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# Wireless Technology in Industry 4.0 for Greater Automation, Flexibility and Mobility

Wireless Technology in Industry 4.0 for Greater Automation, Flexibility and Mobility

The Fourth Industrial Revolution is constantly evolving. The progress of Industry 4.0 is still in the making thanks to the advances in those technologies that made it possible in the first place. Technologies such as low-cost sensors, Big Data and, of course, **wireless connections.**

The fundamental goal of Industry 4.0 is to **make factories smarter** by increasing their adaptability and efficiency in resource management, as well as improving the integration of supply and demand processes between factories. All this is based on a key element: data. Or rather Big Data analysis to discover and collect information, models, trends, correlations and patterns in order to optimize and automate production and maintenance.

To this end, wireless solutions play an extremely significant role, as they allow production data to be collected, moved and shared faster and more efficiently.

## Wireless technologies for Industry 4.0

IoT and connectivity are the enabling factors of Industry 4.0. Wireless networks have always powered smart production, starting with 4G and then migrating to 5G.

Wired and Wi-Fi networks can meet the needs of a static office environment but are not designed for mobility. Which makes them unsuitable for the industrial sector, as they lack coverage, reliability and safety.

Instead, **mobile networks** have greater capacity and coverage. With superior signal penetration and fewer blind spots, they are ideal for effectively and reliably connecting devices that need to move freely and in harsh radio environments. In addition, they provide **lower and more predictable latency.** This is essential for machine-to-machine connectivity (as in the case of robotics), where it would be problematic to have a delay between instruction and reaction.

