MAINTENANCE AND RELIABILITY PROGRAM ASSESSMENT

# From Firefighting to a Funded Reliability Program

A plant-wide maturity assessment, a dollar baseline of the cost of unreliability, and a gated 18-month roadmap with a funding request built to survive Finance review.

SAMPLE — FICTIONAL DAT

| | |
|---|---|
| CLIENT | Larkspur Valley Foods, Inc. — Plant 2 (cultured dairy, three packaging lines) |
| SCOPE | Maintenance and reliability program, all production and utility assets; 12 months of CMMS, production, and finance data to December 2026 |
| REPORT NO. | PA-2027-001 · Revision 0 · Issued February 2, 2027 |
| METHOD | Apex Reliability Maturity Model (10 elements, mapped to ISO 55001:2024 and the SMRP Body of Knowledge pillars); SMRP metric definitions; 24 interviews, 3-day site walk, document and data review |
| BUILDS ON | Six pilot projects completed at Plant 2: RCA-2026-014, FMECA-2026-007, CA-2026-003, ROI-2026-005, MA-2026-006, PR-2026-008. Their benefits are excluded here. |

**Demonstration document.** Sample report. All company names, people, data, and financial figures are fictional and shown for demonstration only. The structure, methods, and level of detail match Apex Reliability Engineering client deliverables.

# Executive Summary

Decision brief for the Plant Manager, Plant Controller, and Operations Director. Sections 1–6 contain the supporting detail.

**BOTTOM LINE**

Plant 2 loses an estimated **$1,500K a year to unreliability** (range $1,230K–$1,800K), most of it as lost contribution margin during 427 hours of unplanned downtime. The six pilot projects fixed specific assets; the program that would stop new problems does not exist yet (maturity **2.1 of 5**). A gated 18-month program costing **$412K in year 1** and $236K/yr at run rate returns an expected **$289K NPV** over 5 years. The conservative case loses money, so funding is released in stages: **no more than $175K is at risk before the first proof point.**

| COST OF UNRELIABILITY | PROGRAM MATURITY | YEAR-1 FUNDING | EXPECTED NPV, 5 YR | AT RISK BEFORE GATE 1 |
|---|---|---|---|---|
| **$1.50M** | **2.1 → 3.4** | **$412K** | **$289K** | **$175K** |
| Per year; $1,233K addressable after pilot claims | Of 5; target at month 18 | $322K OPEX, $90K CAPEX, 2 FTE | IRR 44%; payback 2.7 yr | Month 6; leading indicators |

## DECISIONS REQUESTED

1. **Approve phase 1**: a maintenance planner/scheduler, CMMS clean-up, and PdM tools ($46,000 CAPEX). Phase 1 spend is capped at $175,000 through month 6.
2. **Pre-approve phases 2 and 3**, released only if Gate 1 (month 6) and Gate 2 (month 12) are met (Section 6).
3. **Track the program in one P&L view** owned by the Controller. 85% of the benefit lands in production margin, not in the maintenance budget that pays for it (Section 3).

## WHAT THE ASSESSMENT FOUND

- **No planner.** 46% of labor hours break the weekly schedule; jobs are kitted 9% of the time.
- **Data cannot support decisions.** 22% of corrective work orders carry a failure code, which is also why the cost range is wide.
- **Earlier funding requests stalled for fixable reasons**: one lump sum, no dollar baseline, and no exit point.
- **Strengths to build on:** criticality and RCA are now at level 3 after the pilots, and the craft team is experienced.

SAMPLE — FICTIONAL DATA


Sample report. All company names, people, data, and financial figures are fictional and shown for demonstration only.

