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SAMPLE DELIVERABLE

Site Assessment Analysis and Report

Batch Consistency and Right-First-Time

Halvren Bonding Systems | Calder Falls Plant

PREPARED FOR

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SITE VISIT · REPORT ISSUED

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Sample deliverable. This report is a composite. Company names, people, locations, and figures have been changed to protect client confidentiality. The method, analysis, and recommendations reflect our work.

How to Read This Sample

This is a sample of the report a Webineering site assessment delivers. It is a composite. Company names, people, locations, and figures have been changed to protect client confidentiality. The method, the analysis, and the recommendations reflect our work.

What each part of the report shows:

Report section	What it shows
3.1–3.3 Right-first-time, vessel time, and failure causes	Batch-level quality and capacity analysis from QC results and batch records
3.4 Execution on the floor	What operators and shift leads do when the plant is busy, gathered on every shift
3.5 Cleaning and changeovers	Post-clean vessel scoring and changeover sequencing
3.6 Batch records and data	Record completeness and what the data can and cannot answer
3.7 Shift leadership	Tier meetings, leader standard work, and 5S
5.1 and Appendix D Metrics	Quality and flow metrics with formulas, benchmarks, and sequencing

Engagement at a Glance

Item	Detail
Question we were asked	Why do the same formulas come out differently from shift to shift, and what is that costing the plant?
Duration	2-week pre-visit data review, 3 days on site covering every shift, 2.5 weeks of post-visit analysis
Evidence base	13 months of QC results, 1,248 batch records from May to July 2026, vessel PLC logs on 6 vessels, a 14-vessel post-clean audit, 31 structured interviews
Areas covered	Raw material dispensing, 14 mixing vessels, QC lab, cleaning, four packaging lines, warehouse staging
Deliverables	This report, the batch-failure and vessel-time models behind it, and a 90-day action plan with owners

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2 Background & Context
3 Site Assessment: Current State
4 Immediate Action Plan (0–90 Days)
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1 Executive Summary

Calder Falls can raise right-first-time from 71% to 80% within 90 days and to 88% within six months, mostly by making second and third shift run the process the way first shift already does. Batches that fail their first QC test cost the plant an estimated $2.1M–$2.6M a year and tie up 12% of its staffed mixing-vessel time in adds and re-tests. Fixing the three main failure causes and the cleaning routine frees about 200 vessel-hours a week in the first 90 days, more than the staffed week of one and a half additional mixing vessels.

These are order-of-magnitude estimates built from operating data. They exclude the margin at risk with the plant's largest OEM customer, which has issued two corrective action requests in six months.

What Changed at Calder Falls

Calder Falls is the largest plant in Halvren Bonding Systems, a platform its private equity sponsor assembled through three acquisitions. Over the past year, two product lines moved in from a closed site, volume rose 22%, and a third shift was added in February 2026.

First shift absorbed the growth well. Second shift lost its most experienced lead to retirement in January, turned over 41% of its operators in 12 months, and now runs with 9 of 23 operators who have been in the job less than six months. The formulas are the same as a year ago. The crew and leadership making them on second shift are what changed.

Where We Stand

Measure	Current	Target
Right-first-time, all shifts (May to July 2026)	71%	88%
Right-first-time, first / second / third shift	79% / 64% / 68%	88% on every shift
Batches needing adds, reblends, or scrap	362 of 1,248 in 13 weeks	Under 150
Share of staffed vessel time making good product	52%	70%
Customer complaints per 100 shipments	1.9, up from 1.1	Under 1.0

Why Batches Fail

Three causes explain 72% of first-time failures: viscosity out of range, cure or skin time out of range, and color out of tolerance. Each traces to a step on the floor. Partial filler bags counted as full, mix and vacuum times cut short when a shift falls behind, catalyst additions made without a second check, and samples drawn before the batch is fully mixed.

The plant's procedures describe the right steps. On first shift they are followed. On second and third shift, new operators learn by shadowing, two of six floor scales are out of calibration, and a skipped step stays invisible until QC tests the batch.