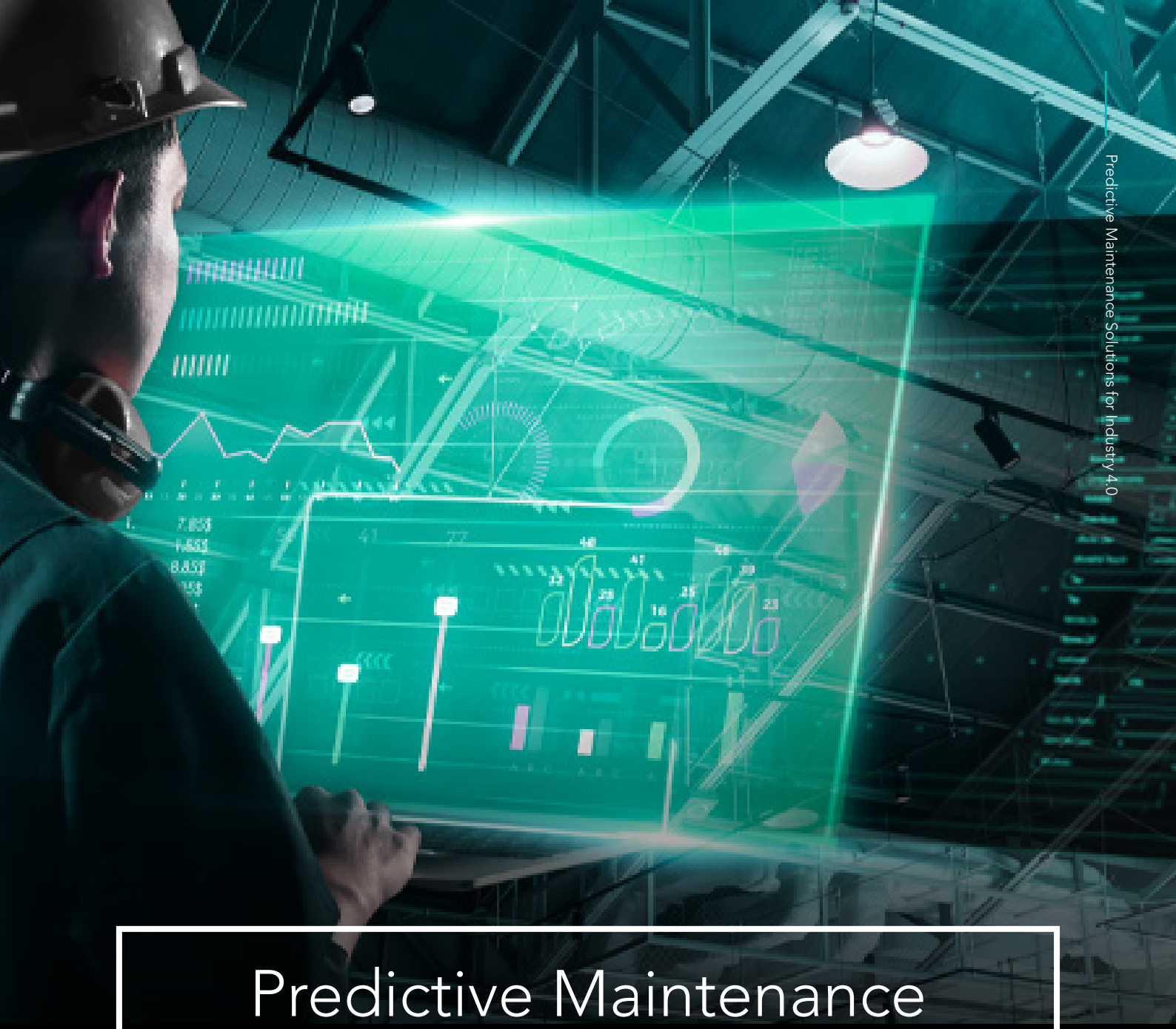
## Impact of wireless in Industry 4.0

With higher bandwidth and higher frequencies, wireless technologies in Industry 4.0 ensure greater data transmission. For example, 5G has an even higher speed and capacity than previous generations, and this allows **acceleration in the use of Big Data and Advanced Analytics.**

This new frontier in data management represents a turning point for the Internet of Things, digitalization and, in general, smart manufacturing, as it promotes an unprecedented level of automation in production.

Furthermore, most wireless equipment provides a longer range of coverage, while technologies such as 5G allow work continuity even on the move. All this translates into **increasing mobility** inside and outside the plants.

Finally, today there are wireless and 5G devices of all shapes and sizes. A further benefit for Industry 4.0, as it guarantees operators maximum flexibility in the design of their networks.



# Predictive Maintenance Solutions for Industry 4.0



Predictive Maintenance Solutions for Industry 4.0

Switching from condition-based monitoring to predictive maintenance represents one of the great breakthroughs of **Industry 4.0.**

The proactive and preventive management of asset maintenance and failure has made it possible to significantly optimize uptime and productivity. This is achieved through the predictive analysis of big data enabled by digitalization, the IoT and artificial intelligence. That is, the analysis of industrial production data in order to identify patterns of operation and malfunctions, so as to subsequently be able to predict malfunctions and problems before they occur.



## Predictive maintenance and Big Data

Predictive analysis is based on production data. Therefore, any predictive maintenance strategy requires an effective and timely data collection system. Today there are multiple technologies that allow to implement it, all based on the Internet of Things and real-time communication between devices. In particular, **sensors** are among the most suitable preventive maintenance solutions.

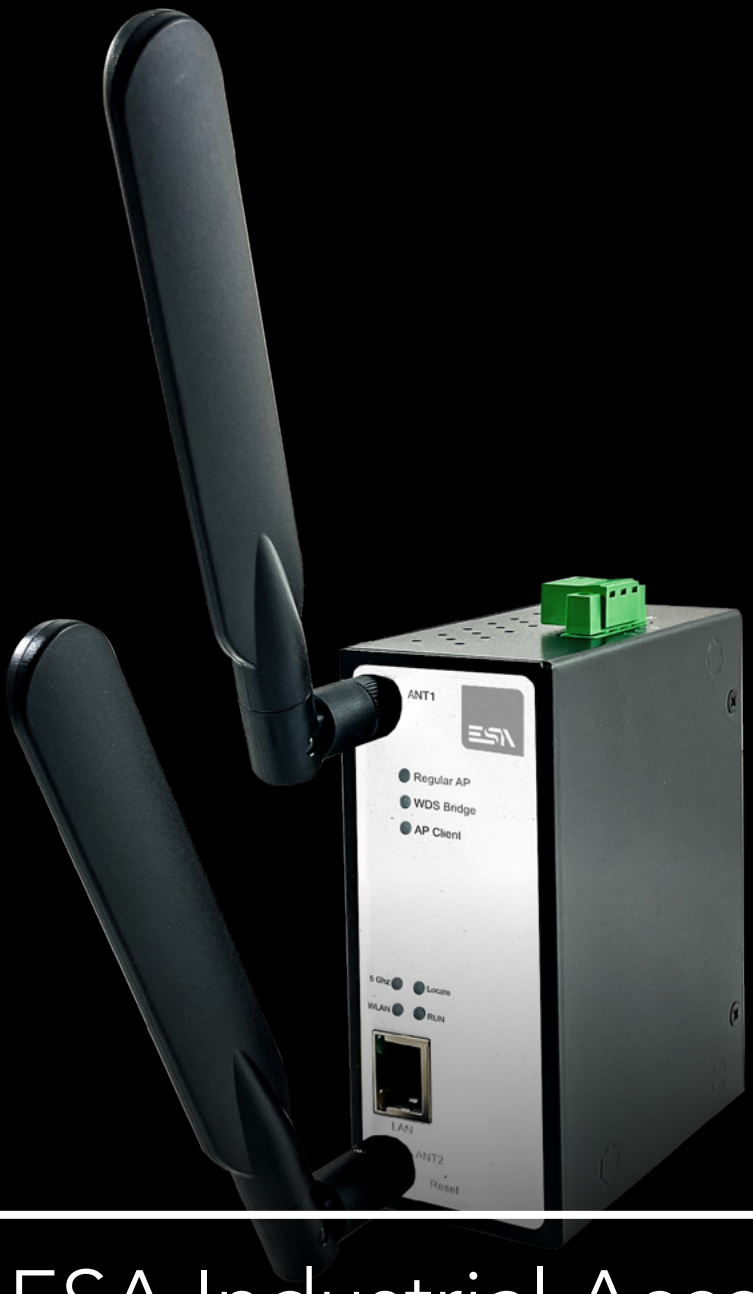
High-quality static sensors are installed on the machinery that monitor the system in real time, collect and transmit important information, and report any anomalies. This is the first step in enabling an IoT maintenance system. Ideally, the sensors must collect a wide variety of metrics and different types of data (images, audio or video) in order to create and feed a **complete predictive model.**

