SECTOR DECISION BRIEF

# Manufacturing

Factory decisions live at the intersection of throughput, quality, maintenance, and shift-level judgment. The useful unit of work is a specific production choice with a measurable baseline.



**AideDeCamp Consulting | Advisory perspective**

Illustrative guidance. Scope and deliverables are agreed for each engagement.

SECTOR DECISION BRIEF / ADVISORY PERSPECTIVE

# Manufacturing

Factory decisions live at the intersection of throughput, quality, maintenance, and shift-level judgment. The useful unit of work is a specific production choice with a measurable baseline.



DECISION TO FRAME

## Which production decision can improve while preserving quality controls and line accountability?

The image is illustrative. The example below is a proposed decision design, not a completed client project.

**WHY THESE CONNECT**

Decide whether to hold, reinspect, or release a flagged unit. We will map when the signal reaches line quality lead or process engineer, then define the last useful point to answer: Hold the unit, seek another check, or release under an approved rule?

## An operating decision, not another alert

Plant AI matters when a signal changes a hold, rework, release, or maintenance choice. ADC will keep the quality or production authority with the client's designated owner and validate by line, product, recipe, and shift.

| EARLIER SIGNAL | DECISION | ACCOUNTABLE ACTION | PROOF |
|---|---|---|---|
| An inspection image or process reading falls outside a reviewed quality band. | Hold the unit, seek another check, or release under an approved rule? | Line quality lead or process engineer. Record disposition, rationale, and any human override in the quality workflow. | False rejects, escaped defects, rework, and time to disposition |

**CONTROL BOUNDARY**

A model flag is evidence for a quality decision, not an automatic release authority.

02 / DIAGNOSTIC

# Where the work gets stuck

We will test three operating friction points against the action each could change.

| OPERATING FRICTION | EVIDENCE WE WILL EXAMINE | DECISION TEST WE WILL RUN |
|---|---|---|
| Visual inspection output needs a consistent disposition process. | Scrap, rework, downtime, inspection and intervention baselines. | We will compare inspection output with actual disposition and downstream defect records. |
| A predictive-maintenance pilot has not been tied to scheduling and spare parts. | Maintenance backlog, alert lead time, planned downtime, spare-part availability, and scheduling decisions. | We will compare alert lead time with maintenance windows, parts availability, and scheduling capacity before deciding whether to intervene. |
| Data sits in equipment, MES, and quality systems with different definitions. | Equipment, MES, and quality-system definitions, timestamps, ownership, and data mappings. | We will reconcile equipment, MES, and quality definitions before building a shared baseline. |

## What our pilot will establish

| WORKSTREAM | WHAT ADC WILL DO | DECISION-READY OUTPUT |
|---|---|---|
| Defect reference | Agree taxonomy and compare model flags with reference inspection. | Defect and false-reject baseline. |
| Digital thread | Join equipment, MES, lot, and quality records by unit and time. | Data dictionary and genealogy map. |
| Disposition | Replay hold, rework, or release cases with quality owners. | Approved decision and override pathway. |
| Value | Compare first-pass yield, scrap, rework, and line downtime. | Intervention-cost and quality scorecard. |

**DECISION GATE** We will recommend whether to proceed, redesign, or stop using this test: Continue only if quality holds across line, product, and shift while avoidable rework falls.

## Design-ready checks we will deliver

| CHECK | WHAT ADC WILL VERIFY | DESIGN OUTPUT |
|---|---|---|
| Variation | Segment validation by product, line, recipe, and shift. | Change and retraining criteria. |
| Maintenance | Check parts, labor, and production windows before alert use. | Feasible work-order handoff. |

03 / SECTOR EXECUTIVE AGENDA

# What sector leaders will ask

A plant leader wants quality disposition, line uptime, traceability, and a process owner who can act on a signal without disrupting production.

| PRIORITY | SPONSOR QUESTION | EVIDENCE TO BRING |
|---|---|---|
| Quality decision | Can inspection output change hold, rework, or release consistently? | Defect taxonomy, reference inspection, false rejects, escapes, and disposition authority. |
| Maintenance into schedule | Does an equipment signal produce a feasible work order with parts and labor? | Failure mode, lead time, spare availability, production window, and intervention cost. |
| Data and genealogy | Do MES, equipment, and quality records identify the same unit, line, lot, and time? | Join keys, timestamps, versioned recipes, traceability, and missing data. |
| Process variation | Does performance survive line, product, shift, and operator variation? | Segmented validation, process change log, drift, and retraining approval. |

