

The digital transformation of the manufacturing industry

How to make companies more resilient and more sustainable with an empowered workforce



Introduction

The problem all companies face

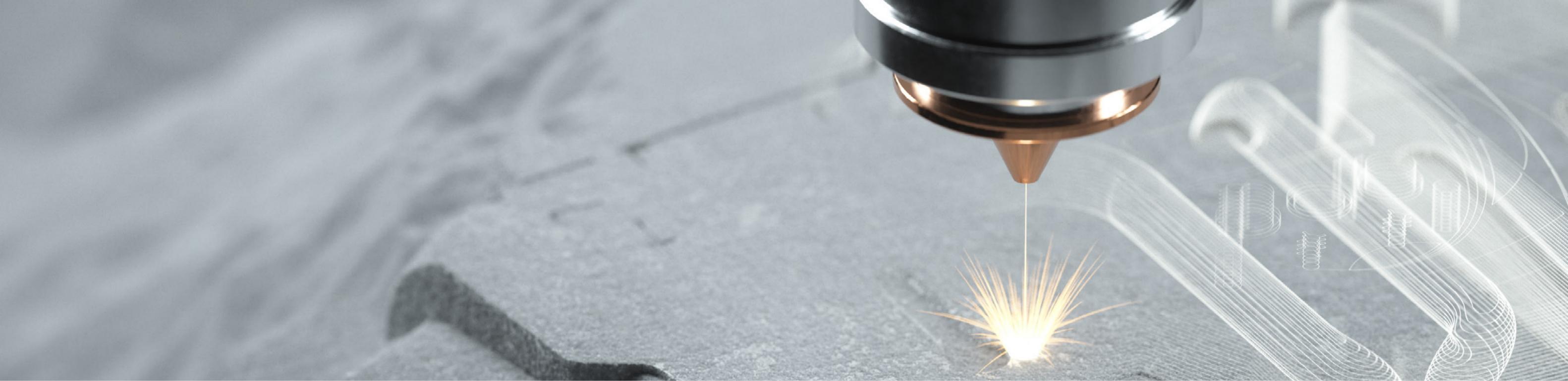
From retail giants like Walmart to the “mom and pop” job shop, businesses today are facing their biggest challenges in decades. It is not coronavirus, although the pandemic is an important factor accelerating the change being imposed on us.

The problem is digitally accelerated obsolescence. Your competitors are becoming faster, better, more responsive and more profitable than your company. This can happen even with new market entrants; your company may not be aware of the threat, before it's too late.

What are these disruptors doing that you are not? What is their “secret sauce”?

It is the adoption of digital technology and the successful cultural change by their people to use it, competently. Digital transformation (DT) is both the threat to slow-moving companies that don't do it, and the huge opportunity for those that do.





Companies are embracing digital transformation strategically, to gain market share from slower-paced competitors in their space. Previously, barriers to entry prevented or slowed companies from developing regions from competing with mature Western companies. DT pulls those barriers down. It enables, for example, a Chinese company with good manufacturing processes to enter a technical product market, compete and win market share in a fraction of the time it would have taken in the 1990s and 2000s.

The Covid pandemic is accelerating the process; adoption of Cloud-based technologies, for example, is accelerating, powering more devices and organizations. Emerging from the Covid pandemic, customers are expecting to bounce back and grow, with companies jockeying for market share and then needing the capacity to handle that influx of business. Morgan Stanley and other investment banks saw growth in the US economy in 2021 from months of pent-up demand and depleted inventories, coupled with record low interest rates. Growth in business applications for some Autodesk partners were at 25% in January.

How can a company design and manufacture products better tomorrow than it does today?

Where competitors offer very similar products, businesses need to make strategic offerings to differentiate themselves: better service or maintenance contracts; the immediate availability of spare parts; or intelligent deliverables that support their customer's digital strategy, like a service wrapped in the product such as predictive maintenance or analytics tools.

With 5G being quickly rolled out, the world is becoming more and more connected, enabling field, construction, and plant operations to become more connected. Those who do not take advantage will be left behind.

Organizations need DT to reduce costs, become leaner, more competitive and, frankly, to remain relevant.

¹ Economic growth post-covid: <https://www.morganstanley.com/ideas/coronavirus-impact-on-global-growth>

What is digital transformation?

According to digital analyst and author Brian Solis, DT is “The realignment of, or new investment in, technology, business models, and processes to drive new value for customers and employees and more effectively compete in an ever-changing digital economy.”²

It is the adoption of digital technology to transform services or businesses by replacing non-digital or manual activities with digital processes, or replacing older technologies with newer, digital technology.³ Digital transformation can refer to anything from IT modernization – for example, cloud computing – to digital optimization, to the invention of new digital business models, such as Product as a Service or Platform as a Service.⁴

But DT is not about technology alone. It is about changing the way a company thinks and operates. It’s about empowering people to use digital tools to improve the company, helping it to achieve goals faster.

² Brian Solis: <https://www.briansolis.com/about/>

³ Wikipedia, Digital transformation

⁴ Gartner: <https://www.gartner.com/en/information-technology/glossary/digital-transformation>



What will digital transformation do for my company?

Digital transformation empowers people to do things differently.

It directly supports lean manufacturing and lean construction with rich data, product information, greater visibility, and connectivity. DT takes a similar mission to information flow.

Like lean, digital transformation can:

- 01** Reduce waste by entering information only once – ideally, at the first point in time where that information is known – and leveraging it through out the entire lifecycle of the product or project.
- 02** Automate laborious tasks such as aggregating information, using project dashboards or BOM (Bill of Material) roll-ups to reduce wasted time.
- 03** Provide a digital element to the product, project or service that the customer values and directly benefits from:
 - a. A smarter dataset that integrates into the customers own DT initiatives
 - b. Project Commissioning and Construction Portal
 - c. Proactive monitoring and predictive maintenance that avoids unplanned downtime
- 04** Digital technology allows better collaboration and communication:
 - a. Enables remote working from any location, giving companies resilience in global shocks like the Covid pandemic. Digital workflows are enabled by technology that facilitates distributed collaboration, approvals, and provides complete visibility into workflow status.
 - b. Greater digital collaboration through the supply chain.

