# Rayterton Manufacturing Execution System (MES)

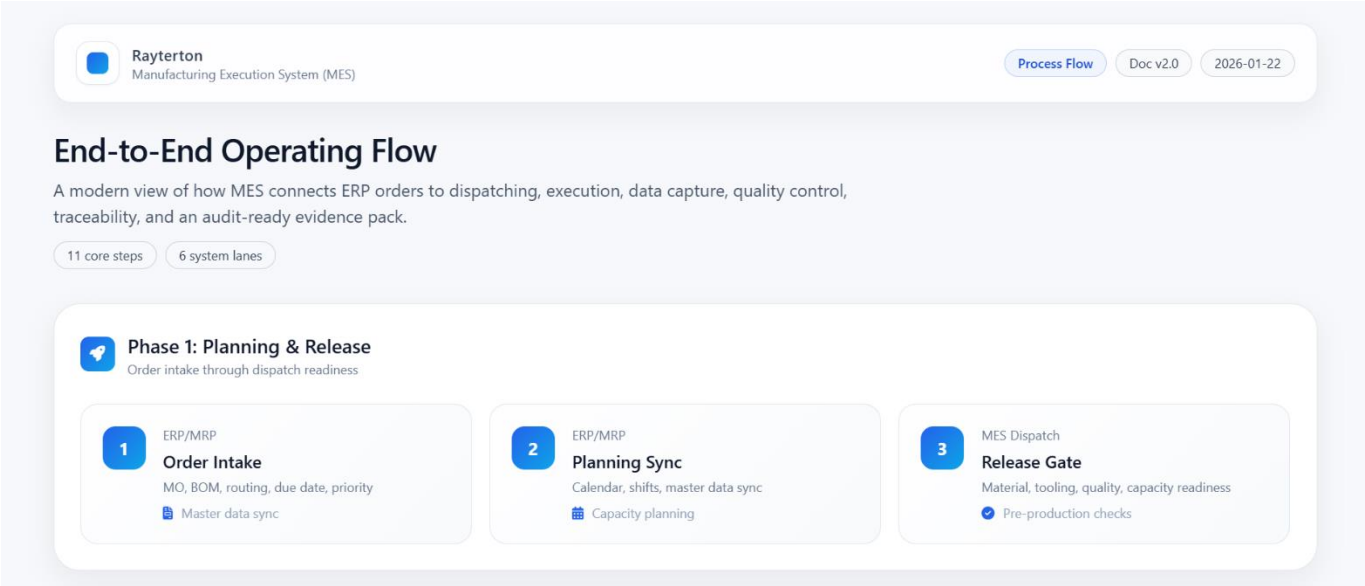
Control production execution from order release to full audit pack, with real time signals, closed loop quality, and multi plant visibility.

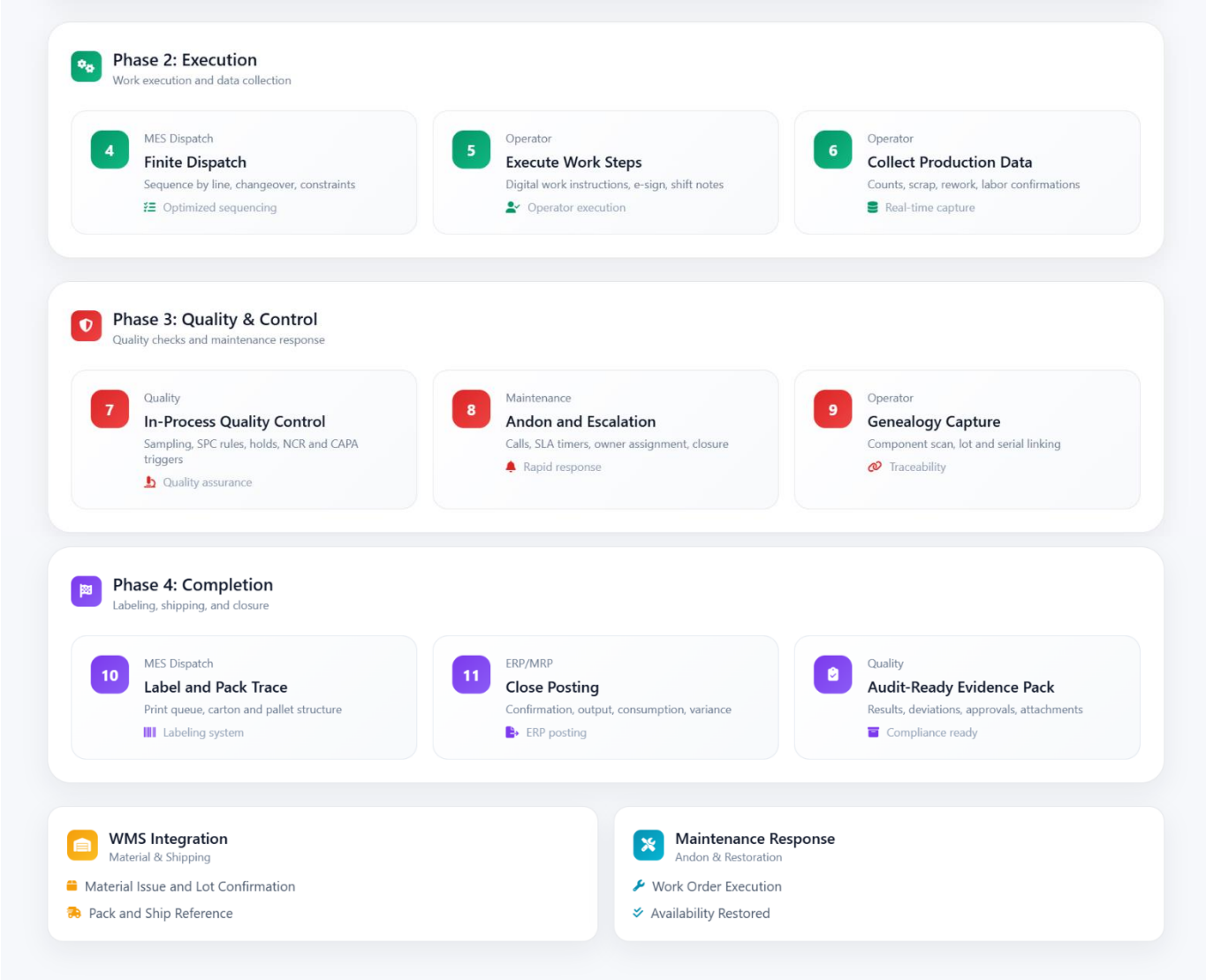
## End to End Shop Floor Control

**Rayterton Manufacturing Execution System (MES)** streamlines manufacturing operations, from order dispatching to work center loading, quality checks, and real-time traceability across 3 plants, 12 lines, and 58 work centers. Our system integrates seamlessly with ERP/MRP, PLCs, IoT, QMS, and WMS for optimal efficiency.

## End to End Operating Flow

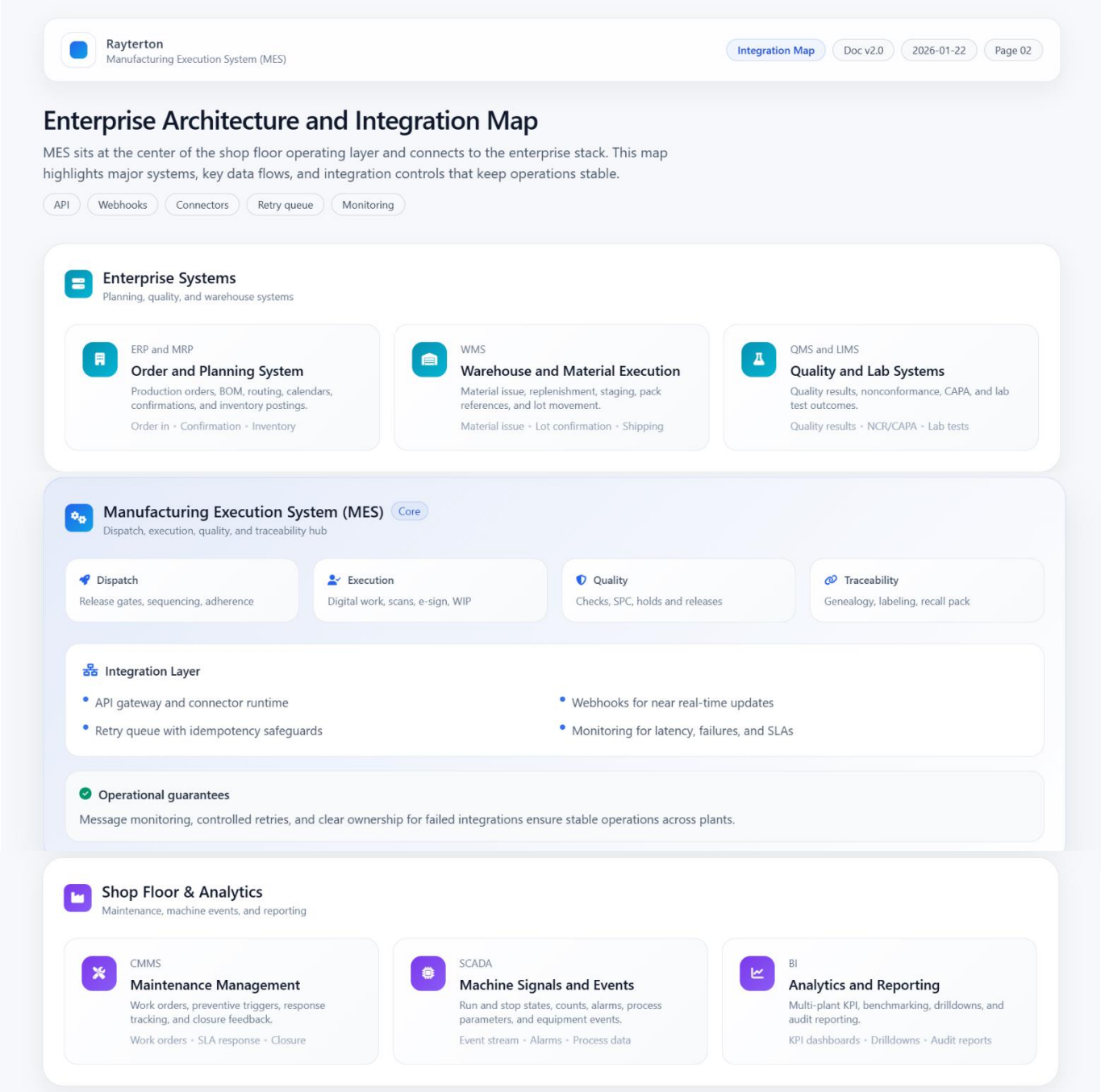
Operating flow starts when ERP sends production orders. MES applies release gate checks, dispatches work to lines, guides operators with digital work instructions, records production and quality results, triggers Andon, maintains genealogy, prints compliance labels, closes the order, then publishes performance analytics and audit packs.

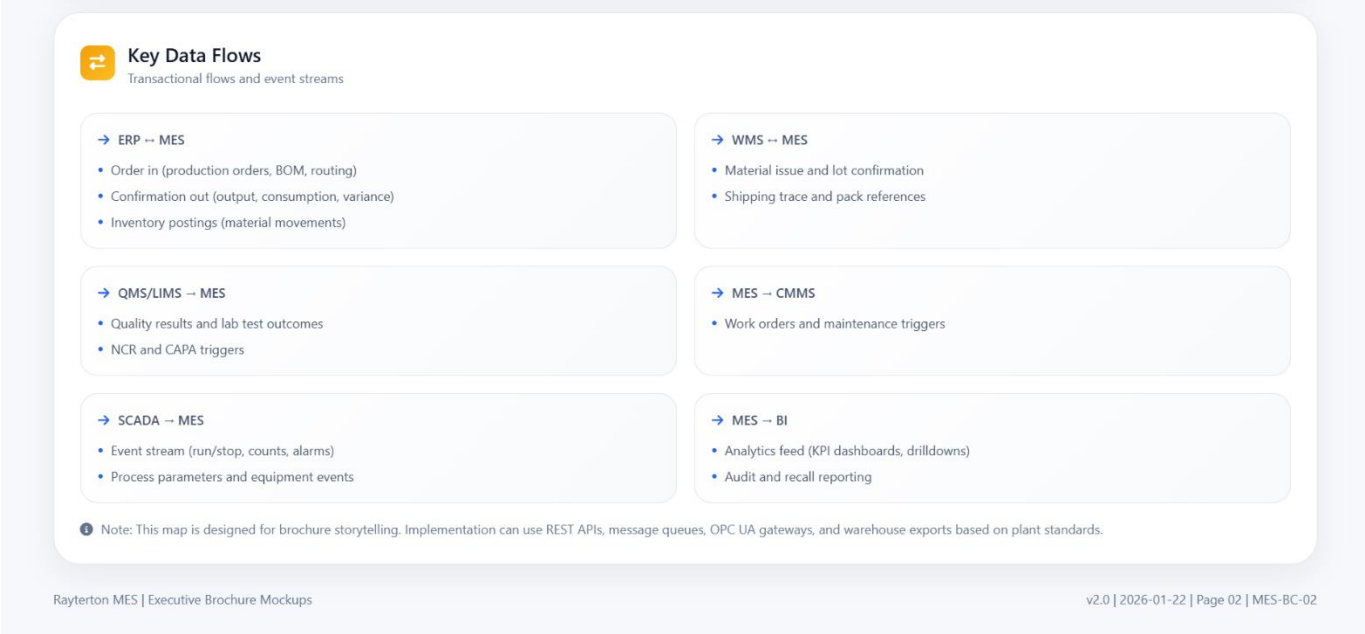



Phase 2: Execution
Work execution and data collection
4
MES Dispatch
Finite Dispatch
Sequence by line, changeover, constraints
Optimized sequencing
5
Operator
Execute Work Steps
Digital work instructions, e-sign, shift notes
Operator execution
6
Operator
Collect Production Data
Counts, scrap, rework, labor confirmations
Real-time capture
Phase 3: Quality & Control
Quality checks and maintenance response
7
Quality
In-Process Quality Control
Sampling, SPC rules, holds, NCR and CAPA triggers
Quality assurance
8
Maintenance
Andon and Escalation
Calls, SLA timers, owner assignment, closure
Rapid response
9
Operator
Genealogy Capture
Component scan, lot and serial linking
Traceability
Phase 4: Completion
Labeling, shipping, and closure
10
MES Dispatch
Label and Pack Trace
Print queue, carton and pallet structure
Labeling system
11
ERP/MRP
Close Posting
Confirmation, output, consumption, variance
ERP posting
Quality
Audit-Ready Evidence Pack
Results, deviations, approvals, attachments
Compliance ready
WMS Integration
Material & Shipping
Material Issue and Lot Confirmation
Pack and Ship Reference
Maintenance Response
Andon & Restoration
Work Order Execution
Availability Restored