# 1 Baseline: Where the Plant Stands

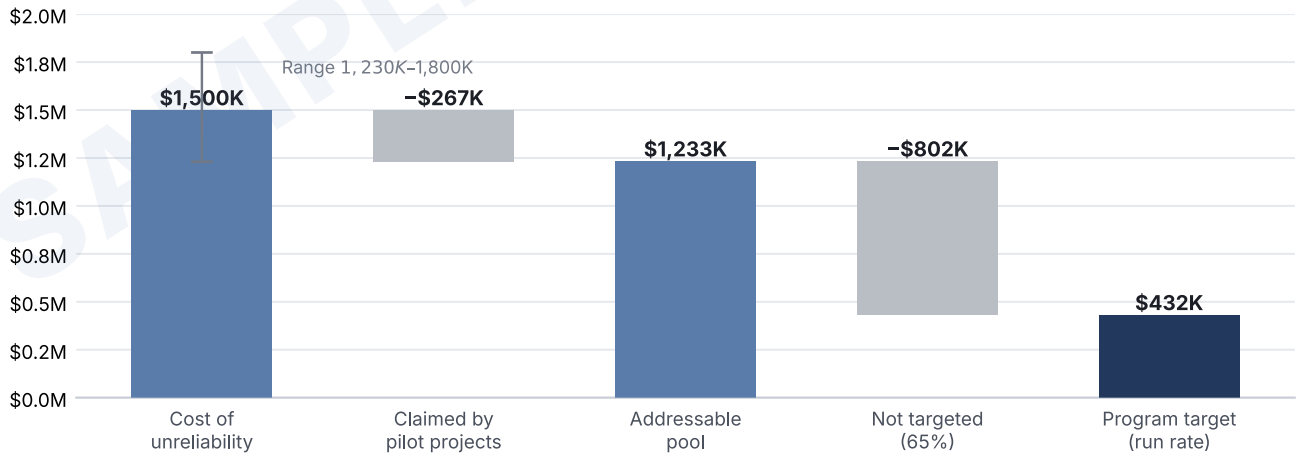
Work-management metrics show a reactive plant. The cost of that, in dollars, is the starting point for the business case.

TABLE 1.1 — PERFORMANCE BASELINE AND TARGETS

| METRIC | SMRP REF. | BASELINE | GATE 1 (M6) | MONTH 18 | COMMONLY CITED REFERENCE | EVIDENCE |
|---|---|---|---|---|---|---|
| Planned work | 5.3.1 | **38%** | 55% | 75% | 80–90% | CONFIRMED |
| Reactive work | 5.4.1 | **46%** | 35% | 20% | below 10% | CONFIRMED |
| Schedule compliance | Work mgmt. | **52%** | 70% | 85% | above 90% | SUPPORTED |
| PM compliance (on time) | Work mgmt. | **71%** | 90% | 95% | above 95% | CONFIRMED |
| Failure-code completion on corrective WOs | — | **22%** | 80% | 90% | Plant standard | CONFIRMED |
| Tier A assets with PdM coverage | — | **35%** | 60% | 100% | 100% of tier A | CONFIRMED |
| Total maintenance cost, % of RAV | 1.5 | **5.0%** | Monitor | Monitor | Not a target alone | CONFIRMED |
| Stocked MRO inventory, % of RAV | 1.4 | **2.3%** | — | 2.1% | Industry-specific | CONFIRMED |

Metric definitions follow SMRP Best Practices (6th ed.), using maintenance labor hours as the denominator. Reference values are commonly cited ranges, not SMRP-published targets; SMRP's own targets are in its copyrighted Best Practices document and should be checked there. Maintenance cost as a percent of RAV is monitored, not targeted: SMRP cautions that lower maintenance cost does not by itself mean better performance.

FIGURE 1.1 — FROM COST OF UNRELIABILITY TO THE PROGRAM TARGET (ANNUAL, EXPECTED)




The whisker on the first bar is the $1,230K–$1,800K range. Benefits already claimed by the pilot projects are removed before the program's target is set, so nothing is counted twice.

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# 1 Baseline (continued)

What the cost is made of, how the downtime figure was built, and what the data does and does not support.