Foundational elements of digital transformation:

Every organization will want to achieve different goals from its DT strategy but all strategies have common foundational elements.

These include:

- + Process management - includes the digital stream and process standardization
- + Digital thread – typically a narrow conduit for data to travel back and forth. A 3D model can create a digital thread when it is carried into data management and a PLM system
- + Data management - including data standards, model standards, and automation
- + Business Model Maturity – four key levels of digital maturity. These ascend from Level 1: very analogue, siloed enterprises up to Level 4: with multiple optimized digital threads building a digital stream in a connected process
- + Business systems integration - what's available today and tomorrow, including Platform as a Service (PaaS)
- + Digital stream – the compilation of multiple digital threads in a single big pipe to transport information through the business to other threads
- + DT culture – bring your people with you. Establish digital teams

Beneath these foundational elements and linked to them are softer “components” of DT like collaboration, people, process control, business continuity, and sustainability. All these components can be used to bring greater value into a business, reduce costs, and increase efficiencies.

N.B. This is not an all inclusive list.

Innovation, Creativity, and Culture

DT liberates an organization to become more innovative and creative. Companies want to design and make products better, where “better” means more valuable products, designed for “manufacturability” in less time. It also means expanding the definition of a product from standalone to something with services integrated. It means creating more sustainable products, traceable throughout their lifecycle.

Companies become more innovative and creative via more integrated delivery, new service and maintenance offerings, better aftermarket support for spares, and more data-rich products with sensors; changes that add value to customers.

DT can empower people to deliver higher value work, boost productivity, and allow the company to grow.

How?

By digitizing processes that are held in individual siloes, combining them with standard operating procedures (SOPs), learning management systems (LMS), and teaching those workflows to others, knowledge can be codified and scaled up.

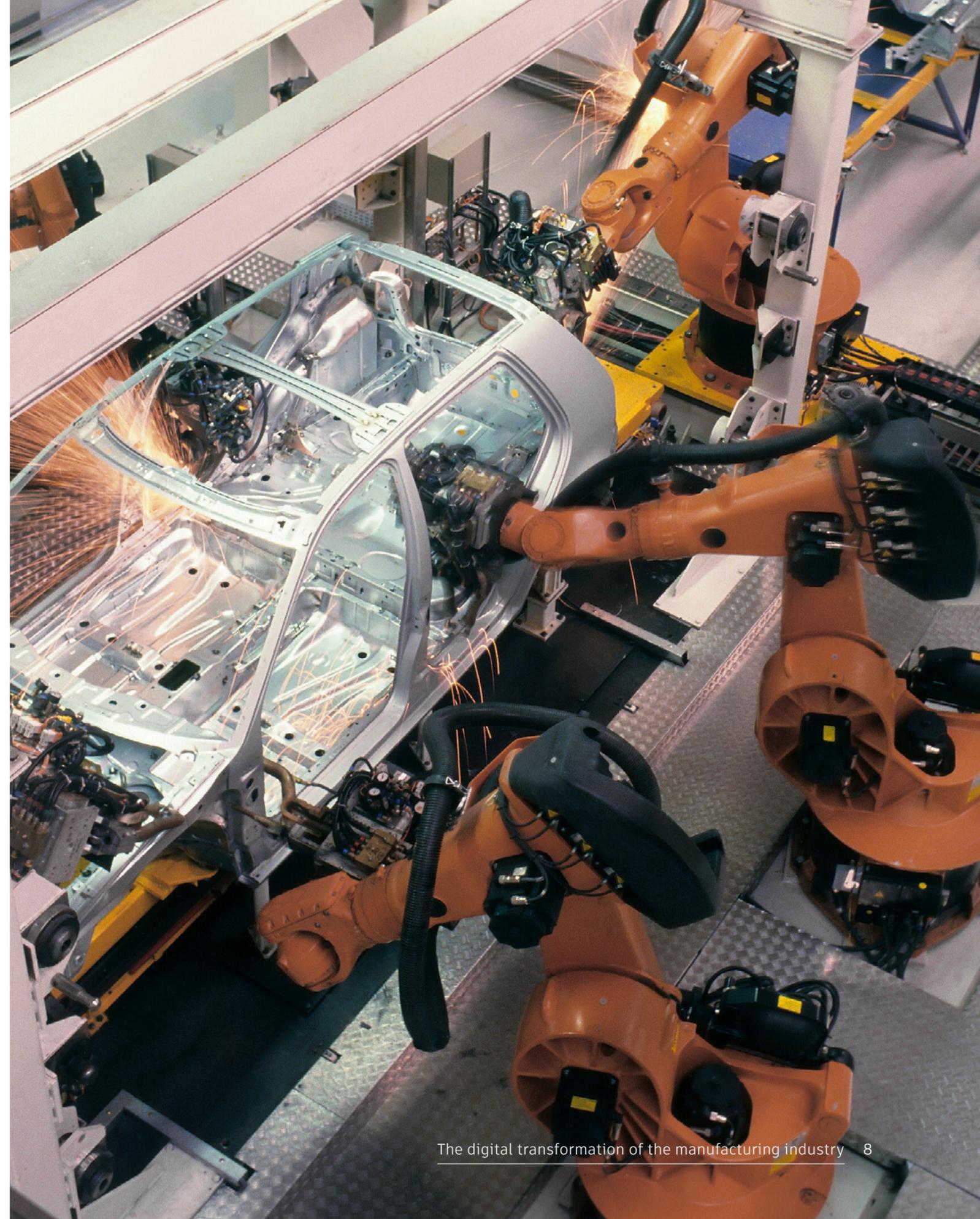
By automating low value tasks, finding efficiencies, and freeing up your biggest asset – people – to use their brains in higher-value ways. Many DT customers say that 70% of their time is spent on non-value added tasks; businesses will access more creativity if they can reduce redundant activity.



