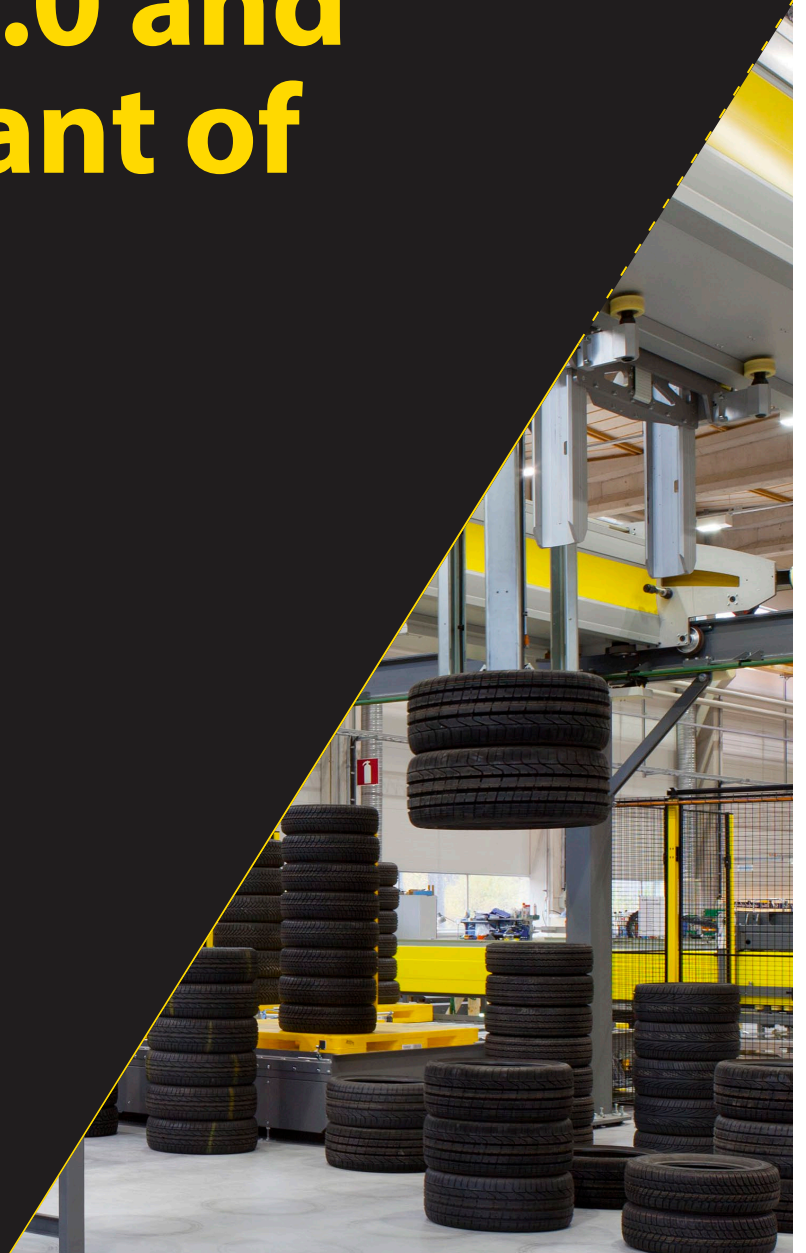


Industry 4.0 and the tire plant of the future

CIMCORP

Passion for optimized material flow



Current challenges in tire manufacturing and distribution

Tire manufacturers are facing unique operational challenges within manufacturing and distribution. These include external challenges, stemming from customer and marketplace demands, and internal ones, which lie in the movement of materials and the optimization of processes within the constraints of production demands.



External challenges

CUSTOMER DEMANDS FOR PROMPTNESS AND AVAILABILITY

Many current consumers are millennials who are accustomed to the e-commerce experience, where they can get exactly what they want and when they want it. For the tire market, this implies they want to be able to acquire new tires within their expected timeframe. They recognize this as an essential part of customer satisfaction, and if not fulfilled, they are disposed to change their purchasing patronage. These new demands are placing significant pressure on tire manufacturers to enhance distribution and ensure they can get products where and when the market requires.

ORDER ACCURACY

There is increased scrutiny surrounding order accuracy, especially when supplying Original Equipment (OE) tires to car manufacturers. Products have to arrive in the right sequence and at the right time, to prevent inefficiencies and maintain positive supplier- manufacturer quality relations. Shipment errors can create problems upstream and downstream in the supply chain.

