# DIGITAL TRANSFORMATION FOR MANUFACTURERS

## GLOSSARY

### Additive Manufacturing/3D Printing

The gradual buildup of a three-dimensional object (e.g., part, product) throughout the application of ultrathin layers of material (e.g., plastic, metals), guided by computer-aided design software.

Automation

The application of technology and machines to a process so that it functions with minimal or no human interaction. Automation is frequently used to perform tasks that would be difficult or impossible for humans to perform.

Analytics/Data Analytics

The analysis of data and information to identify patterns and trends that can be leveraged for decision-making.

Andon

A Japanese term that refers to a warning system — from manual to fully automated — that alerts workers (frontline, management, maintenance, etc.) to a problem within a process.

Blockchain

Open, distributed ledger that digitally records transactions between two parties in a verifiable, permanent way. The ledger is replicated in a large number of identical databases; when changes are entered in one copy, all copies are simultaneously updated, eliminating the need for a third-party to verify or transfer ownership. Recorded transactions cannot be altered because every transaction is linked to other transactions that occurred before.

Constraint

A condition that limits the potential to improve the capability and performance of a process (i.e., a condition outside the control of those trying to improve a process).

Continuous Improvement (CI)

A repeated cycle of actions taken to improve a process, sustain the improvements, and apply additional improvements.

Customer Electronic Data Interchange (EDI)

The electronic exchange of information, such as purchase orders, invoices, etc., from a manufacturer to a customer and vice versa.

Customer Retention Rate

The percentage or number of customers retained over a given period of time.

### Cyber-Risk Management/Cybersecurity

Policies, processes, and practices undertaken by a manufacturer to prevent unauthorized access to business systems and applications and to communicate information to affected parties in the event of a breach.

### Data Capture

Collection of data via digitally enabled documents (e.g., optical character recognition), forms/labels (e.g., barcodes, magnetic strips), embedded devices (e.g., sensors), and objects (e.g., fingerprint recognition).

### Data Sharing

Sharing of data with individuals and functions throughout an organization.

### Data Storage

The storing of data in media via computers or other electronic devices.

### Data Streaming

Sharing of data with individuals and functions throughout an organization in real time and in formats compatible with a recipient’s business system and applications.

### Defect Rate

The percentage of output that fails to meet a quality target. Defect rates can be measured within a process or at the end of a process (e.g., finished goods defects) and applied to production processes, delivery of services, or projects.

### Demand Plan/Sales Forecast

Prediction of future sales for a given period (quarter, year), which can be based on data such as past-period sales, current and future market conditions, corporate release of new products and services, and geopolitical events. The demand plan/sales forecast helps a manufacturer to approximate and manage cash flow across the sales period.

### Digital Sharing/Digitally Shared

Electronic sharing of data via digital networks (e.g., local area network, virtual private network, enterprise private network, wireless network, EDI value-added network).

### Digital Tracking

Automated monitoring of an entity (product, vehicle, person, physical or digital location) using technologies such as sensors, barcodes, RFID, GPS, and electronic codes.

### Digital Strategy

An organization’s vision and goals for applying Industry 4.0/Internet of Things technologies to digitally transform.

### Digitally Connected

The electronic sharing of data and information throughout an enterprise and supply chain.

### Digital Twins

Digital replications of objects that can be used to run simulations of products or processes prior to creation of the physical object or process.

### Digitization

The application of enabling technologies to improve the performance of production (e.g., embedded intelligence, additive manufacturing, robotics, machine learning); enterprise management (e.g., big data, artificial intelligence); and supply-chain management (e.g., remote sensing, electronic data interchange).

### Digital Transformation

The improvement journey on which a manufacturer applies enabling technologies to improve the organization (e.g., safety, employee engagement) and business performance (e.g., quality, profitability).

### Distribution Center/Warehouse

A facility used for storing goods. Manufacturers typically use distribution centers to house finished products prior shipment; raw materials; supplier components; and maintenance, repair, and operations (MRO) supplies.

### Dynamic

Characterized by constant change, activity, or progress.

### Embedded Intelligence

The incorporation of digital devices (e.g., sensors, controls) and software to enable the autonomous operation of equipment and processes for improved performance (e.g., energy management, quality control).

### Enterprise Resource Planning (ERP)

A business management system used to collect, store, share, and manage data throughout an enterprise for multiple purposes.

### Environmental, Health, and Safety (EHS)

Often regarded as a distinct department within a manufacturer, EHS manages the people and processes that impact performances related to the environment (e.g., emissions), health conditions (e.g., elimination of workplace hazards), and safety (e.g., reduced accidents).

### Gemba Walk

A gemba walk consists of an individual or team going to the frontline and *where* a problem occurs to gain a thorough understanding of the problem *and* its context. In lean/Toyota terminology, this is referred to as “going to the gemba” — i.e., going to the place or spot where the work occurs (the “gemba”). Digital Transformation improvement teams will use gemba walks to see for themselves *how* and *why* a digital weakness exists.

### Improvement Opportunity

A change that can be made by an individual or team to improve the performance of a process.

