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Why Manufacturing Automation Fails, and How to Get It Right

Field-tested lessons from the plants that learned the hard way, and the industry evidence that explains why.

Automation & AI in Manufacturing · Research Report

Contents

The pilots work. The rollouts don't.

Almost every manufacturer can point to an automation pilot that worked. A predictive-maintenance model that caught a failing bearing. A vision system that flagged defects a human missed. A dashboard that finally made the line legible. The hard part was never the pilot. It is everything after.

The pattern is so common it has a name. McKinsey calls it "pilot purgatory," and its research has repeatedly found that at least 70% of manufacturers are stuck there, with significant activity underway but no meaningful bottom-line impact, and fewer than a third having scaled a critical use case company-wide. The technology usually works. The program is what fails.

This report is about why. The failures are not random, and they are not mostly technical. They repeat, plant to plant, from the same root causes: data that was never ready, systems that could not talk to each other, models nobody trusted, and people who were never brought along. Each lesson below pairs what we see in the field with the public evidence that shows how widespread it is, and what to do differently.

WHAT MANUFACTURERS LEARN THE HARD WAY

- **The pilot is the easy part.** 70%+ of manufacturers stall between a working pilot and a scaled rollout. Success is an operating-model problem, not a technology one.
- **Bad data sinks good models.** Automation built on siloed, inconsistent, or missing data inherits every one of those flaws, and no algorithm fixes a data foundation that was never laid.
- **Integration is where value goes to die.** Legacy OT that cannot talk to IT is the single most common blocker; only about 30% of manufacturers can get real-time data to the people who need it.
- **A model nobody trusts is a model nobody uses.** Alerts that operators ignore turn a six-figure system into an expensive dashboard.
- **Security is not a later phase.** Connecting the factory floor to the network without securing it invites the most ransomware-targeted sector's favourite entry point.

The manufacturers who win at automation are not the ones with the most advanced technology. They are the ones who treat it as a change program, get the unglamorous foundations right first, and refuse to scale anything their people will not actually use.

Lesson 1 The pilot proves nothing about the rollout

The most expensive misunderstanding in manufacturing automation is treating a successful pilot as proof the program will work. It is not. A pilot succeeds in controlled conditions, on one line, with the vendor's best people and the plant's most engaged team watching closely. Scale removes every one of those advantages at once.

The data is unforgiving. In McKinsey's Global Lighthouse Network research, **at least 70% of manufacturers remain in "pilot purgatory," with significant activity underway but no meaningful bottom-line benefit**, and in its Digital Manufacturing survey, **fewer than 30% of organizations had rolled a critical solution out company-wide.** The gap between "it worked once" and "it works everywhere" is where most automation budgets quietly disappear.

What causes it is rarely the technology. McKinsey's own finding is that **culture is among the most significant challenges to scaling**, not the algorithms. Pilots are funded as experiments; rollouts require an operating model, ownership, training, and a plan for the messy reality of forty machines instead of one.

PLAXONIC'S VIEW

Design the pilot for the rollout from day one. The question a pilot should answer is not "can this work?" but "what will break when we do this fifty times?" That means piloting on a representative asset, not the newest one; measuring the cost and effort to integrate, not just the model's accuracy; and writing the scale plan before the pilot ends. A pilot that proves feasibility but ignores repeatability has answered the wrong question.

Lesson 2 Bad data sinks good models

Every automation and AI initiative rests on data, and in manufacturing that data is often the weakest part of the whole system. Readings live in incompatible historians, sit in proprietary machine formats, are logged inconsistently across shifts, or simply were never captured. A model trained on that inheritance is only as good as the foundation nobody laid.

This is why so many programs stall the moment they leave the pilot. The pilot used one clean, well-instrumented line; the rollout meets the real data estate. Industry research puts hard numbers on the cost of that fragmentation, with data silos estimated to cost businesses trillions each year in lost efficiency and duplicated effort, and manufacturers repeatedly citing data context lost during integration as a core barrier.