## Enterprise Architecture and Integration Map

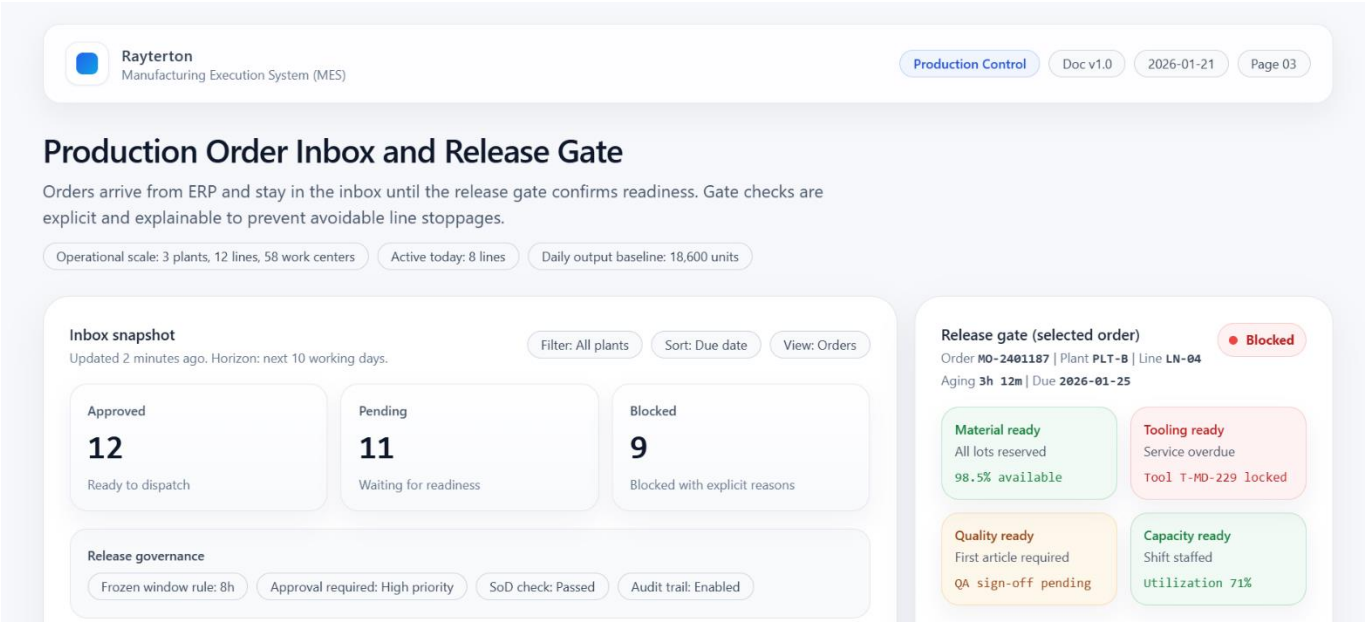
Rayterton **MES** is designed as part of an enterprise stack, not a standalone app. MES sits in the middle and exchanges structured data with **ERP** or **MRP**, **WMS**, **QMS**, **LIMS**, **CMMS**, **SCADA**, and **BI**. Key integration patterns include APIs, webhooks, and connectors with monitoring, retry queue, and safe reprocess. Data flows cover order in, confirmations out, inventory postings, quality results, maintenance work orders, and event streams from edge gateways.

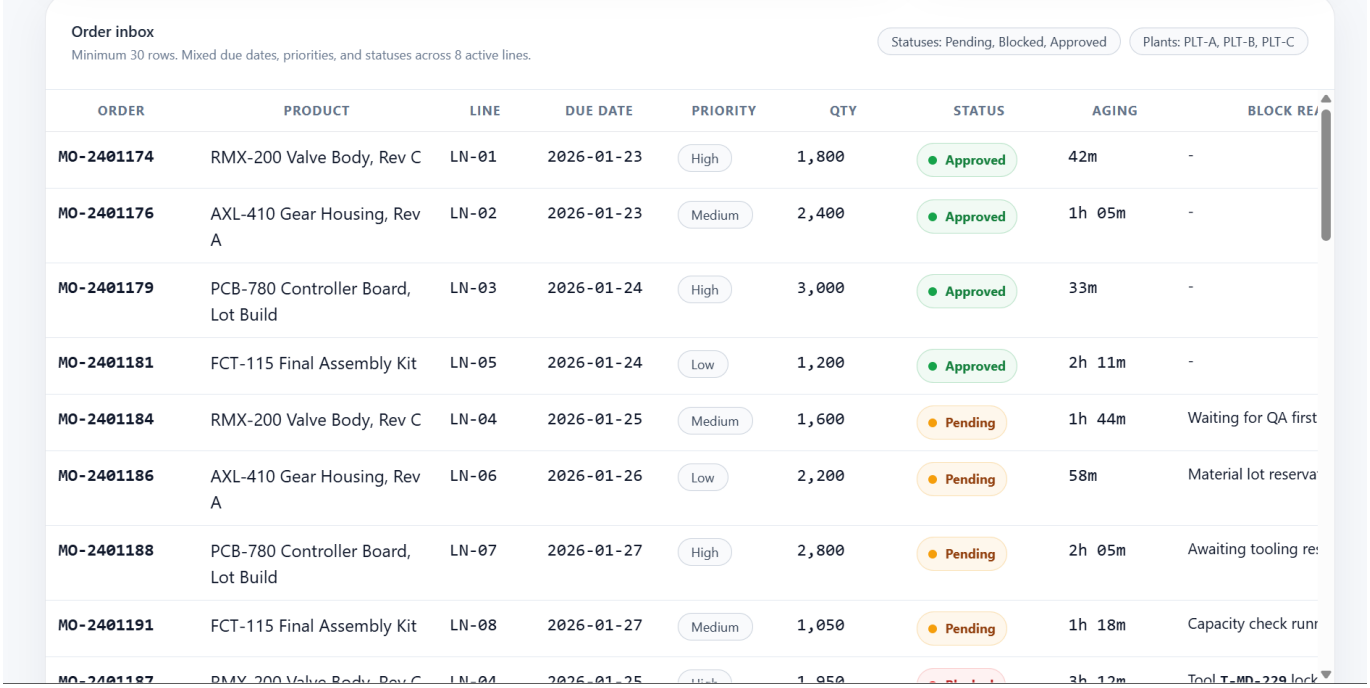





## Production Order Inbox and Release Gate

Orders arrive from **ERP** in an inbox that supports controlled release. The release gate ensures production starts only when prerequisites are met. The release gate checks material readiness, tooling readiness, quality readiness, and capacity readiness. Orders can be approved, kept pending, or blocked with a clear reason. This reduces last minute line stops and prevents execution with missing controls.





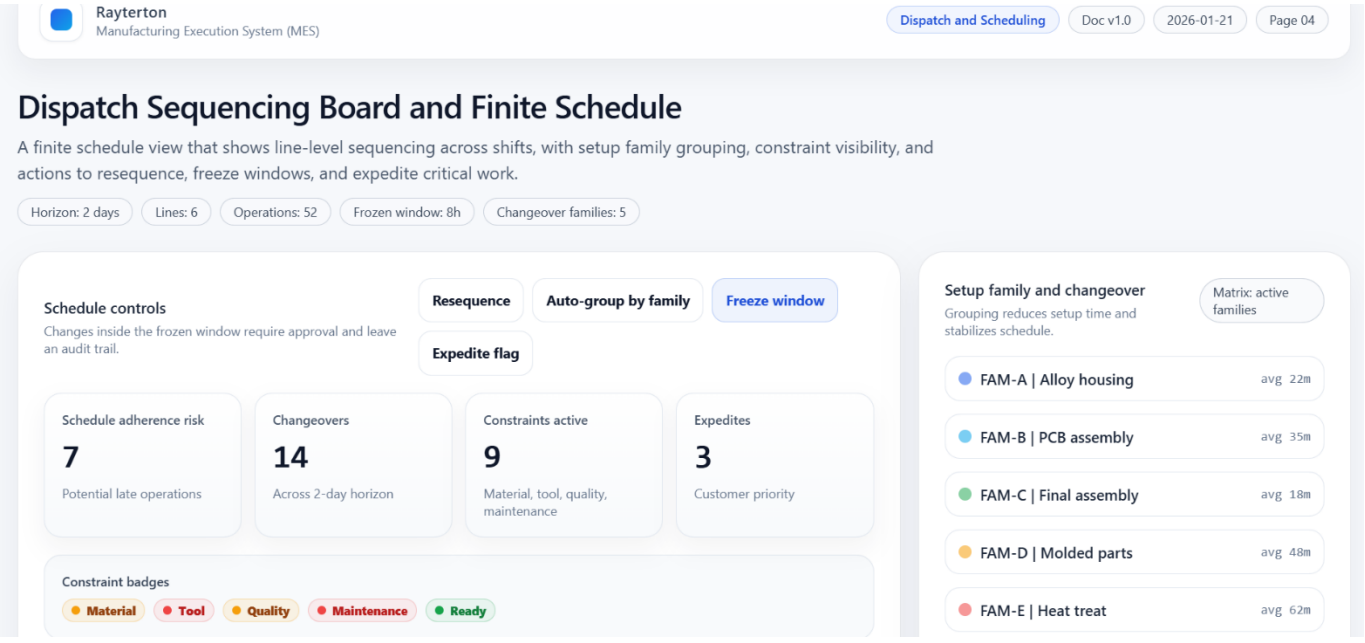
Order inbox
Minimum 30 rows. Mixed due dates, priorities, and statuses across 8 active lines.

Statuses: Pending, Blocked, Approved | Plants: PLT-A, PLT-B, PLT-C

| ORDER | PRODUCT | LINE | DUE DATE | PRIORITY | QTY | STATUS | AGING | BLOCK RE/ |
|---|---|---|---|---|---|---|---|---|
| MO-2401174 | RMX-200 Valve Body, Rev C | LN-01 | 2026-01-23 | High | 1,800 | Approved | 42m | - |
| MO-2401176 | AXL-410 Gear Housing, Rev A | LN-02 | 2026-01-23 | Medium | 2,400 | Approved | 1h 05m | - |
| MO-2401179 | PCB-780 Controller Board, Lot Build | LN-03 | 2026-01-24 | High | 3,000 | Approved | 33m | - |
| MO-2401181 | FCT-115 Final Assembly Kit | LN-05 | 2026-01-24 | Low | 1,200 | Approved | 2h 11m | - |
| MO-2401184 | RMX-200 Valve Body, Rev C | LN-04 | 2026-01-25 | Medium | 1,600 | Pending | 1h 44m | Waiting for QA first |
| MO-2401186 | AXL-410 Gear Housing, Rev A | LN-06 | 2026-01-26 | Low | 2,200 | Pending | 58m | Material lot reserva |
| MO-2401188 | PCB-780 Controller Board, Lot Build | LN-07 | 2026-01-27 | High | 2,800 | Pending | 2h 05m | Awaiting tooling re: |
| MO-2401191 | FCT-115 Final Assembly Kit | LN-08 | 2026-01-27 | Medium | 1,050 | Pending | 1h 18m | Capacity check runr |
| MO-2401187 | RMX-200 Valve Body, Rev C | LN-04 | 2026-01-25 | High | 1,950 | Blocked | 3h 12m | Tool T-MD-229 lock |

## Dispatch Sequencing Board and Finite Schedule

Dispatch is presented as a line based board with shifts and a 2 day horizon. Sequencing supports setup family grouping, changeover awareness, and constraint badges for material, tooling, quality holds, and planned maintenance. Planners can resequence, freeze a window, and flag expedite jobs while keeping trace of what changed and why.



Rayterton
Manufacturing Execution System (MES)

Dispatch and Scheduling | Doc v1.0 | 2026-01-21 | Page 04

Dispatch Sequencing Board and Finite Schedule

A finite schedule view that shows line-level sequencing across shifts, with setup family grouping, constraint visibility, and actions to resequence, freeze windows, and expedite critical work.

Horizon: 2 days | Lines: 6 | Operations: 52 | Frozen window: 8h | Changeover families: 5

Schedule controls
Changes inside the frozen window require approval and leave an audit trail.

Resequence | Auto-group by family | Freeze window | Expedite flag

Schedule adherence risk
7
Potential late operations

Changeovers
14
Across 2-day horizon

Constraints active
9
Material, tool, quality, maintenance

Expedites
3
Customer priority

Constraint badges
Material | Tool | Quality | Maintenance | Ready

Setup family and changeover
Grouping reduces setup time and stabilizes schedule.