Developing a Culture of Transformation is Essential

DT should reflect company culture, such as: focus on quality, customer-orientation, sustainability, and work-life balance. All are part of the continuous improvement journey. Employees should participate willingly because they can see the advantages that DT brings to their employers and to themselves.

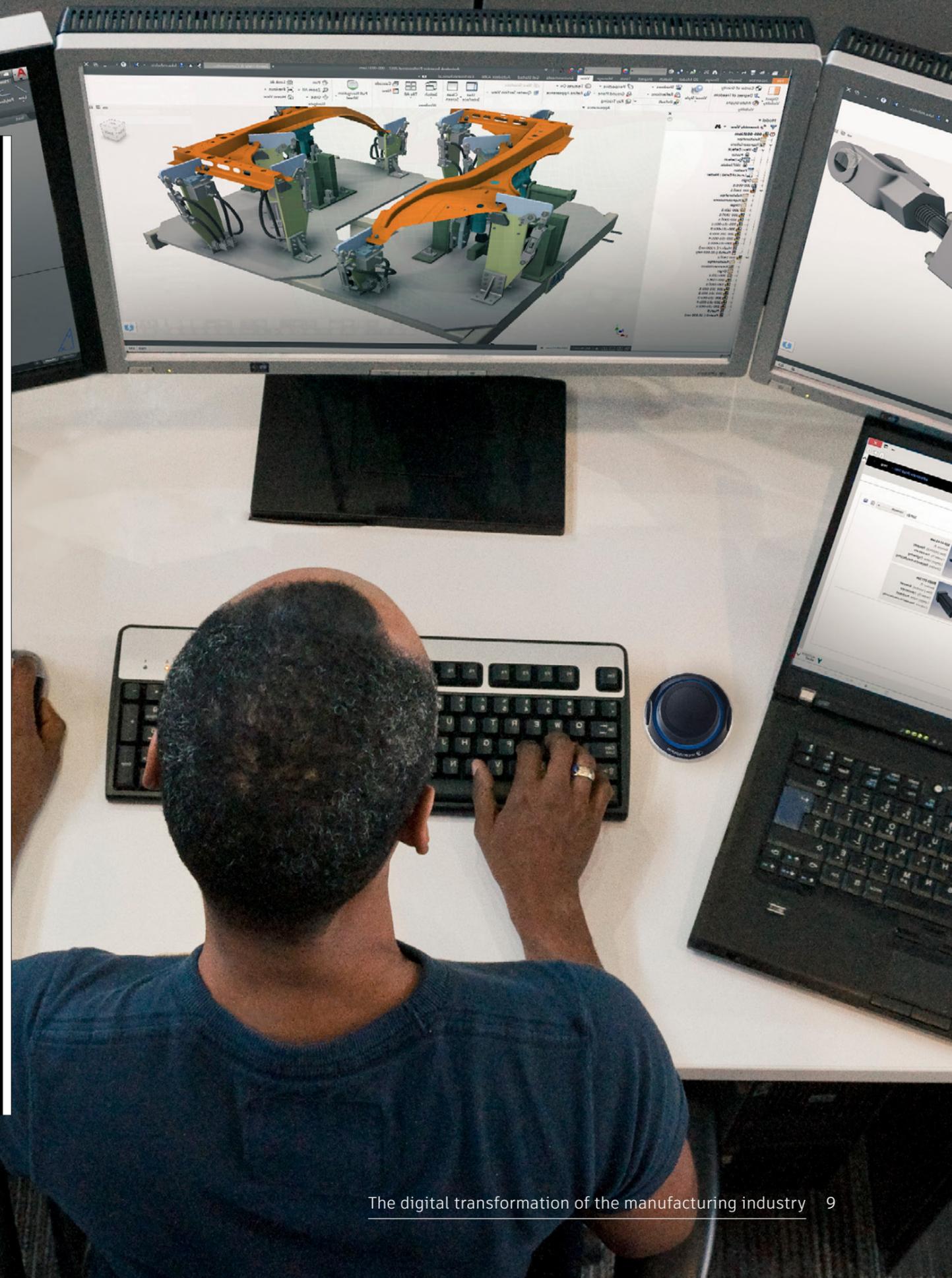
DT should help leaders capture the key elements of different actors' roles in their culture and should support that culture.



Owens Corning Customer Story

Owens Corning is a manufacturer of building materials, a construction company, and an operator of complex assets for itself and its clients. It has a huge number of product designs, SKUs, and product data, as well as a large engineering budget to manage. It also runs a wide array of different IT systems.

As a \$7.2 billion company operating in 33 countries with hundreds of applications involved in design, manufacture, delivery, and operation, a prime challenge of its digital transformation strategy was to decrease the cost of delivery of assets to factories. Digital Engineering Leader Mike Strait produced a detailed vision of which technologies would be effective at delivering efficiencies and identified the most important business improvements. “Everything we do is focused around reducing the costs and time taken to deliver the asset,” he says.



Owens Corning

Customer Story Continued

Owens Corning is moving from a variety of 2D and 3D design models in different formats into a standardized, fully digital modelling environment. The new Sage Timberline estimating package is linked to the PLM, the backbone of the enterprise IT system. Integrating what used to be a manual process into the PLM delivers a bill of materials (BoM) with a very accurate cost structure, which enables the company to estimate more accurate costs for the project, earlier. The sooner in the process informed decisions can be made, the lower the ultimate cost of change.