TABLE 1.2 — COST OF UNRELIABILITY, 12 MONTHS

| COMPONENT | ANNUAL |
|---|---|
| Unplanned downtime, lost contribution | $1,175,425 |
| Overtime premium on breakdown work | $106,600 |
| Product loss and re-sanitation | $96,000 |
| Expedited parts and freight | $64,000 |
| Emergency contractor call-outs | $58,000 |
| **Total (expected)** | **$1,500,025** |

TABLE 1.3 — EXCLUDED: ALREADY CLAIMED BY PILOTS

| PROJECT | ANNUAL |
|---|---|
| FMECA-2026-007 (Line 3 filler, includes RCA-2026-014) | $194,843 |
| ROI-2026-005 (HG-1, option O2), year-1 savings | $56,264 |
| MA-2026-006 (HG-1 window overrun) | $15,600 |
| **Addressable pool** | **$1,233,318** |

TABLE 1.4 — UNPLANNED DOWNTIME BY AREA

| AREA | UNPLANNED HOURS | BLENDED $/H | ANNUAL COST | SOURCE OF HOURS |
|---|---|---|---|---|
| Line 1 (cups) | 130 | $2,305 | $299,650 | Production downtime log |
| Line 2 (bottles) | 105 | $2,005 | $210,525 | Production downtime log |
| Line 3 (cups, high speed) | 150 | $2,615 | $392,250 | Production downtime log |
| Process and utilities (stops all lines) | 42 | $6,500 | $273,000 | Production downtime log |
| **Total** | **427** | | **$1,175,425** | |

Line rates are lost contribution margin, with half the lost volume assumed recovered on overtime at recovery cost (method of FMECA-2026-007). Process and utility stops use the $6,500/h rate from ROI-2026-005 because they halt all three lines.

### WHAT THE EVIDENCE SUPPORTS

- CONFIRMED Downtime hours, from the production log, reconciled to shift reports.
- CONFIRMED Overtime, contractor, and expedite spend, from the general ledger.
- CONFIRMED Work-management metrics, from 14,100 CMMS work orders.
- SUPPORTED Product loss and re-sanitation, from QA hold records; some events are not coded to a cause.

### WHAT IT DOES NOT SUPPORT YET

With 22% failure-code completion, downtime cannot be split reliably by failure mode or asset outside the pilot areas. That is why the cost is given as a range (−18% / +20%) and why the program's target is set as a share of the pool, not as a list of asset fixes. **A bad-actor list is a month-6 deliverable, not an input to this report.**

### HOW THE 18% / 20% RANGE WAS SET

Low end: assumes downtime that the log marks “unassigned” (11% of hours) was partly planned, and product-loss events without a cause code were not reliability-related. High end: adds minor stops under 10 minutes, which the log does not capture but operator interviews put at 30–60 hours a year. INFERENCE

SAMPLE — FICTIONAL D

# 2 Program Maturity

Ten elements scored 1–5 against the rubric in Appendix A. The pilots lifted criticality and RCA; the foundations they depend on (planning, data, lubrication) are still at level 1.5.