Matrix: active families

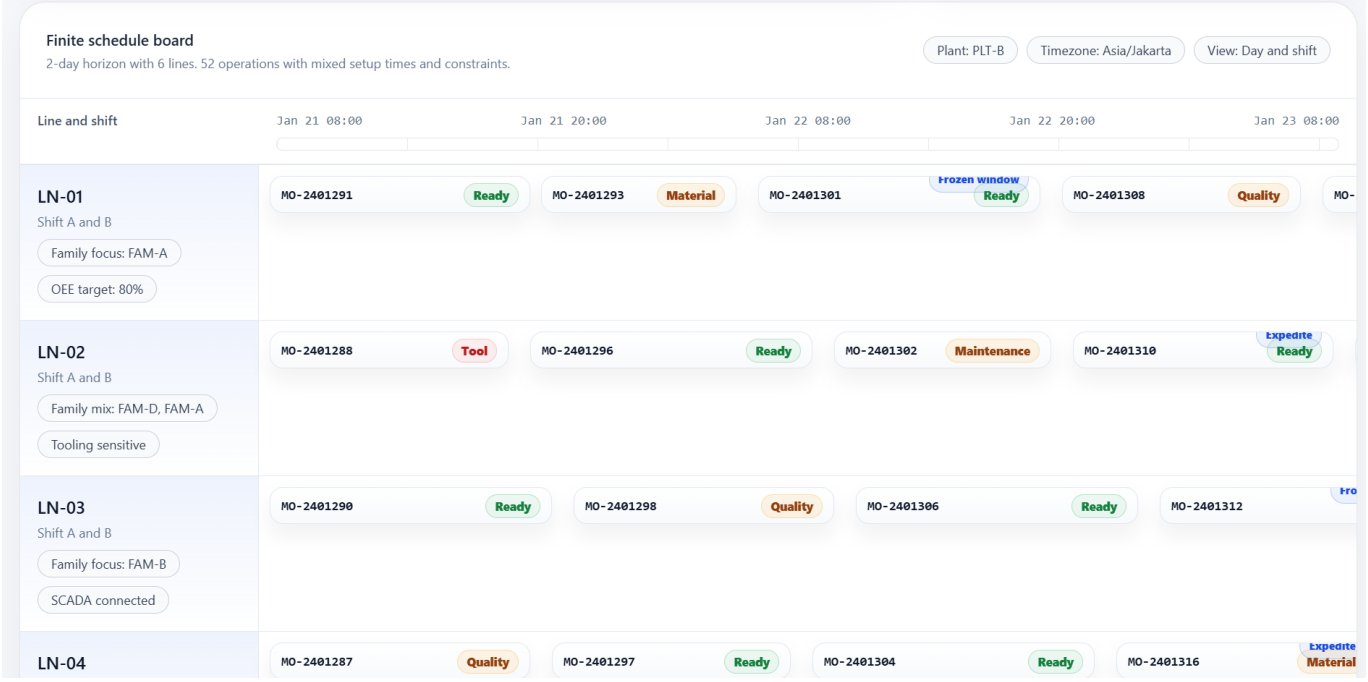
FAM-A | Alloy housing avg 22m
FAM-B | PCB assembly avg 35m
FAM-C | Final assembly avg 18m
FAM-D | Molded parts avg 48m
FAM-E | Heat treat avg 62m

Changeover matrix (minutes)

Example setup times by family transition

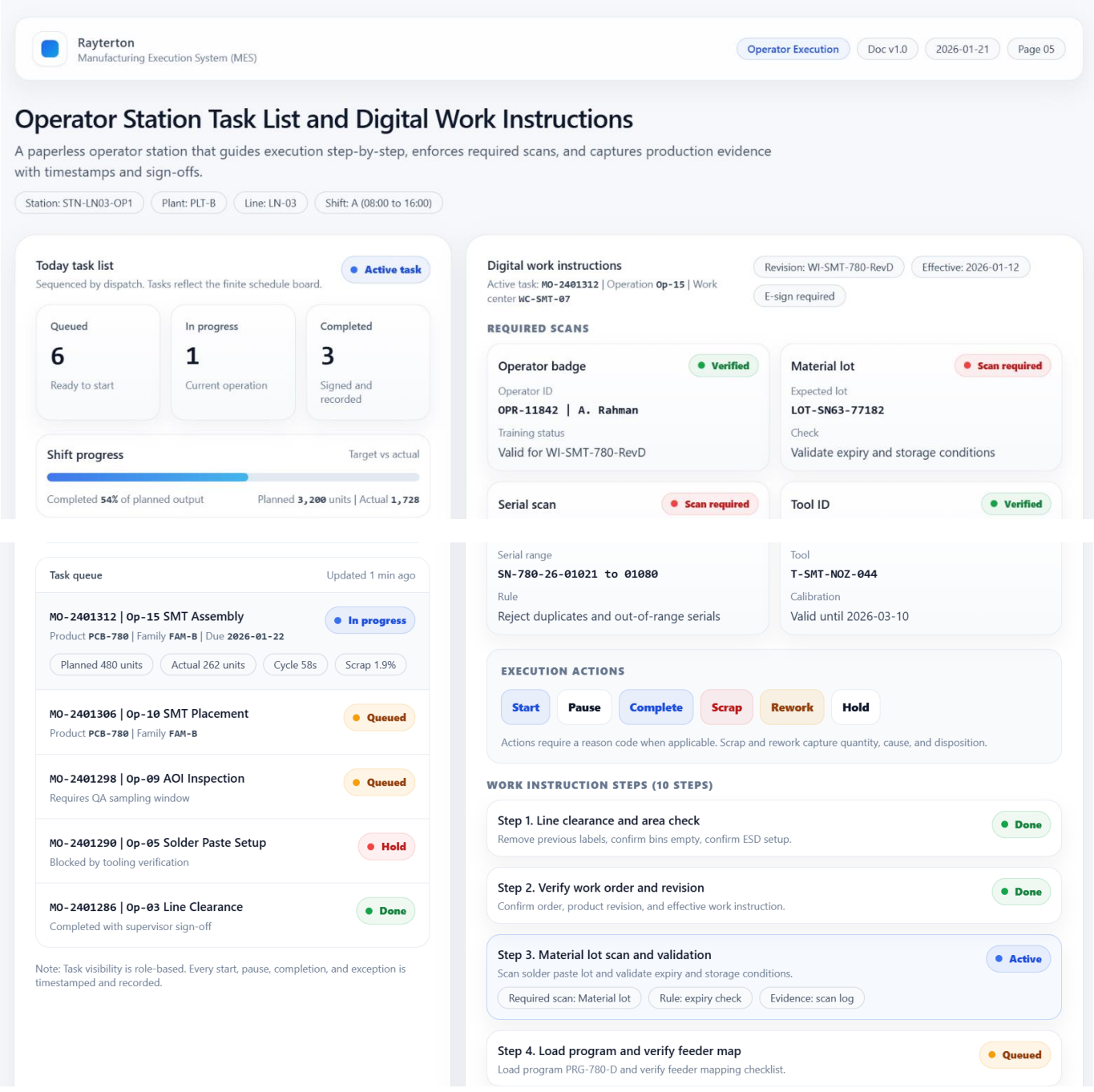
| FROM \ TO | FAM-A | FAM-B | FAM-C | FAM-D | FAM-E |
|---|---|---|---|---|---|
| FAM-A | 0 | 28 | 15 | 34 | 55 |
| FAM-B | 26 | 0 | 24 | 48 | 60 |
| FAM-C | 16 | 22 | 0 | 30 | 52 |
| FAM-D | 38 | 50 | 32 | 0 | 64 |
| FAM-E | 58 | 62 | 54 | 70 | 0 |

Note: Setup times vary by line, tooling state, and cleaning requirements. Matrix values are stored as governed master data.



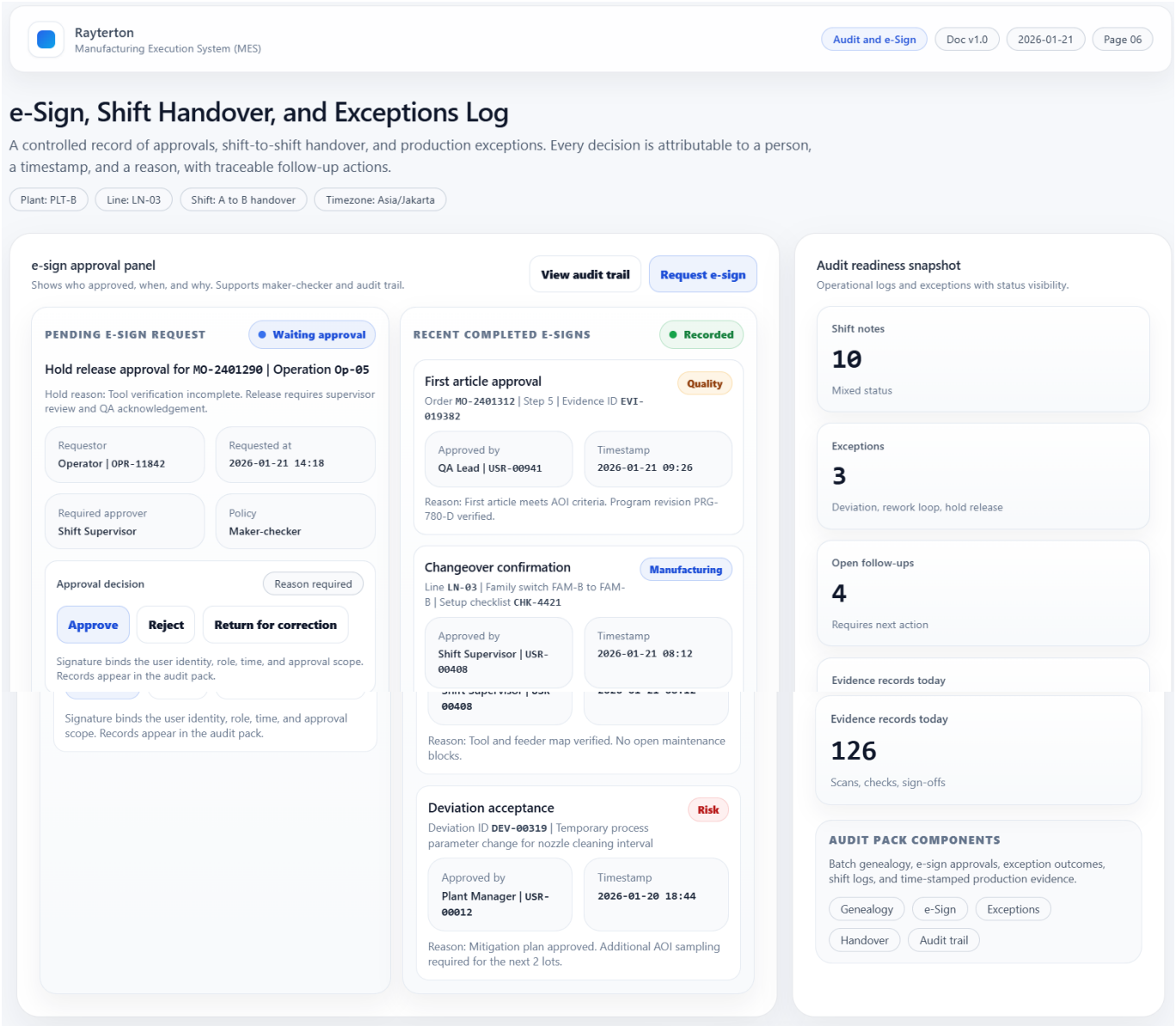
## Operator Station and Digital Work Instructions

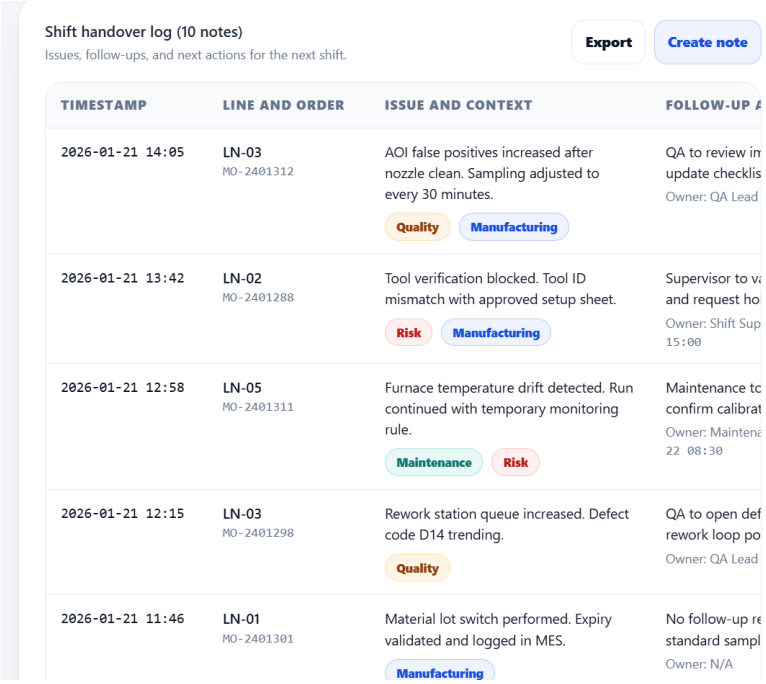
Operator execution is guided by a task list for the current shift. Each task includes the active step, progress, and required scans so execution stays consistent. Digital work instructions provide clear steps with check points. Scans can be enforced for operator badge, material lot, serial, and tool ID. Actions include start, pause, complete, scrap, rework, and hold. Steps that need supervisor sign off are clearly marked and recorded.



## eSign, Shift Handover, and Exceptions Log

Rayterton **MES** is audit ready because approvals are structured and traceable. Electronic signatures capture who approved, when, and the reason, with the exact scope and context. Shift handover logs record issues, follow up, and next actions. Exceptions capture deviations, rework loops, and hold releases. This keeps operations aligned across shifts and makes investigations faster.



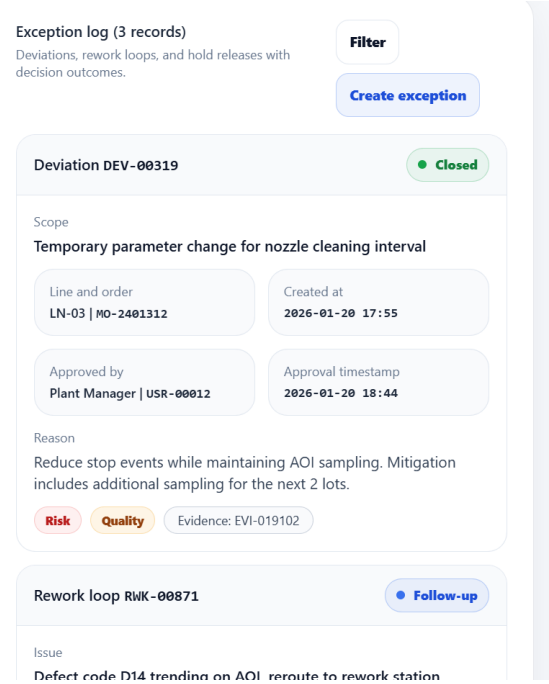


Shift handover log (10 notes)

Issues, follow-ups, and next actions for the next shift.