Once this information has been collected, it is necessary to start a safe data flow between the sensors/machinery and the **central data lake**, which is the next step in the predictive maintenance system. A secure container (on-premises or cloud-based) for all data accessible by authorized programs that need it, including predictive analytics software.

## Predictive analytics and machine learning

Predictive analysis is guided by modeling. But predictive models involve a **machine learning algorithm.** Thanks to an in-depth view of the production activity inside the plant and through artificial intelligence, the machine learning algorithms assimilate, aggregate and synthesize production data to recognize complex models and schemes and generate detailed information. This way, over time, models can be trained to respond to new information.

This is why **machine learning** is another solution that favors and strengthens predictive maintenance. Technological advances in machine learning - such as deep learning algorithms and neural networks - allow us to discover new information and previously hidden patterns. Through machine learning and artificial intelligence, it becomes possible to unlock the true potential of big data, implementing advanced analytics and identifying hidden threats and new predictive maintenance opportunities.




# New ESA Industrial Access Point

New ESA Industrial Access Point

ESA launched its new **wireless access point**, a robust, reliable, and competitive solution that provides stable wireless connectivity to industrial applications.

## Benefits of ESA's wireless access point

### 1. Connectivity

Within the machine panel, the ESA access point enables you to connect and use different devices with Wi-Fi connection. This promotes principles of Industry 4.0 such as IoT and digitalization.

### 2. Greater supervision

Thanks to this device, the operator can supervise the machine without constraints to a fixed position, but rather moving freely along the entire production line.

### 3. More control

The machine tablet does not connect like common mobile devices but is identified with a precise MAC address so as to be able to carry out control operations that would not be possible with a normal smartphone. Smartphones can connect to the access point but are labeled as "guest" devices and therefore do not have access to the privileges of the machine tablet.

### 4. Device for the start up of the line

During commissioning, the technician can move along the line or in the entire building and work in the vicinity of the device he is starting.

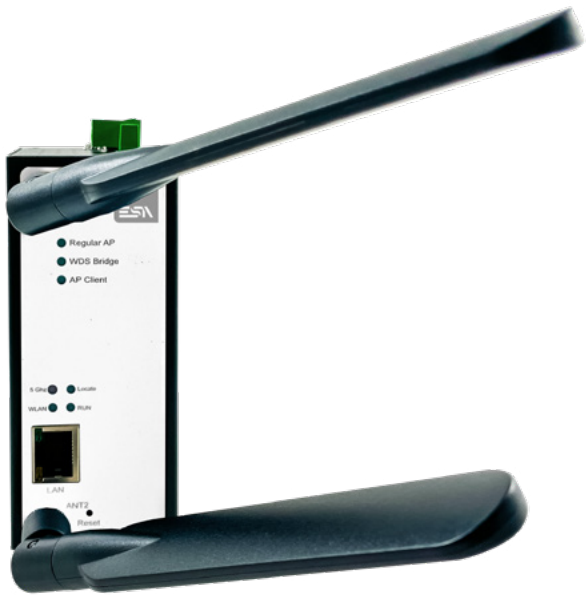
### 5. Greater flexibility and connection capacity