## Three opportunities we will compare

| CANDIDATE | VALUE HYPOTHESIS | PROOF BEFORE INVESTMENT |
|---|---|---|
| Visual inspection | Reduce escaped defects and rework | Validate final disposition, not image score alone |
| Asset maintenance | Protect a constrained line | Connect alerts to parts and scheduling |
| Process variation | Detect drift before scrap grows | Segment by product, line, recipe, and shift |

## Measures we will put on the scorecard

| MEASURE | WHAT A DECISION MAKER SHOULD SEE |
|---|---|
| Quality | Escaped defects and avoidable false rejects, not image accuracy alone. |
| Throughput | Disposition cycle time, scrap, rework, and constraint utilization. |
| Execution | Alerts that lead to approved maintenance or quality actions by shift. |

## Risks we will surface early

- A camera accuracy result is used as a proxy for finished-product quality.
- The same model is assumed to work across unlike lines or recipes.
- Maintenance alerts arrive without parts, labor, or a production window.

04 / ADVISORY APPLICATION

# How we will turn evidence into a decision

ADC will lead the work; exact outputs are agreed before kickoff.

| SERVICE | WHAT ADC WILL DO |
|---|---|
| AI Strategy & Roadmap | ADC will prioritize a bottleneck or quality decision where data and operator action can be tested together. |
| AI Adoption & Integration Advisory | ADC will design the operator interface and exception path before expanding beyond one line or process. |
| Cloud Transformation | ADC will evaluate plant-to-enterprise data flow, latency, access, and continuity before selecting a deployment pattern. |

## The sequence leading to your decision

| STAGE | WHAT ADC WILL DO | WHAT YOU WILL RECEIVE |
|---|---|---|
| Frame | We will choose one constrained quality or uptime decision. | Decision boundary and accountable owner. |
| Examine | We will reconcile inspection, MES, and equipment history. | Line-level baseline and data map. |
| Test | We will replay decisions with operators and quality staff. | Escape, false-reject, and rework findings. |
| Recommend | We will propose a contained trial and change gate. | Quality-owner pilot scorecard. |

## What you will receive

- Line-level baseline and pilot scorecard
- Quality disposition and override workflow
- Plant data and ownership dependency map

## A focused first engagement

We will examine one line-quality decision across inspection, disposition, and genealogy, then deliver a pilot gate and quality scorecard.

### Independent sector reading

NIST: AI in manufacturing

NIST: 2026 roadmap for AI in smart manufacturing

NIST: Digital thread for smart manufacturing

Sources inform context; ADC is not affiliated with their publishers. Examples are illustrative, not completed client work. Scope and deliverables are agreed before kickoff.

05 / ILLUSTRATIVE ENGAGEMENT

# A first engagement in practical terms

This is an example work package, not a completed client assignment. The actual scope, data access, and acceptance criteria would be agreed with the sponsor.

| | |
|---|---|
| WORKFLOW IN SCOPE | One quality-flagged production unit, from inspection result to hold, reinspection, or authorized release. |

## The evidence we will request

- Unit genealogy, inspection images or readings, defect code, and final disposition
- Line, product, shift, rework capacity, and downstream escape records
- MES and quality-system definitions, override authority, and release rules

## Work products and the decisions they support

| WORK PRODUCT | WHAT ADC WILL PRODUCE | HOW THE CLIENT USES IT |
|---|---|---|
| Disposition path | Trace where a flagged unit is held, rechecked, released, or escalated and by whom. | Remove ambiguous handoffs before introducing model advice into quality control. |
| Representative quality set | Stratify known good units, true defects, borderline cases, and shift or product changes. | Compare false rejects and escaped defects with reinspection capacity and consequence. |
| Line trial scorecard | Define review time, rework, escape, override, and rollback measures by line and product. | Decide whether the pilot helps quality and throughput without giving a model release authority. |

| | |
|---|---|
| SPONSOR GATE | Quality and plant owners choose pilot, redesign, or stop if review capacity or release controls cannot support the proposed flow. |

## How the gate changes the next step

| DIRECTION | EVIDENCE-BASED NEXT STEP |
|---|---|
| PROCEED | Pilot on one line if flagged units can be reinspected without overwhelming quality staff. |
| REVISE | Revise if unit genealogy or shift-level performance is too weak to judge escapes. |
| STOP | Stop if a model flag becomes an automatic release decision. |

The example describes a proposed diagnostic and pilot design. It does not claim access to a named client's data, a completed engagement, or a guaranteed result.