Export | Create note

| TIMESTAMP | LINE AND ORDER | ISSUE AND CONTEXT | FOLLOW-UP A |
|---|---|---|---|
| 2026-01-21 14:05 | LN-03 MO-2401312 | AOI false positives increased after nozzle clean. Sampling adjusted to every 30 minutes. Quality Manufacturing | QA to review in update checklis Owner: QA Lead |
| 2026-01-21 13:42 | LN-02 MO-2401288 | Tool verification blocked. Tool ID mismatch with approved setup sheet. Risk Manufacturing | Supervisor to v and request ho Owner: Shift Sup 15:00 |
| 2026-01-21 12:58 | LN-05 MO-2401311 | Furnace temperature drift detected. Run continued with temporary monitoring rule. Maintenance Risk | Maintenance tc confirm calibrat Owner: Maintena 22 08:30 |
| 2026-01-21 12:15 | LN-03 MO-2401298 | Rework station queue increased. Defect code D14 trending. Quality | QA to open def rework loop po Owner: QA Lead |
| 2026-01-21 11:46 | LN-01 MO-2401301 | Material lot switch performed. Expiry validated and logged in MES. Manufacturing | No follow-up re standard sampl Owner: N/A |



Exception log (3 records)

Deviations, rework loops, and hold releases with decision outcomes.

Filter | Create exception

Deviation DEV-00319 — Closed

Scope

Temporary parameter change for nozzle cleaning interval

Line and order: LN-03 | MO-2401312

Created at: 2026-01-20 17:55

Approved by: Plant Manager | USR-00012

Approval timestamp: 2026-01-20 18:44

Reason

Reduce stop events while maintaining AOI sampling. Mitigation includes additional sampling for the next 2 lots.

Risk | Quality | Evidence: EVI-019102

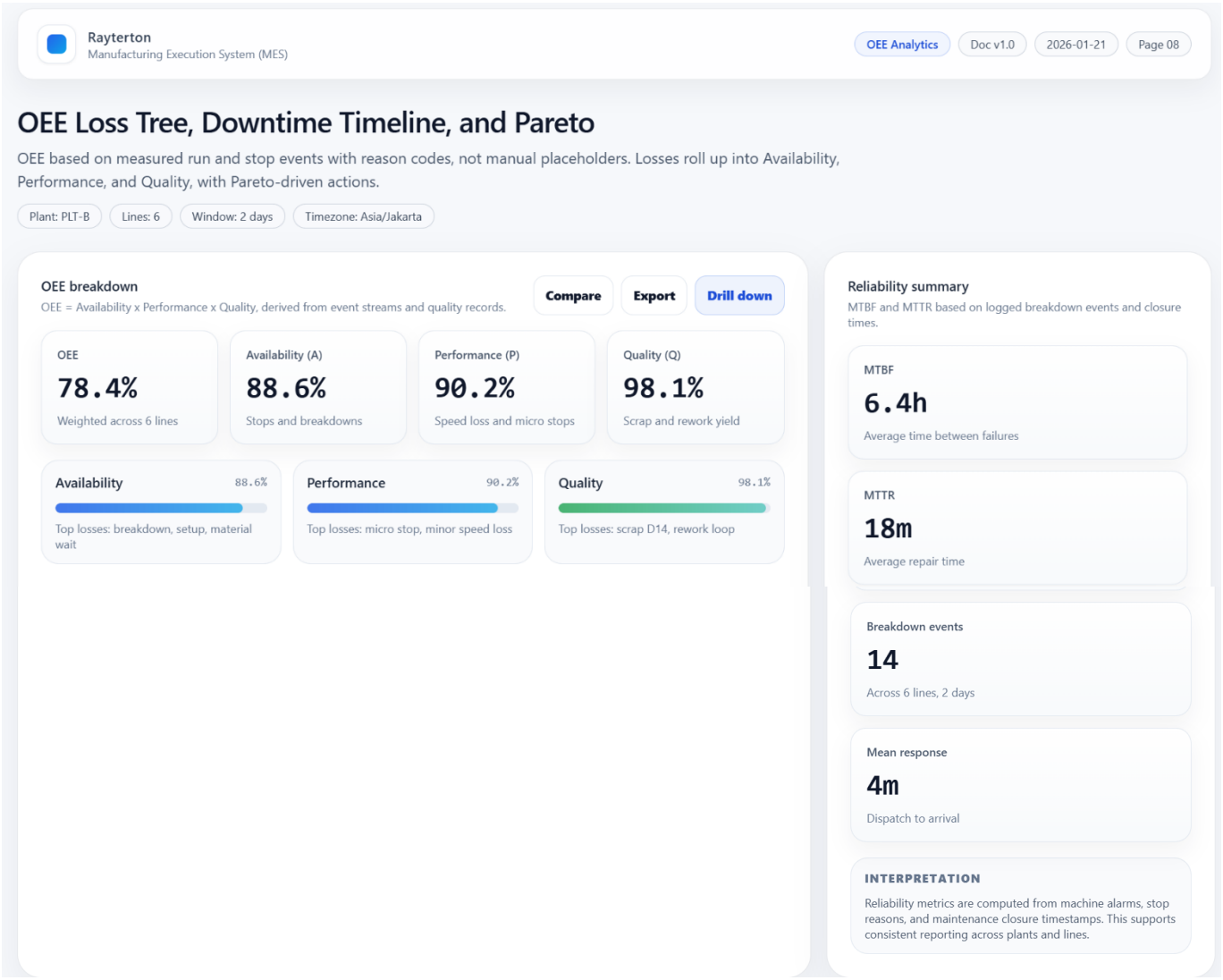
Rework loop RWK-00871 — Follow-up

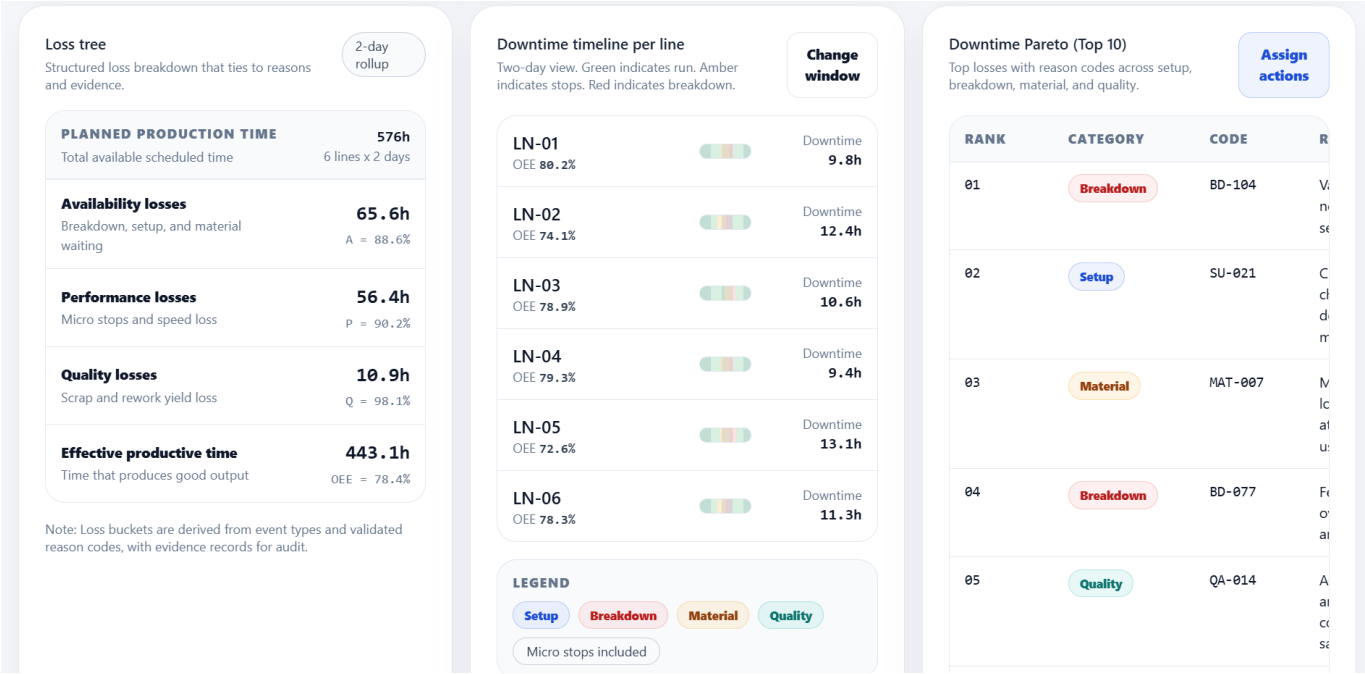
Issue

Defect code D14 trending on AOI, reroute to rework station

## OEE, Loss Tree, and Downtime Pareto

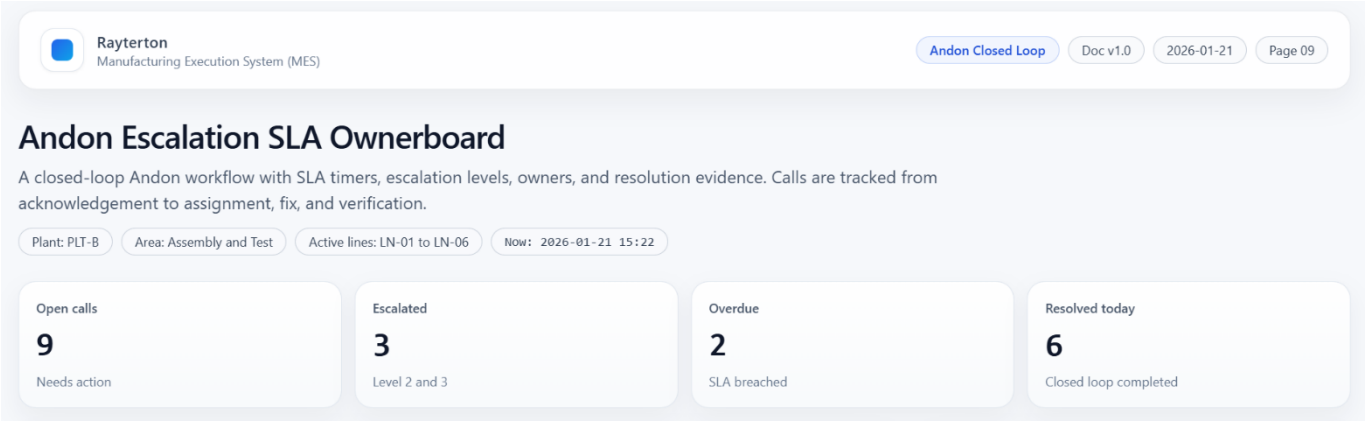
KPI is meaningful only if it can be explained. Rayterton MES breaks OEE into Availability, Performance, and Quality, and links losses to reason codes and events. Downtime timeline shows when stops happen per line. Pareto highlights the top losses and categories such as setup, breakdown, material, and quality. MTBF and MTTR provide a concise reliability view that links back to work centers and events.

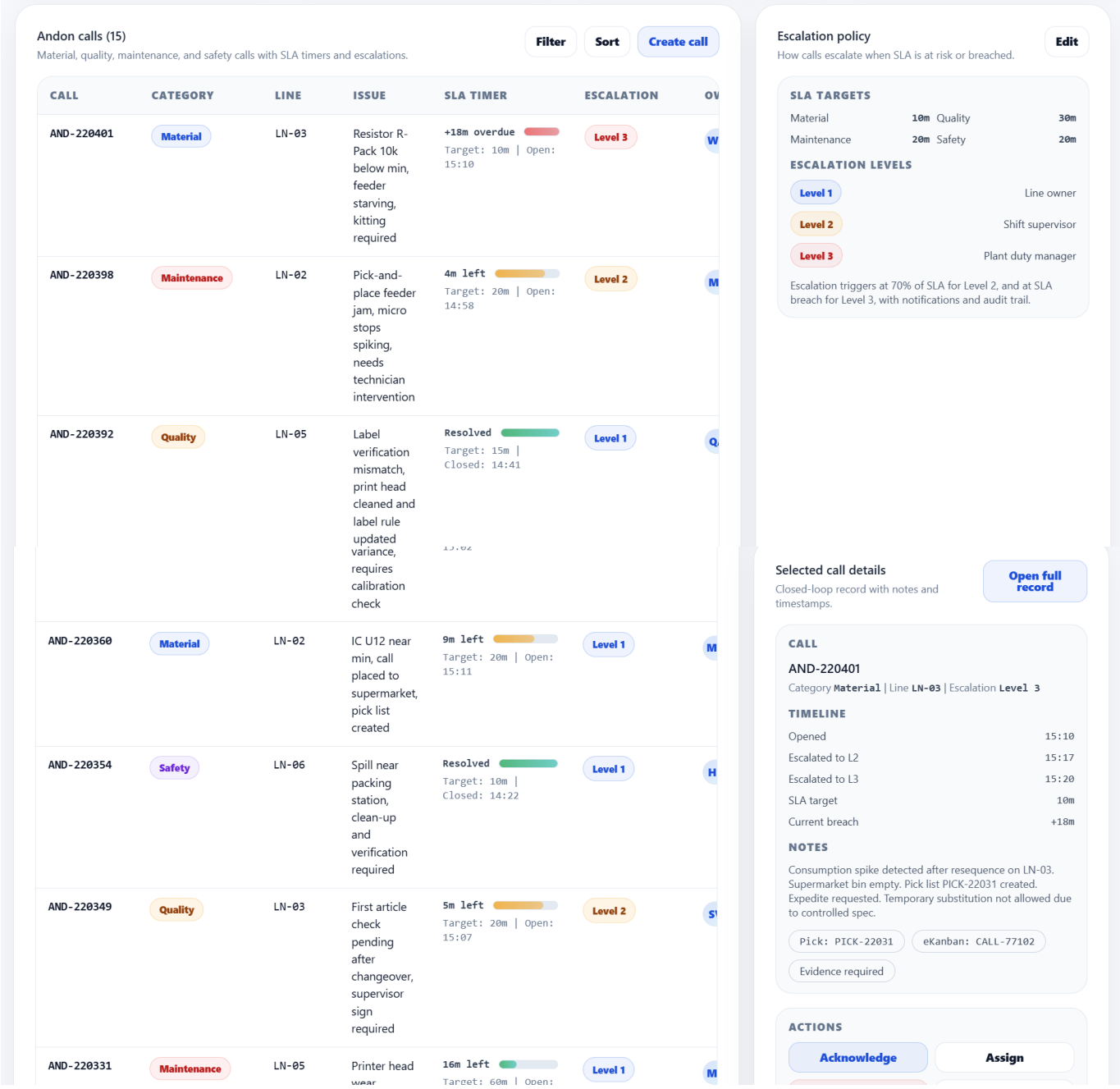





## Andon Escalation, SLA, and Ownerboard

Calls are tracked with SLA timer, escalation level, owner, and status. Teams can acknowledge, assign, resolve, and add notes. Overdue calls and escalations are visible at a glance so leadership can see response discipline and recurring causes.