FIGURE 2.1 — MATURITY BY ELEMENT, NOW AND 18-MONTH TARGET

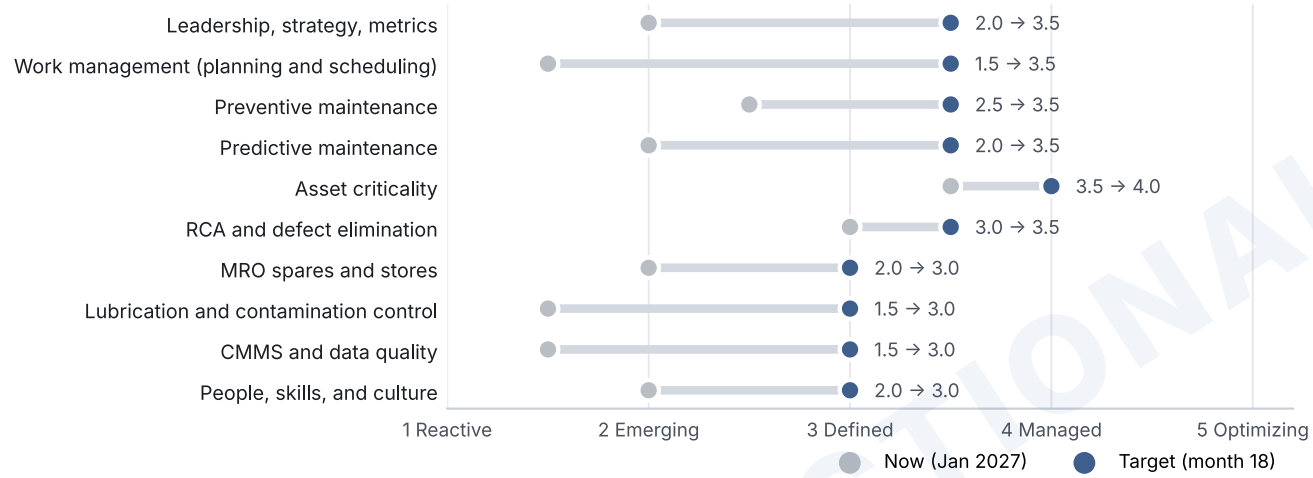



TABLE 2.1 — ELEMENT FINDINGS

| ELEMENT | ISO 55001 | SMRP PILLAR | NOW | KEY EVIDENCE | GRADE | MAIN GAP |
|---|---|---|---|---|---|---|
| **Leadership, strategy, metrics** | Cl. 5, 6, 9 | 1, 4 | **2.0** | No maintenance strategy or KPI review; downtime reported in hours, never dollars | CONFIRMED | No one owns reliability across maintenance and production |
| **Work management (planning and scheduling)** | Cl. 8 | 5 | **1.5** | No planner; 46% of labor hours break the weekly schedule; jobs kitted 9% of the time | CONFIRMED | Technicians plan their own jobs on the fly |
| **Preventive maintenance** | Cl. 8 | 3 | **2.5** | 1,773 PM h/yr; 41% of tasks are inspect-only with no acceptance criteria | CONFIRMED | PM content not tied to failure modes |
| **Predictive maintenance** | Cl. 8, 9.1 | 3 | **2.0** | Quarterly contract vibration on 35% of tier A; no oil analysis trending; IR annual | CONFIRMED | Coverage gaps on tier A; findings not tracked to closure |
| **Asset criticality** | Cl. 6.1, 6.2 | 3 | **3.5** | CA-2026-003 complete: 36 assets ranked, tiers in CMMS | CONFIRMED | Extend to remaining 140 tier C assets |
| **RCA and defect elimination** | Cl. 10 | 2 | **3.0** | RCA-2026-014 run to standard; no trigger criteria or action tracking | SUPPORTED | RCA happens by exception, not by rule |
| **MRO spares and stores** | Cl. 7.1, 8 | 1 | **2.0** | 2,180 stocked items; 31% no movement in 24 months; 14 stock-outs on tier A in 2026 | CONFIRMED | Stock set by habit, not criticality |
| **Lubrication and contamination control** | Cl. 8 | 3 | **1.5** | Open containers in a shared room; no lube routes; FMECA found water ingress | CONFIRMED | No storage, filtration, or route standard |
| **CMMS and data quality** | Cl. 7 | 5 | **1.5** | 22% failure-code completion; 38% of WOs closed with no labor hours | CONFIRMED | Data cannot support bad-actor or MTBF analysis |
| **People, skills, and culture** | Cl. 7.2, 7.3 | 4 | **2.0** | No skills matrix; reactive work praised in shift handover; strong craft experience | INFERENCE | Firefighting rewarded more than prevention |

Element scores are a structured judgment, not a measurement; the grade shows the strength of the evidence behind each score. SMRP pillars: 1 Business and management, 2 Manufacturing process reliability, 3 Equipment reliability, 4 Organization and leadership, 5 Work management.

SAMPLE — FICTIONAL D

# 3 Why Earlier Funding Requests Stalled

Plant 2 asked for a planner and PdM tools in 2024 and 2025. Both requests were declined. The reasons were about the request, not the need.

