

Pilot Run: The trial run as a bridge between sample and series production

The pilot run is an initial series trial run in which a product is manufactured under real series production conditions before full-scale production release is granted. It checks whether processes, tooling, bills of materials and supply chains reliably achieve the required quality and cycle rate. For buyers, the pilot run is a central milestone in supplier development and an important decision-making basis for releasing volumes and frame agreements.

Key facts

- The pilot run is a trial run under series production conditions to validate process, quality and productivity before the series release.
- Typical lot sizes in practice range from around 50 to 1,000 units, depending on complexity and industry.
- In the automotive industry, the pilot run is often linked to standards such as PPAP and the production ramp-up phase.
- Buyers use the pilot run to make second source thresholds, pricing models and volume shifts verifiably binding.
- Key metrics are First Pass Yield, OEE, Schedule Adherence and scrap rate during the trial run.
- A documented, successful pilot run significantly reduces the production ramp-up risk and supports risk analysis in procurement.

Definition: Pilot Run

A pilot run is a limited production run of a product under planned series conditions to demonstrate fitness for series production. In terms of quality and quantity, it sits between prototype/sample production and full series production.

Distinction from prototype and sample

The prototype serves to test functionality, the sample validates form and fit. The pilot run, by contrast, tests the entire manufacturing process including tooling, jigs and fixtures, inspection planning, staff training and material supply. Only once this trial run proceeds stably can one speak of series production readiness.

Significance for procurement

For procurement, the pilot run is a qualification milestone with direct spend relevance: only after a passed trial run are large volumes typically released, frame orders signed and volume rebate agreements become effective. It also forms the basis of the supplier evaluation and feeds into the risk analysis and the risk matrix.

Pilot run procedure and methods

The pilot run follows a structured approach that passes through several stages from planning to release. In many industries it is part of established ramp-up management systems such as APQP.

Planning and target definition

Before the run, lot size, cycle time, inspection catch and acceptance criteria are bindingly defined. Clear acceptance criteria are essential: target OEE, First Pass Yield, measurement equipment capability and the scope of documentation. These criteria should already have been taken into account in the weighted-attribute bid evaluation process during supplier selection, so that capabilities were assessed in advance.

Execution under series conditions

The run is carried out with series tooling, series material and series personnel – ideally including real logistics chains. Transport routes, packaging and load carrier management are also tested, as damage during the ramp-up is frequently attributable to load carriers or Incoterms arrangements such as Incoterms CIP. For international ramp-ups including offshoring set-ups, the transport trial should be carried out with a genuine Air Waybill (AWB) and real transport costs.

Evaluation and series release

After the run, a structured evaluation follows: process capability, defect patterns, stoppages and rework are documented. Only once the release criteria have been met does the customer grant the series release, often formalised through PPAP approvals in the automotive environment or First Article Inspections. Downstream any open points are tracked in a ramp-up plan with defined responsibilities.

Key KPIs in the pilot run

The evaluation of a pilot run is based on hard, measurable metrics. They determine the release and later form the reference for series production monitoring.

Quality and process metrics

Key metrics are First Pass Yield, scrap and rework rates, process capability indices (Cpk) and OEE. Typically, values such as a First Pass Yield above 95 per cent and an OEE above 80 per cent are targeted for release, depending on industry and product complexity. The measured values must come from the series inspection plan, not from special measurements.

Delivery and schedule performance

In addition to quality, schedule reliability counts: Schedule Adherence during the trial run shows whether the supplier can actually maintain the planned cycle rate. The ordering of upstream products by the supplier's own procurement function is also assessed, because material shortages in the pilot run indicate risks in series production.

Cost and logistics metrics

In addition, actual unit costs incurred are compared against the should-cost analysis and the savings forecast. Logistics figures such as lead times, cross-docking capability and packaging acceptance feed into the evaluation and prepare the later series supply with defined Economic Order Quantity (EOQ) values.

Risks and controls in the pilot run

The pilot run entails economic and schedule risks that the buyer must actively manage. Without clear control mechanisms, cost overruns and production delays loom.

Typical risks

Common problems are tooling shifts, unstable process parameters, quality defects in bought-in parts and capacity bottlenecks. Unclear cost responsibility for trial material and rework also leads to disputes in practice. A risk matrix created in advance with categorised failure effects creates transparency here and defines escalation routes.

Contractual safeguards

Buyers should contractually settle expenses for trial material, tooling adjustments and repeat runs. Where pre-financing is involved, an advance payment with repayment conditions is common; in cases of persistent performance deficiencies, clear rules are needed up to and including termination for cause. In addition, second source threshold agreements can ensure that a second supplier is activated once certain quality or call-off schedule violations occur.