CONCERNS OVER PRODUCT QUALITY

Relentless supplier-quality demands are forcing stricter quality assurance measures in effort to prevent product quarantines and recalls, which can be costly and create difficulties regaining consumer trust. Tire manufacturers are heavily investing in quality processes to not only prevent sub-standard manufacturing, but to recognize it in real time and adjust processes accordingly. With enhanced product quality, tire manufacturers can better position themselves in the marketplace as consistent providers of high-quality tires.



Internal challenges

PROLIFERATION OF SKUS

With tire manufacturers producing an expanding variety of tire types for numerous brands, they have to find ways to be flexible in their manufacturing processes and carefully track Work in Process (WIP)/semi-material and manage the process parameters.

CONTINUING TO IMPROVE PRODUCTIVITY AND EFFICIENCY

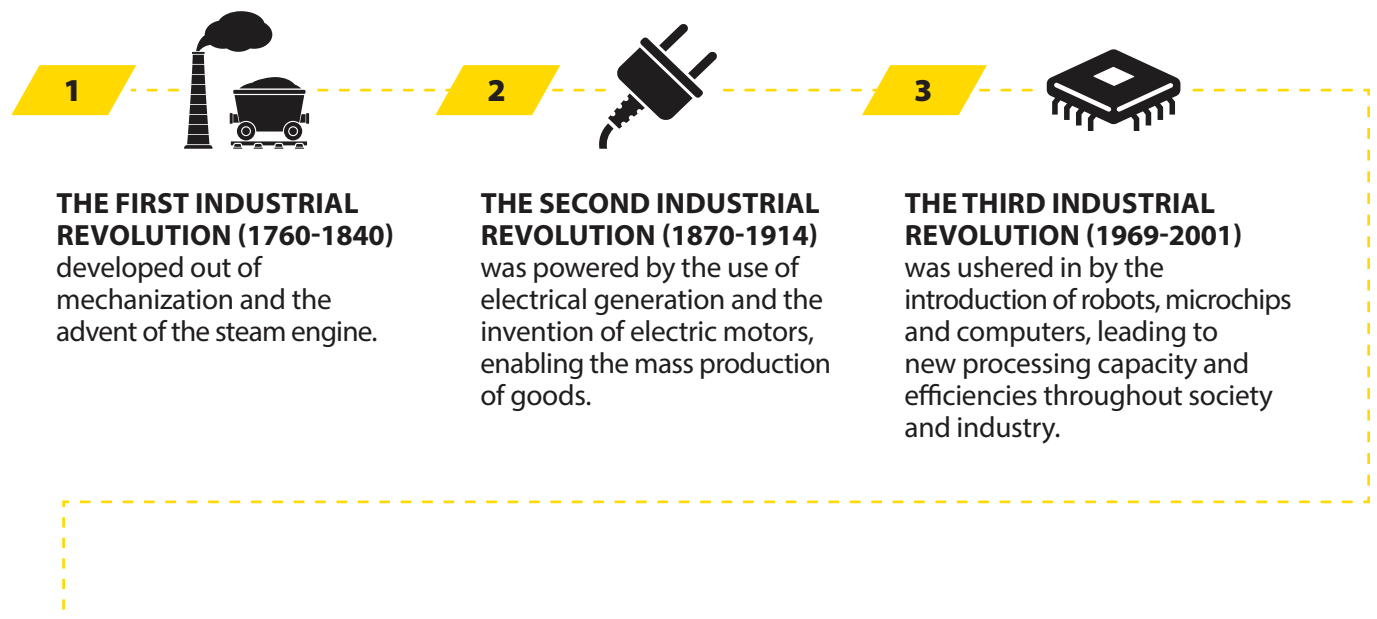
Tire plants must maximize production capacity and efficiency, which means they need greater process control over material flow—from raw materials all the way through to the finished product. They need traceability over all materials in their facilities, including WIP, to ensure 100-percent component availability for all downstream production.

Today's tire manufacturers need specialized equipment and process systems to face these modern challenges. Tire plants must adapt, especially as the rest of the industry embraces the next generation of systems being driven by robotics, computers and the Internet of Things (IoT). These automated, internet-connected solutions can help tire manufacturers operate at high efficiency, with optimum production capacity and with complete control over production and distribution. Collectively, these technologies make up the Industrial Revolution now upon us, known as "Industry 4.0."



