

TECH & AI CASE STUDY - CONSTRUCTION - 2025

Drone and Computer-Vision Inspections That Cut Survey Time 80%

Based on a delivery engagement with RidgeSpan Construction

3 days to 4 hours SURVEY TIME PER SITE	\$3.5M REWORK AVOIDED	6 to 22 SITES COVERED WEEKLY	-62% INSPECTION LABOR COST
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A fillable practice edition: the full story, 8 actions, 6 reflections and a 90-day plan - work it with your team.

Free - no email required
emersontechnology.com

MAKE THIS PRACTICE BOOK YOURS

Work it, do not just read it

This practice book turns the RidgeSpan Construction case study into a working session for your team. Read the full story first - what happened, what was built and what it changed. Then tick the 8 actions you can commit to, write short answers to the 6 reflections, and finish with a 90-day plan. Every field in this PDF is fillable: open it in Adobe Acrobat Reader, Chrome, Edge or macOS Preview, type directly into the boxes and save.

YOUR NAME	ROLE
COMPANY	TEAM / DEPARTMENT
DATE	EMAIL (OPTIONAL)

MY GOAL FOR THIS PRACTICE SESSION

- 01 The story** - What happened at RidgeSpan Construction - before, during and after the project.
- 02 The results** - The numbers that changed, plus industry benchmarks from public research.
- 03 The 8-action checklist** - Tick boxes as your organization completes each step. Owner and date fields included.
- 04 The 6 reflections** - Fillable questions that pressure-test your own roadmap.
- 05 My 90-day plan** - Three fillable phase cards that turn this case study into your roadmap.

RUN IT AS A 90-MINUTE TEAM SESSION

25 min READ Read the story together. Ask everyone to note the one number that surprised them most.	40 min PRACTICE Work the 8-action checklist and the 6 reflections. Assign an owner and a date to every action you commit to.	25 min COMMIT Fill in the 90-day plan. One goal per phase, one number that tells you it worked. Book a review date before you leave the room.
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THE STORY

What happened, and why it worked

01 The Company

RidgeSpan Construction is a general contractor running 22 active earthwork and commercial sites simultaneously, from subdivision mass-grading to retail pads and mid-rise shells. In earthwork-heavy construction, the company's money literally moves with the dirt: cut-and-fill quantities drive payments to excavation subcontractors, grading accuracy determines whether concrete crews mobilize onto a ready surface or a defective one, and the schedule is a chain of handoffs in which every early defect is buried under the next trade's work. RidgeSpan's project managers are accountable for margin at the site level, yet for years their picture of what was actually happening in the ground came from monthly surveys, drive-by observations and whoever remembered to send a photo. The company's competitive reality sharpened the problem. Margins in general contracting are thin enough that rework is not an inconvenience — it is the difference between a profitable project and a losing one — and disputes over earthwork quantities with excavation subcontractors were consuming both cash and relationship capital every month. Growth had spread the leadership team across more sites than anyone could physically visit in a week, which meant attention went to whoever called loudest rather than to the sites that needed it most.

02 Where Things Stood

Before Emerson Technology engaged, RidgeSpan's entire site-intelligence capability rested on a four-person survey crew that needed two to three days per site for progress and quantity surveys. With 22 active sites, the crew was booked eight weeks out, and project managers were effectively flying blind on the sites that needed attention most — the scheduling logic was whoever booked first, not wherever risk was accumulating. Earthwork quantities were disputed monthly with excavation subcontractors, because each side measured from different data, and settling a single dispute could delay progress payments by weeks. Grading defects surfaced only after concrete crews arrived, the most expensive possible moment, and rework consumed roughly 6% of project cost. Documentation was its own quiet liability. Site photographs lived on personal phones, so delay claims and owner questions required days of document hunting, and the evidence that existed was rarely dated, located or admissible in a disagreement. Superintendents kept their own mental models of site status, which meant knowledge left with turnover and could not be transferred. McKinsey's widely cited analysis found construction productivity grew only about 1% annually over two decades, and RidgeSpan was a textbook illustration of why: the industry's information moved at the speed of a survey crew's schedule while the dirt moved daily.

The consequences were compounding rather than episodic. Disputes eroded subcontractor relationships, which raised pricing on the next bid. Defects discovered late forced demobilization and remobilization of concrete crews. And the survey crew — genuinely skilled people — spent its weeks on repetitive coverage instead of the control work and complex layouts that actually required licensed expertise.