PLAXONIC'S VIEW

Fix the foundation before you buy the intelligence. The unglamorous work, a unified data layer where OT historian data, ERP data, and quality data are correlated and made trustworthy, is the investment that makes every later initiative possible, and skipping it is why so many fail. We would rather spend the first phase of an engagement making data reliable than the last phase explaining why a model trained on bad data cannot be trusted. There is no AI shortcut around a data foundation that was never built.

Lesson 3 Integration is where the value dies

The factory floor and the business systems were built in different worlds, and they still speak different languages. Operational technology, the PLCs, SCADA systems, historians, and machines, was designed for reliability over decades, often on proprietary protocols. Information technology, the ERP and analytics and cloud, was built for a different job entirely. Automation lives or dies on getting them to talk.

Most cannot. An IDC study found legacy OT assets are 15 or more years old in roughly half of manufacturers, and only about 30% of manufacturers can deliver real-time data to their frontline workers. Incompatible protocols, the organizational divide between IT and OT teams, and context lost in translation are cited again and again as the reasons production data never reaches the decisions it should inform.

The result is the cruelest kind of failure: the model works, the data exists, and the value still never arrives, because the insight cannot travel from the machine that generated it to the person who could act on it.

PLAXONIC'S VIEW

Integration is not a phase at the end; it is the architecture. The manufacturers who succeed treat the OT-to-IT data path as the first design problem, not the last integration headache, standardizing on modern, vendor-neutral interfaces and deploying adapters for the legacy systems that will not be replaced for years. This is precisely the kind of unglamorous, production-grade engineering work that determines whether an automation program delivers or just demos.

Placeholder for a real Plaxonic example: an OT/IT or systems-integration challenge on a manufacturing engagement, and how it was resolved. Add a real, de-identified account here.

Lesson 4 A model nobody trusts is a model nobody uses

Adoption is the failure mode vendors talk about least, because it is not their fault and not fixable with features. A predictive-maintenance system that generates alerts the maintenance team does not believe, and therefore does not act on, is not a maintenance system. It is an expensive dashboard.

This gap is wide. Deloitte's 2025 manufacturing research found that **82% of manufacturers still rely on reactive or time-based maintenance**, despite predictive approaches being well proven, evidence that the barrier is rarely the technology's capability and usually whether people trust and use it. As one industry analysis put it bluntly, a predictive system that produces alerts nobody reads is a six-figure dashboard.

PLAXONIC'S VIEW

Trust is a design requirement, not a training afterthought. Operators trust systems that explain themselves, that are right often enough to be worth heeding, and that they helped shape. That means bringing the people who will use a system into its design, tuning aggressively against false alarms early (nothing destroys trust faster than crying wolf), and being honest about confidence rather than presenting every output as certainty. A model's accuracy is worthless if the person on the floor has learned to ignore it.

Lesson 5 Connecting the floor without securing it

The whole promise of automation is connection: machines to networks, floor to cloud, data to decisions. But every new connection is also a new way in, and manufacturing has become the favourite target of people looking for one.

Manufacturing has been the most ransomware-targeted sector globally for four consecutive years, with attacks surging 61% in 2025 alone. Against that, the sector's defenses are thin: the same IDC research found only about 15% of manufacturers have robust cybersecurity practices, while half are integrating OT assets over 15 years old that were never designed to be networked, let alone attacked. Connecting a decades-old PLC to the enterprise network without the right architecture does not just risk data; it risks the line stopping.

PLAXONIC'S VIEW

Security has to be in the first diagram, not the final audit. For any manufacturer connecting OT to IT, network segmentation between zones, zero-trust access, and industrial-grade endpoint protection are not enhancements to add later, they are preconditions for connecting at all. The answer to the risk is not to stay isolated and forfeit the value; it is intentional, managed connectivity with the safeguards built in from the start. This is exactly why we treat security as a design input on every engagement, backed by our own ISO 27001 practices.

