

APQP: Structured Process for Advanced Product Quality Planning

APQP (Advanced Product Quality Planning) is a structured, phase-based process for quality assurance in the development and industrialisation of new products. It originally comes from the automotive industry and is established there in connection with IATF 16949. For buyers and suppliers, APQP defines binding milestones, documentation obligations and approval points along the entire product creation process.

Key facts

- APQP typically divides product creation into five phases, from planning to feedback and corrective actions.
- The core documents of APQP are PPAP documentation, FMEA, control plan and production part approval planning.
- APQP is not a certification standard but a procedural model that is often built on customer-specific requirements (CSRs).
- For buyers, APQP is a control instrument for supplier development and risk minimisation before the start of series production.
- Run@Rate and the production process approval (PPA) are typical gates shortly before the start of series production.
- Weak points in the prototype phase are in practice one of the most common causes of delays in the launch of series production.

Definition: APQP

APQP stands for Advanced Product Quality Planning and describes a structured planning process to ensure that a new product meets the customer's quality requirements. The process defines phases, deliverables and review dates from the quotation stage through to series production support.

Origin and normative framework

APQP was developed by the major North American automotive manufacturers and is now widespread industry-wide via the reference manual 'Advanced Product Quality Planning and Control Plan'. It becomes binding through customer-specific requirements built on quality management systems such as IATF 16949. Other industries such as rail, medical technology or mechanical engineering often use APQP in adapted form as a structure for advanced product quality planning.

Distinction from PPAP

APQP is the overarching planning process, while PPAP (Production Part Approval Process) is the evidence process for part approval. In practice, APQP is often understood as a specification corridor whose results flow into the PPAP documentation. Buyers should keep the two terms apart: PPAP answers the question 'Is the supplier ready for approval?', while APQP answers the question 'How is

production readiness achieved in a structured way?'

Methods and procedure: The five APQP phases

The classic APQP model divides product creation into five phases with defined gates. Each phase ends with a review in which deliverables are checked and approved.

Phases 1 to 3: Planning, product design, process design

In the planning phase, customer requirements, objectives and feasibility are clarified, often on the basis of a specification. The design phase covers DFMEA, drawings and specifications; the process design phase focuses on PFMEA, flow diagrams and the first control plan. Procurement contributes relevant evaluation criteria for supplier selection here and ensures that specifications are binding.

Phases 4 and 5: Product and process validation, feedback

In the validation phase, the production trial run, measurement capability analyses, Run@Rate and the PPAP approval take place. After the start of series production, Phase 5 secures continuous improvement via KPIs, complaint analysis and lessons learned. Results from previous projects should be systematically incorporated into new APQP plans in order to avoid repeated errors.

The role of procurement in the APQP process

Procurement typically manages supplier development: it agrees milestones, moderates regular APQP reviews with the supplier and escalates in the event of schedule or quality risks. A source-to-contract (S2C) process provides the foundation, as quality requirements and documentation obligations should already be anchored in the contract.

Key KPIs and evidence documents in APQP

APQP thrives on measurable and documented results. Key evidence and metrics can be monitored throughout the project.

PPAP as central evidence

The PPAP scope is divided into Levels 1 to 5, with Level 3 typically the standard in the automotive series. Included are, among other things, measurement protocols, process capability evidence, MSA results, approval test reports and the signed PSW (Part Submission Warrant). In practice, no series delivery should take place without PPAP approval.

Process and measurement capability

Typical target values are a Cpk of at least 1.33 for variable characteristics in series production, often temporarily 1.0 to 1.33 during the launch phase. Ppm values (defective parts per million) and first-time fix rates are common accompanying indicators. Values should always be checked against the respective customer specification.

Schedule and milestone adherence

Buyers often assess APQP progress via open point lists, status reports (e.g. traffic light logic) and the timely submission of deliverables. A binding delivery call-off and launch monitoring project plan complements the quality view with the logistics perspective. Failure to meet gates is an early indicator of launch problems.

Risks and controls in the APQP process

APQP considerably reduces launch risks but does not replace ongoing risk assessment. Without consistent gate management, residual risks remain undetected.

Typical risks with new suppliers

Common weak points are inadequate FMEA quality, lack of machine capacity, underestimated sub-tier suppliers and unclear responsibilities at the supplier's plant. A risk heatmap and a risk register per supplier help to track critical points systematically. For strategic parts, supply chain mapping complements visibility across the sub-tier.

Control instruments for procurement

Proven controls include structured APQP reviews with checklists, on-site audits before Run@Rate, defined escalation paths and contractual arrangements regarding penalty payments or service credits (SLA) for delays. A credit check and financially oriented supplier assessment also reduce the risk of default during the launch phase. In the event of bottlenecks, safety capacities or alternative second sources can secure supply.

