REAL-TIME INTELLIGENCE:
HMI DIAGNOSTICS & DATA ACQUISITION

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ARTICLE TAKEAWAYS:
- HMI diagnostic screens show WHY a machine is failing
- Data Acquisition: understanding equipment over time

THE PROBLEM:
THE UNPLANNED HALT–THE UNSEEN DATA – NO ONE KNOWS WHY?
In the heart of every foundry, time is productivity, and productivity is profit. Yet, a single unexpected machine halt can throw a wrench into the entire workflow. Like many industrial environments, operators often found themselves in a frustrating loop—machines would stop without warning, and they'd have no clue as to why?

In the world of industrial manufacturing—especially in foundries—time is money. When a machine unexpectedly shuts down, even briefly, the ripple effects can disrupt entire production lines. Often, these halts are caused by something as simple as a missed step or a minor fault. Yet the impact is anything but minor.

This confusion often results in panicked calls to floor managers or engineers, wasting valuable time and increasing downtime. The root of the problem? A lack of immediate visibility into what was going wrong. And when there's no clear visibility into what happened, the downtime stretches on.

For years, many foundries have relied on reactive systems. A fault occurs, the machine stops, and only someone with deep technical know-how can figure out why. Meanwhile, the operator—who's on the front line—has limited information and little ability to fix things quickly.

Even worse, there's often no data to look back on. When a batch turns out defective, a component gets damaged, or an alarm keeps triggering, managers and engineers are left without a reliable record to investigate. It becomes a guessing game of assumptions and trial and error.

GIVING EYES TO THE OPERATOR:
INTELLIGENT HMI DIAGNOSTICS
Recognizing this gap, we decided to flip the script by introducing a new approach to machine controls—rather than leaving operators in the dark, we equipped them with new, intelligent diagnostic tools built directly into the Human-Machine Interface (HMI).

We designed and programmed diagnostic screens into the HMI, serving as the machine's voice. These updated screens go beyond the basic status indicators of the past. When something goes wrong, the system now shows why—in plain language. It pinpoints the problem and often provides guided steps to resolve it.

Take, for example, a situation where a clamp isn't fully engaged or a sensor didn't register correctly or if a clamp fails to engage, instead of just displaying "machine error," the screen might display: 'Clamp not fully engaged – check air pressure and proximity switch.' the HMI highlights the exact component, explains its role in the process, and walks the operator through how to fix it.

This kind of visibility is a game changer. With these screens, operators aren't just pushing buttons anymore—operators can independently troubleshoot minor issues without relying on supervisors or engineering support. The result? Reduced downtime, faster response times, and improved confidence on the factory floor.

DATA THAT TALKS:
THE POWER OF DATA ACQUISITION
Improving the interface was only half the solution. We also needed to understand what the machines were doing over time. So, we introduced a data acquisition system that captures everything.

We integrated data acquisition capabilities directly into our PLC systems, collecting critical operational data continuously. Every cycle, delay, error, temperatures, cycle durations, fault histories, sensor activity, motor trends, and more and resolution is now recorded —timestamped and categorized. This data is accessible in real-time through secure web portals and mobile applications, enabling managers, engineers, and supervisors to monitor operations no matter where they are.

Now, every process, pause, and performance blip is recorded and timestamped. When something goes wrong, we don't guess—we look. And when something goes right, we understand why.

Beyond convenience, this system allows detailed analysis. Engineers and plant managers can now review actual data to make smarter decisions. If a machine is wearing out, we can see the early warning signs. If a production line suddenly becomes inefficient, we can trace it back to the root cause. Operators can track how many parts they've produced and how long each cycle takes. Everything is visualized with easy-to-read graphs and dashboards, making patterns obvious and decisions easier. Managers can assess productivity and even measure the effectiveness of maintenance routines.

