

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.



| 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.

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.

| 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.



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

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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 brown hair tied back, wearing safety glasses and a green long-sleeved shirt, is focused on working on a piece of industrial machinery. The machine is dark-colored with various cables and components. Overlaid on the image are yellow and blue wireframe lines, suggesting a digital or augmented reality interface. The background is slightly blurred, showing more of the industrial environment.

Your Strategic Partner for Digital Transformation

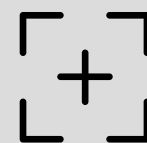
The road to digital transformation begins with the convergence of design and manufacturing disciplines, puts Data at the Center to connect your whole organization, and ultimately unlocks the power of Automation. It all adds up to increased productivity and more time for innovation and business growth.



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.

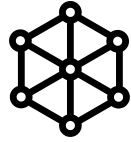


Data at the center

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.eu/campaigns/digital-transformation-in-dm

