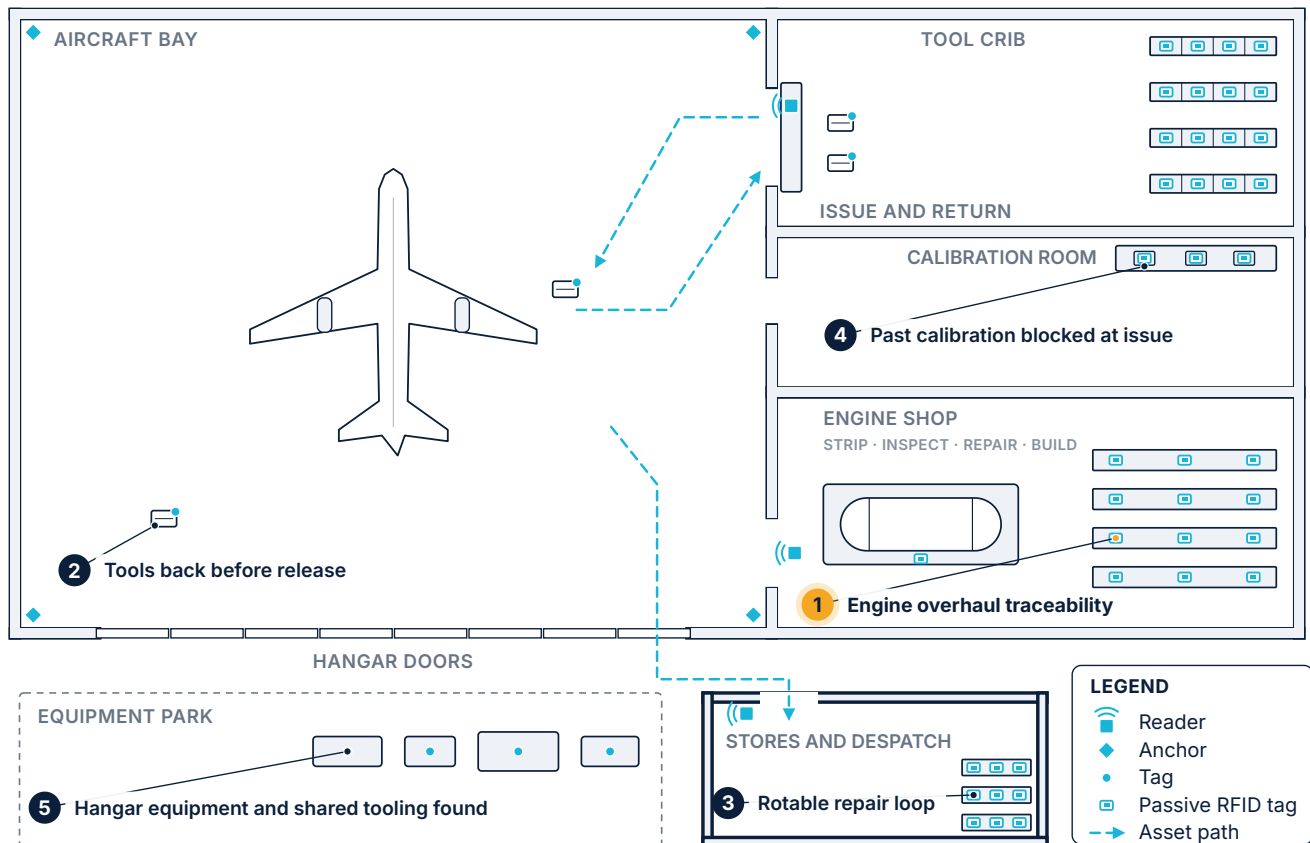


AVIATION MRO · TOOLS, ENGINE SHOP AND PARTS

Shift ends. One torque wrench is still out. Nobody can say where.

A plain guide for maintenance, repair and overhaul (MRO) hangars, tool cribs and engine shops: tools issued and returned, calibration, and parts, modules and life-limited parts kept with their records through the shop visit.



Callouts match the use cases on page 2. Legend: a **reader** reads passive RFID (radio-frequency identification) tags, which have no battery; a **tag** is an active tag, which has a battery; an **anchor** here is a fixed receiver (gateway) that picks up battery tags. Terms used: 2D code: a square barcode.

WHO SHOULD READ WHAT

KPI: key performance indicator, a measure you track. Everyone: your own row and KPI are in the table on page 4.

Hangar and base maintenance managers

Page 2 use cases, page 3 payback.