Andon calls (15)
Material, quality, maintenance, and safety calls with SLA timers and escalations.

Filter | Sort | Create call

| CALL | CATEGORY | LINE | ISSUE | SLA TIMER | ESCALATION | OV |
|---|---|---|---|---|---|---|
| AND-220401 | Material | LN-03 | Resistor R-Pack 10k below min, feeder starving, kitting required | +18m overdue<br>Target: 10m \| Open: 15:10 | Level 3 | W |
| AND-220398 | Maintenance | LN-02 | Pick-and-place feeder jam, micro stops spiking, needs technician intervention | 4m left<br>Target: 20m \| Open: 14:58 | Level 2 | M |
| AND-220392 | Quality | LN-05 | Label verification mismatch, print head cleaned and label rule updated variance, requires calibration check | Resolved<br>Target: 15m \| Closed: 14:41 | Level 1 | Q |
| AND-220360 | Material | LN-02 | IC U12 near min, call placed to supermarket, pick list created | 9m left<br>Target: 20m \| Open: 15:11 | Level 1 | M |
| AND-220354 | Safety | LN-06 | Spill near packing station, clean-up and verification required | Resolved<br>Target: 10m \| Closed: 14:22 | Level 1 | H |
| AND-220349 | Quality | LN-03 | First article check pending after changeover, supervisor sign required | 5m left<br>Target: 20m \| Open: 15:07 | Level 2 | SI |
| AND-220331 | Maintenance | LN-05 | Printer head wear | 16m left<br>Target: 60m \| Open: | Level 1 | M |

Escalation policy
How calls escalate when SLA is at risk or breached.

Edit

SLA TARGETS

| | | | |
|---|---|---|---|
| Material | 10m | Quality | 30m |
| Maintenance | 20m | Safety | 20m |

ESCALATION LEVELS

- Level 1 — Line owner
- Level 2 — Shift supervisor
- Level 3 — Plant duty manager

Escalation triggers at 70% of SLA for Level 2, and at SLA breach for Level 3, with notifications and audit trail.

Selected call details
Closed-loop record with notes and timestamps.

Open full record

CALL

AND-220401

Category Material | Line LN-03 | Escalation Level 3

TIMELINE

| | |
|---|---|
| Opened | 15:10 |
| Escalated to L2 | 15:17 |
| Escalated to L3 | 15:20 |
| SLA target | 10m |
| Current breach | +18m |

NOTES

Consumption spike detected after resequence on LN-03. Supermarket bin empty. Pick list PICK-22031 created. Expedite requested. Temporary substitution not allowed due to controlled spec.

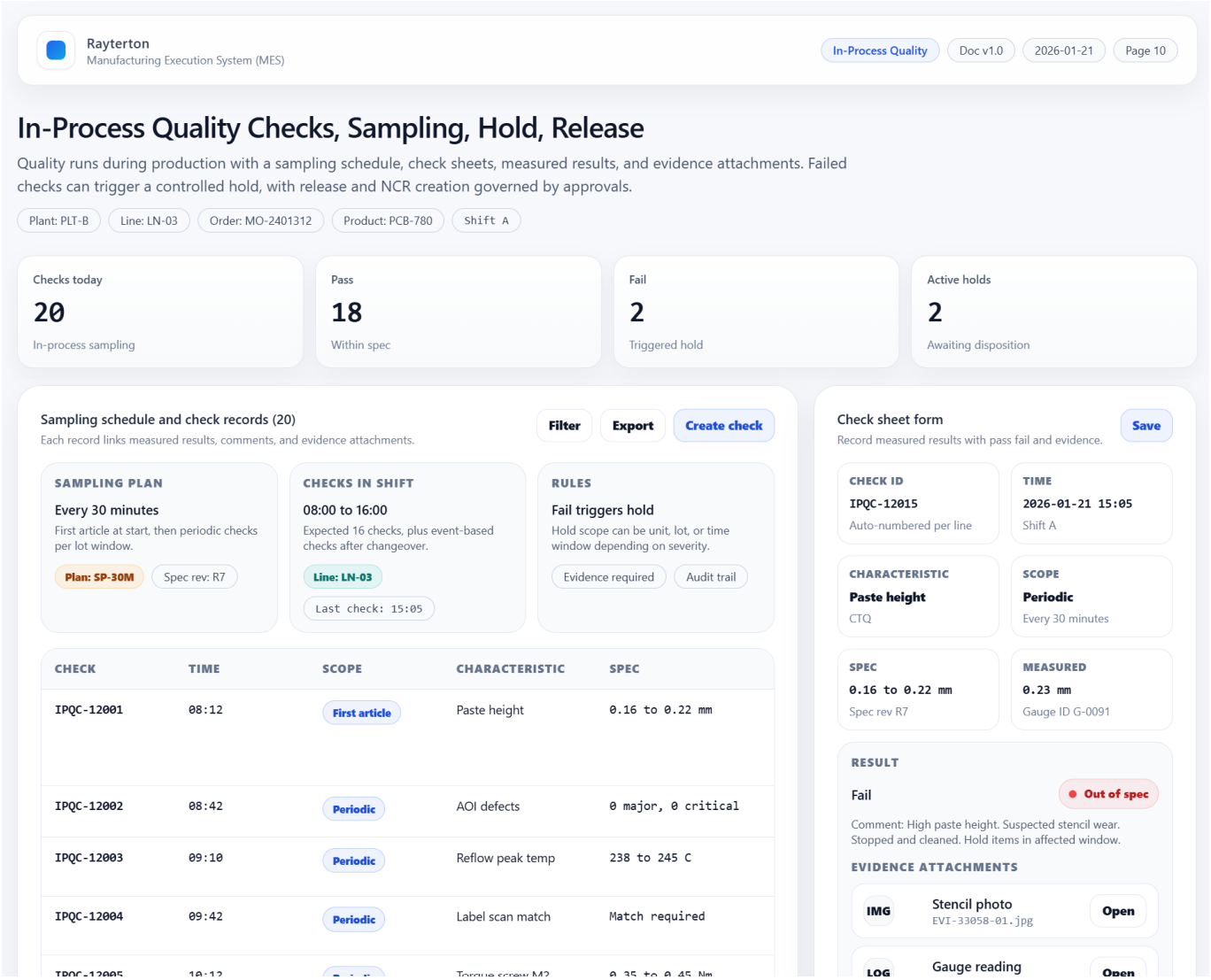
Pick: PICK-22031 | eKanban: CALL-77102 | Evidence required

ACTIONS

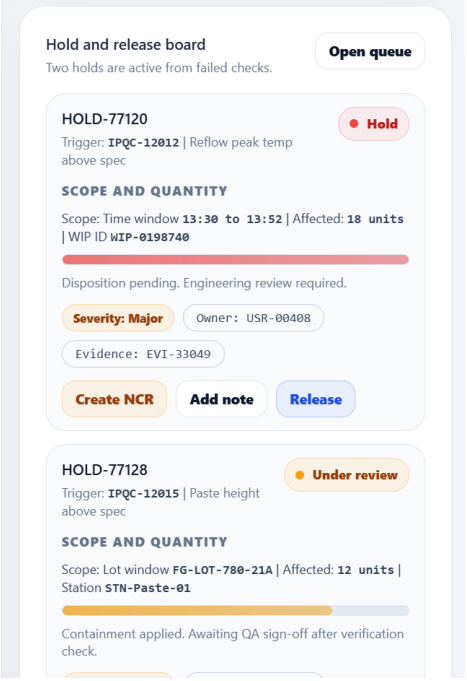
Acknowledge | Assign

## In Process Quality Checks, Sampling, Hold, and Release

Sampling schedules and check sheets guide what to measure and when. Results are captured as pass or fail with comments and evidence attachments when needed. A failed check can trigger a hold. Hold release is governed and traceable, and NCR can be created directly from the check outcome.

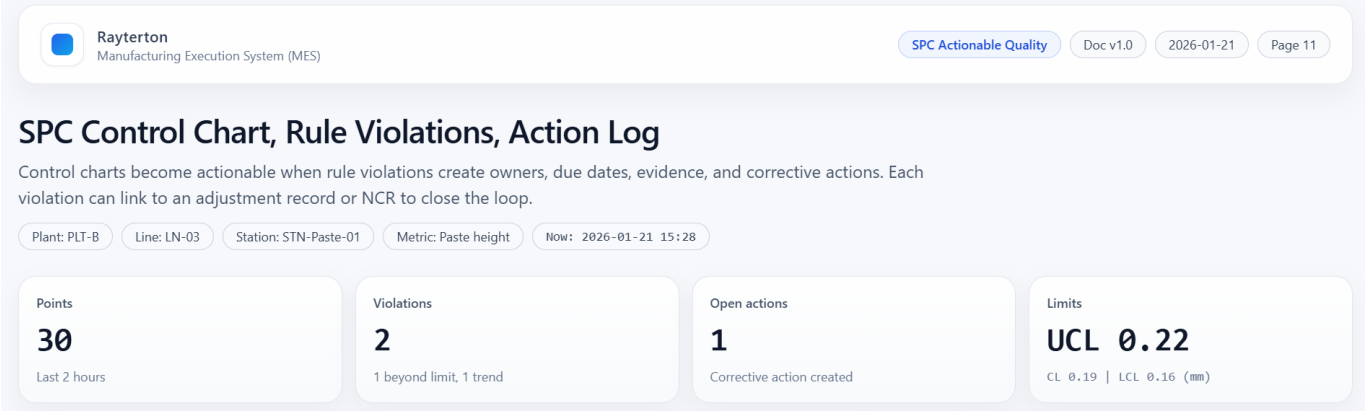


| | | | | |
|---|---|---|---|---|
| IPQC-12009 | 12:18 | Periodic | Reflow peak temp | 238 to 245 C |
| IPQC-12010 | 12:46 | Periodic | Paste height | 0.16 to 0.22 mm |
| IPQC-12011 | 13:12 | Periodic | Torque screw M2 | 0.35 to 0.45 Nm |
| IPQC-12012 | 13:42 | Periodic | Reflow peak temp | 238 to 245 C |
| IPQC-12013 | 14:10 | Periodic | AOI defects | 0 major, 0 critical |
| IPQC-12014 | 14:40 | Periodic | Label scan match | Match required |
| IPQC-12015 | 15:05 | Periodic | Paste height | 0.16 to 0.22 mm |
| IPQC-12016 | 15:18 | Event-based | Post-clean verification | All CTQ pass |




## SPC Control Chart, Rule Violations, and Action Log

Control charts show limits, data points, and rule violations such as trends, beyond limit, and run rules. Violations are listed with details, affected time window, and impact scope. An action log connects the violation to a corrective adjustment or to NCR and CAPA when the issue indicates systemic risk.



X chart (individual points)
UCL, CL, LCL with highlighted rule violations and linked actions.

Time range | Subgroup | Rules

Unit: mm | Sampling: every 4 minutes | Mean: 0.190 | Sigma: 0.010

Limits | Normal | Trend rule | Beyond limit


**RULES ENABLED**

| | |
|---|---|
| Beyond limit | On |
| Trend (7 increasing) | On |
| Run (8 same side) | On |

**LATEST POINT**

0.193 mm
Within limits. No rule triggered.
Point #30 at 15:28

**LINKAGE**

Violations can create a hold, adjustment, or NCR. Actions remain open until verified with evidence.

Create NCR
Create adjustment
Assign owner

Note: 30 points are shown. Two rule violations are flagged and tied to actions.

Rule violations (2)
Trend and beyond limit violations with ownership and SLA.