Where the Vessel Time Goes

Of each vessel's 120 staffed hours a week, 52% go to productive mixing. Cleaning takes 14%, adds and re-tests 12%, waiting for QC 8%, waiting for materials 7%, and idle time 7%. Only 3 of 14 vessels met the plant's own cleanliness standard after a wash, and residue causes 49 of the 362 failures.

What to Do Now (0–90 Days)

Phase 1 uses standard work, scheduling, and shift leadership. It needs no capital beyond scale calibration and a few PLC timer changes.

- Lock the four critical steps on every shift: weigh every charge, verify catalyst and pigment with a second person, enforce minimum mix and degas times, and sample at a fixed point.
- Build a qualification matrix for second and third shift, name an acting second-shift lead, and pair every new operator with a qualified one.
- Publish a visual cleaning standard with a check before every charge, and sequence batches light to dark within product families.
- Put QC coverage on third shift and an in-process viscosity check at the vessel.
- Run tier meetings on every shift with right-first-time on the board, and review the top three failures each day.
- Redesign the batch record to one page and check completeness before release.

What to Build Toward (3–12 Months)

Phase 2 makes consistency hold without heroics: electronic batch records with scale integration, statistical control on viscosity and cure, incoming checks on the raw materials that drive variation, controlled master batch instructions, and a training and qualification program. Phase 3 carries the standard to the platform's other two plants, which is where the sponsor's integration thesis pays off.

Recommendation

Start Phase 1 within two weeks, led by the plant manager with a daily right-first-time review. Webineering recommends a structured implementation engagement that measures progress against this baseline and builds the standard the other two plants will adopt.

2 Background & Context

Calder Falls is now the center of the platform's integration plan. Its consistency sets the quality the sponsor can promise customers across all three companies it has combined.

2.1 Halvren and the Sponsor's Integration Thesis

Halvren Bonding Systems makes sealants and structural adhesives for building products, transportation OEMs, and private-label retail. A mid-market private equity sponsor formed the platform in 2024 through three acquisitions and has a three-to-five-year plan built on margin expansion and consolidation of production.

Consolidation moves volume into the plants that can make it most reliably. Calder Falls already produces 55% of the platform's volume and has received two product lines from a closed site. If it cannot make them consistently, the consolidation plan stalls and the platform carries the cost of poor quality into its valuation.

2.2 The Calder Falls Plant

Attribute	Detail
Facility	168,000 sq ft batch manufacturing and packaging plant
Headcount	182 employees
Shipments	About $7M per month
Operating pattern	Three shifts Monday to Friday; third shift added February 2026
Products	MS-polymer and polyurethane sealants, structural adhesives; about 640 active SKUs from 210 formulas
Process	Raw material dispensing, 14 planetary and dual-shaft mixing vessels from 100 to 1,000 gallons, QC lab release, four packaging lines (cartridge, sausage, pail, drum)
QC lab	Three technicians: two on first shift, one on second, none on third
Customers	Building-products distributors (48% of volume), transportation and RV OEMs (27%), private-label retail (25%)
Systems	ERP for orders, inventory, and lot release; paper batch records; QC results in spreadsheets; PLC logging on 6 of 14 vessels

2.3 Engagement Objectives

Halvren's COO engaged Webineering to answer four questions:

1. Why do the same formulas produce different results from shift to shift?
2. What does inconsistency cost in rework, scrap, capacity, and customer exposure?
3. Can the plant absorb the transferred product lines without adding vessels?
4. What standard should the platform's other two plants adopt?

2.4 Methodology and Evidence

The assessment combined four streams of evidence. Where they agree, confidence in a finding is high. Where they diverge or data was incomplete, we say so in a data confidence note.