Owens Corning has also adopted a two-pillar **digital twin strategy**. One is dedicated to operations and maintenance and is intended to improve the fixed operation of assets. The second uses “Industry 4.0” or IIoT technology; hundreds of sensors inside the equipment monitor performance in real-time, allowing engineers to tweak operations to optimize them. The virtual and physical digital twins work together to validate the performance.

With design automation, construction management, and several more digital solutions working to connect the entire enterprise, Owens Corning’s strategy is being driven hard.



Why do we need digital transformation?

Hundreds of thousands of companies are still addressing the same problems they faced 50 years ago, spending excess time on non-value added tasks. Poor visibility of stock, waste, productivity, and profits. Inefficiencies. A reactive approach to business and customers.

DT represents a massive step forward in addressing these problems.

A simple example, often taken for granted, is the move to 3D in engineering and construction design. 3D information is an inherently smarter dataset than 2D and represents a huge improvement in the way stakeholders are able to work. DT takes that further, to improve how we work upstream and downstream of the core product data.



Benefits from digital transformation include:

Continuity of information flow: Technology platforms have reached the point where all product-related information can be captured within digitized processes configured to individual businesses. This enables relevant information to be shared across platforms, supply chains and customers. Better technology platforms, combined with Learning Management Systems, help to “onboard” people into that transformation, accelerating the pace of adoption.

Mergers and acquisitions: If a company is dependent on tribal knowledge, with essential information embedded in the heads of individual employees but not codified in the business, it will have a difficult time if it wants to merge or be purchased. A technology-agnostic digital framework, with intellectual property and a company’s processes organized and visible, is a better platform for integrating previously separate entities.

Digital companies have greater market value: Autodesk partners that deliver DT have helped companies achieve higher market valuations by giving customers much clearer and thorough digital frameworks that the buying company can see, value, and integrate with.

DT was used to help an oil & gas company in the US showcase its full intellectual property to a buyer. Before the project, the customer had no way to demonstrate its true value because its drawings and designs – its IP – were hidden, siloed, and unpresentable.

Five headline reasons for companies to engage in DT:

- › More efficient operating processes
- › Greater access to current and new markets
- › More profitable business models
- › New sources of revenue
- › Enhanced customer offerings

Successful completion of a true digital transformation should look like this:

- **Increased revenues:** Bigger market shares, new markets acquired, and/or lowered costs to acquire and maintain customers.
- **Increased competitive advantage:** Better products or services than competitors and/or filling new need/want categories no-one else caters to.
- **Getting more done, faster and with less:** Increased efficiency and coordination, and the ability to quickly tap into strengths.



I The digital twin and the digital thread

A digital twin, defined by the Digital Twin Consortium⁵, is a virtual representation of real-world entities and processes, synchronized at a specified frequency and fidelity. Digital twin systems transform business by accelerating holistic understanding, optimal decision-making and, effective action. Digital twin uses real-time and historical data to represent the past and present, and to simulate predicted futures.

Digital twins are tailored to operational use cases; they simulate real-world scenarios. The business value of a digital twin will be derived from the cases contained within and supported by the digital twin. However, that value will be enabled in a cost-effective manner only if the digital twins can communicate via the **digital thread**, rather than having to be manually populated.

A digital thread is typically a narrow conduit or channel for data to travel back and forth. There is more than one type of digital thread. In product modelling, for example, it is a mechanism for correlating

information across multiple dimensions of the virtual representation, which include (but are not limited to) time or lifecycle stage (including design intent), kind-of-model, and configuration history. A product model and its data is one type of thread.

Another digital thread is created by sensors in machines and engines for process monitoring and predictive maintenance. These feed data back from the sensors to the operating company to avoid downtime. A digital stream is where these multiple threads come together in a single “pipe” across the whole business, allowing this live data to integrate with an ERP system to tell operators exactly what they need to know. A working digital stream can be understood as business continuity.

Businesses that use digital twins of their complex assets, factories, and processes, connected by a digital thread, will realize much more value from their operations, save time, and increase efficiency.

⁵ Digital Twin Consortium: <https://blog.digitaltwinconsortium.org/2020/12/>

Digital transformation creates new business opportunities

Autodesk customer **Warren Services** in Thetford, UK is striving to be a digital manufacturing SME. It has run an ERP system and been a paper-free business since the early 2000s, unusual for a small engineering firm. The company, which manufactures structures and electro-mechanical assemblies for the global theatre and performance arts industries, luxury buildings, food processing, and agricultural equipment, is now experimenting with collaborative robots and generative design under the leadership of digital evangelist, company chairman William Bridgman. It has migrated its design department to Autodesk Fusion 360 and Vault, and is looking to recruit engineers globally to work online across time zones. The company is constantly looking to upskill staff and automate mundane, low value work, but retain the people in higher value, more skilled jobs.

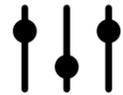
DT gives companies **competitive advantage**. By accessing and sharing more information about products to suppliers, stakeholders, and customers, and what can be delivered on time, in what quantity, manufacturers can offer a better service. And they can build trust.

DT provides new ways to deliver positive customer experience.





Collaboration – the \$100tr opportunity: In 2015, the World Economic Forum (WEF) and Accenture launched the Digital Transformation Initiative (DTI) to study and research the impact of digitalization on both the public and private sectors. Its research focused on ensuring that digitalization unlocks new levels of prosperity for both industry and society. A 2017 interim report claimed that digital transformation “could deliver \$ 100 trillion in value to business and society over the next decade.”



New ways of delivering services: DT supports servitization: wrapping services around products to prolong the lifecycle of an expensive product, augment the value of the product, and create regular revenues for the vendor.

Companies across the spectrum, including very large engineering firms like Rolls-Royce, GE, Caterpillar, and ThyssenKrupp, but increasingly many small and medium-sized businesses, are offering product service systems. Buyers want the availability of the asset for a fixed price, with no downtime, rather than the risk of owning assets that might break or malfunction in service.