Control mechanisms and transparency

Proven controls include daily reports during the run, joint acceptance tests on site and defined rework limits. Digital tools such as e-procurement systems and supply chain visibility platforms help to track progress on an ongoing basis. Supply chain analytics complements the evaluation with data-based pattern recognition across multiple runs.

Current developments surrounding the pilot run

Digitalisation, sustainability requirements and disrupted supply chains are changing the way pilot runs are planned and evaluated.

Digital ramp-up support

Simulations, digital twins and process data analysis are today shortening the time between the first trial run and a stable series. Data from the pilot run is increasingly fed automatically into supplier portals and e-procurement systems, improving traceability for buyers who cannot be on site.

Sustainability and material validation

Sustainability criteria are increasingly also being validated in the pilot run, for example the documented recycled material content in the materials used or energy consumption per unit. Since recycled materials can differ in their properties from virgin material, their characteristics must be expressly tested in the trial run before corresponding targets are contractually fixed.

Resilience and multi-sourcing strategy

In view of supply chain disruptions, companies are increasingly using the pilot run to qualify second suppliers and alternative manufacturing sites. Risk diversification thus begins during the ramp-up: whoever runs a second pilot run at an alternative site early on shortens later changeover times. The spend cube provides the data basis for deciding for which part groups this dual qualification is worthwhile.

Typical metrics

First Pass Yield: > 95 %

typical target value for series release, higher in some industries

OEE: > 80 %

equipment and process availability during the trial run

Schedule Adherence: > 95 %

delivery time reliability of the supplier during the ramp-up

Scrap rate: < 2 %

usual guideline value for simple series parts, to be checked product-specifically

Practical example

A medium-sized mechanical engineering company commissions a new supplier with the production of an assembly carrier for which it will need around 40,000 units per year. Before the series release, both parties agree on a pilot run of 500 units with defined acceptance criteria: First Pass Yield above 95 per cent, cycle time below 90 seconds and documented process capability for all safety-relevant characteristics. During the run, an unstable welding parameter situation becomes apparent, which is remedied within two weeks through targeted tooling adjustments. Procurement links the release to a supplier evaluation, in parallel reviews the logistics chain including packaging and load carrier management, and only fixes the conditions for volume rebates after the run has been passed.

- Acceptance criteria for quality, cycle time and documentation defined and measurable in advance
- Daily reports and joint evaluation meetings during the run
- Linking the series release to volume rebates and the frame agreement
- Risk matrix for the ramp-up with clearly defined escalation routes

Conclusion

The pilot run is the decisive checkpoint between development and series production: this is where it becomes clear whether processes, tooling and supply chains pass the test of everyday reality. For buyers, it is at the same time a negotiation and release milestone at which volumes, pricing models and risk buffers become binding. A properly planned trial run with measurable criteria significantly reduces the production ramp-up risk and creates a fair data basis for the supplier evaluation. Companies that document pilot runs in a structured manner also gain resilience, as alternative suppliers can be qualified more efficiently. The effort invested in a good pilot run usually pays for itself several times over through production stoppages avoided.

Frequently asked questions

What is a pilot run?

A pilot run is a trial production run in which a product is manufactured in smaller quantities under genuine series production conditions. It validates processes, tooling, material supply and quality before release for full-scale production. It therefore sits between prototype/sample production and the production ramp-up.

How large is a typical pilot run lot?

The lot size depends on complexity, unit value and industry. In practice, trial runs typically range from around 50 to 1,000 units; for simple series parts, larger quantities are also common. What is crucial is that all process steps and tooling are subjected to the same loads as in series production.

What is the difference between a pilot run and PPAP?

The pilot run is the physical production under series conditions, whereas PPAP is a documentation and approval process that formally summarises the results of this validation. In the automotive sector, pilot run results frequently form part of the PPAP documentation. The two complement each other: the run provides the data, PPAP documents and formalises the release.

Who bears the costs of the pilot run?

This depends on the contractual agreement. Frequently, the customer bears the material costs of the trial run, while the supplier covers tooling adjustments within the agreed tooling costs. Buyers are advised to contractually settle responsibility for rework, repeat runs and trial material in advance and to have this legally reviewed on a case-by-case basis.

How long does a pilot run take?

The duration ranges from a few days to several months, depending on the product. Complex assemblies with sub-supplier tiers or offshoring set-ups typically take longer, especially if transport and packaging tests are included. What matters is a mandatory schedule with fixed dates for evaluation and the release decision.

Why is the pilot run important for procurement?

It provides the objective basis for releasing large volumes, for price and rebate agreements and for supplier evaluation. A passed pilot run reduces the risk of production stoppages and renegotiations. In addition, it forms the data basis for risk analyses and contingency planning during the ramp-up.