Stream	What we did
Pre-visit data analysis	Reviewed 13 months of QC results and 1,248 batch records; coded every first-test failure by cause; built a preliminary view of where vessel time goes
On-site observation	Watched 46 batches from charge to release across all three shifts, timed cleaning and changeovers, audited 14 vessels after a wash, checked scale calibration and 5S in dispensing
Stakeholder interviews	31 structured interviews with the plant manager, shift leads, operators on every shift, QC technicians, schedulers, and the customer service lead
Post-visit analysis	Built the batch-failure model, vessel-time model, cleaning and sequencing analysis, and the cost-of-poor-quality estimate

3 Site Assessment: Current State

Calder Falls has a consistency problem that sits almost entirely on second and third shift. The formulas and equipment are the same on every shift. The difference is in how four critical steps are carried out, how vessels are cleaned, and whether anyone can see a skipped step before QC does.

3.1 Quality Performance by Shift

Right-first-time across the plant was 71% from May to July 2026. First shift ran at 79%, second at 64%, and third at 68%. Second shift was at 77% a year ago and 62% in August; its decline started when volume rose and accelerated after its lead retired in January.

Second shift's right-first-time fell from 77% to 62% while first shift held near 80%

Batches passing QC on the first test, by shift, monthly

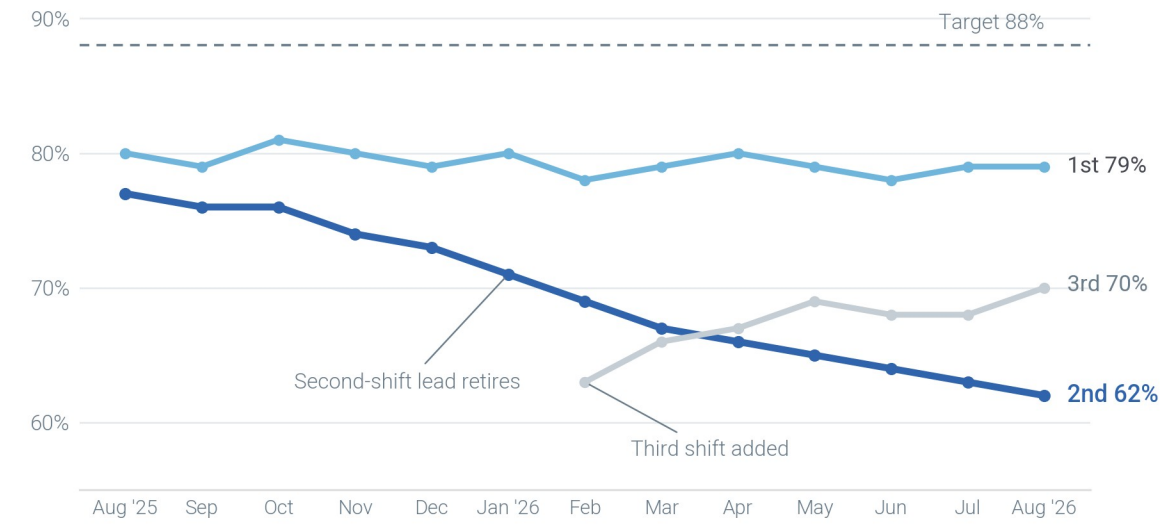


Figure 3.1 · QC release records, August 2025 – August 2026 · Values adjusted for confidentiality

Of the 362 batches that failed their first test, 268 passed after an addition and re-test, 68 needed a reblend, and 26 were scrapped. An addition holds its vessel about 7 hours: 3.4 hours to adjust and remix, and the rest waiting on the second lab test.

> **KEY INSIGHT**
> The plant reports pounds produced and schedule attainment. Both looked healthy while right-first-time fell, because a batch that needs an addition still ships. The cost shows up as vessel time, lab time, and overtime that nobody tied back to the first test.

3.2 Where Vessel Time Goes

Each vessel is staffed 120 hours a week. On average, 52% of that time goes to productive mixing, 14% to cleaning, 12% to adds and re-tests, 8% to waiting for QC, 7% to waiting for materials, and 7% to idle time. The larger vessels lose the most to adds, because their batches take longest to adjust and re-test.

