

TECH & AI CASE STUDY - INDUSTRIAL EQUIPMENT - 2025

AR Training That Cut Field-Tech Onboarding Time 55%

Based on a delivery engagement with TorqLine Industrial

22 to 10 weeks
ONBOARDING TIME

82% to 91%
FIRST-VISIT FIX RATE

18% to 9%
REPEAT SERVICE VISITS

\$1.8M
ANNUAL SAVINGS

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 TorqLine Industrial 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 TorqLine Industrial - 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

TorqLine Industrial builds packaging and material-handling equipment — conveyors, palletizers, case sealers and the drive assemblies that keep them moving — installed at more than 2,000 customer sites across North America. The company's field-service organization is the face of the brand inside customer plants: technicians commission new lines, perform preventive maintenance and answer emergency calls where a stopped machine halts an entire production shift. Service contracts and genuine parts carry some of the healthiest margins in the business, and response commitments are written directly into equipment deals. Every hour a machine sits idle is an hour of TorqLine's reputation eroding at a customer who has alternatives.

Hiring roughly 90 field technicians a year to keep pace with growth and attrition, TorqLine trained each one through a 22-week ride-along apprenticeship: weeks of shadowing, then supervised work, then gradual independence under one of just three regional trainers. The system produced capable technicians for decades, but it was built for an era when tenure was long and equipment changed slowly. By 2025 the equipment catalog had grown across multiple product generations, and the wave of retirements among 30-year veterans — the people who knew the machines' obscure failure modes best — threatened to drain the institutional knowledge the whole apprenticeship depended on.

02 Where Things Stood

Before Emerson Technology engaged, the training process ran almost entirely on human memory and physical proximity. A new technician spent the first weeks watching, the middle weeks doing supervised work, and the final weeks on ride-alongs with a regional trainer, carrying a paper checklist that had not kept pace with the current product line. The three trainers covered the entire country, which meant they spent most of the year on the road and could each shepherd only a handful of trainees at a time. Training a single technician to full independence cost the company an estimated \$34,000 before the person generated a single billable hour.

Quality told the same story as capacity. First-visit fix rates sat at 82% — respectable until you multiply what the other 18% costs — and 18% of service calls required a repeat visit, each one consuming roughly \$700 in truck rolls, parts and SLA credits. Repeat visits also carried a hidden tax: customers with downtime-sensitive contracts lose patience quickly, and a second visit for the same fault is the kind of event account managers hear about for months. Meanwhile the deep knowledge that separated a ten-minute diagnosis from a three-hour one lived in the heads of a shrinking group of veterans, and every retirement was a library burning down without a backup.

The arithmetic behind the bottleneck was simple and unforgiving. Three trainers could not scale to 90 hires a year, so the company faced a choice between capping growth, stretching the training team to its breaking point, or finding a way to teach faster without lowering the bar. Leadership had already tried the obvious patches — more documentation, longer manuals, a video library nobody watched — and none had moved first-visit fix rates at all.

03 The Challenge

The real challenge was not "training takes time." It was three structural problems reinforcing each other. First, knowledge was concentrated: the failure modes that drove repeat visits were understood by a handful of veterans, and their understanding existed as intuition rather than as anything a novice could follow. Second, the training workload was physical — it required a trainer to be in the same place as the trainee and the machine — so the program's cadence was capped by travel schedules, not by learning speed. Third, the organization had no clean feedback loop from service outcomes back into training content: when a callback happened, the lesson stayed with the technician who fixed it and never reached the next hire.

There was a human dimension too. The regional trainers were among the company's most skilled people, yet they spent their weeks driving between sites and repeating the same demonstrations, while the veterans approaching retirement had never been asked to document anything for anyone. New hires, meanwhile, spent long stretches of the apprenticeship as passive observers because machines were only available when a customer site had downtime to offer. Any solution had to change the daily workflow of trainers, veterans and trainees alike — or it would end up as another folder of PDFs.

04 Discovery and Diagnosis

Emerson Technology began with a two-week discovery sprint across the service organization. The audit analyzed several years of work orders and found what the action-oriented leadership suspected but had never quantified: callbacks and training hours concentrated in a small set of procedures, with ten repairs standing out as the costliest in repeat visits, safety exposure and trainer time. The team inventoried training assets and found the documentation stale relative to current designs, and it mapped where knowledge lived — almost entirely in the heads of twelve named veterans the service director could recite from memory. PwC's 2020 study of VR and AR training, which found learners completing courses up to four times faster than classroom settings with materially higher confidence and retention, gave the leadership team a benchmark that the gap was not unusual — it was structural.

The diagnosis also surfaced a quiet asset. Engineering maintained native CAD assemblies for every current product line, which meant the raw material for precise 3D training content already existed; it simply had never been converted into anything a technician could use on a plant floor. Boeing had reported reducing wiring-harness assembly time by about 25% and improving first-time accuracy by putting AR work instructions on tablets, and TorqLine's own failure data suggested its gain could be larger, because its technicians were newer to the equipment than Boeing's assembly crews. The audit concluded with a clear sequencing: convert the ten costliest procedures first, prove the training model on real hires, and let the savings fund the rest of the catalog.