Lesson 6 Chasing the shiny use case instead of the valuable one

It is easy to start an automation program with the most exciting technology rather than the most valuable problem. The generative-AI demo, the autonomous everything, the digital twin of the entire plant. Meanwhile the boring, bankable win, the 10% of equipment that causes 80% of the downtime, goes unaddressed because it is not glamorous.

The evidence favours focus. Industry analyses consistently find the highest and fastest returns come from targeting the small share of assets that drive the majority of downtime risk, delivering ROI in 6 to 12 months, rather than boiling the ocean. Manufacturers who set board expectations on the dramatic early results of replacing a purely reactive process, then cannot sustain them at steady state, damage the credibility of the whole program.

PLAXONIC'S VIEW

Start where the pain is measurable and the payback is fast, then earn the right to do more. The best first automation project is one with a failure mode that is expensive, physical, and easy to measure before and after, because that is what builds the credibility and the budget for everything next. Ambition is not the enemy; unfocused ambition is. Sequence the exciting work behind a foundation of proven, boring wins.

Lesson 7 Buying a product when you needed a capability

The final lesson is the one that ties the others together. Manufacturers often buy automation as a product, a platform, a license, a tool, and expect transformation to arrive with it. But the plants that succeed treat automation as a capability they build: the data discipline, the integration architecture, the security posture, the change management, and the people who can operate it all after the vendor leaves.

The talent side of this is real and worsening. IDC has predicted that by 2026 more than 90% of organizations worldwide will feel the IT skills crisis, with the sharpest shortages precisely at the intersection of cloud, security, and AI, the exact skills manufacturing automation depends on. A tool your team cannot operate securely is not an asset; it is a liability with a license fee.

PLAXONIC'S VIEW

The goal of a good automation partner is to leave you more capable, not more dependent. That means transferring knowledge deliberately, building systems your team can actually run, and being honest about the operating capability a technology requires before you commit to it. The manufacturers who win are not the ones who bought the most; they are the ones who built the capability to keep going. This is the difference between a demo that impresses and a system that ships and keeps running.

FIGURES

The failure patterns, by the numbers

Manufacturers stuck in "pilot purgatory"	70%+
Have scaled a critical solution company-wide	<30%
Still rely on reactive or time-based maintenance	82%
Can deliver real-time data to frontline workers	~30%
Manufacturers with robust cybersecurity practices	~15%
Legacy OT assets aged 15+ years (share of manufacturers)	~50%

Sources: McKinsey Global Lighthouse Network and Digital Manufacturing Global Expert Survey (pilot purgatory, scale rate); Deloitte 2025 manufacturing operations research (reactive maintenance); IDC InfoBrief, Manufacturing's Digital Transformation Dilemma, 2025 (real-time data, cybersecurity maturity, legacy OT age). See References. Figures are drawn from separate studies covering different populations and periods, and are not directly comparable with one another.

THE THROUGH-LINE

- Every figure above describes an operating-model or foundation gap, not a limitation of the technology itself.
- The failures cluster after the pilot: at data, integration, adoption, and security, the parts that do not demo well.
- The manufacturers who scale are those who invest in the unglamorous foundations first, then layer intelligence on top.

Before you automate: a readiness checklist

If there is a single message in this report, it is that automation succeeds or fails on the questions asked before the technology arrives. Here is the sequence we work through with manufacturers for any significant automation initiative.

1. **Is the data actually ready?** Before choosing a model or platform, ask whether the data exists, is trustworthy, and can be reached. If the honest answer is no, the first project is a data project, not an AI one.

2. **Can the systems talk to each other?** Map the path from the machine that generates the data to the person or system that must act on it. Every gap in that path is a place value will leak away.

3. **Will the people use it?** Identify who has to trust and act on the output, and involve them now. A technically perfect system that operators ignore has failed, however good it looks.

4. **Is it secure enough to connect?** Treat segmentation, access control, and endpoint protection as preconditions for connecting OT to IT, not as a later hardening phase.