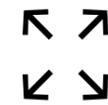
Democratization of technology: Autodesk’s product subscription model has enabled smaller customers to access very powerful digital tools at an affordable cost. With the barriers removed there is now almost no excuse for any company to have some level of involvement in digitalization.



Focus on efficiency: Companies aspire to achieve more of their business goals for the same input. DT delivers it.

Nortek is a \$2.5bn heating, ventilation, and air conditioning company. Its many manufacturing sites were doing Design & Manufacturing in their own way; cleaning up the landscape of

applications was needed. Aligning all D&M in the group on a single platform enables flexible manufacturing. Nortek’s end goal is the “Design it anywhere, Make it anywhere, Ship it anywhere” paradigm, achieving the full utilization of its manufacturing footprint.



Remain competitive: A new factory in China or Vietnam, with the right capital investment, tooling, and IP, can be operational in weeks and taking your company’s market share before you know they even exist.

Owens Corning is the world’s biggest manufacturer of fiberglass composites and has a large market share in its core sectors. It faced losing market share to new, Chinese, competitors who appeared quickly with well engineered, cheaper products. Managing cost is essential in the low margin building products industry, so the company engaged DT to maintain its cost base, but achieve more productivity and better customer experience.



Reducing workforce turnover: DT should work for the employees of the organization being transformed, as much as its customers. It will enable many workers to do more interesting, higher value work, leaving low skilled tasks, including simple data processing and “moving numbers around” to digital tools.

Many Autodesk customers have observed this for real, including Tharsus, Penso, Briggs Automotive Company, Warren Services, and VisiConsult in Europe; and Owens Corning, Nortek, and Advanced Drainage Systems in the US. An accounting assistant at Warren Services, a 100-employee engineering company in Thetford, UK, was retrained as a robot programmer. She implemented “bots” to connect manufacturing, orders, invoicing, and payroll to give a much more accurate picture of the company’s profitability. By empowering people, companies can retain good employees and knowledge in the business.

Nortek Global HVAC Customer Story

Nortek, a \$2.5 billion heating, ventilation, and air conditioning (HVAC) company, has grown both organically and through acquisition, resulting in a landscape of legacy infrastructure and applications. Reorganization of its digital architecture was essential to enable growth.

IT began by harmonizing and standardizing hardware and software, paving the way for more modern technology and moving to the cloud to facilitate accessibility, remote or home working of employees, and to increase efficiency.

“The ability to work online at all times is critical to speed to market and order-to-cash,” says Dr. Andrea Burr, Director Application Services at Nortek. “Digital transformation helps us be more flexible and adaptable.”





Nortek serves two main markets: residential, where the SKUs are the same and production has a common drumbeat; and small volume work, including very different HVAC systems ranging from performing arts centers, museums, and municipal buildings. Expectations and delivery times vary; digital transformation has to improve both, simultaneously.

Aligning everything onto a single platform, including design and manufacture programs along with customer-facing apps, enables flexible manufacturing.

Customers can now access drawings through the free web client and use an app for troubleshooting an HVAC unit. The introduction of digital twins with selected customers means they become the guides to product improvement.

“The digital twin opportunity improves the customer experience, from initial engagement through installation,” says Dr. Burr. “First, we ensure the concepts are yielding the optimized customer experience. Based on user feedback, we test and debug. Next step is to check whether they have implemented changes or not, and why or why not. Finally, after assessing all the inputs, we take everything and iterate it again.”

Within Nortek itself, project leaders were charged to educate and sell the vision, in a concrete way. “You must show how it all falls into place and how we achieve this together,” says Dr. Burr.

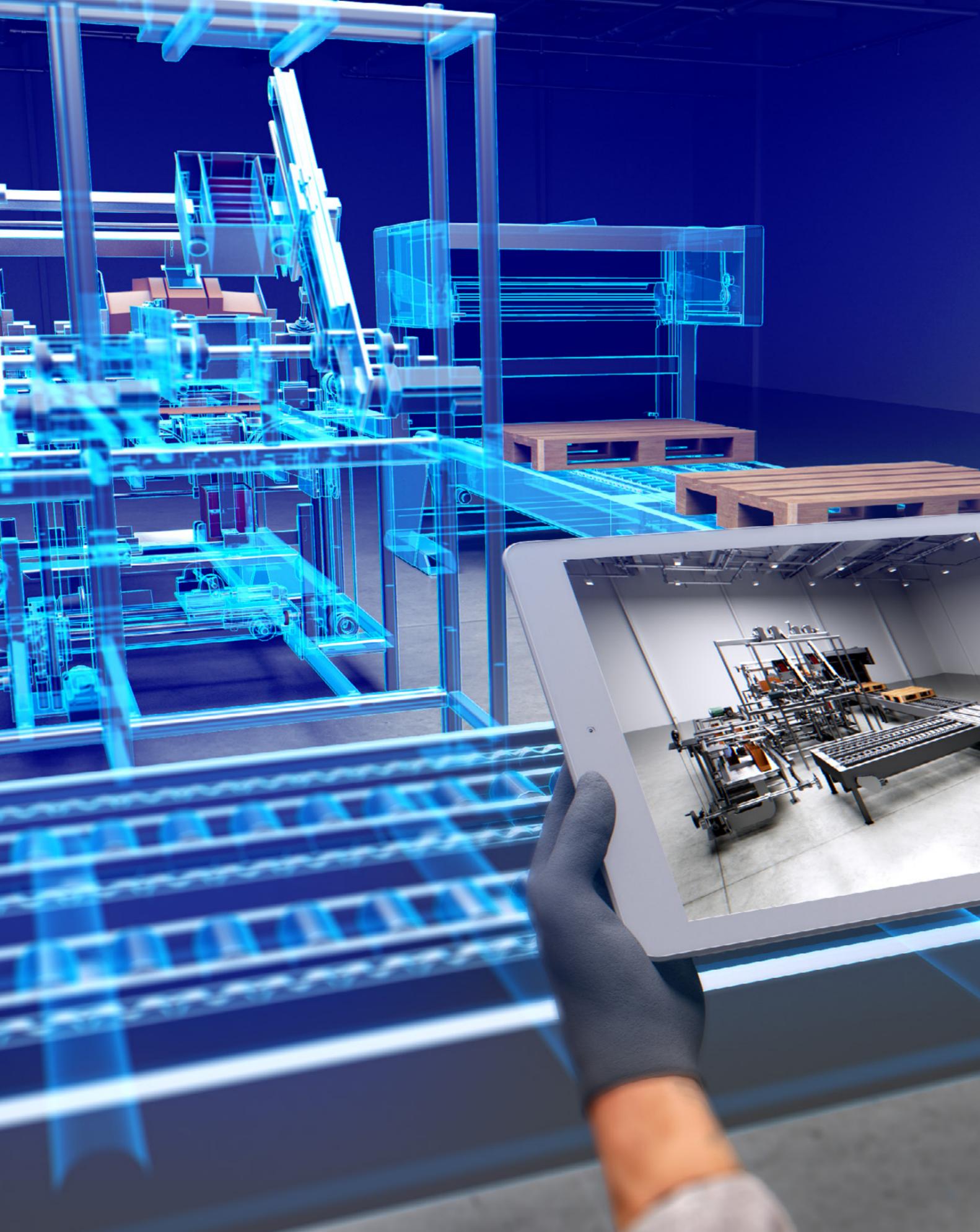
Nortek is now implementing a range of tools through all its compatible business processes. It has structured its journey that paces for a range of adopters that allows the project to progress on schedule.

