The Evolution of Autonomous Manufacturing

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Self-Driving Transport

The Los Angeles Times predicts that by 2025 1.7 million trucks will be self-driving. Future commercial trucks are modernizing into autonomous and electric vehicles. CALSTART, a nonprofit organization focused on clean transport, estimates that new-generation trucks will increase by 80 percent by 2023. Self-driving trucks could help make up for a lack of drivers, an estimated 160,000 by 2030.

Blockchain

Blockchain as a service has seen increased use in the connected factory. The electronic ledger system can be used to track goods across several business units. As products are created and entered digitally into the system, other digital participants must approve and digitally sign the inventory. The new digital records of materials, parts, and products become visible and traceable to all within the system, providing greater inventory control.

Artificial Intelligence and Machine Learning

The backbone of autonomous manufacturing is AI and machine learning. Industry 4.0, cloud-based data systems, and connected devices are now capable of computing at the edge in real-time, moving closer to the factory floors. In turn, manufacturing decisions are predicted instead of reactionary. AI can avoid failures at the end of the line by predicting the failure before building and implementing corrective actions before production begins.

Modular Manufacturing

A modular production line differs from a traditional production line by being connected vertically throughout the organization. Modular production consists of robots, storage vehicles, and flexible production flow that allows immediate reaction based on supply and demand. If the demand for a product increases across the country, connected manufacturing lines can ramp up production. According to ABB, by 2029, companies with modular manufacturing will see an average 12 percent increase in revenue.

Artificial Robots

The main difference between a standard industrial robot and an autonomous robot is that they are self-learning and adaptive. According to Deloitte, autonomous robots will have increased mobility, dexterity, and intelligence, able to take on high-risk tasks previously not possible with industrial robots. They will have enhanced haptic sensors, able to feel and dynamically interact with their environment.

Digital Twin, Modeling, and Simulation

Autonomous manufacturing provides greater flexibility to meet the demands of the customer. This is facilitated by digital engineering. Detailed modeling of products and their testing before production help reduce errors during manufacturing, and greater customization evolves rigid product lines into flexible ones. Deloitte predicts a growth of 38 percent annually in the digital twin market, reaching $16 billion by 2023.

Workforce

Production as a service has been ulti-mated at the factory floor. The modular production systems can be used to dynamically adjust themselves. All products are created and entered digitally on CAD platforms, while digital manufacturing and artificial intelligence plans production into real-time. SKU changes, demand predictions, and product launches are visible and traceable to all within the system.