TABLE 3.1 — WHAT STALLED THE EARLIER REQUESTS, AND HOW THIS PROPOSAL ANSWERS IT

| WHY IT STALLED | EVIDENCE | HOW THIS PROPOSAL ANSWERS IT |
|---|---|---|
| **One lump sum, all or nothing** | 2025 request: $310,000 in one line; review notes say "too large to approve without proof" | Three phases. Only phase 1 is at risk; phases 2–3 release on measured gates. |
| **No dollar baseline** | Benefits stated as "reduce downtime"; downtime reported in hours only | A $1,500K cost baseline, reconciled to the ledger and the downtime log, with a stated range. |
| **Cost and benefit in different budgets** | Headcount charged to maintenance; benefits land in production margin, which maintenance does not report | One program P&L view owned by the Controller (Table 3.2). |
| **No measure of success or exit point** | No KPIs, review dates, or stop criteria in either request | Two gates with numeric thresholds and pre-agreed actions (Section 6). |
| **Requested by maintenance alone** | Neither request had a production or finance sponsor | Joint sponsorship: Plant Manager owns the program; Controller validates the benefit. |

## WHO PAYS AND WHO BENEFITS (YEAR 3, EXPECTED RUN RATE)

TABLE 3.2 — BUDGET VIEW

| ITEM | ANNUAL |
|---|---|
| Program OPEX (maintenance budget) | −$236,000 |
| Benefit landing in maintenance budget | $65,784 |
| **Net change, maintenance budget** | **−$170,216** |
| Benefit landing in production margin | $365,877 |
| **Net change, plant** | **$195,661** |

### WHY THIS MATTERS TO FINANCE

Judged on the maintenance budget alone, the program looks like a $170K/yr cost increase, and maintenance cost rises from 5.0% to 5.3% of RAV. Judged at plant level, it adds $196K/yr. Earlier requests were judged on the first view. **The decision belongs at plant level, with benefits validated by the Controller, not claimed by maintenance.**

SAMPLE — FICTIONAL D

# 4 18-Month Roadmap

Foundations first. Planning, data, and condition monitoring come before PM optimization, because PM optimization needs the failure data that phase 1 creates.

TABLE 4.1 — WORKSTREAMS BY QUARTER

| WORKSTREAM | OWNER | ELEMENT | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 |
|---|---|---|---|---|---|---|---|---|
| **PHASE 1 · STABILIZE (MONTHS 1–6)** | | | | | | | | |
| Hire planner/scheduler; weekly schedule, kitting, backlog review | Maint. Mgr. | Work mgmt. | ■ | ■ | ■ | ■ | ■ | ■ |
| CMMS clean-up; failure codes to ISO 14224; WO closure standard | Planner | CMMS | ■ | ■ | | | | |
| PdM tools; tier A vibration, IR, and oil routes; findings tracked to closure | Maint. Mgr. | PdM | | ■ | ■ | ■ | ■ | ■ |
| RCA trigger rules and action tracking | Ops Mgr. | RCA | ■ | ■ | | | | |
| Monthly KPI review; program P&L view set up with Controller | Plant Controller | Leadership | ■ | ■ | ■ | ■ | ■ | ■ |
| **PHASE 2 · PREVENT (MONTHS 7–12, AFTER GATE 1)** | | | | | | | | |
| Hire reliability engineer | Plant Mgr. | People | | | ■ | | | |
| PM optimization on tier A, tied to failure modes | Reliability Eng. | PM | | | ■ | ■ | ■ | |
| Lubrication program: storage, filtration, routes | Reliability Eng. | Lubrication | | | ■ | ■ | | |
| Spares rationalization by criticality; stores reorganization | Stores, Rel. Eng. | MRO | | | ■ | ■ | ■ | |
| **PHASE 3 · SUSTAIN (MONTHS 13–18, AFTER GATE 2)** | | | | | | | | |
| Skills matrix and craft qualification | Maint. Mgr. | People | | | | ■ | ■ | ■ |
| Design-for-maintainability standard (MA-2026-006) in capital process | Engineering | Leadership | | | | ■ | ■ | |
| Extend criticality to remaining tier C assets | Reliability Eng. | Criticality | | | | ■ | ■ | ■ |

Q1 starts at approval. Gate 1 falls at the end of Q2 and Gate 2 at the end of Q4. Phase 2 starts only if Gate 1 is met.