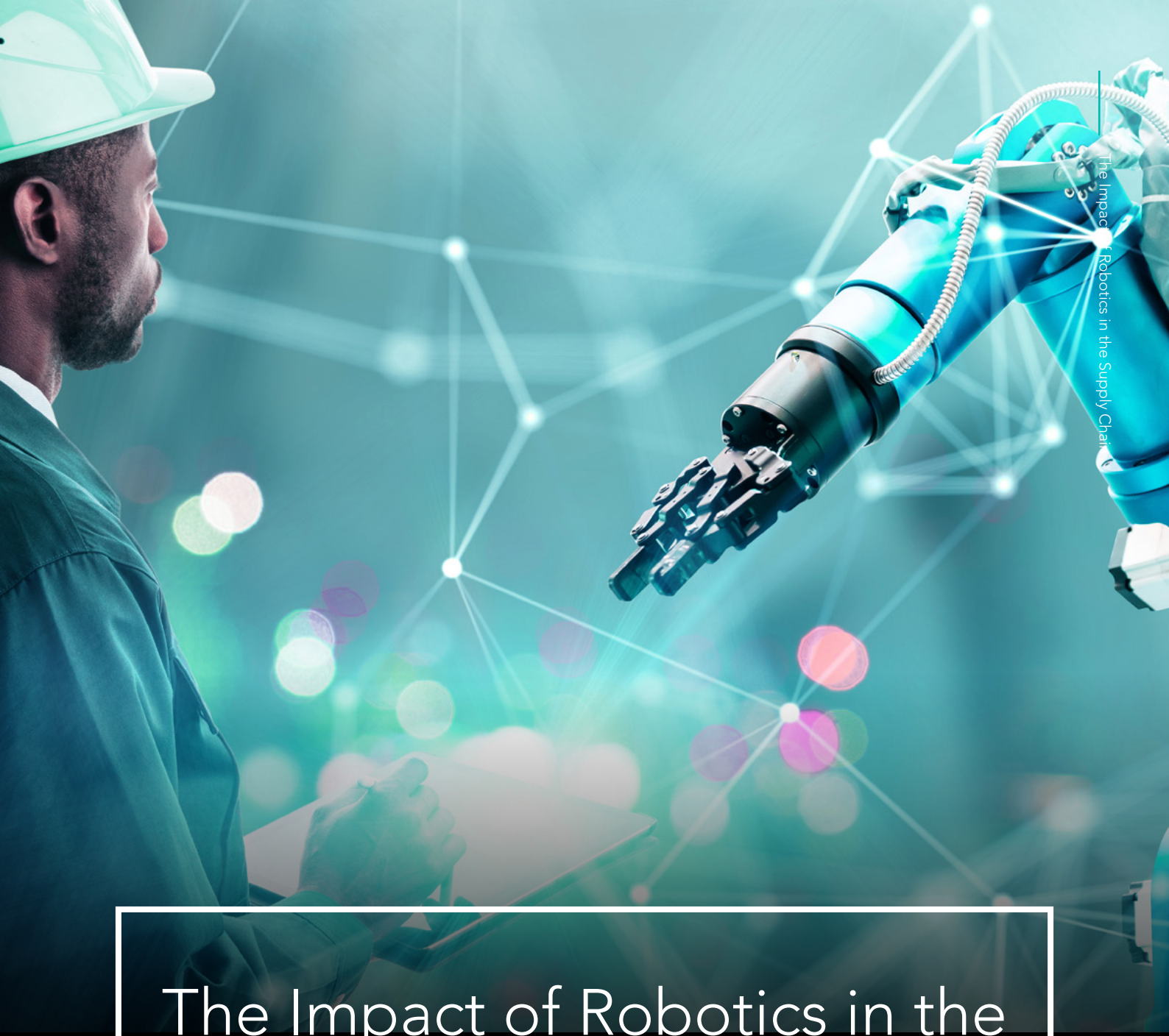
It is now possible to connect the machine as a Wi-Fi client to the factory mesh network. In addition, the ESA access point allows you to create a Wi-Fi connection between machines that are not physically connectable to each other. For example, machines that are in two different buildings without a common network.