Acknowledge

VIO-88021 — Open
Type: Beyond UCL | Point #18 | Value 0.225

OWNER
QA Inspector
USR-01102

Detected: 14:52 | SLA: 30m
Evidence required

Create adjustment | Create NCR | Add note

VIO-88019 — Acknowledged
Type: Trend rule | Points #6 to #12 | Increasing sequence

OWNER
Shift Supervisor
USR-00711

Detected: 14:34 | Monitor and verify

Add note | Mark verified

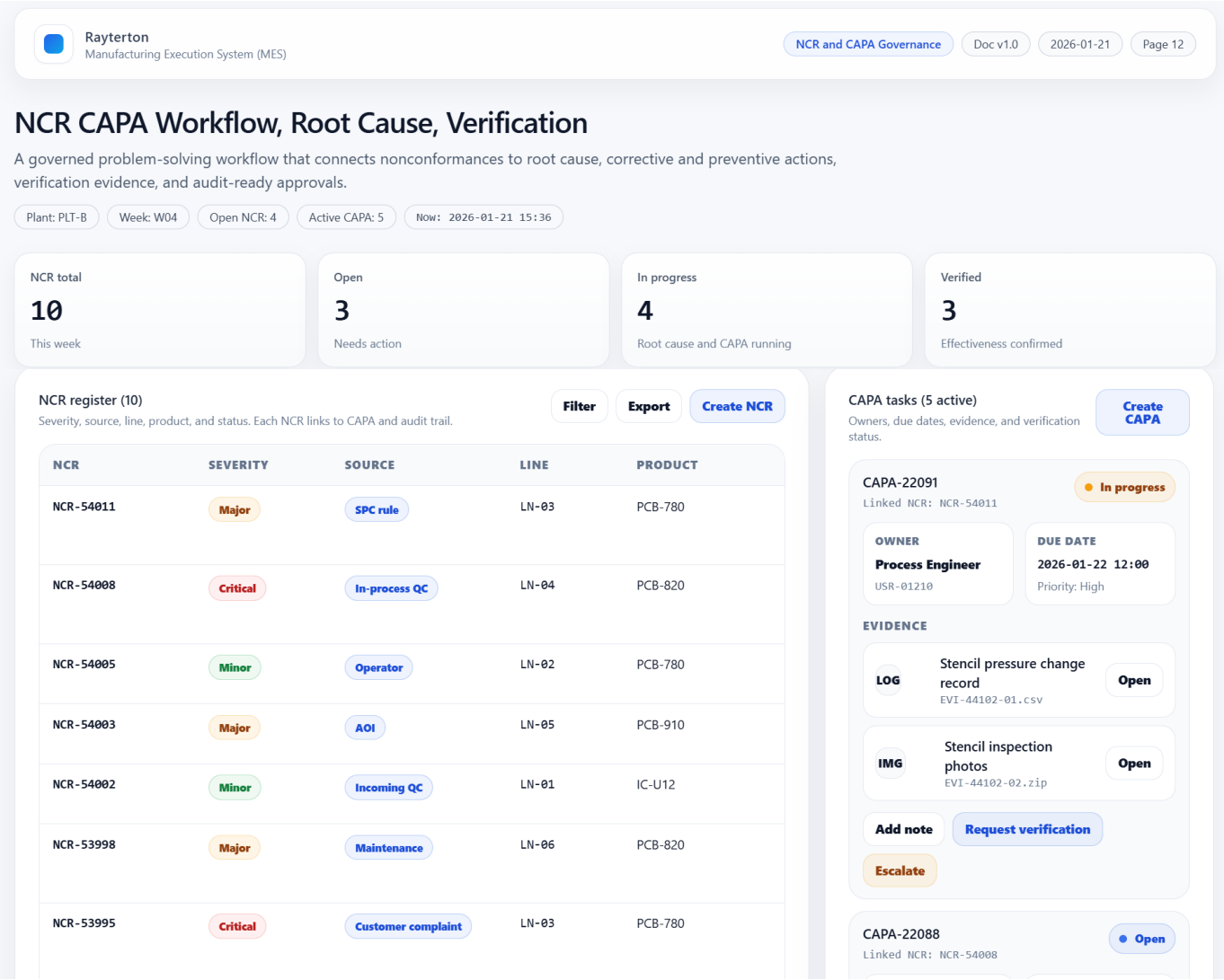
Action log
Actions created from SPC violations, with links to NCR or adjustments.

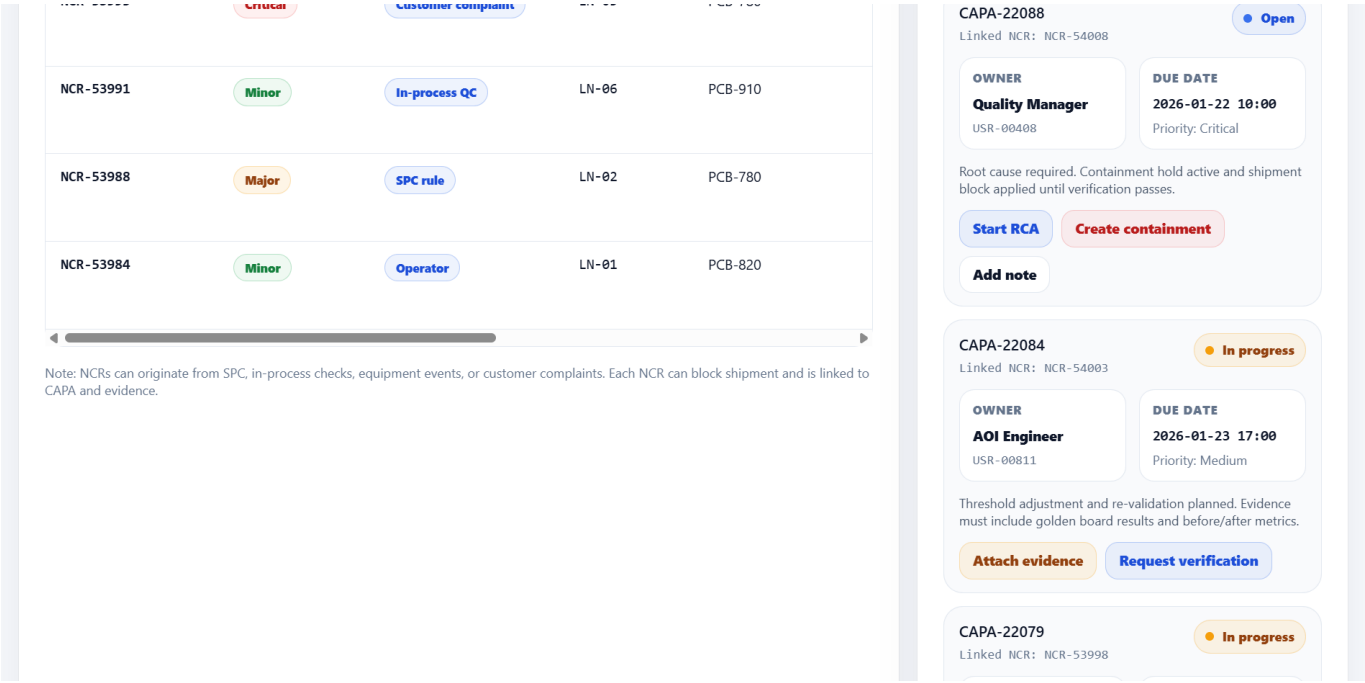
Open history

| TIME | ACTION | TR |
|---|---|---|
| 14:54 | ADJ-44102 | VI |
| 14:56 | HOLD-77133 | VI |

## NCR and CAPA Workflow with Root Cause and Verification

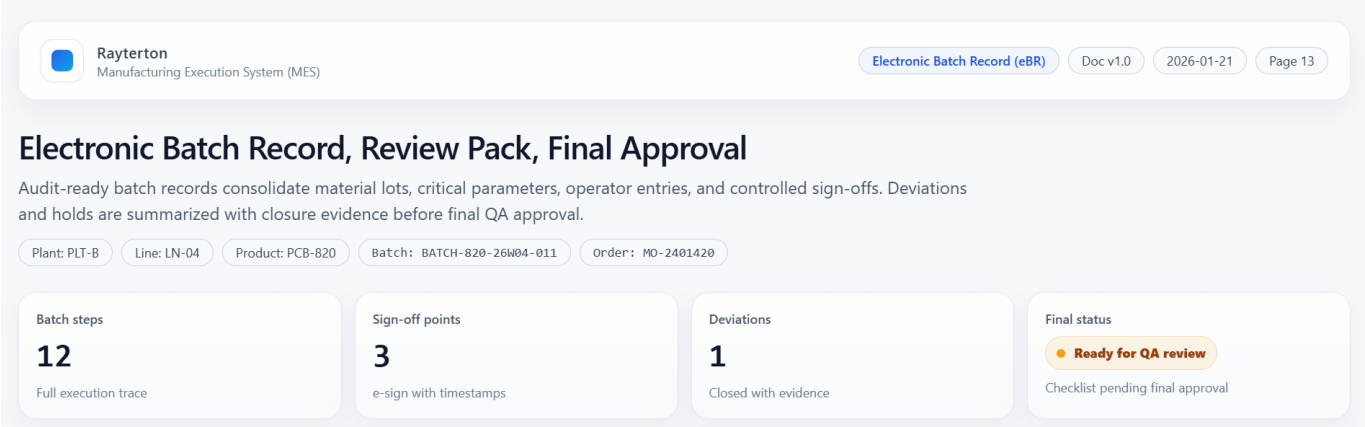
NCR records include severity, source, line, product, and status. CAPA breaks down tasks into root cause, action plan, owner, due date, evidence, and verification. Approvals and audit trail keep the workflow controlled. Verified closure means the fix was validated, not only completed.






## Electronic Batch Record, Review Pack, and Final Approval

The record summarizes material lots, process parameters, and sign offs per step. Deviations and holds are summarized with closure status. Attachments and review checklist form a review pack for final approval. This supports compliance, customer audits, and internal governance.



Batch record summary

Materials, parameters, and sign-offs consolidated in one review view.

Print pack | Export PDF | Open full eBR

**PLANNED QTY**

1,200 units

Start: 08:10 | End: 15:22

**PRODUCED**

1,176 units

Yield: 98.0%

**SCRAP AND REWORK**

Scrap 12 | Rework 8

All linked to genealogy

**MATERIAL LOTS USED**

| MATERIAL | LOT | QTY | IQC |
|---|---|---|---|
| Solder paste SP-93 | LOT-SP93-260121A | 3.6 kg | Accepted |
| PCB base board BB-820 | LOT-BB820-260119C | 1,220 pcs | Accepted |
| IC U12 | LOT-U12-260118B | 1,260 pcs | Accepted |
| Connector CN-14 | LOT-CN14-260120A | 1,240 pcs | Accepted |

**CRITICAL PARAMETERS SNAPSHOT**

| PARAMETER | SPEC | OBSERVED | STATUS |
|---|---|---|---|
| Paste height | 0.16 to 0.22 mm | Mean 0.190 | Within |
| Reflow peak temp | 238 to 245 C | 241 C | Within |
| AOI major defects | 0 allowed | 0 | Within |
| Torque M2 | 0.35 to 0.45 Nm | 0.41 Nm | Within |

Parameters link to SPC charts and calibration records where required.

Batch steps (12) with sign-offs

Each step includes timestamps, operator identity, and evidence.

Expand all | Jump to deviation

**1. Batch initiation and line clearance** — Complete

Line LN-04 cleared, previous labels removed, station checks complete

Operator **USR-01910** | Start **08:10** | Evidence **EVI-EBR-001**

**2. Material issue and lot scan** — Complete

Scan and confirm lots for paste, PCB boards, and critical components

Material lots captured and reconciled to WIP consumption. WMS ref **GI-78110**.

**3. Setup verification and first article** — Signed

First article inspection required before run release

OP Operator sign
USR-01910 | 08:22

QA QA sign
USR-01102 | 08:34

**4. Execute run, capture parameters**

Deviations and holds summary

One deviation closed. No active holds remaining for this batch.

Open log

Deviation DEV-33019 — Closed

Micro stop event, sensor adjustment, verification passed

**DISPOSITION**

**Continue with corrective maintenance**

CMMS WO-77102

**VERIFICATION**

**Passed**

12:44

Evidence includes equipment check, event timeline snapshot, and maintenance completion note.

Evidence: EVI-DEV-33019 | Linked CAPA: CAPA-22079

**HOLDS**

0 active holds — Clear

Shipment release is not blocked. Any hold would appear here with scope and release approvals.

Attachments (review pack)
Evidence set required for review and audit trace.

Download pack

| | | |
|---|---|---|
| SPC | SPC chart snapshot<br>EVI-EBR-SPC-011.pdf | Open |
| QC | IPQC check sheets<br>EVI-EBR-IPQC-011.zip | Open |
| EVT | Event timeline export<br>EVI-EBR-EVT-011.csv | Open |
| MNT | Maintenance completion note<br>EVI-EBR-CMMS-011.pdf | Open |
| LBL | Label reconciliation report<br>EVI-EBR-LBL-011.pdf | Open |

Review checklist and final approval
Checklist gates final approval to ensure audit readiness.

Approve

| | | |
|---|---|---|
| ✓ | All material lots scanned and reconciled<br>No missing lots or mismatch in consumption posting | Pass |
| ✓ | Critical parameters within spec<br>SPC reviewed and violations addressed | Pass |
| ✓ | Deviations closed with evidence<br>DEV-33019 closed, verification attached | Pass |
| ✓ | Sign-off points completed<br>Operator and QA e-sign captured | Pass |
| • | Final QA review and approval<br>Requires QA manager sign and timestamp | Pending |

