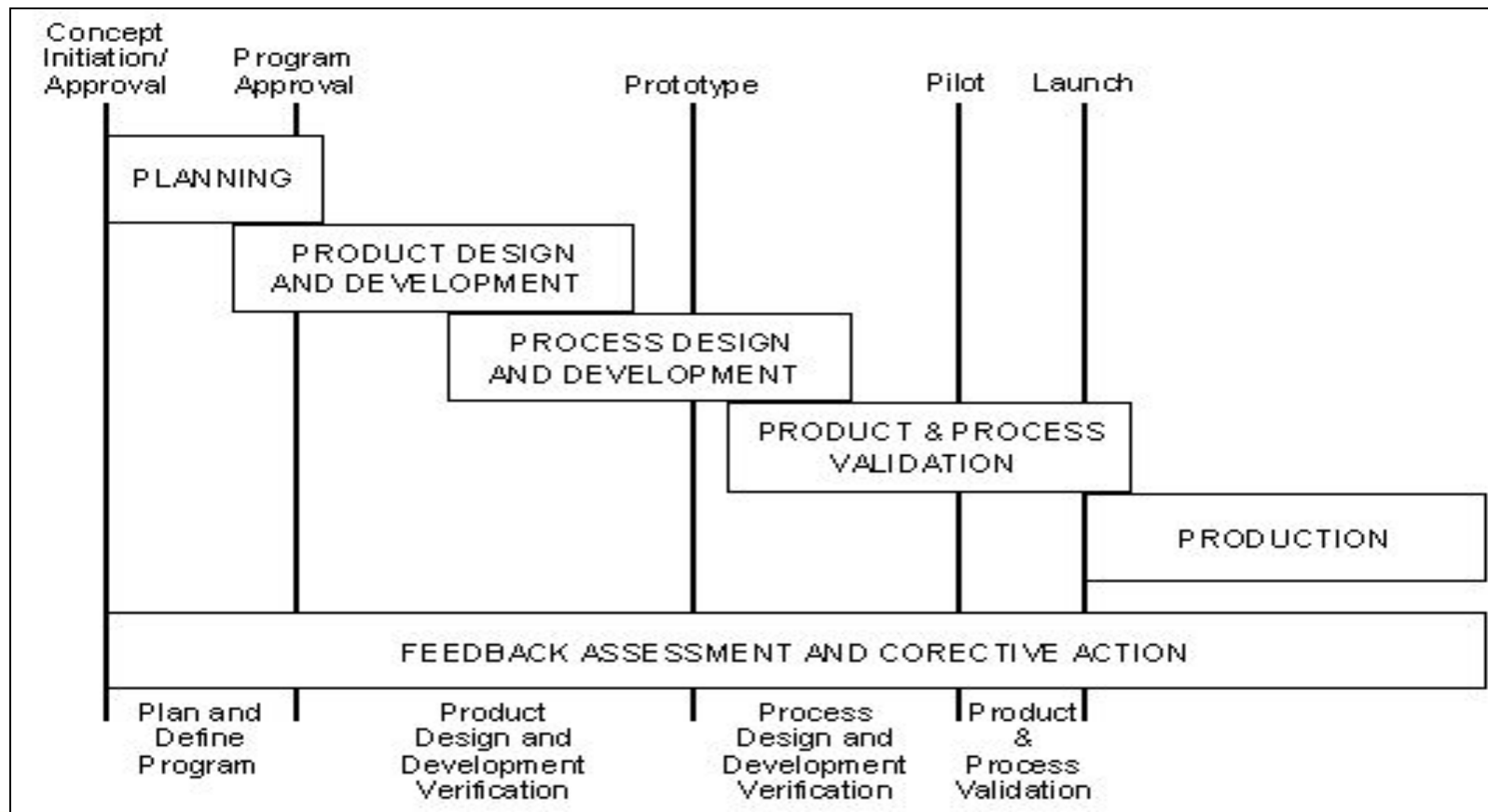
- Advanced Product Quality Planning method to assure (обеспечить) that a product satisfies the customer (both internal (внутренний) and external/внешний)
 - The goal of APQP is to:
 - **Plan** before acting
 - **Anticipate** (предусмотреть) and **prevent** (предотвратить) issues
 - **Validate** before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

APQP Background

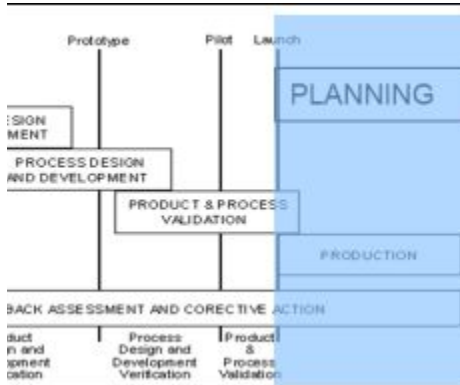
- Automotive industry challenges:
 - Innovation, more complex product
 - Reduce NPD times (сократить время разработки нов.продукта)
 - Complicated Supply chain (сложная цепочка поставки)
 - Increasing customer and quality requirements
- Solution:
 - Ford, GM, Chrysler APQP Task Force jointly (together) 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



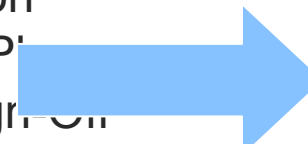
INPUTS:

- 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.

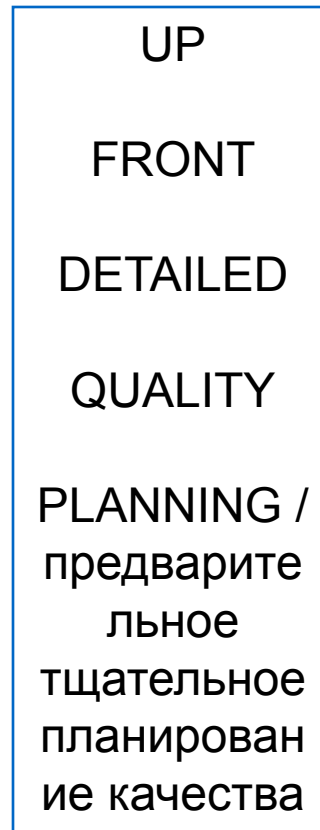


APQP Summary:

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?

- 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