First Article Inspection (FAI): First article inspection as a gate to series production release

First Article Inspection (FAI) refers to the systematic inspection and documentation of a first sample manufactured under series production conditions before a new part number or a new supplier is released. The first article inspection compares the actual production against all technical requirements from the drawing, bill of materials and specification. For buyers, the FAI is a central quality gate in project procurement that significantly reduces the risk of costly errors in series production. It links the procurement strategy with the operational qualification of suppliers.

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Key facts at a glance

01 The FAI inspects the first series part completely against the drawing, specification and all relevant standards and formally documents the result.

02 Typical trigger situations are new part numbers, tooling changes, location changes, material changes or process changes at the supplier.

03 In practice, many companies follow the structure and procedure of AS9102 for aerospace or the PPAP requirements of the automotive industry.

04 A FAI is only valid under real series production conditions – the same machines, tools, processes and personnel qualifications.

05 If processes are insufficient, a control loop procedure follows with root cause analysis, corrective actions and renewed inspection.

06 FAI results feed into the supplier evaluation and into procurement decisions such as dual-sourcing strategies.

Definition: First Article Inspection

The First Article Inspection is the formal first article inspection that demonstrates that a manufacturing process can produce the component consistently at the required quality. It is not an isolated measure but a documented process with an inspection catalogue, measurement results and a release decision.

Distinction from normal incoming goods inspection

Unlike routine incoming goods inspection, the FAI is a one-off, event-based and comprehensive exercise: every characteristic is inspected, not just samples. It targets process capability, not merely the conformity of a single lot.

Role in the product life cycle and in project procurement

The FAI sits at the transition from project procurement to small-series and series production. Before release, open points are clarified so that later changes within a freeze fence do not jeopardise deadlines. The degree of standardisation of the inspection criteria determines how quickly and reproducibly the release can be effected.

Methods and procedure for the FAI

A structured approach begins with defining the scope of the inspection and ends with the formal release decision. A phase model run through jointly by procurement and quality managers together with the supplier has proven effective.

Preparation and inspection catalogue

A complete inspection catalogue is derived from the drawing, bill of materials, technical specification, general terms and conditions and, where applicable, industry-specific standards. All inspection points are uniquely numbered, including measuring equipment, tolerance and measurement method. For customer-supplied drawings, the supplier must also verify internal characteristics such as hardness results or material quality.

Manufacture of the first article under series production conditions

The inspection sample is manufactured with the same tools, machines, parameters and qualifications that will later apply in series production. In a critical environment (e.g. export control-relevant drawings), information transparency must be regulated – see the glossary term Confidentiality. Depending on the product, 1 to 3 parts (in aerospace typically several) are fully inspected.

Inspection report and release decision

The results are documented in the FAI report, often in a structure and format similar to AS9102 or the PPAP level of the automotive industry. The release decision is made by a defined authority according to predefined procurement release thresholds; without release, no delivery release takes place. In the event of deviations, the control loop procedure or Control of Nonconforming Product applies before a

renewed inspection is due.

Important KPIs and metrics in the FAI process

The success of the FAI can be measured: duration, first-pass rate and rework effort show whether suppliers work with process reliability and where detailed planning needs to adjust procurement capacity.

Duration and on-time performance of the first article inspection

In practice, a FAI takes a few days to several weeks depending on complexity. Planning reliability is assessed as on-time performance (actual versus planned release date). High expedite rates in the downstream process indicate that FAI time windows need to be calculated realistically.

First-pass approval rate and control loops

The first-pass approval rate – the proportion of FAIs without control loops – is typically well above 90% for mature suppliers. Frequent control loops increase the total cost calculation and are an indicator of low process capability.

Follow-up KPIs

After release, relevant metrics include, among others, the DPU (Defects per Unit) during ramp-up, the exception rate in exception management and the on-time delivery performance of the first series lots. These values feed into the supplier evaluation and the data quality KPIs of master data maintenance.

Risks, controls and organisational anchoring

An incomplete or merely formal FAI shifts risks into series production: margin losses, returns, line stoppage or, in the extreme case, product recalls. Clear responsibilities and controls limit this risk.

Typical sources of error

Frequently, internal characteristics (hardness, microstructure, cleanliness) are not inspected, measuring equipment capability is not demonstrated or incomplete documentation is accepted. Forgoing a renewed FAI after undocumented process changes at the supplier is also a common risk.

Control mechanisms and contracts

Contractual anchors are quality agreements in the framework contract annex as well as provisions on change notifications and production process approvals. Provisions on payment terms or Incoterms CFR only affect the FAI process indirectly, for example via the timing of invoicing for first article samples. Legally relevant statements should be reviewed on a case-by-case basis.

