For Manufacturing, Digital Transformation is No Longer a Choice—It's a Necessity

WHITE PAPER

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Digital transformation really isn't about digital transformation: It's about business transformation—and using technology and data to help make this change happen.

Digital transformation combines traditional manufacturing processes with new technology and applications like IIoT, artificial intelligence, augmented and virtual reality, and human-machine collaboration to address operational issues such as inefficiency, downtime and safety.

There's no silver bullet or single formula that leads to the right transformation strategy for every plant. For example: A manufacturer with multiple locations may see immediate benefits from cloud infrastructure while a manufacturer with a single location may see more impactful returns by keeping data on-premises and comparing orders to real-time supply chain data.

Each environment requires a unique combination of applications, such as the cloud, big data, mobile technology, analytics and IIoT, to meet its goals. None of these technologies or applications alone will provide a "digital transformation." They must all come together to change operational and product processes for the better.

Are You Ready for Digital Transformation?

Technology moves much faster today. Over the last few centuries, we've seen four industrial revolutions in the industrial world (and are headed toward a fifth):

1. Early 1800s: Mechanization and steam/water power (Industry 1.0)
2. Mid- to late-1800s: Electricity and mass production (Industry 2.0)
3. 1990s: Computers and simple automation (Industry 3.0)
4. Today: Digital transformation and the interconnectedness of machines and systems (Industry 4.0)
5. Tomorrow: People working alongside robots and smart machines (Industry 5.0)

There are no manufacturers still in business today that didn't adapt to early innovations. If they still exist, it's because they implemented steam/water power, electricity, the concept of mass production, etc. as these innovations came about. At the time, each transition probably seemed insurmountable. Today, however, they're common practice.

The takeaway is this: Adopting digital transformation may seem like a difficult hurdle, but history indicates that industrial plants won't be successful in the future if they don't continue moving forward.

At some point, the industry will reach a tipping point: Digital transformation will no longer be an option, but a requirement to keep pace with the world.

For now, however, digital transformation is still a choice that must be made. So how do you decide whether—and when—it's the right route for you?

Don't invest in new technology for no particular reason or without cause. Instead, start by considering your plant's biggest barriers or bottlenecks. Do they involve poorly designed processes and workflows? Staff shortages? Lack of automation?

Identify where change is most needed and think about what you hope to accomplish through digital transformation:

- Improved productivity and efficiency?
- Maximized cost savings?
- Reduced downtime?
- Expansion into new markets?
- Deployment of predictive maintenance?

When you prioritize the problem you're trying to solve, then you can work backward to identify the inputs that contribute to the metric you want to improve. Technology shouldn't be the end goal ("We want to install wireless technology!"). Instead, technology is a tool that helps you achieve a desired business result ("We want to improve worker safety, and wearable devices with smart sensors—supported by wireless technology—can help make that happen!").

From there, you can consider the types of data you're missing that would be helpful in decision-making. For example: Maybe you have information about standard costs, but you wish you tracked times and temperatures. Compare the kinds of data you need to the data you currently have. And do you need new processes to capture this new data? Also think about the data you already have that you're not currently using.

As you compare the status of your data to your goals (what you hope to accomplish through digital transformation), look for gaps. What data do you have that you aren't using? What data do you need—but don't have—in order to meet your goals? If you find some gaps, then you're likely a good candidate for digital transformation sooner rather than later.

Starting Your Digital Transformation Journey

Digital transformation doesn't have to happen all at once with sweeping change. In fact, too much change can be daunting. Lingering in the background is a fear of upsetting the established flow of information to and from the factory floor. Instead, you can take incremental steps toward change.

To start, don't focus on transforming equipment and processes that currently work well for you. If they give you the output you need, and you can't envision ways to drive additional performance from that equipment or process, then don't spend time integrating it into your digital transformation strategy right now.

Spend time and money on quick wins with small pilot projects that can offer fast ROI. This helps build credibility and demonstrates how data-driven operations will pay off.

Find the technology that's no longer supportable or easy to maintain in a certain area: inventory management or capacity optimization, for example. A good place to begin may be with technology that's too dated to manage or still relies on analog signals. These types of projects can lead to substantial savings and streamlined workflows.

From these small projects, you'll learn lessons and apply those best practices as you create a roadmap that prioritizes larger transformation initiatives based on your goals, the data you need and how often you need it.