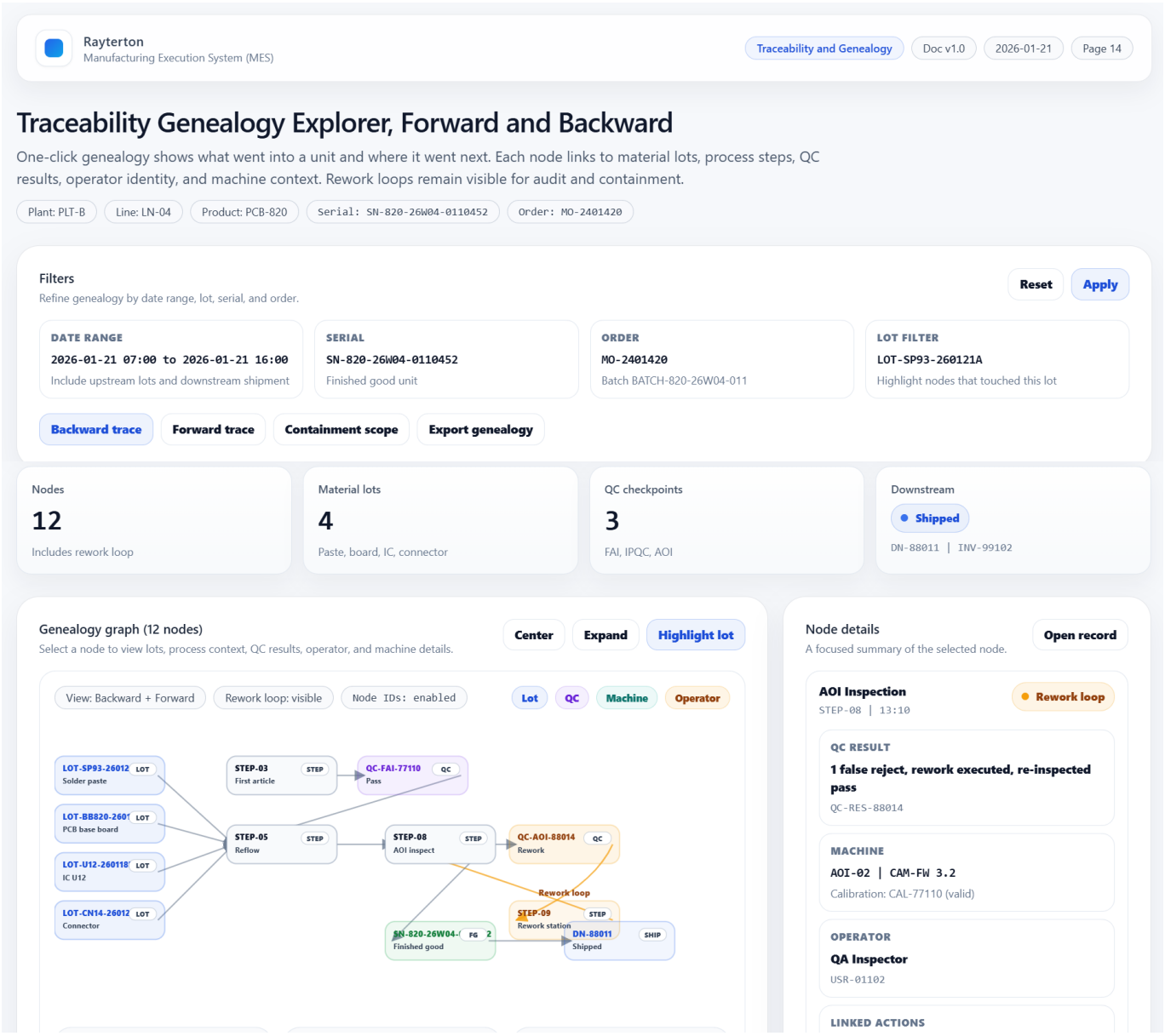
**Sign-off 1: First article release** — Signed
QA USR-01102 | 08:34 | Reason: first article passed

**Sign-off 2: Batch step completion** — Signed
Supervisor USR-00711 | 12:52 | Reason: deviation closed

**Sign-off 3: Final QA approval** — QA gate
Pending, checklist must complete before approval

## Traceability and Genealogy Explorer

Traceability is a core differentiator. The genealogy view supports backward trace from finished good to component lots, process steps, QC results, operators, and machines. Forward trace identifies where a component lot was consumed and where finished goods were shipped. Filters include date range, lot, serial, and order. Rework loops are visible so investigations are accurate.



**SELECTED FINISHED GOOD**

`SN-820-26W04-0110452`

Status: Shipped. Genealogy includes one rework loop after AOI.

`Pack: PK-22019`

`Shipment: DN-88011`

**CONTAINMENT SCOPE**

Use lot filter or process window to find all impacted serials and shipments, then create hold and recall scope if required.

**Create hold**

**Recall scope**

**TRACE LINKS**

`Lots` `Steps` `QC` `Operators` `Machines`

Every node is clickable and carries audit metadata.

Note: Nodes include materials, process steps, QC results, rework loop, pack, and shipment. All events are timestamped and link to audit logs.

**LINKED ACTIONS**

`RWK-11021` | `NOTE-91018`

No shipment block

**View QC evidence** **View audit trail**

Trace tables

Lots, steps, operators, and machines involved.

**Export**

**MATERIAL LOTS**

| MATERIAL | LOT |
|---|---|
| Solder paste SP-93 | LOT-SP93-26012 |
| PCB base board BB-820 | LOT-BB820-2601 |
| IC U12 | LOT-U12-260118 |
| Connector CN-14 | LOT-CN14-26012 |

Lot clicks highlight related nodes and downstream shipments.

**PROCESS STEPS AND CHECKPOINTS**

| STEP | NAME |
|---|---|
| STEP-03 | First Article Inspection |
| STEP-05 | Reflow Profile |
| STEP-08 | AOI Inspection |
| STEP-09 | Rework Station |

Rework loop is preserved and does not hide original inspection failure context.

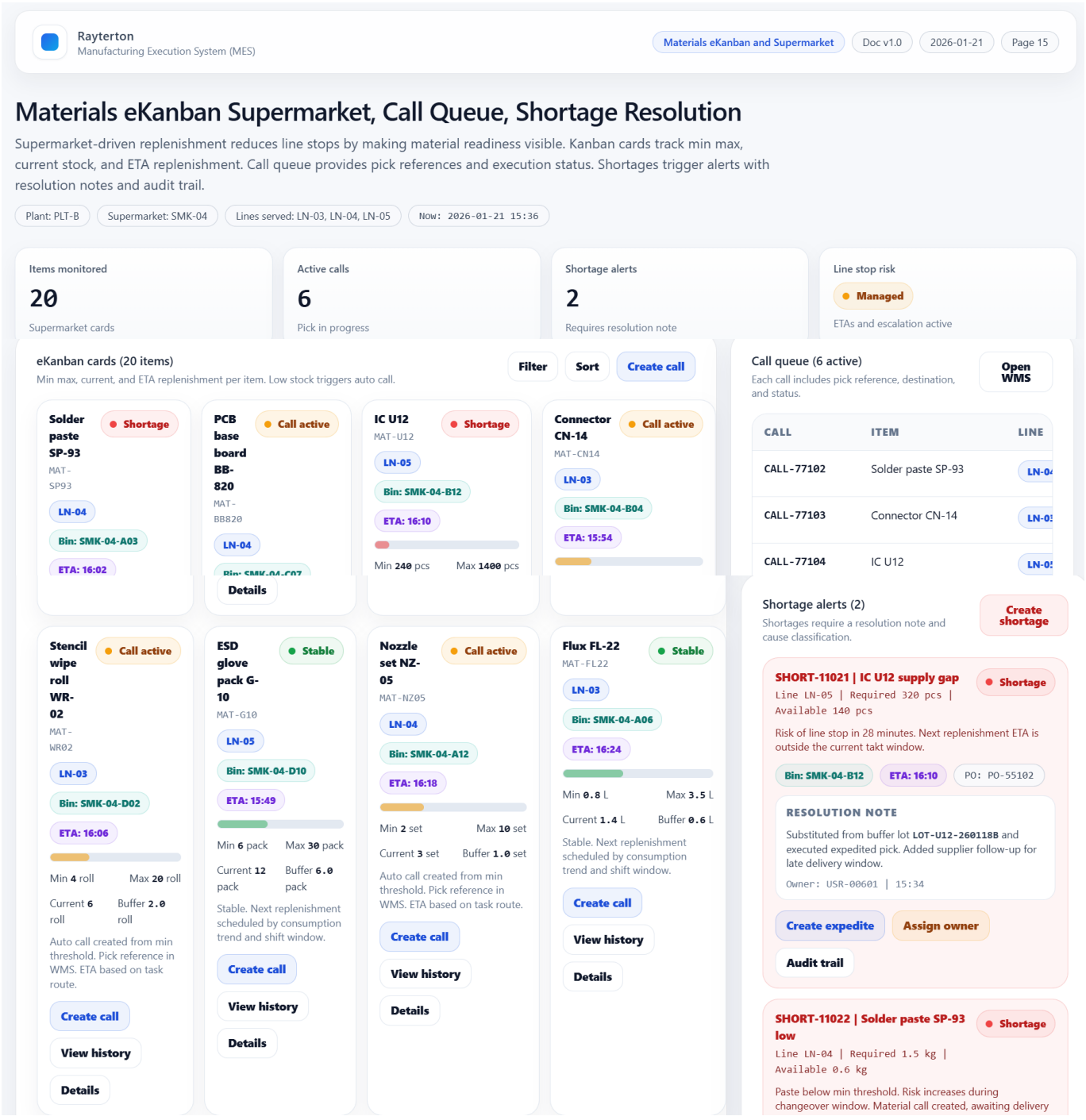
**FORWARD TRACE (SHIPMENT)**

| PACK | DELIVERY |
|---|---|
| PK-22019 | DN-88011 |

Shipment links to WMS postings and customer trace scope.

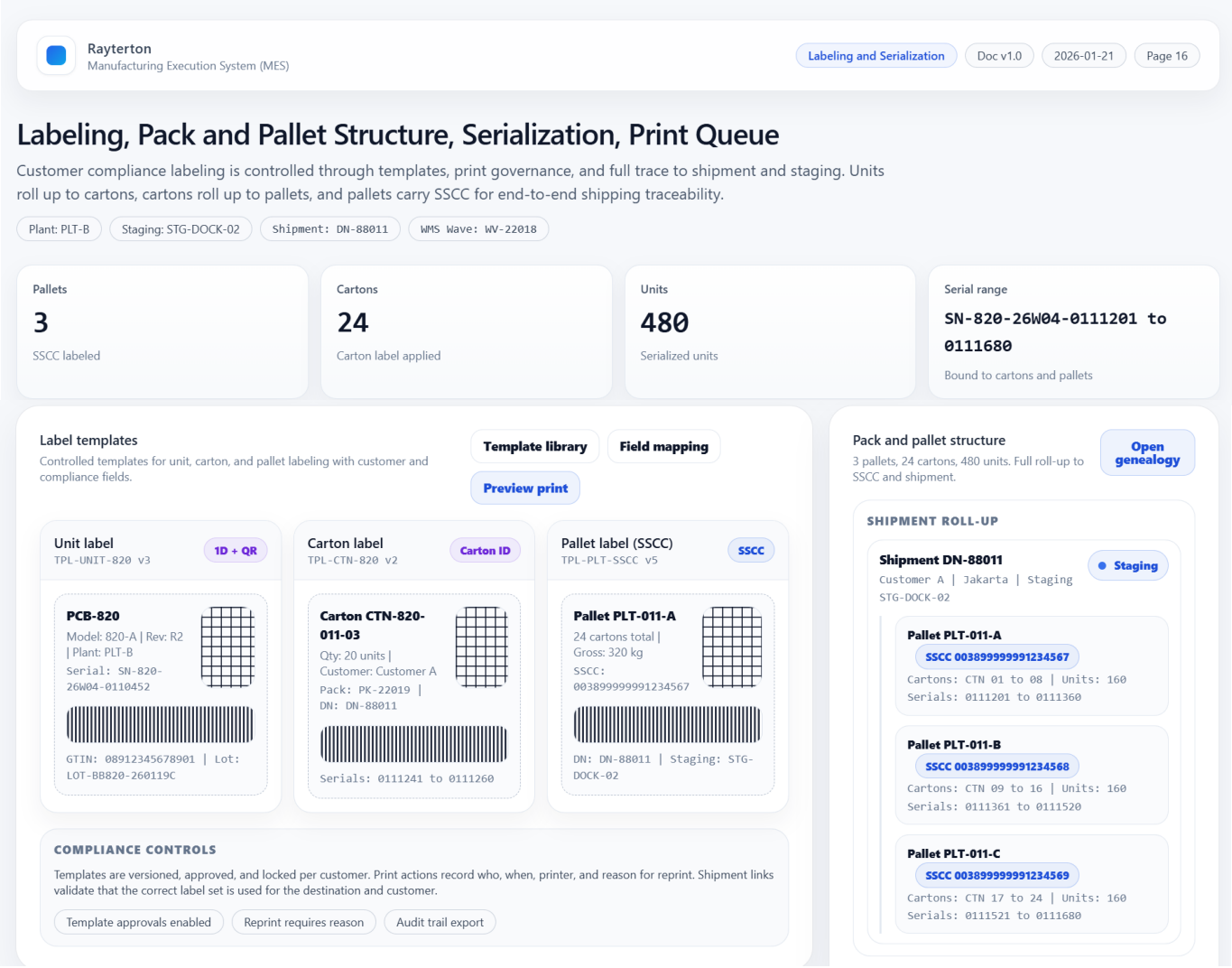
# Materials eKanban, Supermarket Call Queue, and Shortage Handling

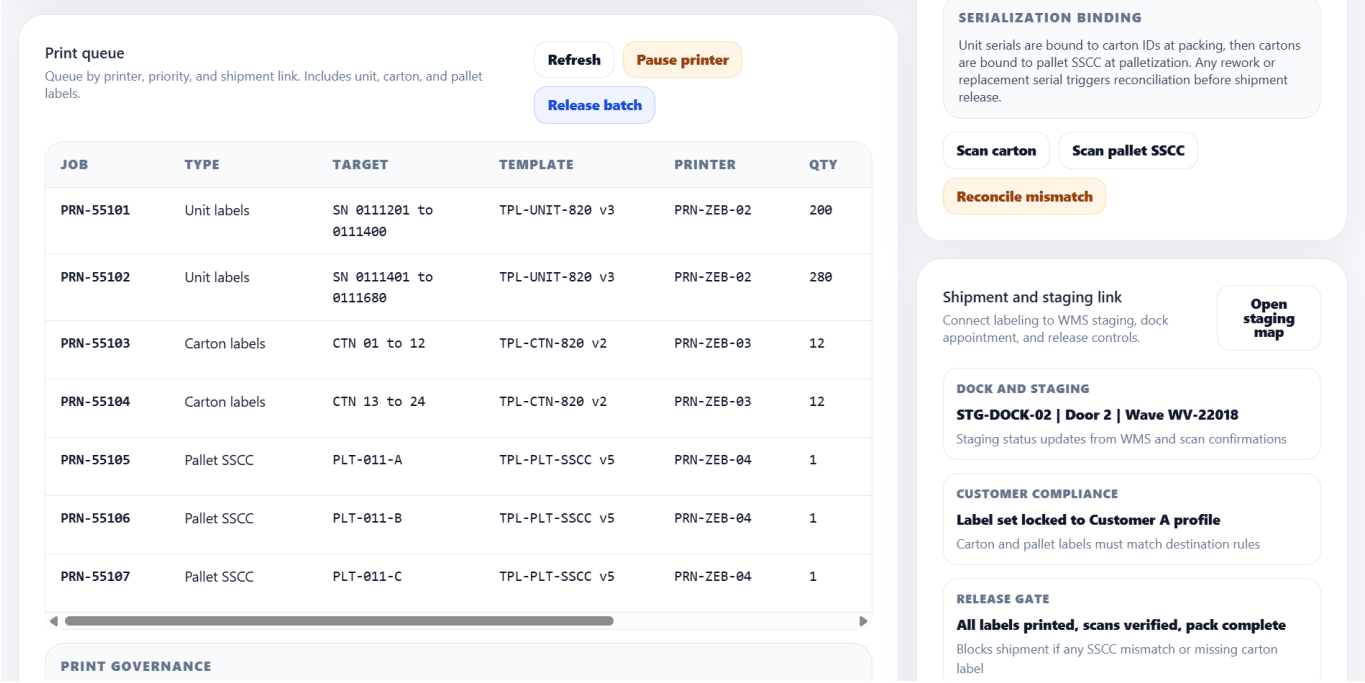
Material readiness is managed proactively to prevent line stops. eKanban cards track min, max, and current stock, plus ETA replenishment. A call queue connects material requests to pick references and execution status. Shortage alerts include the reason and resolution note, so the system remains auditable and repeatable.