Change management after approval

After PPAP approval, no process or material change may take place without re-approval. Binding change requests (e.g. according to customer specification) and a clear purchase order confirmation requirement prevent grey areas. Lessons learned from complaints should flow back into the FMEA and the control plan.

APQP in practice: integration into procurement processes

APQP only unfolds its effect when it is integrated into the company's own procurement and development processes. Isolated checklists remain ineffective.

Anchoring in sourcing and contracts

APQP requirements should already be included in the sourcing RFX: evaluation criteria, documentation obligations, Run@Rate dates and PPAP levels are thereby made binding before the contract is awarded. Milestones, obligations to cooperate and consequences of delays should be fixed in the contract. Structured APQP tracking then follows in the order execution phase.

Supplier assessment and further development

APQP performance – such as the punctuality of deliverables, first approval rate and launch ppm – should feed into the ongoing supplier assessment. Weak performers can be supported through targeted supplier development; a diversified supplier base provides alternatives. Findings are documented via lessons learned and used across future projects.

Digitalisation and current developments

In practice, digital APQP portals and shared dashboards are increasingly replacing the classic Excel status lists. Electronic data exchange accelerates PPAP review and approval, especially in global supply chains. At the same time, concepts from software development (iterative reviews, early prototypes) are finding their way into classic APQP workflows without abandoning the gate structure.

Typical metrics

PPAP approval rate: > 95 % of parts approved on time

Proportion of parts approved without delay by the gate deadline

Process capability Cpk: ≥ 1.33

typical series production target value for characteristic features, often temporarily lower during the launch phase

Milestone adherence: > 90 %

Proportion of APQP deliverables submitted on time per supplier

Launch ppm: project-specific

Defective parts per million during the launch phase, target value to be agreed by industry and component

Practical example

A medium-sized mechanical engineering company awards a new gearbox component to a supplier and establishes a complete APQP process for it for the first time. Procurement defines the quality requirements in the specification, sets PPAP Level 3 and agrees five binding gate dates with the supplier in the sourcing RFX.

- Monthly APQP reviews with open point list and traffic light status per deliverable
- On-site audit and Run@Rate two weeks before planned series approval
- Risk heatmap per sub-tier supplier with escalation levels
- Lessons learned workshop after launch for transfer to follow-up projects

Conclusion

For technical buyers, APQP is the central control instrument for achieving production readiness at suppliers in a structured and verifiable manner. Its value arises from consistent gate management, binding evidence and early involvement in sourcing and contracts. Those who take APQP seriously recognise launch risks early and reduce costs for rework, delays and alternative sourcing. What is decisive is the systematic coupling with supplier development, supplier assessment and lessons learned. In this way, APQP becomes a paper process turned real lever for launch reliability and competitiveness.

Frequently asked questions

What does APQP mean?

APQP stands for Advanced Product Quality Planning and describes a structured planning process for the development and industrialisation of new products. It typically divides product creation into five phases with defined gates and evidence. Originally from the automotive industry, APQP is now used in many manufacturing sectors.

What is the difference between APQP and PPAP?

APQP is the overarching planning process across all project phases, whereas PPAP is the documented evidence for part approval at the end of development. PPAP is therefore part of, or the result of, APQP. In practice, both work together: APQP structures the path, PPAP evidences production readiness.

When is APQP mandatory?

APQP is not required by law, but is contractually demanded by many OEMs and Tier-1 suppliers, particularly in the automotive sector on the basis of IATF 16949 and customer-specific requirements. Whether APQP is binding results from drawings, framework agreements or quality agreements. In case of doubt, the obligation should be clearly specified contractually.

Which documents belong to APQP?

Typical APQP deliverables include FMEA (DFMEA and PFMEA), control plan, process flow diagram, MSA results, measurement capability evidence, Run@Rate report and the complete PPAP documentation with PSW. The specific scope varies depending on the customer specification and PPAP level. Buyers should agree the required scope bindingly at an early stage.

How does an APQP process work?

An APQP process passes through five phases: planning, product design, process design, product and process validation, and feedback and corrective actions. Each phase ends with a review and approval of defined deliverables. After PPAP approval, the series production phase begins with ongoing monitoring via the control plan.

Is APQP also sensible outside the automotive industry?

Yes. The structured gate logic with defined evidence can be transferred to mechanical engineering, medical technology, the rail industry and other manufacturing sectors. Many companies use APQP as a blueprint for their production part approval planning, often in an abbreviated form or aligned to risk classes. The effort should match the value of the part and the risk situation.