

# Digital Manufacturing Market

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The global digital manufacturing market size was valued at USD 320 billion in 2021. It is expected to reach USD 1,370 billion by 2030, growing at a CAGR of 16.5% during the forecast period (2022–2030). The use of digital technology, such as software and services, in manufacturing industries like automotive, aerospace, and defense is known as "digital manufacturing." Technologies like asset tracking, fleet management, and machine learning are all part of digital manufacturing. The reduction of waste in manufacturing industries has also decreased accidents and fatalities on industrial sites due to IoT, sensors, BIM software, smart wearables, and RFID monitoring. The digital manufacturing market is expanding due to remote monitoring and data collecting, which has enhanced productivity and optimized financial resources. The digital manufacturing demand is increasing due to the industrial sectors' adoption of IoT, remote monitoring, and 5G technologies.



## Market Dynamics

**Drivers: Efficient Safety Management on Manufacturing Sites**

According to the Occupational Safety and Health Administration (OSHA), a part of the US Department of labor, around 252,000 manufacturing industries in the US employ approximately 6.5 billion people. Fatal injuries in the manufacturing sector are higher than the national average of any other industry in the US. Manufacturing industries are prone to falls, trench collapse, repetitive motion injuries, unavailability of proper protective equipment, and scaffold collapse. Including digital technologies such as IoT and machine learning with smart wearables such as wearable sensors, smart glasses, wearable hero-skeletons, safety vests, and smart helmets enable real-time safety management on sites.

Moreover, around 83% of contractors are convinced that wearable technologies can boost site safety and thereby reduce fatal injuries on job sites, including fall prevention, which accounts for around 30% of all manufacturing injuries. Therefore, benefits associated with digital technologies such as smart monitoring of hazardous gases, fall prevention, microsleep prevention, and vital sign tracking boost demand for digital technologies in manufacturing sites, which drives the growth of the digital manufacturing market.

### **Drivers: Increased Efficiency and Productivity in Manufacturing Sites**

IoT, robotics, and machine learning-based products connect manufacturing industries using sensors, CCTV cameras, Radio-frequency Identification (RFID) tags, and sensors, which assist in obtaining real-time data statistics about workers, inventory, and ongoing activities. RFID tags and wearable sensors on materials enable smooth workflows and allow equipment servicing, equipment usage monitoring, proactive material ordering, and preventive maintenance, among other benefits. Proper time management on manufacturing sites reduces equipment and workers' downtime, saving time and costs incurred due to delays.

Moreover, according to research conducted by McGraw Hill Construction based in the US, around 97% of contractors using building information modeling (BIM) in Japan have reported a positive return on investment (ROI). These companies have also exhibited a 41% reduction in errors, 21% more accuracy in project estimation, 23% better waste management, 31% reduction in re-works, and other advantages. Therefore, implementing IoT, BIM, and others boost productivity and efficiency on manufacturing sites such as automotive, transportation, and defense industries, which drives the growth of the digital manufacturing market.

### **Restraint: Increasing Security Threats in Connected Devices**

Information technology systems and networks are mainly managed by third-party companies related to business activities. Processing and maintaining data collected through robotics and IoT-connected devices are prone to cyber-attacks, which may be

targeted and coordinated. This compromises the confidentiality and integrity of data. In addition, such cyber-attacks cause not only informational damage but also reputational damage to consumers that may lead to penalties, government enforcement actions, and litigation with third parties. Such vulnerabilities are a significant threat to IoT implementation, especially in the manufacturing production industry. Thus, rising security threats in connected devices restrain the growth of the digital manufacturing market.

## **What Are Future Growth Opportunities in Global Digital Manufacturing Market**

- Growing Awareness in Emerging Countries

Most developing countries such as India, Brazil, and Russia are more focused on adopting new technologies such as IoT, robots, and BIM to assess knowledge about digital manufacturing industries. Rise in adoption of digital technologies in manufacturing activities, owing to features such as limited repetitive work and human error. New technologies such as 3D scanning, building information modeling, augmented reality, and drones used in construction activities drive the growth of the digital manufacturing market. The rise in government initiatives such as smart advanced manufacturing and rapid transformation hub (SAMARTH), Udyog Bharat 4.0 in India to keep the competition fuels the market's growth.

## **Segmental Analysis:**

The digital manufacturing market share is segmented by component, technology, application, and region.

- **Insights into Component**

Component-wise, the global digital manufacturing market is segmented into Hardware, Software, and Services.