## ESA industrial access point features

Below are the main functionalities and features of our new industrial access point:

- Designed for 802.11 a/b/g/n networks.
- Configuration via webserver and management utility.
- 2.4 GHz frequency support.
- 5 GHz support to reduce interference on 2.4 GHz with other wireless devices.
- Client isolation.
- Different operating mode and topology options.
- FCC, ETSI, NCC certified wireless equipment.
- Industrial grade device designed for harsh environment.
- Security: encryption and virtual network segmentation.
- Integrated cybersecurity features (Access Control List, VPN to segment the network).
- Redundant power supply.





# The Impact of Robotics in the Supply Chain

Robotics in the supply chain is a key contributor. Thanks to autonomous and collaborative robots, companies have access to new opportunities in terms of long-term cost reduction, productivity, stability of use and labor, reduction of the error rate, optimization of picking times, sorting and storage, and much more.

## Robotics of the future, today

The first industrial robot dates back to 1937, a rudimentary five-degree-of-freedom manipulator driven by an electric motor. But the industrial robots that we know today came only 30 years later, with the third industrial revolution and the creation of the first programmable controls.

We've come a long way since then. Over the decades, robots have grown in size, performance, precision and functionality, becoming collaborative or even autonomous. These **cobots** play a role of primary importance in Industry 4.0. The technical evolution of robotics has gone beyond its main function of replacing humans in all the most dangerous, tiring and repetitive activities. Today, the purpose of robots is to **work with the operator in a collaborative relationship.**

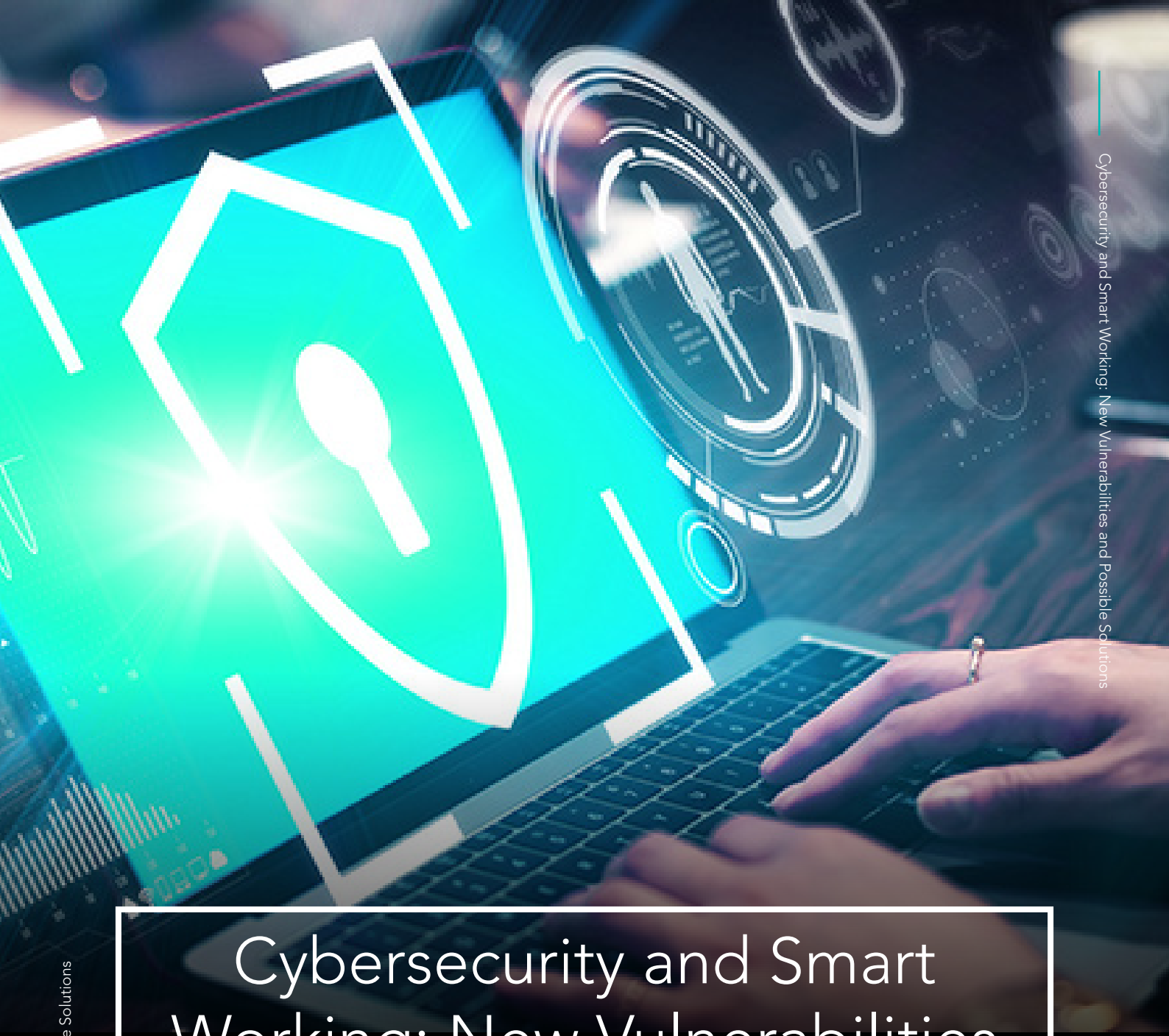
Robots are equipped with sensors and controls for the safe management of their movements and any contacts with the operator - intentional or accidental - in compliance with the protection of the latter. Thus, through the data collected with machine learning and their processing through artificial intelligence, and thanks to advanced sensors, robots are **acquiring autonomous behaviors**, with the ability to understand the context and act accordingly.

