

MANUFACTURING IN THE AGE OF EXPERIENCE

Delivering personalized, emotional experiences for customers



Consumers demand more from products and services. They want them better, cheaper and customized for personalized experiences. To respond, businesses must be faster, more integrated and more agile than ever. With enterprise-wide digitalization and innovative manufacturing technologies, companies and consumers can shape their value network.

THE EXPERIENCE ECONOMY AND MANUFACTURING

Manufacturing has always been a complicated affair, and today's hyperconnected, fast-evolving markets only add to that complexity. The task is to address a global economy in an advancing digital age, with customers demanding more than products and services—they want individualized, emotional experiences each person can "own."

Responding to this consumer demand for personalization, businesses in the Age of Experience are ushering in a revolution of manufacturing innovation, transforming from mass production to mass customization—the proverbial "one-off order." Today's manufacturing is –

- **Creative**, enabling new business models with cost-effective mass customization
- **Smart**, improving speed and agility with real-time learning
- **Value**, connecting value streams end-to-end from ideation through manufacturing to ownership
- **Human**, empowering collaboration and augmenting human creativity

The digitalization of manufacturing brings new levels of collaboration, using big data analytics, real-time data acquisition and digital continuity from ideation to design to production and even to ownership. By embracing technology advances (such as 3D printing, Internet of Things, robotics) with a mindset of continuous improvement and competitive agility, businesses can drive value, meet market demands and deliver unique, one-to-one experiences for everyone.

MANUFACTURING IS CREATIVE

A completely new and creative way of thinking is emerging among manufacturers, freed of traditional constraints. Simultaneous mass customization and faster time-to-market result from digitalization of previously siloed functions. In product design, "function-based generative design" uses rapid computer simulation and processing to find the right design based on functional requirements.

Continuous improvement for products, processes and customer satisfaction are enabled by virtual experience modeling. Unified product and process models integrate feedback from the shop floor (including digital data generated by low-cost wireless sensors and cameras), the supply chain, the distribution network and consumers to update and validate operations processes and marketing plans. This is where the concept of digital continuity extends beyond the digital thread promise: using 3D design and models all the way through to 3D manufacturing, value chain and the end user.

Additive manufacturing is an exciting transformational component of this change. It is now possible to design a part or subsystem as a single, solid object, rather than relying on multiple components that are assembled. Integrating different materials enables new capabilities for strength, weight, flexibility and more. Additive manufacturing techniques can also save on materials, improving materials usage/waste ratios in production.

Companies that can change how they do business or get closer to customers the fastest will have the advantage in transforming how they go about manufacturing, use their supply chain and maintain operating margins.

MANUFACTURING IS SMART

Everything about designing, engineering and building a product can be digitalized (3D) and synchronized with the actual physical production assets. That process can be modeled (without investing in the physical process) to determine if a concept can become "manufacturing ready." Because customization requires better, digitized tools for design, engineering and production, mass customization is driving digitalization. But in the end, it's about adapting to complexity. Digital manufacturing lets businesses experience their entire production value stream virtually.

IN THE AGE OF EXPERIENCE, CUSTOMERS WANT INDIVIDUALIZED, EMOTIONAL EXPERIENCES EACH PERSON CAN "OWN."

COMPANIES THAT ADOPT DIGITALIZATION THE FASTEST WILL HAVE THE ADVANTAGE IN MANUFACTURING, THEIR SUPPLY CHAIN AND MARGINS.

It increases agility to respond to market changes or competitive challenges, and to reduce production costs. With interconnected shop floors using smart, sensor-connected machines, manufacturers can measure and control their processes like never before; and one of multiple “digital threads” can extend beyond production, integrating feedback from the shop floor, supply chain, distribution network and even consumers. Using the virtual **3DEXPERIENCE**® twin, digital continuity enables informed, trusted and timely decision support across all digital threads.

The value chain describes a series of value-adding activities connecting a company’s supply side (raw materials, inbound logistics and production processes) with its demand side (outbound logistics, marketing and sales). Increasingly, it will extend through to the product in use. With everything connected, the implications of a decision are clear—here are the tradeoffs, the best ways to make it happen and execute in a synchronized way. Manufacturing can adjust orders (for the right supplies), as well as reduce lead times. Improving efficiency can extend beyond labor to managing the entire chain of suppliers and distributors, whether internal or external, to achieve major gains in profitability, predictability, agility and speed.

The more complex an operation becomes, the more a sophisticated orchestration system is needed, such as Manufacturing and Operations Planning and Management. Executing a complex operational scenario takes a combination of just-in-time supply and highly efficient production (whether for 1 or 10 or 1,000 units) at the same cost. To do that efficiently on the shop floor means planning for it efficiently beforehand.

MANUFACTURING IS VALUE

Supply Chain Planning and Operations technology can manage an entire value stream for a business. Traditional supply chains have expanded to include materials at suppliers and products being manufactured and finished. Supply chain analytics improve business visibility into a global manufacturing and supply chain, and better synchronize it, improving predictability, agility and speed.