TABLE 4.2 — PROGRAM COST BY YEAR

| ITEM | TYPE | YR 1 | YR 2 | YR 3+ |
|---|---|---|---|---|
| Maintenance planner/scheduler (1 FTE, loaded) | OPEX · headcount | $96.0K | $96.0K | $96.0K |
| Reliability engineer (1 FTE from month 7, after Gate 1) | OPEX · headcount | $64.0K | $128.0K | $128.0K |
| External program support (Apex) | OPEX | $72.0K | $24.0K | $0.0K |
| CMMS clean-up and failure-code build | OPEX · one-time | $22.0K | $0.0K | $0.0K |
| Training and qualification | OPEX | $38.0K | $12.0K | $12.0K |
| Implementation backfill (internal labor) | OPEX · one-time | $30.0K | $0.0K | $0.0K |
| **OPEX total** | | **$322.0K** | **$260.0K** | **$236.0K** |
| PdM tools: vibration analyzer and software, IR camera, ultrasound | CAPEX | $46.0K | — | — |
| Lubrication storage and filtration | CAPEX | $26.0K | — | — |
| Stores reorganization (bins, labels, cages) | CAPEX | $18.0K | — | — |
| **Total** | | **$412.0K** | **$260.0K** | **$236.0K** |

SAMPLE — FICTIONAL DATA

# 5 Financial Case

Expected value is positive and robust to cost overruns; it is not robust to slow adoption. That is the risk the gates are built to catch.

TABLE 5.1 — RESULTS BY SCENARIO (5 YR, 10% HURDLE, PRE-TAX)

| SCENARIO | POOL REDUCTION | RUN-RATE BENEFIT | NPV | IRR |
|---|---|---|---|---|
| Conservative | 21% | $259K/yr | −$275K | -34% |
| **Expected** | **35%** | **$432K/yr** | **$289K** | **44%** |
| High impact | 45% | $555K/yr | $631K | 80% |

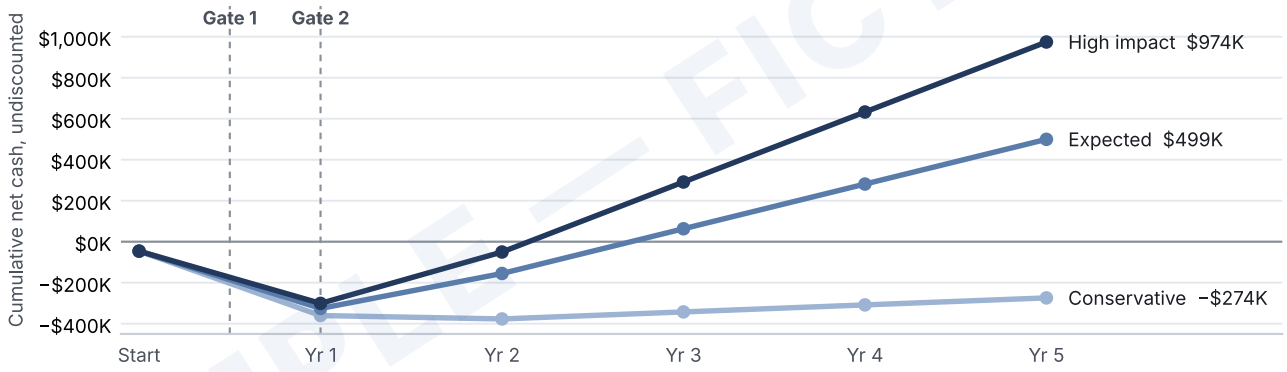
Benefits ramp 20% / 65% / 100% over years 1–3. MRO release of $150K in year 2 (50% in the conservative case) is working capital, beyond the release already counted in CA-2026-003; carrying-cost savings at 15%/yr follow.