From static, robots have become mobile and autonomous. That is why we talk about cognitive robotics, a phenomenon that has already begun in the industrial sector and will continue to grow in the future, with a huge impact on the supply chain.

## Autonomous mobile robots in the supply chain

Today, the intervention of an expert technician is no longer necessary for industrial robots programming and installation. The end user can manage and program them on their own. Once placed in a workstation, with a few guided instructions and an increasingly rich and expandable library of features, even a non-expert operator is able to make them operational.

Warehouses are becoming more and more automated, and autonomous mobile robotics is becoming more common every day. As such, robots are real collaborators, not a substitute for humans, helping workers to be more productive and fulfill orders quickly and efficiently. Both in large companies and in smaller ones.



# Cybersecurity and Smart Working: New Vulnerabilities and Possible Solutions



Cybersecurity and Smart Working: New Vulnerabilities and Possible Solutions

Faced with the COVID19 pandemic, in 2020 and 2021 companies around the world promoted smart working through the implementation of appropriate procedures. This, however, presented challenges not only from an organizational and production point of view. Several studies have in fact highlighted the **growing threat to corporate cybersecurity** in multiple sectors due to the increase in remote work.

If on the one hand digitization and the use of smartphones and tablets have undoubtedly increased productivity, on the other hand the exposure of corporate networks to the real risk of cyber-attacks has grown. Therefore, there is an urgency to introduce solutions that can protect the information assets of companies, both locally and remotely.

## IT security solutions for smart working

The chaos generated by the health crisis and the sudden need to adopt new working methods have created an all-encompassing and unexpected scenario. This did not give companies the time to adapt and train their employees on the necessary safety measures. As a result, companies have found themselves exposed to a new level of vulnerability, which unfortunately presents an opportunity for cybercriminals.

To prevent and limit cybersecurity risks, it is essential to adopt adequate solutions and implement best practices.

## Cryptography techniques

Today, encryption techniques use complex keys to encode and decrypt corporate data based on some algorithms. In this way, only those in possession of the algorithm key can access the encrypted data. The encryption method can vary depending on the type of key used, the length of the key and the size of the encrypted data blocks.