Overcoming Common Digital Transformation Obstacles

Digital transformation doesn't come without challenges. But these challenges are seldom about the technology itself—they're about internal factors and what it takes to implement it. Here, we take a look at some of the biggest barriers that manufacturers face when it comes to digital transformation.

1. OT and IT Collaboration

For decades, the IT world has focused on Ethernet networks while the production-oriented factory floor operated independently on fieldbus. These two isolated networks used different protocols and had different purposes—neither aware of (nor impacted by) the other.

Now, the technology and platforms used in OT are similar to those in IT. The employees working within these two groups have to come together (and may even become one position in the future). IT will play a hands-on role as OT's business partner.

As OT systems and devices connect to the enterprise network and the internet through IoT devices, IT networks, workflows and security will be impacted. Working together as a team, you'll make decisions about where and how specific data flows (one way, back and forth, etc.).

As IT and OT unite, someone needs to act as a neutral third party, not taking either "side." This person or group needs to communicate with—and relate to—both teams and convey information in a way that encourages cooperation and collaboration. This can happen by:

- Clear communication about common goals for the project or initiative and how IT and OT each make an impact.
- Defining who will manage things like control systems, security software, third-party vendors, etc. to reduce conflict.
- Cross-training both teams to provide a look at the "other side" and generate transparency to understand each group's priorities and concerns.

2. Planning for the Future

Don't plan your digital transformation strategy based on what's happening now—think about where your plant is headed and what it will grow into. What do you expect to become? How much more capacity do you anticipate? How much more output could you potentially deliver?

You don't want to spend money and time upgrading to something that won't allow you to scale in the future. If you do, you'll end up having to rip out relatively new technology and start over. For example: Installing a 100 Mb/s backbone for switches may serve you well now, but what happens when it becomes a digital backbone and you want to add more switches and devices? You likely won't have the capacity, and you'll have to upgrade.

3. Ensuring Security

Finding the right balance of security and user access is a never-ending struggle. Employees and third parties require access to certain systems, applications and data to do their jobs, but granting user privileges inherently creates risk.

For example, maybe you have a service-level agreement with a third-party vendor for automation. To do their job, the vendor needs access to your network. To allow third parties to check data, we've seen plants set up networks similar to VPNs—but without controlling access. The vendors have access to the entire plant network instead of only the data they need.

Or perhaps the reverse happens: Due to security concerns, your network is too locked down and the vendor can't get the data they need, so your plant isn't able to take advantage of all they have to offer.

Situations like these require you to architect an appropriate security strategy to establish a secure bridge to third-party vendors. What data is the third party allowed to touch? What data are they not allowed to touch? Implement required layers of approval before someone from a remote location can connect and read or make changes to device values. Make sure access is recorded so you know who is logged in, for how long and when.

4. Managing Different Industrial Protocols

The many different devices on your manufacturing floor bring with them many different industrial protocols to gather data. Protocol conversion—translating protocols so they are compatible and can communicate with one another—is a necessity to connect, monitor and control devices with different protocols. It's the only way to allow various signals to be brought into the system for data aggregation.

Maybe you started with analog and then shifted to a PROFINET network. A few years later, new technology was introduced that uses EtherNet/IP—so now you have two protocols to manage. It's best to get them to speak the same language so they can join the same network.

In-chassis and gateway modules can convert one data protocol to another to allow communication between devices that otherwise wouldn't be able to share information.

This allows older devices to connect and communicate with newer devices that use updated protocols.

Protocol conversion also lets you take a phased approach to modernizing equipment; instead of upgrading everything all at once, you can swap out equipment over time and in accordance with budgets.

4 Strategies to Get Your Leaders on Board

Every CEO and board of directors is focused on increasing growth through more volume, better pricing, and lower operating costs. If they aren't, then they aren't doing their jobs.

Here are four tips to help your leaders find value in digital transformation...

1. Know the Plant Inside and Out

Take time to understand your plant from every angle so you can paint an accurate picture to the C-suite. Explain what's currently happening, what needs to improve, and how digital transformation may improve some of these processes.

To gather this information, talk to people who may interact with plant data: shop-floor leaders, the VP of operations, etc. Ask them about their current state affairs and where they'd like to see improvement. Look for problem areas and how they could be improved through digital transformation.

2. Explain Processes

Walk them through some of your processes so they understand how things currently work and how they could be improved. Explain what could be possible with digital transformation along with sharing real-world examples of what these improvements could bring.