03 The Challenge

The challenge was to get trustworthy eyes on every site weekly without doubling headcount, and "trustworthy" carried a precise meaning: quantities measured with survey-grade accuracy that both RidgeSpan and its subcontractors would accept in a payment dispute, not approximations that would simply move the argument from the field to the spreadsheet. The data also had to arrive as decisions rather than as another artifact — a project manager with forty responsibilities does not parse point clouds, so detections had to arrive as tagged, photo-evidenced tasks inside the tools already in use.

There were constraints that made naive approaches non-starters. Recreational drones cannot produce defensible quantity data, so the hardware path was fixed from the start. Flight operations had to comply with aviation regulations, which meant certificated remote pilots rather than enthusiastic volunteers. And the workflow had to fit the rhythm of construction: flights on a repeatable weekly template, results compared against the project schedule, and findings routed to the people who could still fix the problem cheaply. Anything less would produce pretty maps and unchanged outcomes.

04 Discovery and Diagnosis

Emerson Technology began with a two-week discovery sprint centered on three sites with the worst rework and dispute histories. The team shadowed the survey crew, sat in on a quantity dispute negotiation, and reconstructed the life of a grading defect from creation to discovery — finding that the average interval between an error being made in the grade and anyone detecting it was measured in weeks, by which point the fix required mobilizing crews that had moved on. The audit found that the survey crew's capacity, not its skill, was the bottleneck, and that roughly 80% of its field time went to repetitive coverage that did not require a licensed surveyor. Dodge Data & Analytics surveys have reported that a majority of contractors using drones see measurable improvements in site accuracy, safety and issue detection, but RidgeSpan's leadership was less interested in surveys than in whether drone-derived quantities could survive contact with an adversarial subcontractor — so the diagnosis tested exactly that.

The technical audit established the accuracy path: RTK positioning with proper ground control could produce volumes within survey tolerance, and a side-by-side test on one stockpile showed drone-derived measurements agreeing with the crew's traditional survey closely enough that the difference was smaller than the normal margin of argument. The diagnosis also mapped the delivery problem — findings had to land in the existing project-management platform as tasks, not in a new dashboard nobody would open. The FAA's count of more than 790,000 registered drones in the United States, with construction and inspection among the fastest-growing commercial applications, told the team the hardware ecosystem was ready; the pilot-certification and workflow design would be the real work.

05 The Solution

Emerson Technology paired RTK-capable drones with an automated inspection pipeline that turns weekly flights into decisions project managers can act on. The architecture has three layers.

The aerial capture layer

Every site follows a repeatable weekly flight template — fixed altitude, overlap, timing and camera settings — so weekly images are comparable and trend lines mean something, because variation between flights destroys the analysis that creates value. Flights capture orthomosaics and point clouds processed into survey-grade surface models, with two certificated pilots per region handling operations and licensed surveyors spot-checking outputs against control points during the early months, which is how trust in the numbers was earned by agreement rather than asserted by software. The same imagery documents safety conditions: PPE findings, barricade gaps and excavation hazards are logged with dated aerial context that protects workers today and defends the company in later disputes.

The analysis pipeline

A Python computer-vision stack processes each flight automatically: stockpile volumes are measured, earthwork progress is tracked against the BIM model and the project schedule rather than against memory, and the stack flags PPE violations and drainage issues before they become rework. Because each flight is compared to the previous week and to plan, the pipeline detects the deviations that matter — a grade drifting out of specification, a

drainage swale that has been bladed off, a stockpile that has quietly shrunk — while they are still cheap to fix. The comparison against the BIM model is what turns imagery into inspection: the question is never "what does the site look like" but "does it match the design, and if not, where and by how much."

The delivery layer

Detections flow into a cloud dashboard built on AWS alongside the imagery pipeline, giving project managers cut-and-fill status, anomaly photos and trend lines per site in one place. Critically, findings then push into RidgeSpan's existing project-management platform as tagged tasks with photo evidence attached, because another dashboard to check is another dashboard quickly ignored. Superintendents receive the specific defects on their sites with location and date, subcontractor meetings start from the same RTK-grade quantities, and owner reporting draws from the same dated record that would settle a delay claim. The survey crew, freed from repetitive coverage, refocuses on control work and complex layouts where licensed judgment is irreplaceable.

06 The First 90 Days

The rollout obeyed a discipline the construction industry respects: prove it on one site before talking about twenty-two. Weeks one and two established the flight template, ground-control procedure and safety plan, and certificated the first two pilots. Weeks three through eight ran a single-site pilot through several complete flight-analysis-action cycles on a mass-grading project with an active dispute history. The pilot's defining moment arrived in week six, when the pipeline flagged a drainage swale that had been disturbed two weeks earlier — invisible from the trailer, catastrophic after paving — and the grading was corrected for a fraction of the cost of post-concrete rework. That single catch, walked through in the subcontractor meeting with dated imagery, converted more skeptics than any presentation could have.