Hardware is the highest shareholder and is estimated to grow at a CAGR of 16% during the forecast period. The basic structure of digital technologies for hardware devices consists of collectors, sensors, RFID, and augmented reality. Sensors can be used to design particular construction designs using the software. They can also be integrated into nearly all manufacturing site activities to manage and access real-time data. For instance, AOMS Technologies, based in the US, offers LumiCon concrete sensors, which provide real-time insights regarding concrete maturity, temperature, and strength

without destructive testing of the member. Such products boost demand for hardware technologies in the digital manufacturing market.

Services are the fastest-growing component. Implementing engineering services such as retrofitting, scheduled maintenance, and personnel training maintain efficiencies and productivity of equipment, thereby decreasing downtime or accidental expenses. Recognition of these benefits propels maintenance and support services during the forecast period. Major players such as Trimble Inc and Oracle Corporation offer platform-as-a-service for the manufacturing industry. For instance, in March 2020, Trimble announced the launch of the Trimble platform-as-a-service. These products offer contractors the ability to purchase civil construction hardware and software solutions.

The Software component is used to avoid repetitive work and mistakes. Similarly, building information modeling (BIM) software assists in model-based planning of all construction activities such as planning, structural designing, quantity estimations, project management, and maintenance. BIM software products include computer-aided designing (CAD) software, mechanical, electrical, and plumbing (MEP), and other services through products such as AutoCAD, Revit, Navisworks, Tekla, and ALLPLAN. The availability of such a versatile range of software for construction surges the growth of the digital manufacturing market.

## • **Insights into Technology**

Technology-wise, the global digital manufacturing market is segmented into robotics, 3D printing, the internet of things (IoT), and others.

The Internet of Things (IoT) is the highest shareholder and is estimated to grow at a CAGR of 16.2% during the forecast period. Implementing IoT technology in the industrial sector greatly influences effective safety management on manufacturing sites. Due to weariness, working in hazardous regions, and falling materials, these personnel are frequently at risk for accidents on construction sites. Moreover, augmented productivity and proper resource management boost IoT growth in the construction market. The use of sensors, radio-frequency identification (RFID) tags, and others help obtain real-time data regarding inventory, workers, and on-site activities. This reduces operational downtime and optimizes resource planning using digital platforms such as building information modeling (BIM). All these instances drive the growth of the digital manufacturing market.

3D Printing is the fastest-growing technology. Increased demand for customized manufacturing products drives the market for 3D construction printing. 3D printers are used in manufacturing activities of the complex structure accurately. The increasing

infrastructure development in several countries acts as a growth driver for the market. Additionally, the 3D printing technology is helpful in reduction of time and waste during manufacturing products and lowering costs involved in the manufacturing process. It is better than traditional technology that involves high labor costs. Several manufacturing companies' increased implementation of 3D printing technology drives the digital manufacturing market.

Robotics assist in connecting all operational vehicles on a manufacturing site. It provides day-to-day information related to fabrication, manufacturing operations, weak links, equipment downtimes, and upcoming responsibilities, which reduce vehicle downtime and achieve maximum productivity from the vehicle in minimum fuel consumption. This also includes scheduled maintenance that avoids project delays due to poor maintenance and unavoidable breakdowns. Major players such as Siemens AG and Aras Corporation are adopting acquisition as a critical strategy to improve the product portfolio of robots for the manufacturing industry.

- **Insights into Application**

Application-wise, the global digital manufacturing market is segmented into Automation & Transportation, Aerospace & Defense, Consumer Electronics, Industrial Machinery, and Others.

The Industrial Machinery application is the highest shareholder and is estimated to grow at a CAGR of 15.5% during the forecast period. Industrial machinery, such as robotics equipment companies, offer machines that automatically place bricks to build walls. It saves a lot of manual effort and time in construction activities. For instance, SAM100 is a semi-automatic mason machine used for laying bricks and is offered by a company named construction Robotics. Using SAM100, the company constructed UMHC Brighton Health Center South, in Brighton, Michigan, in July 2017.

Consumer Electronics is the fastest-growing application. Automation in the electronics and consumer electronics industry uses industrial robots instead of manual labor. Additive manufacturing systems are primarily used in the electronics industry, owing to reduced paperwork, cost-effectiveness, and maximum productivity. 3D printing technology reads data from 3D models to create printing instructions for the electronics industry's fabrication and assembling manufacturing process.