3. Be Ready to Answer Questions

If you were the CEO, what questions would you ask? Formulate thorough answers to these questions so you're ready to respond.

4. Show Them the Numbers

Make economic justification simple: Demonstrate how this investment will reduce the company's largest expense (overhead costs) while improving the customer experience. Those two things will capture the attention of most CEOs right away.

Promise to report back early and often on progress and share updates in real-time to demonstrate the value of the project and what it's doing for the plant, employees and customers.

Don't Forget About Your People

You can make major investments in technology and infrastructure, but digital transformation still requires the knowledge and expertise of people. The data captured as a natural part of digital transformation is valuable and useful, but it must be organized, managed, analyzed, and shared. People are key to your success. Here are some things to keep in mind in terms of how your workforce may be impacted by digital transformation—and vice versa.

1. Buy-In is Necessary

From product design to the tools used every day, digital transformation will likely change how work is done. This shift can be hard for everyone—but especially people who aren't comfortable with or quick to adapt to change.

As you move down your path, think about forming small groups made up of representatives from different departments to help build buy-in. This turns them into stakeholders, so they don't feel like digital transformation is something that's "happening to them" without their input.

During this process, it's important to consider what they have to say—and that they understand how digital transformation will positively impact them (not replace them).

2. Digital Transformation Requires Service

How will the equipment, devices and technology applications rolled out as part of digital transformation be maintained and serviced? Will workers get training so they're comfortable with these new processes and procedures?

We've seen employees leave industrial plants because they weren't confident about being responsible for a new system they didn't understand. Make sure everyone is trained and has time to get their questions answered before you completely pull the plug on the "old way" of doing things.

3. Boosting Recruitment

An investment in digital transformation may also come with a perk that many plants don't think about: It could help attract new talent.

As many people in manufacturing approach retirement, fresh workers are entering the industry. They excel in the world of smart devices and want data at their fingertips. Without data, the speed and complexity of today's processes have made it nearly impossible to know what's really going on. When new employees come to work for you, that's the kind of information they expect to have—and they'll notice that you're making investments to improve the work environment.

What You Can Do with Your Data

Digital transformation inherently generates and captures lots of data. What can you do with the data you generate? When used the right way, it can improve predictive maintenance, optimize products, increase yield and profit, help you analyze trends, optimize schedules, etc. The insights one can extract from the data will be the differentiator in this crowded market. Insights will empower people at all levels to take the most optimized action at the right time in sync with the rest of the team.

Data and analytics accelerate smart manufacturing and digital transformation. They also shine a light on the areas in need of capital investment (and areas where wasteful spending occurs). Instead of each department fighting for dollars as purchasing decisions are made, you can turn to the data to make these choices. Decision-making becomes more about facts and less about feelings, emotions, and "we've always done it that way."

Data will also answer questions that you may not have been able to address in the past. What's your defect rate? Does it need to improve? Check the data. It can tell you.

How Belden Can Support You

As connectivity and networking experts, Belden is dedicated to helping you accelerate the design and implementation of robust, reliable and secure industrial networks to deliver data and insights that drive better business performance. This is where the Customer Innovation Center™ (CIC) can help. We provide technical expertise, onsite assessments and design solutions to better fuel business performance.

Belden's comprehensive portfolio of network products supports industrial connectivity and automation, and our in-house experts have decades of experience to share with you. We've learned lots of best practices over the years, and we can demonstrate what will work best in your environment.

Our Customer Innovation Center stands ready to support your digital transformation—whenever you're ready to make it happen. We start by assessing your situation, helping you understand your existing processes and identifying areas that may benefit from improvement.

Digital transformation is a journey that will never be complete. New technologies launch all the time—from robots that complete basic tasks faster than humans to machines that solve equipment problems without intervention.

If you're not already talking to us about your industrial network and how to prepare for digital transformation, now's the time. Visit us at belden.com/CIC to learn more.

About Belden

Belden Inc., a global leader in high quality, end-to-end signal transmission solutions, delivers a comprehensive product portfolio designed to meet the mission-critical network infrastructure needs of industrial, enterprise and broadcast markets. With innovative solutions targeted at reliable and secure transmission of rapidly growing amounts of data, audio and video needed for today's applications, Belden is at the center of the global transformation to a connected world. Founded in 1902, the company is headquartered in St. Louis, USA, and has manufacturing capabilities in North and South America, Europe and Asia.

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