Engine shop managers and technical records

Engine shop: use case 1. Technical records: use cases 1 and 3.

Tool crib, stores and engineers

Page 2: use cases 2 to 5 and the KPIs you would own.

Quality and compliance

Page 2: use case 4 and the calibration and audit KPIs.

IT and OT, finance, procurement, leadership

Page 3: technology, links and payback. OT means operational technology: the systems that run the floor.

One next step: book a free 30-minute call to talk through your site and your use case.

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Book a free 30-minute call

What goes wrong today

Records come apart

Tags come away from parts in the shop visit.

Who has what

Chits show a tool was issued, not where it is.

Parts wait for paper

A rotatable waits for its details to be typed in again.

Calibration slips

An overdue tool is issued because nobody checked.

USE CASES

Numbered to match the floor plan on page 1. Each card ends with the technology that usually fits.

1 Engine overhaul traceability

Pain: Tags and task cards come away from parts, and life-limited part (LLP) records are rebuilt by hand.

What good looks like: Every module, part and LLP stays linked to its engine and work order, outside repairs included. Inspectors still decide serviceability.

Usually fits: 2D codes or passive RFID on tags and trays, not the part, confirmed in the survey

2 Tools back before release

Pain: Chits show who took a tool, not whether it came back, so someone walks the bay before release.

What good looks like: Each issue is logged to a person and work order, open issues are listed before release, and your lost-tool procedure still applies.

Usually fits: passive RFID or barcodes at the crib counter and on tool sets, confirmed in the survey

3 Rotable repair loop

Pain: A removed rotable's details are typed in again by hand, and its tag can come away.

What good looks like: Part, tag and paperwork are linked at removal and unserviceable parts stay apart. Birth records on tagged parts are read, not typed again.

Usually fits: passive RFID to ATA Spec 2000 on tagged parts, 2D codes on the rest, confirmed in the survey

4 Past calibration blocked at issue

Pain: Due dates sit in a spreadsheet, so an overdue torque wrench can still be issued.

What good looks like: The crib reads the calibration register: a tool overdue, or due before its return, cannot be issued, and recalls are listed.

Usually fits: tool records linked to calibration, checked at the counter, confirmed in the survey

5 Hangar equipment and shared tooling found

Pain: Engineers lose time looking for jacks, stands, test sets, carts and engine stands.

What good looks like: Larger equipment shows its last known zone, and idle or overdue inspection items are flagged. It helps the search but never closes a lost-tool event.

Usually fits: battery tags by zone, with GPS or low-power wide-area trackers outside the hangar, confirmed in the survey

ALSO COVERED

- **Crib and stores counts:** RFID flags gaps to check.
- **Quarantine and spares stock:** records match the shelf.
- **Base check flow:** see where work waits.
- **Loan tools and part cases:** out and back logged.
- **AOG spares:** picked and sent without a search.
- **Tool and equipment servicing:** due dates flagged.

KPIS TO TRACK

A KPI is a number you track before and during the pilot.

KPI

WHO OWNS IT

Parts reaching the build with a record gap

Engine shop manager

Tools not back at shift end

Tool crib supervisor

Time from removal to repair shop

Stores and logistics lead

Tools issued past calibration

Quality and compliance

Time to find hangar equipment

Hangar manager

Time to answer an audit or records query

Quality and compliance

We agree how each KPI is measured, and the baseline, in the pilot plan.

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Technology fit

Pick the simplest option that answers the question you have

Technology	Where it fits here	Watch for
Barcode, 2D code (square barcode) or direct part mark	Issue and return at a staffed counter, small tools, parts marked by the manufacturer, and tags and trays in the engine shop.	One scan per item, so it depends on discipline. No location. Marks must stay readable through cleaning and repair.
Passive RFID (radio-frequency identification, no battery)	Crib counters, drawers and tool sets, many tools at once. Parts tagged to ATA Spec 2000 Chapter 9 are read, not typed in again.	Metal affects reads, so test on your real tools. Tags must not become foreign object debris (FOD).
BLE (low-energy radio tags with a battery)	Finding larger items by zone: trolleys, stands and test sets.	Zone level only. Needs gateways (fixed receivers). Batteries need replacing.
Smart cabinets	Unstaffed issue of critical or high-value tools.	Only covers what is inside. Make sure you can export the records.

The right mix depends on your site. We confirm it in the survey.