05 The Solution

Emerson Technology designed and built an AR training and support system in Unity, running on the standard tablets and ARCore- and ARKit-capable phones that technicians already carry into the field. The architecture has three layers.

The content pipeline

An automated pipeline imports engineering CAD files directly into Unity and converts them into interactive 3D exploded views. Because instructions derive from the same files engineering uses, they stay current with each design revision instead of drifting the way PDFs did. A trainee can rotate a gearhead, walk through a torque sequence overlaid on the real hardware, and see internal components in exploded detail no camera could capture. Manual content production is the costliest bottleneck in most AR programs, so automating this step from day one was a deliberate design decision — it is what made the program economically repeatable across the

whole catalog rather than a one-time pilot.

The training experience

Each module pairs the 3D instruction with graded checks: a trainee demonstrates each step on real hardware and cannot advance until the step is completed correctly, replacing completion checkboxes with demonstrated capability. Progress syncs to the existing learning management system through an AWS backend, so service managers see competence by technician and region in a Next.js admin portal and can assign modules accordingly. The system also works offline — instructions cache on-device and progress queues locally, syncing whenever connectivity returns — because basements, rooftops and plant floors rarely have reliable signal, and a training tool that fails where the work happens is a tool that gets abandoned.

Remote expertise and the knowledge loop

A one-tap remote-expert mode opens a WebRTC video session in which a senior technician sees the trainee's camera view and draws annotations directly onto it, turning a phone call into a shared visual workspace. Every resolved session becomes recorded, searchable knowledge: expert demonstrations accumulate into a growing library that captures exactly the intuition that used to retire with the veterans. The loop closes at the service level too — callback data flows back into the content backlog, so the modules that reduce repeat visits get refined and the ones that are no longer relevant get retired on a quarterly review cycle.

06 The First 90 Days

The rollout was deliberately narrow at the start. Weeks one and two were spent finalizing discovery and standing up the CAD-to-Unity pipeline, including validation that exploded views matched as-built machines in the field. Weeks three through six built and piloted the ten costliest procedure modules with a single cohort of new hires, alongside the legacy apprenticeship for comparison. The pilot built trust the honest way: trainer assessments and graded-check scores showed trainees reaching procedural competence visibly faster, and the first remote-expert session resolved an unfamiliar failure in twenty minutes that would previously have meant a second visit. Weeks seven through ten added the remote-expert mode across the current trainee population and hardened offline behavior with field testing in signal-poor sites — a warehouse basement and a rooftop chiller room were the humbling test cases. Weeks eleven and twelve extended content beyond the initial ten procedures, trained all three regional trainers as program owners rather than passive observers, and switched the service dashboard to track time-to-competence rather than module completions. Every new hire received a short onboarding session, a one-page playbook for the remote-expert workflow, and a named contact for questions.

The team agreed on one transition rule: whenever a trainee's graded check exposed a mismatch between module and reality, the case was logged and reviewed weekly with engineering. That review loop caught content drift early — twice in the first quarter, design revisions had silently invalidated a step — and it gave the veterans visible evidence that the system respected the machines as they actually were. Within eight weeks, the veterans had shifted from skeptics to contributors, recording expert sessions as a standard part of retirement preparation rather than as a favor. By the end of the quarter the program had a waiting list of procedures nominated by the trainers themselves, which is the strongest adoption signal a training platform can produce.

07 The Results

Within two quarters, the numbers moved where it counts. Onboarding time fell from 22 weeks to 10 — a 55% reduction — letting TorqLine put billable technicians in the field two and a half months sooner per hire. First-visit fix rates climbed from 82% to 91%, and repeat service visits were cut in half, from 18% to 9%. The company estimates \$1.8M in annual savings across training costs and service operations, a figure that combines faster time-to-billability with the avoided cost of repeat visits and SLA friction.

METRIC	BEFORE	AFTER
Onboarding time	22 weeks	10 weeks
First-visit fix rate	82%	91%
Repeat service visits	18%	9%
Annual savings	-	\$1.8M

The softer changes carried as much weight as the hard ones. Veteran technicians now record expert sessions that become reusable training content instead of retiring with them, converting an impending knowledge crisis into a growing asset. The training team has since replicated the model for two new equipment lines without adding a single trainer, which was the scaling test the whole program was built to pass. The regional trainers describe their role as changed rather than reduced: they spend less time repeating demonstrations and more time assessing judgment on live machines. And Deloitte and The Manufacturing Institute's projection that as many as 2.1 million US manufacturing jobs could go unfilled by 2030 now reads internally not as a threat but as a hiring argument — TorqLine can promise a novice real competence in ten weeks, in an industry where that has rarely been true.