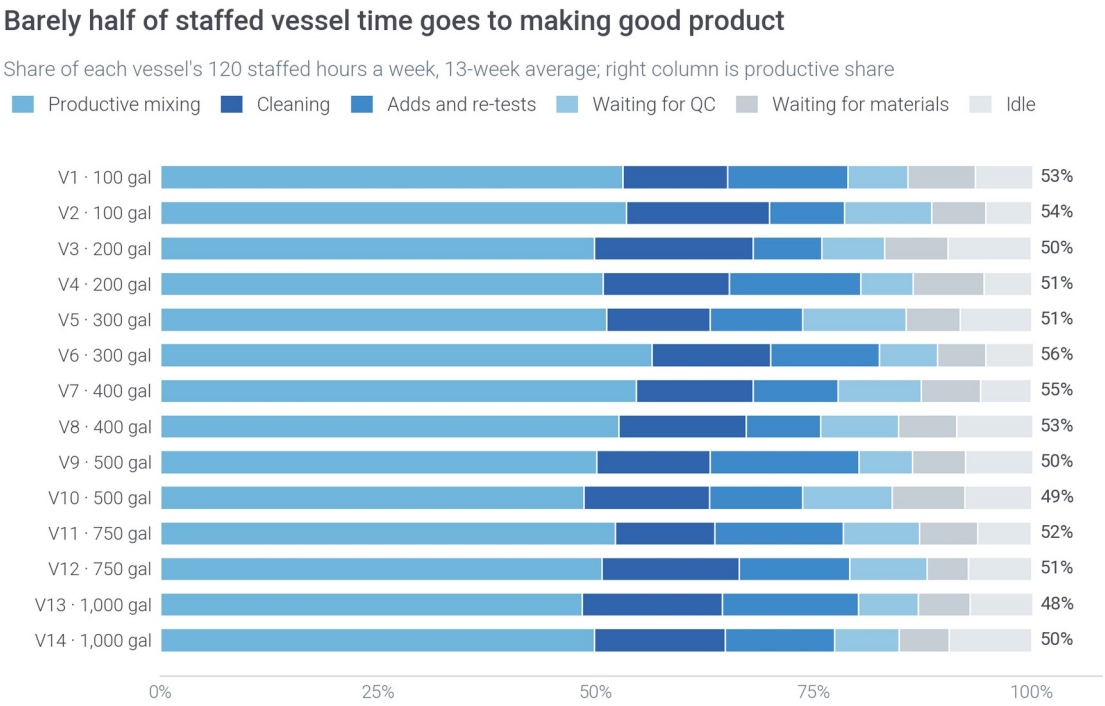


Figure 3.2 · PLC logs on 6 vessels and shift logs on 8, May – July 2026 · Values adjusted for confidentiality

Phase 1 targets three of these losses: adds and re-tests from 12% to 7%, QC waiting from 8% to 4%, and cleaning from 14% to 11%. That frees about 200 vessel-hours a week, more than one and a half vessels' staffed week. At the six-month targets the recovery reaches about 300 hours.

DATA CONFIDENCE NOTE

Six vessels have PLC logging; the other eight were reconstructed from shift logs and batch records, which round to the nearest quarter hour. The plant-wide shares are stable across both methods within two percentage points.

3.3 Why Batches Fail

We coded all 362 first-test failures by cause. Three causes account for 72% of them.