What is digital transformation: The detail - Industry 4.0

Industry 4.0 – the Fourth Industrial Revolution – refers to the production of goods using smart manufacturing technologies, where capital equipment has a degree of decision-making ability. Companies must embrace digital change to support moving to a fully-connected state.

Production machinery needs to be smarter and more flexible, to respond to changing customer demands and market needs. Machine builders today, who have hitherto developed machines with mechanics and electronics only, are shifting from a classical product type to one where the machine has a digital interface and offers new services, including tool libraries, which enable it to be more flexible in what it can manufacture. OEE – Overall Equipment Effectiveness – remains a very important tool in helping to achieve more machine uptime, boosting output and productivity.





Manufacturing is now moving away from the complex sequence of conveyor belts and traditional factories into event-driven, modular systems. Truly smart factories are being developed where autonomous production cells can reconfigure their machines and material handling equipment by themselves, using cognitive computing, from manufacturing Product A to Product B, giving the company huge flexibility in both the type and volume of product it can make from day-to-day, rather than a monolithic factory that can only make many of one or two types of products.

Emerging markets, like Asia, are making machines cheaper. The only way to compete is to change the game, by introducing more flexibility and less complexity.

The business case for this kind of flexible manufacturing is twofold. First: survive and compete better. Companies cannot compete on salary and fixed costs; they must compete on performance.

Second: margins in classical production are becoming thinner. In the Industry 4.0 world, firms try to increase margins by providing complementary digital services, which normally have high margins; c. 50% of all industrial machinery revenues now come from services. Companies can reduce complexity and the number of people involved in the operation, and thus reduce operational expenditure.

This technology helps to deliver mass customization, the demand for making things with small, personal variations in very high volume.

I Cyber security

Cyberattack – including espionage, data theft, ransomware, and industrial sabotage – has become one of the greatest risks to business continuity of our time.

Cyber security as part of a digital transformation strategy, enables you to run your business with less risk of cyberattack.

There are several ways a cyber-criminal can attack a manufacturing company, including phishing and other “social engineering” techniques, resulting in malware infections such as viruses, ransomware, and Trojan horses.

Phishing is the fraudulent attempt to acquire sensitive information, such as passwords and protected files. It tends to involve the deployment of booby-trapped files, sent by someone posing as a trustworthy party. It could be enacted through a fake advertisement on social media or masquerading as an email from a work colleague. It is the most common form of cyberattack because it is so simple and cheap to carry out. Defense often relies largely on the vigilance and security awareness of the victim.

Companies are looking at DT to shore up their cyber security. There is some risk that exposure to cyberattack can be magnified with DT because companies cannot always detect the level of security risk that is being introduced, but more often they increase and fortify their cyber security procedures as an integral part of a DT project.





In many cases, DT will retire old and very vulnerable IT systems with new, far more secure platforms. DT experts would recommend higher level cyber security as one of the earliest steps in a DT strategy, as it's a great opportunity to audit and fortify your existing IT protection. With well-publicized ransomware attacks on industrial companies, especially in the last two years, many customers are now asking to move to the cloud and take the responsibility off their on-premise IT.

Hacking and modifying a factory operation can be achieved by attacking any management system of operations technology, or SCADA – Supervisory Control and Data Acquisition – architecture. Most manufacturing companies have a variety of these OT systems to manage their factories inside their corporate IT structure; they are also accessible remotely, which is where criminals target.

A large DT project can potentially create more entry points for cyber criminals, as transformation increases the “attack surface” at the company. No security, or poor governance processes, increase the risk; effective measures and protocols are vital.



I The digital twin

Digital twin refers to a digital replica of potential and actual physical assets (physical twin), processes, people, places, systems, and devices that can be used for various purposes. Examples of digital twins in industry include engines, turbines, aircraft sub-systems, factories, and processing plants. It is also possible to create digital twins of an assembly process, a financial instrument or accountancy method.

Engineering companies can simulate on a digital twin any process change that can be applied to the real asset in the field. They can use the twin to make operational changes to the physical asset, such as adjusting the speed of a turbine, cooling via a heat exchanger, or the flow rate of fluids in a processing plant.

