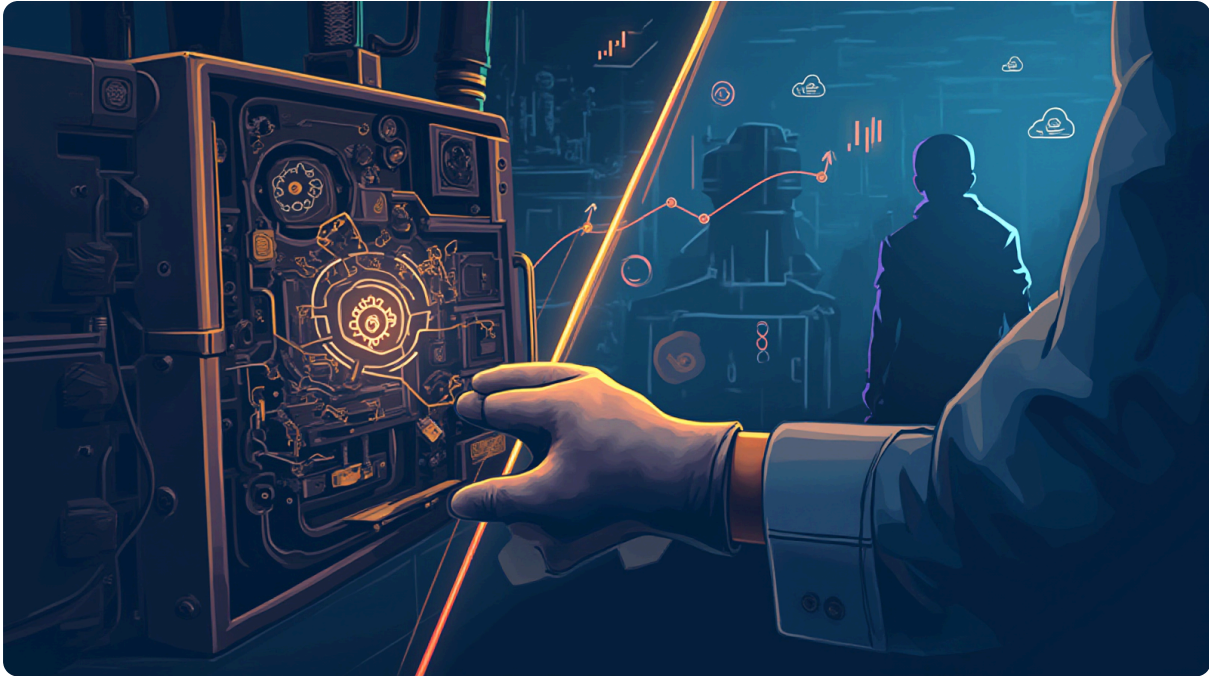


Your AI Agents Only Work If You Fix Your Product Data First.

Why foundational data governance is the true prerequisite for digital manufacturing.

PLM · Data Governance · Automation · Quality

The newsletter for operations leaders who prefer fixing their foundation over chasing shiny new technology.



The Problem with 'Black Box' AI

There is a growing temptation in manufacturing leadership to view Artificial Intelligence as a "silver bullet"—a sophisticated magic wand that will somehow clean up messy processes and magically optimize production schedules. We see the headlines about AI-driven predictive maintenance or autonomous quality checks, and it's easy to think that if we just "plug in" an intelligent algorithm, our operational headaches will vanish.

But here is the reality: **AI is not a magic wand; it is a magnifying glass.**

If you have a messy process, AI will simply help you perform that messy process faster and at a larger scale. If your data is inconsistent, an "intelligent" system won't find the truth; it will just provide high-speed, automated errors. This is what I call **The Algorithm Fallacy**. It is the belief that sophisticated math can compensate for a lack of discipline on the shop floor.

When we talk about "Black Box" AI, we are often talking about systems where the logic is hidden behind layers of complexity. If you don't understand the inputs going into that box, you cannot trust the

outputs coming out of it. In manufacturing, an incorrect output isn't just a software glitch; it's a machine that runs for three hours producing scrap parts, or a safety protocol that fails because the system didn't "see" a critical constraint. Before you worry about how smart your AI is, you have to ensure that what you are feeding into it is actually true.

What is Actually Happening? (Revision Drift)

In many plants, there is a gap between what the office thinks is happening and what is actually happening at the workstation. We see this most clearly in what I call **The Ghost Data Trap**. This occurs when the digital record of a part—its dimensions, its material specs, or its assembly sequence—no longer matches the physical reality on the floor because the documentation failed to keep up with the "hacks" and workarounds required to get through the shift.

This is known as **Revision Drift**. It's not that people are trying to be difficult; it's that when a tool breaks or a part doesn't fit, an operator makes a choice to keep moving. If that change isn't immediately captured in the Product Lifecycle Management (PLM) system, the "truth" of the product begins to drift away from the digital record.