### Independent Problem-Solving

The ability of frontline staff to identify problems and implement solutions without management involvement.

### Industry 4.0

Embedding intelligence, smart devices, and enabling technologies (e.g., additive manufacturing, artificial intelligence, robotics) into operations; connecting operations technologies and the data and information they provide to the enterprise and supply chain; and the development of products that incorporate embedded intelligence.

### Information Technology (IT)

Business systems, applications, hardware, and networks that enable organizations to store, share, manage, and leverage enterprise data and information.

### Internet of Things

Embedding intelligence, smart devices, and enabling technologies (e.g., additive manufacturing, artificial intelligence, robotics) into operations; connecting operations technologies and the data and information they provide to the enterprise and supply chain; and the development of products that incorporate embedded intelligence. Includes the Industrial Internet of Things and the Consumer Internet of Things

### Inventory Level

The count of inventory (e.g., raw material, work-in-process, finished goods) at a specific point in time. Counts are segregated by type (e.g., SKU).

### Inventory turn rate

The number of times in a period that a type of inventory (e.g., raw material, work-in-process, finished goods) is completely replaced. For example, if finished goods are replenished every month, the annual inventory turn rate is approximately 12.

### Key Performance Indicators (KPIs)

An organization’s important quantitative measures that highlight results relative to goals, plans, and actions.

### Lean Manufacturing

Improvement methodology based on the principles of automaker Toyota (Toyota Production System). A key objective of lean manufacturing is to eliminate anything in a process that does not add value for the customer. In a broader corporate context, lean also encompasses the management systems and organizational habits that lead to a culture of continuous improvement. Lean was popularized in the book, *The Machine that Changed the World*.[[1]](#footnote-1)

### Legacy Devices and Technologies

Technologies that are outdated (multiple generations behind current state-of-the-art).

### Machine Availability

The time that equipment is working and available, typically expressed as a percentage of the time the equipment is scheduled to be available.

### Maintenance

Function whose role is to maintain equipment in working order.

### Materials and Components

Goods from suppliers required to manufacture a product.

### Maturity Model

A framework for organizing and prioritizing changes and incremental steps of continuous improvement as an organization progresses toward overall excellence.

### Network Infrastructure

The information technology hardware (e.g., routers, servers) and software (e.g., security applications) that form the electronic communication pathways of an organization.

### Online Customer Portal

An online/internet location that allows a customer to conduct business (e.g., place and track orders, request assistance, make payments) electronically.

### On-Time Delivery Performance

The percentage of customer orders delivered on time and in full (i.e., in the quantity ordered).

### Operations Technology (OT)

Systems, applications, hardware, and networks in manufacturing facilities and warehouses to store, share, manage, and leverage production data and information.

### OT and IT Business Systems and Applications

Software that allows manufacturing and warehouse facilities (OT, such as production control systems) and the enterprise (IT, such as financial management systems) to perform tasks.

### OT and IT Hardware

Electronic devices that allow manufacturing and warehouse facilities (OT, such as programmable logic controllers) and the enterprise (IT, such as data storage devices) to perform tasks.

### Predictive Maintenance

Maintenance requirements are estimated and performed in advance of potential equipment breakdowns.

### Preventive Maintenance

Maintenance is performed on a regular schedule to minimize equipment breakdowns.

### Product Modeling and Simulation

Digital models of a physical product used to test product parameters efficiently and safely.

### Production Output

The volume of products produced by a manufacturing facility, typically expressed as a percentage of the plant’s capacity to produce products.

### Quality Control

Processes and policies used to ensure product quality.

### Quality Inspection

In-process or end-of-process evaluations of product quality against a checklist of product characteristics.

### Real Time

Occurring simultaneously with an event.

### Reactive Maintenance

Maintenance performed after equipment breaks down.

### Remote Device Monitoring

Application of sensing and other technologies to an object or environment, enabling conditions (e.g., location, temperature, pressure, vibration) to be monitored remotely and, in some cases, managed remotely.

### Robots/Cobots

Programmable machines capable of independently completing complex actions (robot) or completing complex actions in collaboration with human engagement (cobot).

### Sensors

A device capable of detecting environmental conditions (e.g., temperature, vibration, light) and sending information to other devices.

### Smart Device

A device capable of changing environmental conditions, either autonomously or via interactions with other technologies.

### Subtractive Manufacturing

Removal of material from an object manually or with equipment (CNC machine) to create a part or product.

### Supply-Chain Management

Methods, practices, processes, and systems used to coordinate an enterprise’s interaction with suppliers (e.g., forecasts, ordering) and the actions of suppliers (e.g., manufacture of supplies, quality of supplies, delivery of supplies).

### Workforce Skills Development

Comprehensive program that identifies the skills required by a workforce to perform safely, productively, and efficiently; trains the workforce in skills in which growth and development are required; applies program learnings to create new and higher standards of work; and establishes reward and compensation systems to support continuous improvement.

1. James P. Womack, Daniel T. Jones, Daniel Roos, *The Machine that Changed the World*, Rawson Associates, New York, 1990. [↑](#footnote-ref-1)