Digital twin technology allows detailed information about a physical object to be shared with a larger number of agents, unconstrained by physical location or time, increasing the benefits of multi-person collaboration.

Autodesk customer Owens Corning, a large building materials manufacturer and building contractor and operator, has adopted a two-pillar digital twin strategy. One twin is dedicated to operations and maintenance and is intended to improve the fixed operation of assets. The second uses Industry 4.0 or “IIoT” (Industrial Internet of Things) technology; hundreds of sensors inside the equipment monitor performance in real-time, allowing engineers to tweak operations to optimize them. The virtual and physical digital twins work together to validate the performance of the asset in the field.

Warren Services

Customer Story

Founded in 1990, Warren Services employs 100 multi-skilled people, manufacturing structures, and electro-mechanical assemblies, from high-speed winches for the theatre industry to balconies for luxury apartments. Early on, it introduced the concept of EDI links for transactions in the DOS days and installed an ERP system years before many engineering firms of similar size.

With a machine shop that is almost completely CNC, the business is now experimenting with collaborative robots and routinely uses data capture to measure machinery performance.

“We want to automate work to give people better jobs, not to automate jobs away,” says chairman Will Bridgman, the company’s digitalization champion.

After years of working with several ad hoc systems, Warren Services this year embraced Autodesk Vault and Fusion Lifecycle to manage its design department on a single platform, cloud-hosted to maximize storage and accessibility to employees and to customers, allowing better collaboration.



Warren Services

Customer Story Continued

After years of working with several ad hoc systems, Warren Services embraced Autodesk Vault and Fusion Lifecycle to manage its design department on a single platform, cloud-hosted to maximize storage and accessibility to employees and to customers, allowing better collaboration.

Covid-19 impelled Warrens to accelerate its digital transformation. With some staff working from home, the need for better controlled processes was starkly highlighted.

“If we can work from home and from the office seamlessly, we could employ people effectively from anywhere in the world,” says Will.

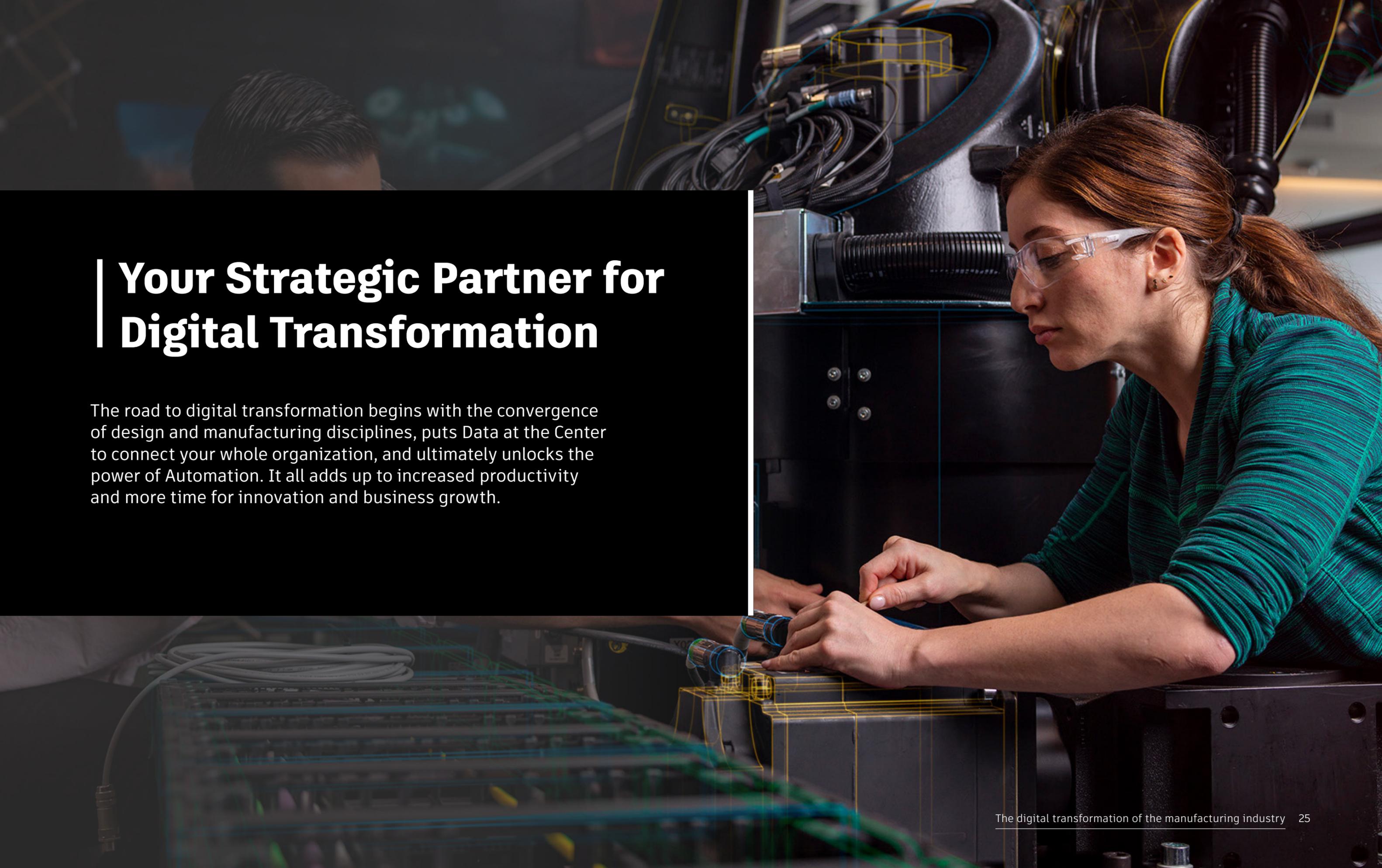
“For work with a short lead-time, we can access engineers in the US or Asia, enabling a project to run 24-hours a day.” Covid and digitalization are revealing better, agile business solutions.