## Monitor corporate networks

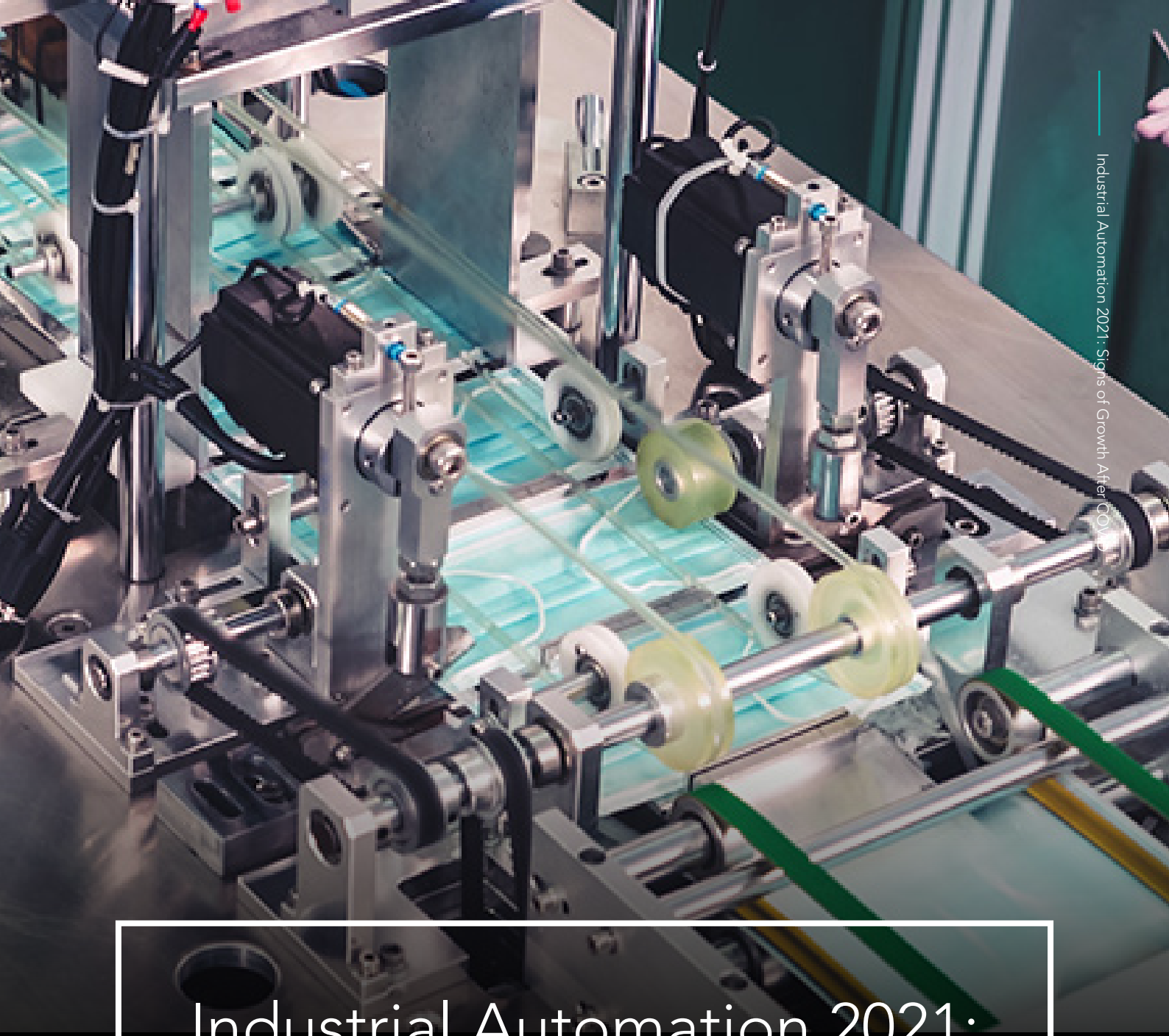
As the distribution of workers grows, the complexity of threats increases. New challenges arise for security, which is played on a more delocalized and therefore difficult to control level. It's necessary to constantly monitor corporate networks, with solutions such as VPN and "threat-aware" networks.

## Blockchain

The blockchain also has numerous advantages in terms of cybersecurity. For example, it allows you to prevent Deliberate Denial of Service (DDoS) attacks, which today represent one of the most widespread cybersecurity threats. The concept of the blockchain lies precisely in decentralizing data and this guarantees superior protection.

## Staff training

An adequate level of staff training is the foundation of any cybersecurity strategy. Teaching employees how to apply the right security measures and recognize threats, such as phishing, is a critical step in fighting cyber-attacks. When best practices regarding the management of personal credentials, the recognition of untrusted emails and URLs, etc., enter the ordinary work of employees, companies will certainly have a more resistant shield.