TABLE 5.2 — STRESS TESTS ON THE EXPECTED CASE

| STRESS APPLIED | NPV |
|---|---|
| **Base case (expected)** | **$289,107** |
| Benefits arrive one year late | −$91,596 |
| Program costs +25% | $19,446 |
| No MRO release | $118,897 |
| COUR at low end of range | $26,937 |

**Break-even:** the program pays at the hurdle rate if it removes 27% of the addressable pool, against 35% expected.

FIGURE 5.1 — CUMULATIVE NET CASH BY SCENARIO




Year 1 is negative in every scenario: headcount starts before the benefit does. The scenarios separate in year 2, which is why Gate 2 sits at month 12.

TABLE 5.3 — EXPECTED CASH FLOWS

| | START | YR 1 | YR 2 | YR 3 | YR 4 | YR 5 |
|---|---|---|---|---|---|---|
| Reliability benefit | — | $86.3K | $280.6K | $431.7K | $431.7K | $431.7K |
| MRO release and carrying cost | — | $0.0K | $150.0K | $22.5K | $22.5K | $22.5K |
| Program OPEX | — | −$322.0K | −$260.0K | −$236.0K | −$236.0K | −$236.0K |
| CAPEX | −$46.0K | −$44.0K | — | — | — | — |
| **Net cash** | **−$46.0K** | **−$279.7K** | **$170.6K** | **$218.2K** | **$218.2K** | **$218.2K** |

**ACCOUNTING TREATMENT**

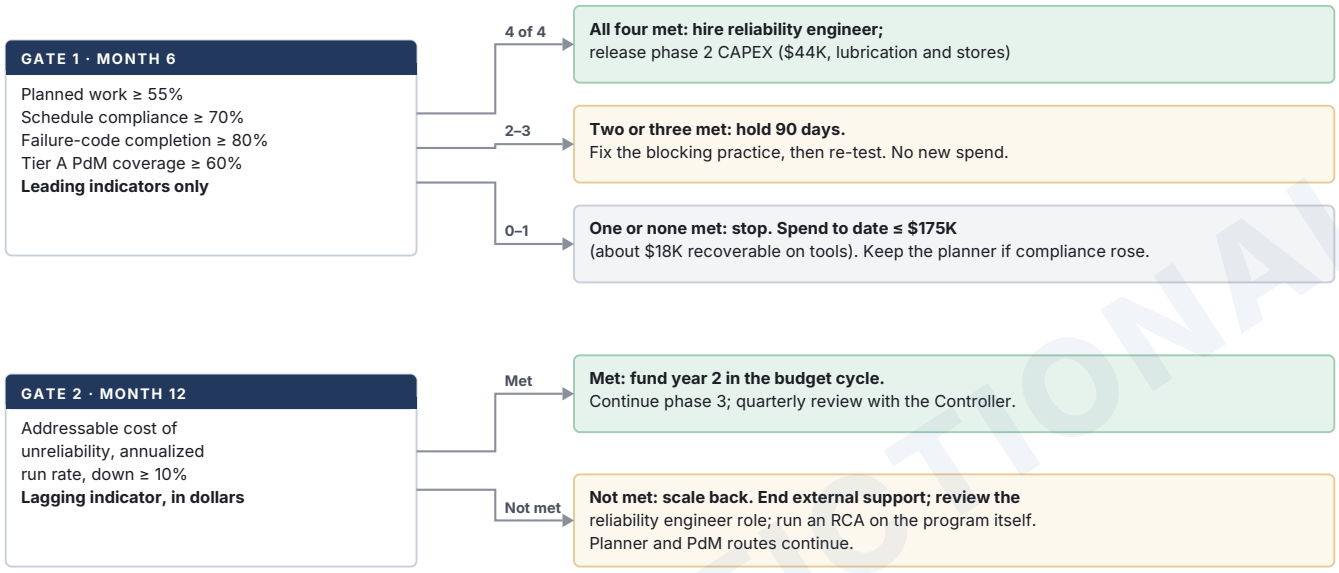
Headcount, support, training, and CMMS work are OPEX and hit the P&L in the year incurred. Tools and storage ($90,000) are CAPEX, depreciated over 5–7 years under the plant's policy; bonus depreciation may apply if the Controller elects it. The MRO release improves working capital and cash, not EBITDA. Two FTE are added to the maintenance headcount plan.