The engineers are looking to automate parts of CAM programming in Fusion 360, for even greater efficiency. Shared libraries mean that an updated tool choice, for example, is immediately visible; knowledge is not held in siloes. Tool numbers and usage will be stored on Warrens’ web platform; levels are immediately visible, enabling better management of inventory and supplies.

The company has automated its financial operations, with digital accounting. A female employee who volunteered to self-train is now a qualified robot process programmer.

Warren Services’ example proves that digital transformation can benefit any business with a vision, leadership, and a willingness to change.



A woman with long brown hair tied back, wearing safety glasses and a teal long-sleeved shirt, is focused on working on a piece of industrial machinery. The background shows a factory environment with various cables and equipment. The image is overlaid with a dark semi-transparent box containing text.

Your Strategic Partner for Digital Transformation

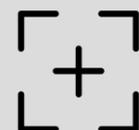
The road to digital transformation begins with the convergence of design and manufacturing disciplines, puts Data at the Center to connect your whole organization, and ultimately unlocks the power of Automation. It all adds up to increased productivity and more time for innovation and business growth.



Convergence

At the heart of Autodesk's vision for digital transformation is the idea of convergence. A convergence of technologies, a convergence of industries, and a convergence of design and manufacturing disciplines. This is the cornerstone of digital transformation.

With the Product Design and Manufacturing Collection, Autodesk is building a simple way for different disciplines and different teams to come together in one product development and manufacturing environment. Data is the digital thread that ties it all together and drives this convergence. Creating a common data experience gives you a complete view of your products and processes. It creates transparency at a global scale. And it offers actionable insights across your entire organization. So, everyone can make better decisions, faster.

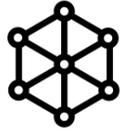


Data at the center

Connected Data is the key to better collaboration. It breaks down silos between departments and makes sure the right people have the right information at the right time.

When data is organized cleanly with Data Management tools like Autodesk Vault PLM, a user can quickly find and reuse data, eliminating the need to start over every time. It can track changes, revisions, and design history automatically as you work; and reduce waste and streamline product data with intelligent search capabilities.

Teams need to work together concurrently regardless of their physical location or where they sit in the product development lifecycle. This is fundamentally what we've come to expect today. And this is where Autodesk can help you bring teams together in a virtual collaborative environment. And this collaboration doesn't have to stop within your own walls. When everyone is working from a secure cloud platform, you can stay connected 24/7 to your entire supply chain.



Automation

Once you're connected and collaborating effectively, the next leap forward is to automate. Automation eliminates the delays of working manually and can exponentially accelerate product development across all departments. Without it, you'll never move beyond incremental productivity improvements.

Autodesk's mission is to make automation accessible to everyone, building automation technology directly into its platform.

Technology like generative design in Fusion 360, which uses artificial intelligence to automate the design to manufacturing process. Engineers and manufacturers can now define their problem statements and objectives... and let the AI automate the creation of multiple validated designs. The engineers can then select the option that fits their preferred manufacturing method to work best with the machines in their factories and have the best cost-to-volume ratio and performance.

Ultimately, it's through Automation that we will bridge the Innovation Gap.



Cloud platforms

In this 'new normal' of distant working, the cloud has become a necessity for collaboration.

It's no longer an option, but rather a critical component to keeping your teams connected and your business operational. Autodesk is not new to the cloud. For more than a decade, Autodesk has been building a cloud-enabled platform that empowers a virtual workforce. A cloud platform that connects the product lifecycle from initial concept to customer delivery. A cloud platform that enables connection across the entire manufacturing ecosystem.

Platform technologies are powerful programs, such as Autodesk Forge and Autodesk Fusion 360, that serve as large, very capable platforms for other programs to sit under and feed into. Forge, the product data management suite or third-party CAD programs – can feed into Fusion 360, the PLM that often functions as the backbone of the company's IT architecture.

In true digital transformation, these platform technologies are vendor agnostic. An Autodesk platform can connect all the applications and data in the business seamlessly, regardless of vendor origin.

I Conclusion

Digital transformation is essential for businesses that are serious about being competitive.

Companies that want to compete effectively and not be consumed by competitors have to understand and harness digital technology competently, and understand where and how it can add value to the business and customers. Ignoring digital transformation wholesale is an existential threat to a business.

Think about the rise of servitization, and providing product data to customers to make better decisions. Today, up to 50% of all industrial machinery revenues come from services. You can only servitize your products by using data effectively through DT.

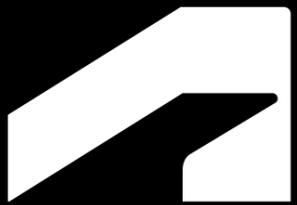
Ignore all the jargon and the fear of high IT implementation costs. Digital transformation often means simple interventions and is equally powerful for a 10-person microbusiness as a global corporation. It is about allowing digital technology to automate tasks, remove non-value-added work, reveal useful information faster, allow your designers and engineers to do more, save time, and give customers exactly what they want. It helps customers to become active stakeholders in your products and services so they can gain more value from them.

Although the words describe digital technology, people are at the heart of this change. People need to apply the technology and understand it. This liberates them to access better, higher value, and more productive jobs, letting people fulfil their potential and allowing the company to do what it does better, and grow. It should enable people – customers, suppliers and employees – to achieve what they want, with less effort and more satisfaction, improving their jobs and their quality of life.

Digital transformation is a journey to a much better destination that you can't afford to miss.

Learn more about digital transformation for your business

www.autodesk.com/solutions/digital-transformation

The Autodesk logo, a stylized 'A' composed of two overlapping shapes, is positioned to the left of the word 'AUTODESK'.

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