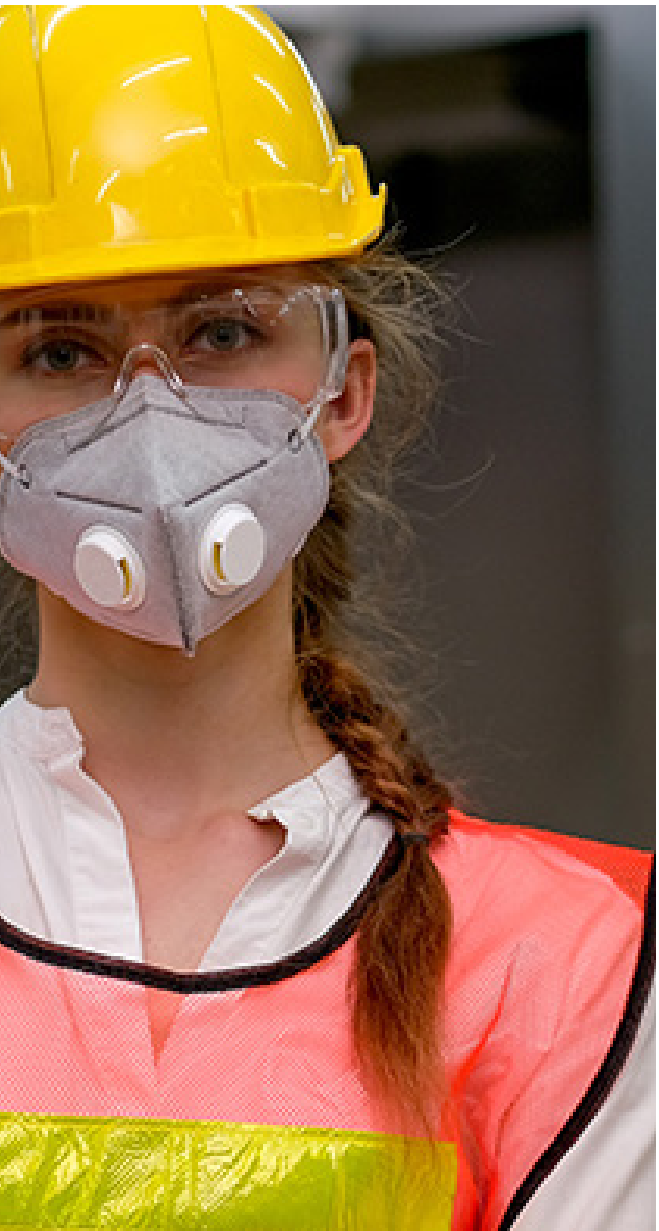


# Industrial Automation 2021: Signs of Growth After COVID

After a decline in 2020, the global industrial automation market is finally showing positive signs of a recovery after COVID-19. According to researchers, during 2021 we'll see a progressive growth that will continue in the coming years.

## Effects of the COVID19 pandemic in 2020

In 2020, the closure of manufacturing plants and businesses around the world due to the COVID-19 pandemic impacted the market. The decline in demand for industrial automation solutions in the manufacturing sectors caused significant losses, especially in the first two quarters of the year.



In Italy alone, in 2020 the industrial automation market recorded a contraction of 10.9% compared to the previous year. A decline also highlighted by **Fabrizio Scovenna, President of ANIE Automazione,** who said that "2020 was profoundly marked by the pandemic and the lockdown", a crisis that "has entered a deteriorating picture since the second half of 2019, with internal demand strongly weakened by a gradual slowdown in industrial investments related to the Transition Plan 4.0."

## Industrial automation market recovery in 2021

Fortunately, with the reopening of the plants and the resumption of industrial activities, in the first months of 2021 we saw the positive signs of a recovery. According to a report published by Fortune Business Insight, after reaching $ 153 billion in 2020, the global industrial automation market is expected to grow at a CAGR of 8.9% over the forecast period 2021-2026 to **exceed 325. billions of dollars by 2027.**

Advances in Industry 4.0 technologies have led to an increase in demand for automated solutions such as robotics in many industrial sectors. For several years now, we have been witnessing a digital transformation of manufacturing industries. Manual labor is being replaced by the increasingly widespread use of intelligent robots and automation-based systems.

Technologies such as 5G, augmented reality and simulation have created and will continue to create **new opportunities on the market.** Industrial automation is necessary to meet current production demand and, in particular, to ensure today's precision and quality standards. In addition, the growing need for digital transformation in sectors such as healthcare and transportation will continue to accelerate the growth of the industrial automation market.

# ESA Case Study June 2021

## Company ID

The client designs and builds machines and systems for quicker and easier production of baked goods. From mixing to forming, baking, cooling, sandwiching and packaging of biscuits bread, cake, pie, pizza and other snacks.

### Application description

The application we worked on is a complete production line for cookies forming and cutting.

### ESA's solution

In our solution we integrated both hardware and software ESA components to develop the user interface. Specifically, we've decided to use:

•Our EW112AA HMI with Crew SCADA application.
•CompactLogix PLC from Rockwell Automation for the machine control.

The Crew application offers the following features:

- User Interface
- Alarm management (both active alarm and historical alarm)
- Production recipe
- SQL database connection for the recipe archive management via the main production database.
- Multilanguage support
- Remote maintenance via the integrated Everyware infrastructure
- Servomotors setting and controls
- Integrated password management and FDA secure logging

Key element of the ESA solution is the ability to integrate the user interface and the most important functionalities for monitoring and controlling the production line. Furthermore, we have made it possible to implement IoT functionalities simply through software programming (without the need to add any external gateway or router for the connection between OT, IT and Cloud).

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