08 What Your Business Should Do

TorqLine's playbook transfers well, and none of its steps require headsets nobody owns. Start by modeling your ten costliest procedures first: list the repairs generating the most callbacks, safety exposure or training hours, because converting the highest-pain procedures funds the rest of the program with its own savings. Build an automated pipeline from engineering CAD files into interactive 3D instructions rather than producing content by hand — manual content production is the costliest bottleneck in every AR training program we have seen. Design for phones and tablets your people already carry before considering dedicated headsets, which add cost, hygiene and acceptance issues that can safely wait until the workflow is proven.

Pair every module with graded checks so trainees demonstrate each step on real hardware before advancing, because competency gates produce measurable capability while completion checkboxes only produce statistics. Add one-tap remote-expert escalation so unfamiliar failures route to a live expert with shared camera annotations, and treat every resolved session as recorded knowledge for the next person. Support offline execution deliberately — cache instructions and queue progress on-device, syncing when service returns, because field environments are where the work actually happens. Then measure what matters: track time-to-competence on live equipment rather than completions, and retire stale content every quarter using usage analytics, since wrong instructions erode technician trust faster than no instructions at all. These steps matter most where the workforce math is tightening; Deloitte and The Manufacturing Institute project up to 2.1 million US manufacturing jobs unfilled by 2030, and organizations that can halve time-to-competence will hire from a pool their competitors cannot reach.

Before you fund anything, sit with the questions TorqLine's leadership had to answer honestly. How many of your most experienced technicians will retire within five years, and who is documenting what they know? What does a single repeat service visit truly cost once truck rolls, penalties and customer goodwill are counted? Could a new

hire reach full competence in half the time if instructions lived on top of the equipment? Which five procedures generate the most callbacks today, and are they documented anywhere a novice can follow? Do your training metrics measure hours spent in class or capability demonstrated on real machines? If your best technician could annotate a live camera feed remotely, how many escalations would resolve without travel? Use the action checklist in this practice book to work through these with your team, and return to them each quarter as your equipment lines and your workforce both change.

REAL-WORLD PROOF & BENCHMARKS

PwC's study of VR and AR soft-skills training found learners completed courses up to four times faster than in classroom settings, with materially higher confidence and retention. - PwC, 2020

Boeing reportedly reduced wiring-harness assembly time by about 25% and improved first-time accuracy after giving technicians AR work instructions on tablets. - Boeing, 2018

Deloitte and The Manufacturing Institute projected as many as 2.1 million US manufacturing jobs could go unfilled by 2030, accelerating corporate investment in faster training methods. - Deloitte & The Manufacturing Institute

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.

☐**1. Model your ten costliest procedures first**

List the repairs generating the most callbacks, safety exposure or training hours. Converting the highest-pain procedures first funds the rest of the program with its own savings.

OWNER

TARGET DATE

STATUS

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☐**2. Convert CAD files into AR content**

Build an automated pipeline from engineering CAD to interactive 3D instructions. Manual content production is the costliest bottleneck in every AR training program we have seen.

OWNER

TARGET DATE

STATUS

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☐**3. Design for phones before headsets**

Start with tablets and phones technicians already carry. Dedicated headsets add cost, hygiene and acceptance issues that can safely wait until the workflow is proven.

OWNER

TARGET DATE

STATUS

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☐**4. Pair every module with graded checks**

Require trainees to demonstrate each step on real hardware before advancing to the next. Competency gates produce measurable capability, while completion checkboxes only produce statistics.

OWNER

TARGET DATE

STATUS

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☐**5. Add one-tap remote expert escalation**

When a trainee or new tech hits an unfamiliar failure, route them to a live expert with shared camera annotations. Every resolved session becomes recorded knowledge.

OWNER

TARGET DATE

STATUS

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6. Support offline execution in the field

Basements, rooftops and factory floors rarely have reliable connectivity. Cache instructions and queue progress locally on-device, syncing automatically whenever service returns — design for it deliberately.

OWNER

TARGET DATE

STATUS

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7. Track time-to-competence, not completions

Measure how quickly new hires reach defined capability levels on live equipment. Completion percentages tell you nothing about whether a technician can safely work unsupervised.

OWNER

TARGET DATE

STATUS

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8. Retire stale content every quarter

Review usage analytics and delete or rewrite modules nobody completes or that no longer match current designs. Stale or wrong instructions quickly erode technician trust.

OWNER

TARGET DATE

STATUS

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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 most experienced technicians will retire within five years, and who is documenting what they know?

Q2. What does a single repeat service visit truly cost once truck rolls, penalties and customer goodwill are counted?

Q3. Could a new hire reach full competence in half the time if instructions lived on top of the equipment?

Q4. Which five procedures generate the most callbacks today, and are they documented anywhere a novice can follow?

Q5. Do your training metrics measure hours spent in class or capability demonstrated on real machines?

Q6. If your best technician could annotate a live camera feed remotely, how many escalations would resolve without travel?

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 TorqLine Industrial'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

support@emersontechnology.com

or start online: emersontechnology.com/contact