Weeks seven through ten scaled to the first five sites and formalized the surveyor spot-check routine, with the licensed crew verifying model outputs against control points until the agreement rate made further weekly verification unnecessary for routine quantities. Weeks eleven and twelve extended coverage to the remaining sites and integrated the task-push into the project-management platform, with superintendents trained in fifteen-minute sessions built around real detections from their own sites rather than demo data. Quantity-dispute meetings began starting from the shared RTK-grade dataset, and the first dispute settled from the new data — in RidgeSpan's favor, on defensible numbers — became the story told at every subcontractor kickoff afterward.

The team also built the failure-mode discipline early: when a flight was missed due to weather, the week's comparison was marked incomplete rather than silently skipped, so trend lines never contained hidden gaps. A monthly review retired detections that generated false alarms and tuned the CV thresholds by site type, because an inspection system that cries wolf gets ignored exactly when it matters. By day 90, all 22 sites were covered weekly by the same small team, and the question had shifted from "does this work" to "which sites do we look at first each Monday."

07 The Results

Over 18 months, the numbers told the story plainly. Per-site survey time fell from roughly three days to four hours — an 80% reduction — letting one small team cover all 22 sites weekly, with inspection labor costs down 62%. The program avoided an estimated \$3.5M in rework by catching grading and drainage defects before concrete mobilized, attacking the 6% rework burden at its root. Quantity disputes with excavation subcontractors collapsed because both parties now work from the same RTK-grade data, and dated aerial evidence has measurably shortened two delay-claim negotiations.

METRIC	BEFORE	AFTER
Survey time per site	3 days	4 hours
Rework avoided	-	\$3.5M
Sites covered weekly	6	22
Inspection labor cost	-	-62%

The changes that never reach a bill of quantities compounded the measured ones. Project managers plan their week from trend lines instead of anecdotes, and the loudest-voice problem has been replaced by a risk-ranked Monday review. The survey crew's work has shifted up the value curve toward control and layout complexity, improving both retention and utilization. Subcontractor relationships have improved in a way the purchasing team can feel: when both sides measure from the same defensible data, disputes become reconciliations. And the dated, location-stamped imagery archive has quietly become one of the company's most valuable legal assets — evidence that did not exist in the era of phones full of unlabeled photographs.

08 What Your Business Should Do

RidgeSpan's playbook is portable to any contractor, and its first rule is patience. Fly one site weekly before scaling: run a single-site pilot through several full flight, analysis and action cycles before buying any fleet, because workflow discipline matters more than hardware or models. Buy RTK-grade equipment, not recreational — only RTK positioning and proper ground control produce volumes that hold up in payment disputes. Ground-truth outputs with licensed surveyors during the first months, since trust in the data is earned by agreement, not asserted by software. Standardize a repeatable flight plan per site type — fixed altitude, overlap, timing and camera settings — because variation between flights destroys the trend analysis that creates value. Then make the data earn its keep. Compare volumes against the BIM model and schedule, not against memory or last month's grade, because that comparison is how defects surface before they are buried. Push findings into the project-management tools your teams already use, delivered as tagged tasks with photo evidence — another dashboard to check is another dashboard quickly ignored. Document safety observations with the same imagery, since dated aerial context protects workers today and defends the company in later disputes. Certify two pilots per region to cover absence and growth, because regulatory dependency on one person is a real schedule risk. The industry context argues for moving: McKinsey measured construction productivity growth at only about 1% annually across two decades, and the FAA counts more than 790,000 registered drones with construction among the fastest-growing uses — the gap between digital and non-digital contractors is widening weekly.

Before you buy a single drone, sit with the questions RidgeSpan's leadership had to answer honestly. How many of your active sites have no reliable progress data older than last week's drive-by? What do monthly quantity disputes with subcontractors cost you in payment delays and relationship capital? How often do grading or drainage defects surface after the crews who could fix them cheaply have left? If an owner disputed a delay claim tomorrow, how long would finding dated site evidence take? Is your survey capacity allocated to the sites that need attention, or to whoever booked first? What would weekly aerial coverage of every site change about how your superintendents plan their week? Work the action checklist in this practice book with your team against each question, and repeat the exercise every quarter as your site mix and your subcontractor base evolve.