A federated view can immediately show whether a product is “available to promise.” Modeling a product and production processes shows very quickly whether it can be made, where it should be made, whether raw materials and components are available, and how long it takes. Digitalization can be used to create a value delivery network, connecting all direct participants from production, distribution, marketing, customer service, etc. **Manufacturing in the Age of Experience** no longer works in a “between four walls” supply chain system, but enables industries to dynamically manage their production chain.

If all aspects are integrated—agile manufacturing, agile supply chain, availability for customization—manufacturing disruptions can be anticipated and dealt with beforehand. But without comprehensive modeling, a manufacturer must make assumptions, essentially, a guess. With assumptions, some wrong decisions can be made, and customers won’t tolerate that.

Manufacturing value is both financial and qualitative. Manufacturing provides return on assets. When cost of goods sold is reduced, operating margin will increase. Or if a company is agile enough, it can capitalize on new market opportunities, actually accelerating revenue growth for more market share. Qualitative value manifests itself in customer and employee satisfaction, and employee empowerment—elements that make an organization appealing to the people of its ecosystem. Financial metrics are the focus of managers. Qualitative metrics concern workers and customers. Does the manufacturing process provide a productive, collaborative environment? Does the product provide a unique offer that satisfies or creates demand?

Being able to virtually model, simulate and assess potential process steps is critical to making sure, even before production, that manufacturing and service are compatible with an offering. Companies today have networks of factories around the world, moving towards having every factory capable of producing any product any time. These decentralized factories will serve the market from whichever location is most cost and service effective. Process digitalization (products, virtual factories and virtual supply chains) can test operational plans, uncover issues and confirm solutions before anything happens. Dassault Systèmes’ DELMIA® brand solutions can evaluate manufacturing processes, factory floor layout, transitics, robot movements or NC machine simulation.

MANUFACTURERS CAN MEASURE AND CONTROL PROCESSES LIKE NEVER BEFORE.

THE ABILITY TO VIRTUALLY MODEL, SIMULATE AND ASSESS PROCESS STEPS IS CRITICAL TO MAKING MANUFACTURING AND SERVICE COMPATIBLE WITH AN OFFERING.

MANUFACTURING IS HUMAN

The Experience Economy puts the human at the center of industrial transformation. That might seem counterintuitive, but it's true—designing, organizing and managing processes for the shop floor, delivering products/services and following up.

Innovative technologies provide cost-effective products with higher quality, produced to individual preferences. This "market of one" can even collaborate on finalizing designs, before robotics and digitalized production provide flexibility and speed to deliver quickly. Smart sensors and machines connect manufacturing operations systems into highly interactive, simple-to-use, collaborative environments. **Manufacturing in the Age of Experience** is not doing repetitive production tasks—it's being connected, creative and impactful.

Managers now can follow operations from around the world in real time, anticipate issues and take corrective actions. Production teams follow the same data to plan and execute work. The shop floor is directly tied into global operations. Decision support comes from a virtualized factory and operations model, continually measuring data within its context. Qualitative metrics (such as customer and employee satisfaction) empower workers in the factory and management, demonstrating how their work and decisions make a difference both locally and globally.

With real-time visibility into processes and operations, work teams and managers have the needed information for global manufacturing systems to succeed. This is about engaging teams, giving autonomy and providing timely, contextual, global information to implement across the value stream. Dassault Systèmes' **3DEXPERIENCE** platform provides that information within the framework of business operations. It provides the core of what lean manufacturing is all about.

THE PLATFORM APPROACH TO MANUFACTURING

Dassault Systèmes' **3DEXPERIENCE** platform offers technologies and solutions to pursue discoveries, nurture them and bring the results to business and people throughout the world. Sophisticated modeling and simulation, data acquisition, analysis and reporting, and breakthroughs in imaging and manufacturing come together for organizations pursuing what was once thought "impossible."

For manufacturing, the result is an operations management and development environment with a single, federated view of models, processes, operations and planning. Essentially the **3DEXPERIENCE** platform provides a global operations management cockpit that supports knowledgeable decision making to keep things running smoothly. That helps optimize production for greater efficiency and output, while reducing costs and time-to-market.

A major challenge of manufacturing innovation is that by definition, it creates change. For a production asset, change can be bad. There isn't time to stop, adjust, test and go back online which could waste time, production and revenue. But a virtualized **3DEXPERIENCE** twin enables companies to innovate, while mitigating risks. The **3DEXPERIENCE** platform is transforming, enabling innovation focused on improving agility, efficiency and productivity.

Dassault Systèmes' commitment is to bring innovators and leaders together with the best tools. Together, we can transform discovery and sustain our environment, delivering on the promise of a brighter future. Such is the promise of **Manufacturing in the Age of Experience**.

**THE 3DEXPERIENCE
PLATFORM PROVIDES
A GLOBAL OPERATIONS
MANAGEMENT COCKPIT
TO KEEP THINGS RUNNING
SMOOTHLY.**

Our **3DEXPERIENCE**® platform powers our brand applications, serving 12 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3DEXPERIENCE**® Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 220,000 customers of all sizes in all industries in more than 140 countries. For more information, **visit www.3ds.com**.