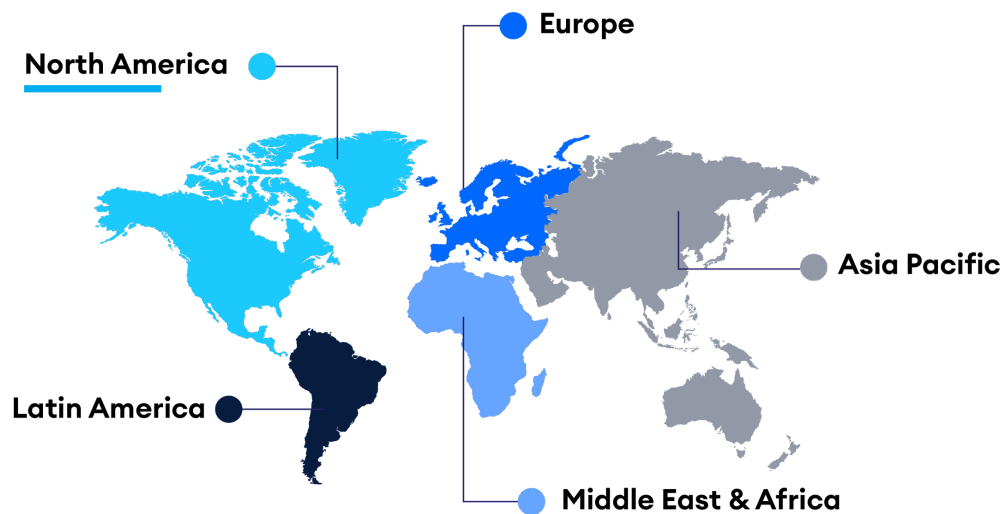
Automotive & Transportation is the second-largest segment. The trend shows that adopting Industry 4.0 in the automotive & transportation industry is accelerating automotive production faster. Digital manufacturing equips interior suppliers and manufacturers of automotive with necessary tools and connected devices in the modern area. Digitization in automotive and transportation manufacturing has features such as

maximizing productivity, reducing waste, reducing work, avoiding repetitive work, and improving decision-making.

## Regional Analysis:

Region-wise, the global digital manufacturing market share has been analyzed across North America, Asia-Pacific, Europe, and LAMEA.

### North America Commands Maximum Share



### Regional Growth Insights

North America holds the highest market share and is estimated to grow at a CAGR of 15.8% during the forecast period. The implementation of the Internet of Things (IoT) and Artificial intelligence (AI) in the manufacturing sectors such as automotive & transportation fuels the growth of the digital manufacturing market. Furthermore, the regional market is likely to grow rapidly with technical development. Overcoming challenges such as poor finish for 3D printing and technical expertise for material handling has also anticipated a rise in automation in the manufacturing industry in the US.

Asia-Pacific is the fastest-growing region. It has the largest manufacturing market globally. The growth of the manufacturing industry is mainly delivered by the rise in per

capita income, increasing urbanization, and the high adoption of technologies. Developing nations such as Myanmar, Thailand, the Philippines, and Vietnam are highly committed to improving local infrastructure and manufacturers. In addition, urbanization boosts renovation and reconstruction projects, which, in turn, is expected to increase the demolition industry. Therefore, the use of automation and robotics is anticipated to propel the growth of the Asia-Pacific digital manufacturing market during the forecast period.

Europe is the second-largest region. It is projected to reach USD 372.7 billion by 2030, growing at a CAGR of 16.2%. The high focus of government in Europe on supporting digitization and innovation in the fields of IoT, Big data, Edge computing, and other technologies to transform the value chain promotes the use of digital technologies in manufacturing-related activities. For instance, in June 2020, Parrot, a drone manufacturer, launched a new drone ANAFI USA, which can be used for aerial surveying and 3D mapping for manufacturing purposes.

## Competitive Landscape

- Dassault Systems
- Siemens AG
- Autodesk Inc
- Tata Consultancy Services
- Mentor Graphics Corporation
- Parametric Technology Corporation Inc
- SAP SE
- ARAS Corporation
- Cogiscan Inc, and Best plant.

## Recent Developments

- June 2022 - Tata Consultancy Services launched the TCS Servitization Engine on Oracle Cloud to help customers create subscription-first business models and provide outcome-based solutions with intelligent service capabilities. The engine offers an industry package with bundled combinations of products, services, support, self-service, and a knowledge base that companies can leverage to add value to their core product offerings and robust front-end customer-facing solutions.

- June 2022 - Tata Consultancy Services was recognized as a Leader in The Forrester Wave: Robotic Process Automation Services, Q2 2022.

## Market Segmentation:

### By Component

- Hardware
- Software
- Services

### By Technology

- Robotics
- 3D Printing
- Internet of things (IoT)
- Others

### By Application

- Automation & transportation
- Aerospace & defense
- Consumer Electronics
- Industrial Machinery
- Others

### By Regins

- North America
- Europe
- Asia-Pacific
- LAMEA