The modern Industrial Revolution – Industry 4.0

New technologies are constantly emerging. But every so often, major innovations occur that upend entire industries and transform the way organizations manufacture products and conduct business. These breakthroughs are commonly referred to as “Industrial Revolutions.” To date, the world has experienced three:



Now, we are in middle of the fourth—Industry 4.0—which sees robots, computers and the IoT converging in society, the workplace and manufacturing to create the cyberphysical systems of tomorrow. In these new environments, companies have the ability to not only use automation to perform highly repeatable tasks, but also leverage sensors to capture data on what their automated tools and robots are doing and how they are affecting the process.

Organizations can use this captured data in a controlled system in order to find ways to improve upon processes or reorganize their robot operations in real time. Industry 4.0 is creating smarter, data-driven enterprises with the ability to pivot, adapt and innovate. It is set to disrupt virtually every industry, including tire manufacturing and distribution, and accelerate the pace of change. Tire manufacturers that recognize the potential in Industry 4.0 technologies, and are modernizing their plants, stand to take full advantage of the benefits and gain an edge over the competition.

What does the Industry 4.0 tire plant look like?

In the modern, Industry 4.0-enabled tire facility, manufacturers can control, as well as track and trace raw materials and WIP through various production processes all the way through to outbound shipping with high efficiency and accuracy.

Two webs define this cyberphysical environment: the physical network of interconnected hardware/equipment and the cyber network that ties everything together electronically and manages information flow across the plant.



THE PHYSICAL NETWORK

The physical network of automated systems includes automated guided vehicles (AGVs), mobile robots, gantry robots, articulated robots, monorail transfers, automated storage and retrieval systems (AS/RS), conveyors, etc. These systems are used to move raw materials, compounds, components, green tires and cured tires from one process phase to another—accurately and gently for improved quality.

Using high-density storage and an AS/RS, plants can optimize access to WIP and better utilize storage space. With these flexible robotic systems, they can implement just-in-time order picking: sending tires in the right sequence to outbound shipping trucks, which helps minimize the space needed for preparing orders and truck turnaround times. Hardware is integrated with barcode readers, vision systems, laser scanners and other technologies that collect and send sensory data to software solutions in the cyber network.

THE CYBER NETWORK

In the Industry 4.0 tire plant, all automated equipment and subsystems are electronically interconnected to higher-level control systems, which are able to control, assess and adapt performance. Manufacturing Execution Systems (MES) orchestrate their activity, and collect and trace production data throughout the whole production process. These software systems take real-time sensory data coming from machines to guide decisions for optimized intralogistics, improved WIP and inventory management, and maximized production capacity and throughput.

THE CYBERPHYSICAL ENVIRONMENT

Using a combination of automation hardware, sensors and advanced control systems, tire manufacturers can collect data to understand what is happening in their facilities, automatically feed it for analysis and use the results to optimize operations. They can have total control and traceability over material and data flow within their facilities. The level of control in these cyberphysical environments can help solve the modern challenges facing tire manufacturers with error-free, efficient and top-quality production and distribution. Highly flexible, the modern Industry 4.0 tire plant can accommodate rapid changes in production that reflect market demand.





Moving your tire plant into the future

Discussions surrounding automation and Industry 4.0 can seem overwhelming for brownfield plants. Industry 4.0 can seem like a far-off consideration given the age of equipment in these legacy facilities. Actually, Industry 4.0 is modular and is easily scaled. It is not an “all-or-nothing” approach. Any facility can begin to make moves into this environment that installs cellular automation one step at a time.

Many of these systems can operate as an “island of automation” within manual operations. As you introduce more automation over time, you can gradually connect the cells together and align the factory with Industry 4.0 technologies, both from a robotic hardware point of view and a control software management perspective. A phased implementation is also easy to manage, keeps costs low and delivers a faster ROI. A good system supplier can look at your facility and determine the best areas to automate first, develop a rollout plan and set you on the roadmap to modernizing the tire plant.

Currently, tire facilities are seeing the net effect of Industry 4.0. Tire manufacturers that have implemented or have their strategies set on modern technologies already stand ahead of their competition. They are ready to move into the next age of tire manufacturing and distribution with flexible, efficient automation that is optimized by data-driven feedback, providing complete control over production and material flow.



Learn about Sentury Tire, a tire manufacturer that transformed its manual, legacy operations by embracing Industry 4.0 technologies