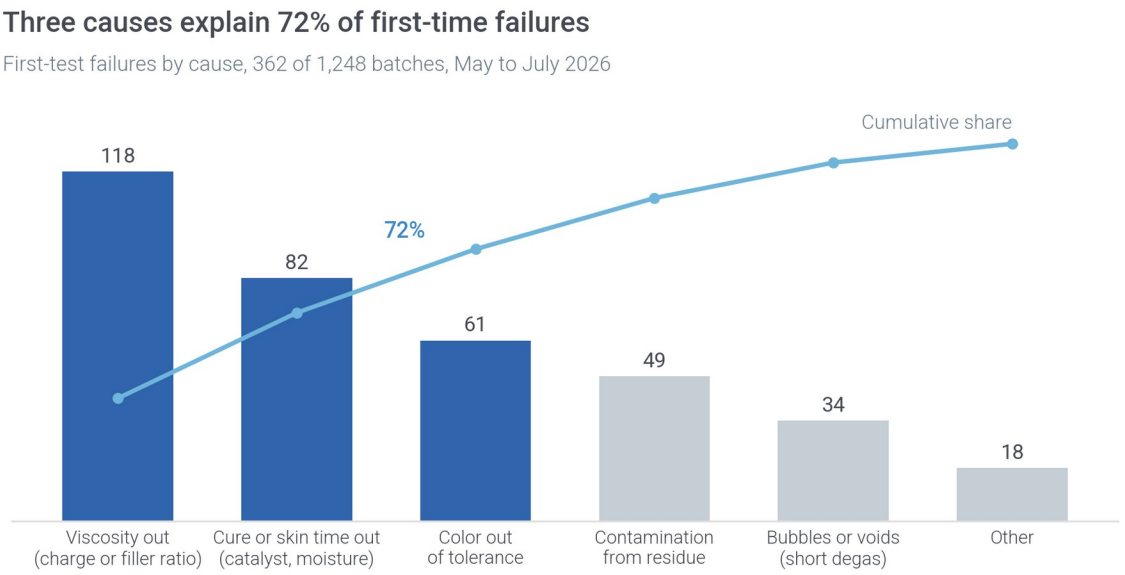


Figure 3.3 · QC results and batch records, May – July 2026 · Values adjusted for confidentiality

Viscosity Out of Range (118 Failures)

Viscosity tracks the filler-to-polymer ratio. On second shift, fillers were charged by bag count with no weight check on 40% of the batches we observed, and partial bags left from earlier batches were counted as full. Two of six floor scales were past their calibration date. A partial bag counted as full, or a scale reading light, moves viscosity outside the range.

Cure or Skin Time Out of Range (82 Failures)

Cure depends on catalyst amount and on moisture. Catalyst additions have no second-person check, and on four vessels with PLC logs, second shift cut mix and vacuum time by 18% on average when the shift was behind. Moisture left in the batch by a short degas starts the cure early, which raises viscosity and shortens skin time.

Color Out of Tolerance (61 Failures)

Color failures cluster after dark-to-light changeovers and when pigment pastes are added by eye. Most of them trace to sequencing and cleaning, covered in Section 3.5.

3.4 Execution on the Floor

Operators on every shift described the same process. The difference is in what happens under time pressure and who is there to ask.

- **Learning by shadowing.** New operators learn from whoever is on shift. There is no qualification matrix, so nobody can say who is qualified to run which formula.
- **Outdated instructions.** 38% of master batch instructions have not been updated since 2023, and operators keep their own notes for the formulas that run most.
- **Steps cut when behind.** Second-shift operators told us mix and degas times are the first thing shortened when the schedule slips. PLC logs confirm it.
- **Sampling too early.** Time stamps show 22% of second-shift QC samples were drawn before the batch reached its full mix time, so the first test sometimes fails a batch that would have passed.

KEY INSIGHT

The operators who are cutting steps know the process. They are making the trade the plant's metrics reward: pounds out the door now, with the quality cost landing somewhere nobody measures.

3.5 Cleaning and Changeovers

Cleaning takes 14% of vessel time, and it is not producing clean vessels. In a post-wash audit of all 14 vessels, scored 1 to 5 against the plant's own cleanliness standard, the average was 2.7 and only 3 vessels met the standard.

Only 3 of 14 vessels met the cleanliness standard after a wash

Post-clean audit score, 1 to 5, average of six criteria; plant average 2.7



Figure 3.4 · Post-clean audit of 14 vessels, August 19–20, 2026 · Values adjusted for confidentiality

Batches are scheduled by due date, so vessels often switch from dark products to light ones, which needs a full solvent wash. Sequencing light to dark within product families would avoid 41% of full washes, cut solvent use by about 3,900 of the 9,400 gallons used each year and remove the main source of color and contamination failures.