## Labeling, Pack, Pallet, Serialization, and Print Queue

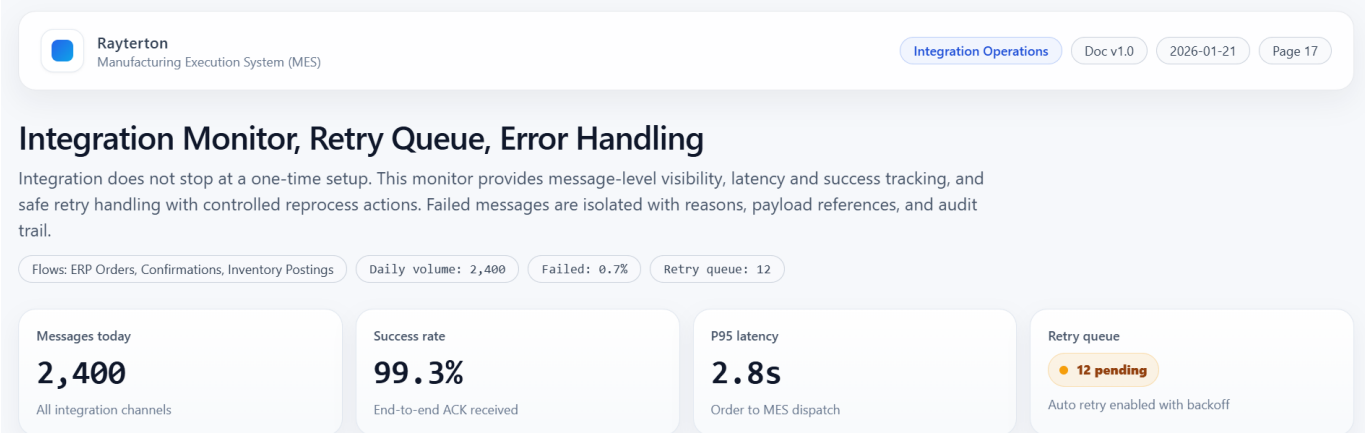
Shipping compliance requires controlled labeling and serialization. Label templates are versioned and linked to customer requirements. The pack and pallet structure connects units to cartons and cartons to pallets with SSCC. Print queue shows jobs, printers, quantities, and status, linked to shipment or staging. Serial ranges are clear and traceable across the hierarchy.






## Integration Monitor, Retry Queue, and Error Handling

Message monitor tracks ERP orders, confirmations, and inventory postings. Latency, success rate, and failed messages are visible with correlation IDs and reason classes. Retry queue supports safe reprocess with idempotency and guardrails. Example operational scale is 2,400 messages per day with 0.7% failed and 12 items in retry queue.



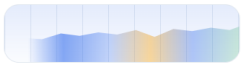
### Message monitor overview

Latency trend, success rate, and failed messages by channel.

Time window | Filter channel | Download report

#### LATENCY TREND (SECONDS)

P50 1.2s | P95 2.8s | Max 9.6s



Spikes correlate with ERP posting bursts.

#### SUCCESS RATE BY HOUR

24h 99.3% | Peak fail 1.1%

Includes ACK and validation checks.

#### FAILED MESSAGES BY CHANNEL

ERP | MES | WMS

| | |
|---|---|
| ERP Orders | 0.2% |
| Confirmations | 0.3% |
| Inventory postings | 0.2% |

Fail rates are calculated from end-to-end delivery confirmations.

#### OPERATIONAL GUARANTEES

Messages are idempotent, ordered per business key when required, and protected with retry backoff. Each failure includes error class, correlation ID, payload hash, and a safe reprocess path that prevents duplicate postings.

Idempotency keys | Correlation IDs | Dead-letter handling | Audit trail

### Controls and actions

Governed reprocess with safeguards.

Open runbook

**RETRY POLICY**
**Auto retry with exponential backoff**
`Max attempts 6 | Backoff 30s to 15m`

**REPROCESS GUARDRAILS**
**Duplicate prevention enabled**
Idempotency and ERP posting status checks

**ALERT ROUTING**
**Ops channel + on-call escalation**
`SLA: P1 10m | P2 30m`

**OBSERVABILITY**
**Metrics, traces, and payload references**
Correlation ID links to logs and dashboards

Retry selected | Reprocess safe | Pause channel | Quarantine

### Message monitor (latest)

Recent messages with latency, status, and error context.

Search | Filter failed | Export

| TIMESTAMP | CHANNEL | MESSAGE TYPE | BUSINESS KEY | LATENCY | CORRELATION ID | STATUS | ERROR / NOTE |
|---|---|---|---|---|---|---|---|
| 2026-01-21 15:52:10 | ERP | Production order intake | MO-2401420 | 1.4s | CORR-260121-1552-9011 | Delivered | ACK received. Mappe dispatch. |
| 2026-01-21 15:51:28 | WMS | Inventory posting, issue | GI-44018 | 3.9s | CORR-260121-1551-8832 | Retry queued | Timeout from WMS c Will retry with backof |
| 2026-01-21 15:50:43 | ERP | Confirmation, yield report | CNF-88201 | 2.2s | CORR-260121-1550-8841 | Delivered | Posted. Duplicate gua check passed. |
| 2026-01-21 15:49:59 | WMS | Inventory posting, receipt | GR-77110 | 5.6s | CORR-260121-1549-7719 | Failed | Validation error: bin n Requires mapping up |

### Retry queue (12 items)

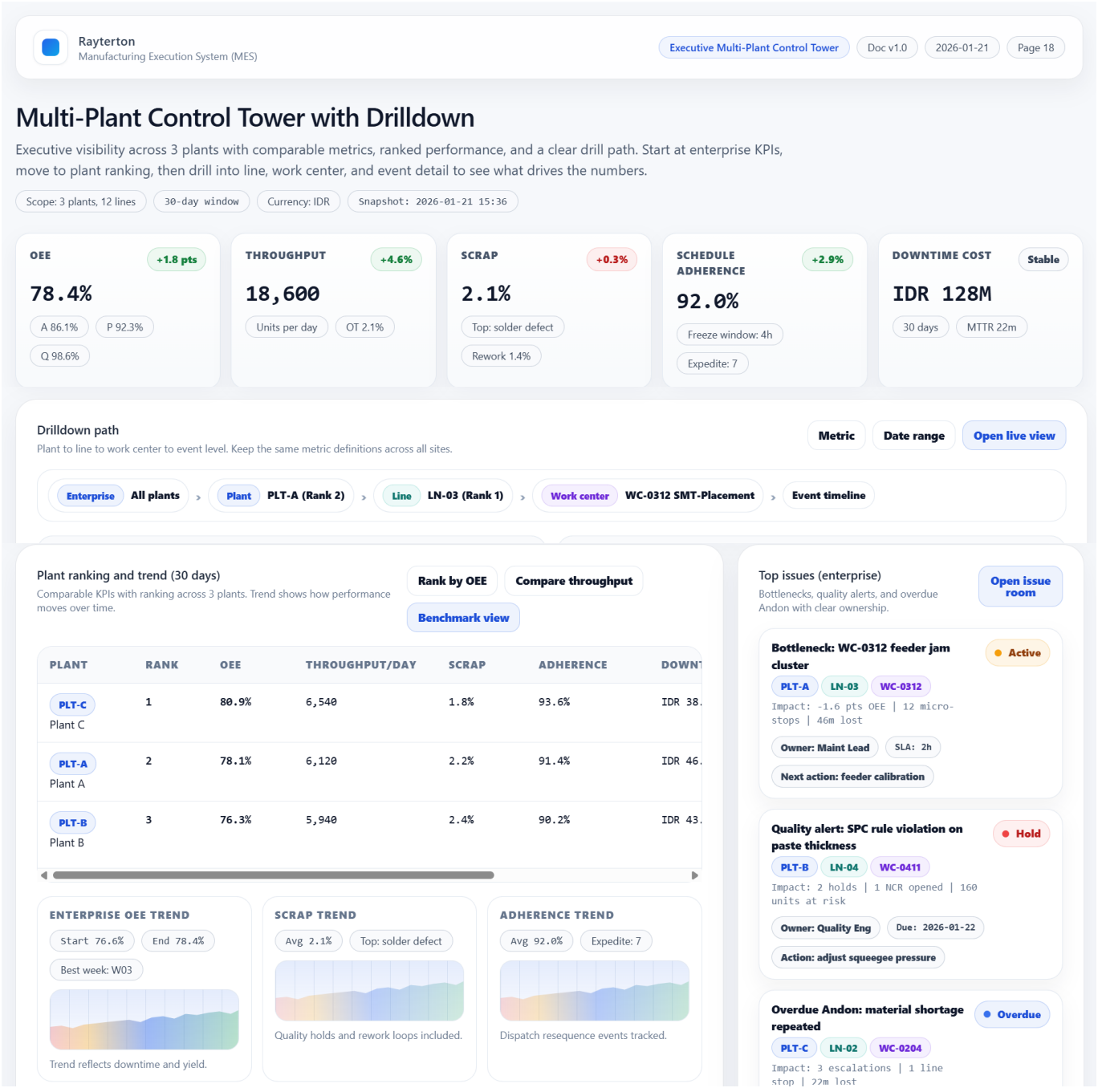
Items awaiting retry or manual intervention. Includes reason, attempt, and next schedule.

Retry all safe | Bulk assign | Quarantine selected

| QUEUE ID | CHANNEL | TYPE | BUSINESS KEY | ATTEMPTS | NEXT RETRY | REASON CLASS | ACTION |
|---|---|---|---|---|---|---|---|
| RQ-99011 | WMS | Inventory posting, receipt | GR-77110 | 2 of 6 | 2026-01-21 15:55 | VALIDATION_BIN_NOT_FOUND | Retry Pa Details |
| RQ-99012 | WMS | Inventory posting, issue | GI-44018 | 1 of 6 | 2026-01-21 15:56 | CONNECTOR_TIMEOUT | Retry Pa Details |
| RQ-99013 | ERP | Confirmation, scrap posting | CNF-88219 | 3 of 6 | 2026-01-21 16:02 | ERP_LOCK_CONFLICT | Retry Pa Details |
| RQ-99014 | ERP | Order update, BOM rev | MO-2401470 | 1 of 6 | 2026-01-21 15:58 | SCHEMA_MISMATCH_FIELD | Reprocess saf Payload Assign owner |
| RQ-99015 | WMS | Staging confirmation | STG-DOCK-02 | 2 of 6 | 2026-01-21 16:04 | WMS_DUPLICATE_ACK | Retry Pa |

## Multi Plant Control Tower with Drilldown

This is the executive view that connects outcomes to root causes. KPI tiles cover OEE, throughput, scrap, schedule adherence, and downtime cost, with 30 day trends. Top issues list highlights bottlenecks, quality alerts, and overdue Andon. Drilldown path is consistent and fast: plant to line to work center to event. Leadership can see ranking across 3 plants and then open the exact event chain behind performance gaps.



## Glossary

**API (Application Programming Interface)**
A standard way for software systems to exchange data automatically.

**BI (Business Intelligence)**
Tools used for reporting, dashboards, and business data analysis.

**CAPA (Corrective and Preventive Action)**
A process to fix quality problems and prevent them from happening again.

**CMMS (Computerized Maintenance Management System)**
Software for managing equipment maintenance and maintenance work orders.

**EBR (Electronic Batch Record)**
A complete digital record for one production batch.

**ERP (Enterprise Resource Planning)**
The main business system for managing orders, finance, inventory, and production.

**IoT (Internet of Things)**
Connected devices and sensors that send machine data to software systems.

**KPI (Key Performance Indicator)**
A key number used to measure performance, such as efficiency or downtime.

**LIMS (Laboratory Information Management System)**
Software for managing laboratory test data and results.

**MES (Manufacturing Execution System)**
Software that controls and tracks shop floor production in real time.

**MRP (Material Requirements Planning)**
A system that calculates what materials are needed for production.

**MTBF (Mean Time Between Failures)**
The average operating time before equipment breaks down.

**MTTR (Mean Time To Repair)**

The average time required to repair equipment after a failure.

**NCR (Nonconformance Report)**

A report for products or processes that do not meet requirements.

**OEE (Overall Equipment Effectiveness)**

A key metric that combines machine availability, speed, and quality.

**PLC (Programmable Logic Controller)**

An industrial computer that controls machines and reads machine signals.

**QMS (Quality Management System)**

Software used to manage quality processes and documentation.

**SCADA (Supervisory Control and Data Acquisition)**

A system for monitoring and controlling industrial processes.

**SLA (Service Level Agreement)**

A defined target time for responding to and resolving issues.

**SPC (Statistical Process Control)**

Statistical methods used to monitor and control process performance.

**SSCC (Serial Shipping Container Code)**

A unique code used to identify pallets and shipping containers.

**WMS (Warehouse Management System)**

Software for managing warehouse operations and inventory.

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