SMARTER SYSTEMS, SMARTER DECISIONS – FROM THE FLOOR TO THE OFFICE

This shift isn't just technical; it's cultural. With the right information flowing into the right people, everyone can do their job better:

- Operators respond quickly to issues, often fixing them on the spot
- Supervisors track trends and identify where improvements are needed
- Maintenance teams plan their work based on real usage data—not guesswork
- Engineers fine-tune logic and optimize performance with hard numbers
- Executives gain a clear view of productivity and system's health, even remotely

Access isn't limited to the control room either. Our dashboards and alerts are available online, so whether you're on the factory floor or checking in from across the country, the data is always just a few clicks away.

IT'S NOT JUST AUTOMATION – IT'S AWARENESS

At its core, what we're building is a new way to think about industrial control. It's not about just fixing what breaks. It's about understanding why it breaks, and making sure it doesn't happen again. It's about equipping people with the tools they need to act with confidence, not just react with uncertainty. We're learning from every run, every fault, every fix. We're building a feedback loop—not just for machines, but for the entire organization.

THE FUTURE OF DATA AND INTELLIGENT CONTROL

This isn't just an upgrade—it's a foundational shift in how foundries operate. With historical data in hand, the path toward predictive maintenance opens up. Machines can notify teams of wear and tear before a failure occurs, using trends and patterns to anticipate maintenance needs. Imagine a clamp that historically begins to fail every 10,000 cycles. With data tracking, we can proactively schedule inspections at 9,500 cycles. That's not just efficient—that's smart.

Additionally, user-specific roles and permissions allow tailored access. Operators see diagnostics, engineers see performance metrics, and executives get efficiency dashboards. Everyone accesses what they need. Suddenly, you're not just producing parts; you're building a rich history of your operations. This data-rich approach doesn't just help solve today's problems—it lays the groundwork for continuous improvement and smart manufacturing for years to come.

WRAPPING IT UP

We didn't just upgrade software—we upgraded the experience of every person who interacts with it. We believe that when operators are equipped with the right information at the right time, everything runs better.

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HALL

Hall Foundry Systems

By CMH Manufacturing

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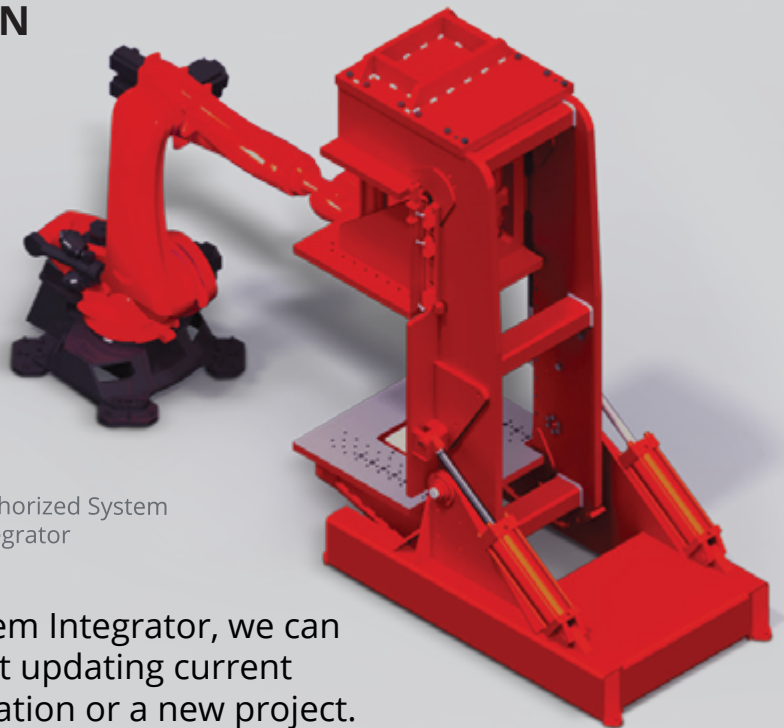No tie-bars to interfere with robotic core placement or casting extraction.

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