3.6 Batch Records and Data

Batch records are on paper, and 31% of the 1,248 we reviewed were incomplete: missing charge confirmations, temperatures, mix times, or sign-offs. QC results sit in spreadsheets, and the ERP records only lot release. The plant cannot link a deviation on the floor to the test that failed, so the same failures repeat without a clear cause on record.

3.7 Shift Leadership and Management Operating System

Tier meetings run on first shift only, and the board shows pounds produced and schedule attainment. Right-first-time is not posted. Shift leads have no leader standard work, and the second-shift lead position has been filled informally since January. The dispensing area scored 2.3 out of 5 on our 5S audit, with partial bags, unlabeled containers, and pigment pastes stored without fixed locations.

3.8 QC Lab Flow and Customer Exposure

The QC lab has no technician on third shift, so batches finished overnight wait 6.5 hours on average for their first test. Second shift has one technician for up to seven vessels finishing at once.

Customers are noticing. Complaints rose from 1.1 to 1.9 per 100 shipments in a year, the largest transportation OEM issued two corrective action requests in six months, and credits and returns totaled $310K over the last 12 months.

4 Immediate Action Plan (0–90 Days)

Phase 1 makes every shift run the critical steps the same way and gives shift leads the tools to see when they are not. The target is 80% right-first-time across the plant within 90 days, and on every shift before Phase 2 starts.

4.1 Lock the Critical Steps

Four steps decide most outcomes: the charge, the catalyst and pigment additions, the mix and degas, and the sample. Each gets a standard that cannot be skipped quietly.

Action	Owner (suggested)	Timeline	Expected outcome
Calibrate all six floor scales and set a monthly calibration check	Maintenance, Quality	0–14 days	Charge weights trusted on every shift
Weigh every charge; retire bag-count charging	Plant Manager	0–30 days	Viscosity failures down by about 40%
Second-person check on catalyst and pigment additions	Shift Leads	0–30 days	No unverified catalyst or pigment additions
Minimum mix and degas times enforced by PLC on the 6 logged vessels; timer and sign-off on the rest	Process Engineer	0–45 days	No shortened cycles
Fixed sampling point after full mix time	QC Lead	0–14 days	No early samples
Update master batch instructions for the 40 formulas that make up 80% of volume	Process Engineer	30–90 days	Current instructions at every vessel

4.2 Qualify Second and Third Shift

Action	Owner (suggested)	Timeline	Expected outcome
Build a qualification matrix by operator and formula family	Plant Manager, HR	0–30 days	Clear record of who can run what
Name an acting second-shift lead with first-shift support for 30 days	Plant Manager	0–14 days	Second shift has a leader on the floor
Pair every operator with under six months on the job with a qualified operator	Shift Leads	0–30 days	No unqualified operator runs a batch alone

4.3 Cleaning Standard and Changeover Sequence

Action	Owner (suggested)	Timeline	Expected outcome
Visual cleaning standard with photos at each vessel; post-clean check before every charge	Quality, Shift Leads	0–30 days	Vessel audit average from 2.7 to 4.0
Sequence light to dark within product families on a weekly campaign wheel	Scheduler	30–60 days	41% of full washes avoided; cleaning from 14% to 11% of vessel time

4.4 QC Lab Coverage

Action	Owner (suggested)	Timeline	Expected outcome
Staff third shift with one QC technician, by hire or by moving one from first shift	QC Lead, Plant Manager	0–60 days	Overnight QC wait from 6.5 hours to under 2
In-process viscosity check at the vessel before the release sample	QC Lead, Process Engineer	30–60 days	Problems caught while the batch can still be adjusted in place

4.5 Shift Leadership and Data Basics

Action	Owner (suggested)	Timeline	Expected outcome
Tier 1 meeting on every shift with right-first-time, adds, and top failures on the board	Plant Manager	0–30 days	Every shift sees its quality daily
Leader standard work for shift leads covering scale checks, cleaning checks, and batch record review	Operations Manager	30–60 days	Critical steps verified every shift
One-page batch record; completeness checked before release	Quality	0–45 days	Incomplete records from 31% to under 5%
5S in dispensing with fixed locations for bags, pastes, and containers	Shift Leads	30–60 days	5S score from 2.3 to 4 of 5

IMPORTANT

Do not add a vessel or a fourth crew to absorb the transferred product lines until Phase 1 has run for 60 days. The capacity is already in the plant; it is being spent on adds, waiting, and cleaning.