The Comfortable Rationalization	The Operational Reality
"The system has the correct revision."	A technician is using a handwritten note taped to the machine because they don't trust the screen.
"We will update the data in the next phase."	Parts are being produced today with tolerances that were changed six months ago but never logged.
"It's just one part; it won't affect others."	A single un-updated tolerance creates a downstream assembly failure three stations later.

When your AI agent tries to optimize production based on these "ghost" records, it will fail because its foundation is built on lies. You cannot automate a process that isn't accurately defined in your data.

Why Does This Failure Persist?

If you wonder why so many companies struggle with this, the answer usually lies in how we categorize information. Most organizations treat PLM and data management as "back-office" IT functions—something for the engineers to handle in a cubicle, rather than an operational core of the manufacturing process.

We treat data like a filing cabinet: something you fill up once and then walk away from. But on the shop floor, data is not a file; it is a **control plan**. Just as you wouldn't allow a technician to skip a torque check because "it's just one bolt," you cannot allow them to bypass data integrity for the sake of convenience.

The failure persists because we prioritize "speed of production" over "accuracy of record." We tell ourselves that documenting every change is a bureaucratic hurdle, but in reality, it is the only way to

ensure long-term stability. When we treat data as an afterthought, we create a culture where "the work" is what happens at the machine, and "the records" are just something people have to do later when they have time. In manufacturing, if you don't have time to record it correctly today, you won't have the resources to fix the mistakes tomorrow.

What Happens When Data is Untrue?

The cost of poor data isn't a line item on an IT budget; it shows up in your scrap bin and your warranty claims. I call this the **Cost of Invisible Friction**.

When your product data is untruthful, you lose the ability to predict anything. If the system doesn't know exactly which version of a component is being installed, it cannot accurately calculate tool wear. You end up replacing expensive bits too early or, worse, not often enough—leading to catastrophic machine failure.

Furthermore, think about your compliance and traceability requirements. If you cannot prove that every part was made according to the current specification because your data drifted three months ago, you are one audit away from a massive headache. You can't "verify" what you haven't accurately recorded.

When we talk about AI-driven manufacturing, we are talking about high-speed decision making. If an automated system makes a call based on inaccurate dimensions or outdated material specs, it will move at the speed of light to produce a non-conforming part. You aren't just getting a "bad" result; you are potentially creating a massive recall risk because your digital twin and your physical reality have diverged.

The Operational OS: Making PLM Foundational

To fix this, we have to stop viewing data as an IT project and start treating it as the **Operating System** of the factory. Just as a computer cannot run without its core OS, a modern manufacturing site cannot function without high-integrity product data.

We need to move from "Data Entry" to "Process Integrity." This means embedding the update of your PLM system into the standard work of the shop floor. If an operator identifies a discrepancy or needs to make a field change, that change must be part of the "close the loop" process before they can proceed with the next step.

To build this foundation, focus on these three pillars:

1. **Verification at the Point of Use:** Ensure the technician's screen matches the physical part perfectly before the machine starts.
2. **Mandatory Feedback Loops:** If a manual override is required, it must trigger an immediate "exception" in the system that requires a supervisor to clear it by documenting the change.
3. **Eliminate Shadow Systems:** Get rid of the notebooks, the whiteboards with "temporary" notes, and the verbal instructions. If it isn't in the system, it doesn't exist for the next person on the line.

Three Things You Can Start Doing Tomorrow

You don't need a new AI platform to start fixing your data; you need more discipline in your current processes. On your next Gemba walk, focus on these three specific actions:

1. **The "Paper Trail" Audit:** Walk the line and look for anything not on a screen or a printed official spec. If you see a "cheat sheet," a taped-up note, or a handwritten tally mark, ask the operator why that information isn't in the system. That is your first point of failure.
2. **The Revision Check:** Pick three random parts at different stages of production. Compare their physical characteristics and current revision numbers against what is currently showing in your PLM software. If they don't match exactly, you have identified a "ghost" that needs to be addressed immediately.
3. **Identify the 'Workaround' Hotspots:** Ask your lead operators where they feel they have to "bend" the rules or ignore the system to keep things moving. These are the places where your data will eventually drift. Instead of just telling them not to do it, look at why the system is failing them and fix the process there.

The Path Forward

The road to autonomous manufacturing isn't paved with better algorithms; it's paved with cleaner data. We cannot outsource our lack of discipline to a machine. If you want an AI that can predict your failures, you must first build a digital environment where "failure" is clearly defined and recorded in real-time.

Stop looking for the magic in the "Black Box." The power isn't in the software; it's in the integrity of the data you feed into it. Start by cleaning up your shop floor records, enforcing your control plans, and ensuring that what is true on paper—or on a screen—is exactly what is happening at the machine. Only then will your technology actually start working for you.

Call to Action

What foundational process is currently slowing down your digital ambition? Share this with a colleague who needs to hear it. newsletter@sixsigmakaizen.com

Newsletter replies: newsletter@sixsigmakaizen.com · X: [@kaizen_6sigma](https://twitter.com/kaizen_6sigma)

Stay curious, stay improving,

David Rodgers

SixSigmaKaizen.com

References: Source Article: Your AI Agents Only Work If You Fix Your Product Data First.