SAMPLE — FICTIONAL DATA

# 6 Gates, Governance, and Approval

Each gate has numeric thresholds and a pre-agreed action, so a weak result leads to a smaller program, not a debate.

### FIGURE 6.1 — GATE DECISION TREE




Thresholds sit between the expected path (about 14% run-rate reduction at month 12) and the conservative path (about 8%), so the gates separate the two.

### TABLE 6.1 — GOVERNANCE

| FORUM | CADENCE | OWNER |
|---|---|---|
| Weekly schedule and backlog review | Weekly | Planner, Maintenance Mgr. |
| Reliability review: KPIs, bad actors, RCA actions | Monthly | Reliability Eng., Ops Mgr. |
| Program P&L and benefit validation | Quarterly | Plant Controller |
| Gate decisions | Months 6, 12 | Plant Manager |

### TABLE 6.2 — PROGRAM RISKS

| RISK | MITIGATION |
|---|---|
| Planner pulled into breakdowns | Written role charter; breakdown hours tracked |
| Benefit claimed but not real | Controller validates against the ledger and downtime log |
| Hiring delay | Gate dates move with the start date, not the approval date |

### APPROVAL ROUTING

**Prepared by**
Lead Reliability Engineer, Apex Reliability Engineering — Signature — Date

**Benefit baseline validated**
Plant Controller — Signature — Date

**Program sponsor**
Plant Manager — Signature — Date

**Headcount approval**
Operations Director — Signature — Date

SAMPLE — FICTIONAL D

# A Scoring Rubric and References

TABLE A.1 — APEX RELIABILITY MATURITY MODEL: LEVEL DEFINITIONS

| LEVEL | WHAT IT LOOKS LIKE |
|---|---|
| **1 Reactive** | Work is driven by failures. Practices depend on individuals and are not written down. Data is missing or unused. |
| **2 Emerging** | Some practices exist but are applied unevenly. Results are tracked in places, rarely acted on. |
| **3 Defined** | Practices are written, applied across the plant, and owned. Basic metrics are reviewed on a schedule. |
| **4 Managed** | Practices are measured against targets and corrected when off track. Decisions use reliability data and cost. |
| **5 Optimizing** | Continuous improvement is routine. Reliability is designed in at purchase and modification. Results are sustained through staff changes. |

Half-point scores mean most, but not all, of the next level's criteria are met. Each element has 6–10 scored criteria in the full assessment workbook, provided to the client.

TABLE A.2 — EVIDENCE BASE

| SOURCE | SCOPE |
|---|---|
| Interviews | 24: plant leadership, maintenance, production, QA and food safety, stores, finance |
| Site walk | 3 days, all shifts; stores, lube room, shops, three lines, utilities |
| CMMS extract | 14,100 work orders, 2,180 stocked items, PM library (12 months) |
| Production and finance | Downtime log, QA hold records, general ledger (maintenance accounts), 2024 and 2025 funding requests |

TABLE A.3 — STANDARDS AND REFERENCES

| REFERENCE | TITLE AND USE |
|---|---|
| **ISO 55001:2024** | Asset management — Asset management system — Requirements. Clause mapping of maturity elements. |
| **SMRP Best Practices, 6th ed.** | Maintenance and reliability metric definitions and the five-pillar Body of Knowledge. Metric definitions (1.4, 1.5, 5.3.1, 5.4.1). |
| **ISO 14224:2016** | Collection and exchange of reliability and maintenance data for equipment. Failure-code structure for the CMMS clean-up. |
| **IEC 60300-3-3:2017** | Dependability management — Life cycle costing. Program cost structure. |
| **Plant 2 pilot reports** | RCA-2026-014, FMECA-2026-007, CA-2026-003, ROI-2026-005, MA-2026-006, PR-2026-008. Downtime rates and excluded benefits. |

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