5 Systemic Initiatives (3–12 Months)

Phase 1 recovers consistency through discipline and leadership. Phase 2 builds the systems that keep it there as people change and volume grows, and that the platform's other two plants can adopt.

5.1 Quality and Flow Metrics

#	Metric	What it measures	Why it matters here
1	Right-first-time	Batches passing QC on the first test, by shift and formula family	The single best signal of process control
2	Adds per 100 batches	Additions needed to bring batches into specification	Each addition holds a vessel about 7 hours, including the re-test
3	Productive vessel share	Share of staffed vessel hours spent making good product	Capacity in hours the plant already has
4	Cleaning hours per changeover	Wash time by changeover type	Shows the value of sequencing
5	QC wait	Hours from batch complete to first test result	Lab coverage and priority rules
6	Batch record completeness	Records with every required field at release	Traceability and root-cause analysis
7	Complaints per 100 shipments	Customer-reported quality issues	What customers see

Metrics 1, 2, 5, and 6 can start within 30 days from existing records. Formulas and benchmarks are in Appendix D.

5.2 Electronic Batch Records and Weigh-and-Dispense

Replace paper batch records with electronic records tied to the vessel PLCs and to scales in dispensing. Each charge is weighed against the recipe, each critical step is time-stamped, and the record is complete before the batch can be released. Extend PLC logging to the eight vessels that lack it.

5.3 Statistical Control and Raw Material Variation

Put viscosity and cure time on control charts by formula family, so drift is visible before a batch fails. Compare supplier certificates of analysis for the three raw materials that drive most viscosity and cure variation, and add incoming checks where certificates do not predict performance.

5.4 Formula and Instruction Control

Bring all 210 master batch instructions under document control with a named owner, a review date, and a single current version at the vessel. Retire operators' personal notes by building what they know into the instructions.

5.5 Training and Qualification Program

Turn the Phase 1 qualification matrix into a program: structured training by formula family, sign-off by a qualified trainer, and requalification after extended absence. New hires reach full qualification on the top 40 formulas within eight weeks.

5.6 A Standard for the Platform

The critical-step standard, cleaning standard, metrics, and qualification program built at Calder Falls should become the platform standard. We recommend a short assessment at each of the other two plants against this baseline before production moves between them.

6 Implementation Roadmap

The roadmap runs in three phases over 12 months, each with a gate the plant must pass before the next begins.

Workstream	Phase 1 · 0–90 days	Phase 2 · 3–6 months	Phase 3 · 6–12 months
Process execution	Critical-step standards, scale calibration, PLC minimum times, updated instructions for top 40 formulas (4.1)	Control charts on viscosity and cure; raw material checks (5.3)	All 210 instructions under document control (5.4)
Cleaning and scheduling	Visual cleaning standard; light-to-dark campaign wheel (4.3)	Cleaning time by changeover type tracked and reduced (5.1)	Campaign scheduling built into the planning system
QC lab	Third-shift coverage; in-process viscosity check (4.4)	QC wait under 2 hours on every shift	Lab results flowing into the electronic batch record (5.2)
Data and systems	One-page batch record; completeness check (4.5)	Electronic batch record pilot on 6 PLC vessels (5.2)	Electronic records and weigh-and-dispense on all 14 vessels
People	Qualification matrix, acting lead, tier meetings, and leader standard work on every shift (4.2, 4.5)	Training and qualification program (5.5)	Platform standard and assessments at the other two plants (5.6)
Gate to next phase	80% right-first-time on every shift for four weeks; batch records 95% complete	85% right-first-time; electronic record pilot live	–

A Note on Phasing

Phase 1 depends more on shift leadership than on any tool. If the second-shift lead role is not filled permanently by day 60, the gains are likely to fade.