Anchoring in procurement controlling

Procurement controlling monitors FAI deadlines as part of project tracking and links them to supplier development. Procurement release thresholds define who may grant which release and prevent superficial inspections without technical depth from being accepted.

Current developments and digital implementation

Digitalisation is changing the FAI process: standardised data models, electronic inspection reports and automated document handling shorten lead times and improve traceability.

Digital data exchange and classification

Systems for product data and classifications such as ECLASS improve the data quality of drawing derivations and inspection points. Digital FAI checklists are increasingly replacing paper-based reports and facilitate audits and change tracking across the entire product life cycle (product life cycle management).

Combination with supplier qualification

The FAI is part of holistic supplier qualification: market analyses and a structured tender (see the glossary term Tender) provide advance information on process suitability. Particularly for small-series production and a low degree of standardisation, the FAI pays off as a contractually fixed milestone.

Change management

After the initial release, changes – material, tooling, location, process – must be triggered again. Clearly defined trigger lists and clean exception management prevent so-called 'silent changes' from entering series production unnoticed.

Typical metrics

Metric	Typical value
First-pass approval rate	typically > 90% *Proportion of FAIs without control loops; a high value indicates capable suppliers.*
FAI lead time	typically 5–30 working days *Depending on complexity and scope of the inspection catalogue; important for ramp-up schedule planning.*
DPU during ramp-up	low single digit to < 1 *Defects per Unit of the first series lots as an indicator of process capability after FAI.*

FAI release on-time rate	> 95% *Proportion of on-schedule releases; delays jeopardise the production ramp-up.*

Practical example

A medium-sized mechanical engineering company qualifies a new supplier of turned and milled parts for a precision-critical attachment component. Before release, the buyer demands a complete FAI report with all drawing characteristics, material evidence and hardness results. The first inspection run reveals two deviations on internal contours; the supplier analyses the causes, adjusts the tool setting and submits a second FAI, which passes without errors. Only after release by the quality manager and the project manager is the delivery release granted.

- Complete inspection catalogue agreed with the supplier before sample production
- Procurement release thresholds defined: release only under the four-eyes principle
- Deviations documented in a traceable manner via the control loop procedure
- Follow-up KPIs (DPU, on-time delivery) integrated into the ongoing supplier evaluation

Conclusion

The First Article Inspection is the central quality gate between project procurement and series procurement. It protects against costly series errors, creates traceability and strengthens the buyer's position vis-à-vis the supplier. Decisive factors are a complete inspection catalogue, real series production conditions and consistent documentation including control loops. Those who integrate the FAI into supplier qualification and procurement controlling measurably reduce ramp-up risks. The inspection should never be seen as a formality but as an investment in process capability.

Frequently asked questions

? What does First Article Inspection mean?

First Article Inspection (FAI) is the formal first article inspection of a part manufactured under series production conditions. It compares the actual product against all technical requirements and documents the result in an inspection report. Only after a successful FAI is a new part number or a new supplier released for series production.

? When is a FAI required?

Typical triggers are new part numbers, new suppliers or manufacturing locations, tooling or material changes, as well as relevant process or drawing changes. Even after a prolonged production standstill, many companies require a renewed first article inspection. The specific triggers are defined contractually or in quality agreements.

? What is the difference between FAI and PPAP?

The FAI inspects and documents one first sample against the drawing; PPAP (Production Part Approval Process) is a more comprehensive approval process from the automotive industry that additionally includes process evidence such as MSA, process capability studies and control plans. The FAI is standalone in many industries but can form part of a PPAP package. Structure and scope vary depending on industry and customer.

? Who performs the First Article Inspection?

Manufacturing and metrological execution is the supplier's responsibility; evaluation and release are carried out by the customer, typically jointly by quality, engineering and procurement. Responsibilities and procurement release thresholds should be clearly defined in advance. Independent inspection institutes are brought in where necessary.

? What happens if a FAI is not passed?

In the event of deviations, a control loop procedure follows: the supplier analyses root causes, implements corrective actions and resubmits the sample. Until successful release, no series deliveries take place; nonconforming parts are blocked according to Control of Nonconforming Product. Frequent control loops worsen the supplier rating and extend ramp-up time.

? How long does a FAI take?

In practice, the first article inspection takes a few days to several weeks depending on complexity – simple turned parts are often significantly faster than complex assemblies with internal verification evidence. The duration depends on the scope of the inspection catalogue, measuring equipment capability and coordination loops. Anyone planning project procurement should factor FAI time windows into the schedule from the outset.

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