5. **Is this the most valuable problem, or just the most exciting one?** Target the measurable, expensive, physical failure mode first. Earn the credibility and budget for ambition with a proven, boring win.

6. **Will you own the capability, or rent the tool?** Ask what your team must be able to do after the partner leaves, and build for that. A system you cannot operate is a liability, not an asset.

> The manufacturers who get automation right are not distinguished by the sophistication of their technology. They are distinguished by the discipline of their questions. Every lesson in this report is, at heart, a question someone wished they had asked earlier.

IN CLOSING

The technology of manufacturing automation has never been more capable, and the failure rate has stayed stubbornly high.

That is not a contradiction. It is the whole point. The bottleneck was never the tools. It is the data beneath them, the systems around them, the people who use them, and the discipline to get those right first. The plants it in stalled pilots and abandoned platforms. The ones who learn it early build automation that actually ships, and keeps running long after the launch.

Resources and references

Every quantitative figure in this report is traced below to a named third-party source. Where a figure is a forecast rather than a measurement, it is treated as such. Original sources should be treated as authoritative.

1. McKinsey & Company, "Preparing for the next normal via digital manufacturing's scaling potential" and related Global Lighthouse Network research. Source for at least 70% of manufacturers being in "pilot purgatory," and for culture as a leading barrier to scaling. Cited in Key Takeaways and Lessons 1–2.

2. McKinsey & Company, "Digital Manufacturing Global Expert Survey" (and "How digital manufacturing can escape pilot purgatory"). Source for fewer than 30% of organizations having rolled critical solutions out company-wide. Cited in Lesson 1 and Figures.

3. Deloitte, 2025 manufacturing industry outlook and operations research. Source for 82% of manufacturers still relying on reactive or time-based maintenance strategies. Cited in Lesson 4 and Figures.

4. IDC InfoBrief, sponsored by Imprivata, "Manufacturing's Digital Transformation Dilemma," IDC #US53662525, July 2025. Source for legacy OT assets being 15+ years old in roughly 50% of manufacturers, only ~30% able to deliver real-time data to frontline workers, and only ~15% having robust cybersecurity practices. Cited in Lessons 3 and 5, and Figures.

5. Industry reporting on manufacturing ransomware (as compiled by Dassault Systèmes / DELMIA and others, 2026). Source for manufacturing being the most ransomware-targeted sector for four consecutive years, with attacks up 61% in 2025. Cited in Lesson 5.

6. IDC, "Enterprise Resilience: IT Skilling Strategies," 2024. Source for the prediction that by 2026 more than 90% of organizations worldwide will be affected by the IT skills crisis. Cited in Lesson 7.

7. Industry benchmarking on predictive maintenance ROI (as compiled from Deloitte, McKinsey, and maintenance-industry sources, 2024–2026). Source for the finding that targeting the ~10% of assets driving ~80% of downtime risk delivers ROI in 6–12 months. Cited in Lesson 6.

8. Industry analysis on IT/OT convergence and data silos (multiple sources, 2025–2026). Source for the characterization of data silos and integration context-loss as core barriers to manufacturing automation. Cited in Lessons 2 and 3.

About Plaxonic

Plaxonic is a global AI-first engineering and product company. We help organizations turn ambition into working systems: intelligent, cloud-native, and automation-driven software built to perform in production, not just in a demo.

Our work spans the full journey of a modern digital system. We build production-ready AI that makes it into daily operations, engineer enterprise software that businesses depend on, and design scalable cloud platforms that hold up under real demand. Where legacy systems hold companies back, we modernize them. Where operations are slow or manual, we streamline and automate them.

With globally distributed teams, we bring together the engineering depth and range that complex problems require, working alongside our clients rather than at arm's length. The result is technology that is built for scale and measured by outcomes: systems that run reliably, operations that cost less to run, and digital products that move the business forward.

We build what actually ships, and we make sure it delivers once it does.

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