Webineering recommends a phased implementation engagement to support this work, with progress measured against the baseline in this report at each gate.

7 Appendices

Appendix A: Data Sources

Source	Description	Period	Used in
QC release records	First-test results, additions, and final release by batch	Aug 2025 – Aug 2026	1, 3.1, 3.3
Batch records	1,248 paper batch records, reviewed for completeness and failure cause	May – Jul 2026	3.3, 3.6, App. E
Vessel PLC logs	Mix, vacuum, and hold times on 6 vessels	May – Jul 2026	3.2, 3.4
Shift logs	Vessel status by hour on the other 8 vessels	May – Jul 2026	3.2
Post-clean audit	14 vessels scored 1 to 5 against the plant cleanliness standard	Aug 19–20, 2026	3.5
Staffing and training records	Headcount, tenure, and turnover by shift	Last 12 months	1, 3.4
Customer complaints and credits	Complaints, corrective action requests, and credits	Last 12 months	3.8, App. E
Site visit notes and interviews	46 batches observed; 31 structured interviews	Aug 18–20, 2026	Throughout

Appendix B: Terms

Term	Meaning
Add	An addition of material to bring a batch that failed its first test into specification
Certificate of analysis	A supplier's test results for a raw material lot
Degas	Mixing under vacuum to remove air and moisture
LSW	Leader standard work
Master batch instruction	The controlled recipe and procedure for making one formula
Reblend	Mixing an off-specification batch into new batches to recover it
Right-first-time	A batch that passes its first QC test with no addition
SPC	Statistical process control

Appendix C: Methodology and Data Limitations

Pre-visit coding of failure causes set the hypothesis that execution on the floor drove the shift gap. Observation of 46 batches on every shift confirmed it: when the steps were followed, the formulas performed as designed. Post-visit analysis quantified each loss and built the vessel-time model.

The main limitations are these. Eight vessels lack PLC logs, so their time shares come from shift logs. Failure causes were coded from QC notes and batch records; where both were incomplete, the cause was recorded as Other. Customer credits are as booked and may lag the shipments that caused them.

Appendix D: Metric Specifications

Metric	Formula	Benchmark (good / world-class)	Data source today	Start
Right-first-time	Batches passing first test ÷ batches tested	90% / 97%+	QC release records	Within 30 days
Adds per 100 batches	Additions ÷ batches × 100	Under 10 / under 3	QC release records	Within 30 days
Productive vessel share	Productive mixing hours ÷ staffed hours	70% / 80%+	PLC logs, shift logs	30–90 days
Cleaning hours per changeover	Wash hours ÷ changeovers, by type	Set by product family	Shift logs	30–90 days
QC wait	First result time − batch complete time	Under 2 hours	QC records	Within 30 days
Batch record completeness	Complete records ÷ records at release	98% / 100%	Release check	Within 30 days
Complaints per 100 shipments	Complaints ÷ shipments × 100	Under 1.0 / under 0.3	Customer service log	Within 30 days

Appendix E: Financial Impact

Cost of poor quality	Basis	Annual estimate
Rework labor and vessel time	About 1,340 adds and reblends a year at 3.4 vessel-hours of adjustment plus labor; vessel time held for re-tests is counted in the capacity figure	$0.86M
Scrapped batches	About 104 batches a year at $6,000 average material cost	$0.62M
Customer credits and returns	Last 12 months	$0.31M
Expedited freight	Late orders caused by rework, last 12 months	$0.24M
QC lab overtime and re-tests	Second tests and overtime, last 12 months	$0.18M
Excess cleaning solvent and waste disposal	Solvent, waste disposal, and wash labor on the full washes sequencing would avoid	$0.17M
Total		About $2.1M–$2.6M

These are order-of-magnitude estimates built from operating data and have not been audited. They exclude the margin at risk if the transportation OEM moves volume to a second source, and the value of the recovered capacity: about 200 vessel-hours a week in Phase 1, enough to absorb the transferred product lines without a new vessel.