Integration

Tool events can reach the work order, once a link is agreed

- **Work order link:** issue and return events reach your MRO or ERP system (enterprise resource planning) against the job.
- **Calibration:** due dates come from one source, and the crib reads from it.
- **Records:** make sure tool history can be exported for audits.
- **People:** Check local privacy and employee-consultation rules, such as works councils or unions, before tracking people, or tools and equipment linked to people.



ROI AND PAYBACK

ROI (return on investment) compares what you gain with what you spend. Payback is the time until the savings cover the cost.

What drives payback here

- Engine shop turnaround, and parts waiting on paperwork
- Parts and LLPs that keep their value with full records
- Time spent chasing tools, parts and hangar equipment
- Aircraft held for lost tools, and repeat audit findings

If the benefit is not bigger than the running cost, there is no payback.

Bring to the call

- A layout showing where tools and parts change hands
- Rough counts of crib tools, shop visits and rotables, from your records
- Your MRO or ERP system, and how records are kept
- One recent tool, part or record that took too long to find

We work out payback with you from your own pilot data, not technology provider averages. **Bring rough figures to a free 30-minute call.**

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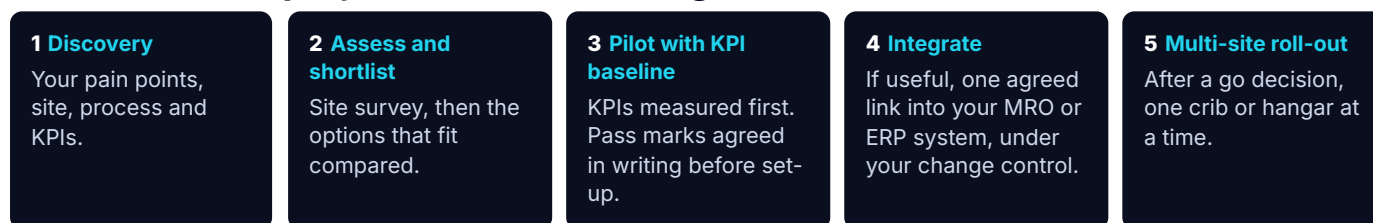
Book a free 30-minute call

What it means for you: find your role and your KPI

YOUR ROLE	WHAT IT MEANS FOR YOU	YOUR KPI
Hangar or base maintenance manager	Less time working out who last had a tool.	Time to find hangar equipment
Engine shop manager	LLP records built as the work happens.	Parts reaching the build with a record gap
Technical records lead	Records ready at release, not rebuilt.	Time to answer an audit or records query
Tool crib supervisor	No chits, and a shift-end list.	Tools not back at shift end
Licensed engineer or mechanic	Less searching, and faster issue.	Time to find hangar equipment
Quality and compliance manager	Tool and calibration records on request.	Tools issued past calibration
IT and OT teams	Events into your MRO or ERP system.	Events reaching the linked system
Finance, procurement and leadership	Payback on your numbers from one crib.	Payback months, go or no-go

Events reaching the linked system: the share of issue and return records that arrive without manual entry.

How a TRACIO project works: five stages



How a pilot runs: set-up, then live weeks in normal use, then a short written report with a go or no-go. Timings are agreed per site.

Questions we hear

"We already have a system."

We give a free second opinion and check how it performs against your KPIs, using your live data and a site visit.

"How do we know it will work here?"

Judge us on method: a pilot, KPIs measured before and during it, and a written go or no-go.

"Can you bid with us, or for us?"

Yes. We team with integrators, or act as the buyer's independent adviser, but never both on the same bid.

"Do you sell or resell hardware?"

No. We don't sell hardware, so our advice stays independent. We rent pilot equipment and offer survey and installation support.

Free second opinion

Send us your technology provider's quote or spec for a free second opinion. What to send: the quote or spec, a floor plan or site photos, item counts and your current process. Bring it to the call or send it via tracio.com/contact.

TRACIO consultancy fees

- **UK:** £3k to £30k per project, £1,200 a day
 - **Europe:** €3.5k to €35k per project, €1,400 a day
 - **US and Canada:** \$4k to \$40k per project, \$1,600 a day
 - **Middle East and Australia:** \$4k to \$40k per project, \$1,600 a day
 - **Rest of the world:** \$3.5k to \$35k per project, \$1,400 a day
- Scoped per project, no packages. Fees cover our work only; hardware, software licences and other supplier costs are separate. \$ = US dollars. Travel extra.

Why TRACIO: we work for you, not for the technology providers. We compare the options across the market that fit your site, provide site surveys and installation support, and work worldwide under your change control.

One next step: book a free 30-minute call to talk through your site and your use case.

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