REAL-WORLD PROOF & BENCHMARKS

McKinsey's widely cited analysis found construction productivity grew only about 1% annually over two decades, fueling investment in digital site-monitoring tools. - McKinsey & Company, 2017

The FAA has reported more than 790,000 registered drones in the United States, with construction and inspection among the fastest-growing commercial applications. - FAA

Dodge Data & Analytics surveys have reported that a majority of contractors using drones see measurable improvements in site accuracy, safety and issue detection. - Dodge Data & Analytics

THE PRACTICE PAGES

The 8-action checklist

Work through the list with your team. Tick each box as your organization completes the step, and fill in an owner and a target date so every action has a name and a deadline.

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1. Fly one site weekly before scaling

Run a single-site pilot through several full flight, analysis and action cycles before buying any drone fleet. Workflow discipline matters more than hardware or models.

OWNER

TARGET DATE

STATUS

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2. Buy RTK-grade, not recreational

Recreational drones cannot produce survey-grade volumes or defensible quantity data. RTK positioning and proper ground control are what make drone numbers hold up in payment disputes.

OWNER

TARGET DATE

STATUS

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3. Ground-truth outputs with surveyors

Have licensed surveyors verify model outputs against control points during the first months. Trust in the data is earned by agreement, not asserted by any software.

OWNER

TARGET DATE

STATUS

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4. Standardize a repeatable flight plan

Fix altitude, overlap, timing and camera settings per site type so weekly images are comparable. Variation between flights destroys the trend analysis that creates value.

OWNER

TARGET DATE

STATUS

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5. Compare volumes against the BIM

Measure cut-and-fill progress against the design model and schedule, not against memory or last month's grade. This is how defects surface before they are buried.

OWNER

TARGET DATE

STATUS

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☐ **6. Push findings into existing PM tools**
Deliver detections as tagged tasks with photo evidence inside the platform project managers already use every day. Another dashboard to check is another dashboard quickly ignored.

OWNER

TARGET DATE

STATUS

☐ **7. Document safety observations with imagery**
Log PPE findings, barricade gaps and excavation hazards with dated aerial context. The same evidence protects workers today and defends the company in later disputes.

OWNER

TARGET DATE

STATUS

☐ **8. Certify two pilots per region**
Train and license at least two remote pilots per region to cover absence and growth. Regulatory dependency on one person is a real schedule risk.

OWNER

TARGET DATE

STATUS

AFTER THE CHECKLIST: OUR TOP 3 PRIORITIES

From the eight actions above, write down the three you will start first - and the single number you expect each one to move. Three priorities with owners beat eight without any.

PRIORITY 1 NUMBER IT SHOULD MOVE	PRIORITY 2 NUMBER IT SHOULD MOVE	PRIORITY 3 NUMBER IT SHOULD MOVE
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THE PRACTICE PAGES

Reflections for your team

Use these questions in your next planning session and type short answers into the boxes. The gaps you find are usually the fastest wins.

Q1. How many of your active sites have no reliable progress data older than last week's drive-by?

Q2. What do monthly quantity disputes with subcontractors cost you in payment delays and relationship capital?

Q3. How often do grading or drainage defects surface after the crews who could fix them cheaply have left?

Q4. If an owner disputed a delay claim tomorrow, how long would finding dated site evidence take?

Q5. Is your survey capacity allocated to the sites that need attention, or to whoever booked first?

Q6. What would weekly aerial coverage of every site change about how your superintendents plan their week?

THE PRACTICE PAGES

My 90-day plan

Finish the session by committing to a plan. Three phases, one goal each, one number that tells you it worked. Bring this page to your next leadership review - or to a free consultation with Emerson Technology, and we will pressure-test it with you.

Days 1-30 Focus: audit and alignment

PRIMARY GOAL**KEY ACTIONS****HOW WE MEASURE SUCCESS****OWNER**

Days 31-60 Focus: build and prove

PRIMARY GOAL**KEY ACTIONS****HOW WE MEASURE SUCCESS****OWNER**

Days 61-90 Focus: scale and measure

PRIMARY GOAL

KEY ACTIONS

HOW WE MEASURE SUCCESS

OWNER

Tip: save a copy per team so each group keeps its own answers. Revisit the reflections every quarter - the questions stay the same even as the numbers move.

BOOK THE REVIEW BEFORE YOU CLOSE THE BOOK

Plans without a review date drift. Before you close this practice book, agree on when you will come back to these pages, who will run that session, and when you will check the numbers again. If you want an outside pair of eyes, bring this page to a free consultation with Emerson Technology and we will pressure-test the plan with you.

REVIEW DATE	REVIEWED BY	NEXT CHECK-IN
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Ready for a transformation like RidgeSpan Construction's?

Emerson Technology designs and builds the data, AI, cloud and automation systems behind results like these. On a free consultation call we will map this exact playbook to your business - your data, your constraints, your numbers.

Book a free consultation

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or start online: emersontechnology.com/contact