

# Ericsson - Manufacturing use cases



# Autonomous Mobile Robots in manufacturing



Supported by 5G cellular connectivity, Autonomous Mobile Robots (AMRs) increase factory efficiency and automate production flow in a safer manner.

Key challenges for factory employees include lack of flexible and portable solutions. In fact, 49% see portability as a key purchasing criteria<sup>1</sup> and 56% say flexibility of the measuring system can significantly reduce the time for inspection<sup>2</sup>.

With high connection density, high reliability, low latency and ultra-high security, autonomous mobile robots can be used for material movements and quality inspections.

**Case type:** Concept/research

**Client:**

**Category:** Manufacturing

**Location:** Global

**Year:** 2020



Source: 1. Hexagon; 2. Hexagon; 3. Ericsson, Arthur D. Little, Hexagon

# Autonomous Mobile Robots in manufacturing



## Challenge

Conducting quality inspections today requires a lot of time-consuming manual work and measuring systems are often inflexible and stationary. Additionally, hiring skilled personnel is a key challenge.

Hexagon already has several portable measurement solutions that could be placed on an AMR. However, in order to enable free movement of AMRs around the production environment, the manufacturer will need to process and manage a large amount of data, as well as have highly reliable, low-latency connectivity that is secure and able to provide real-time data transfer. Legacy standards like WiFi and Bluetooth aren't robust enough to accommodate the performance requirements.

## Solution

A private cellular network provides the necessary level of connectivity. With 5G, AMRs can move throughout the factory without any magnetic strips for guidance.

Cellular-connected AMRs improve worker safety since they can easily maneuver through environments that may pose risks to human workers. They can also handle materials much more accurately, eliminating up to 30% of typical scrap, which is not only good for the bottom line, but the environment as well.

Additionally, 5G provides the positional accuracy needed so robots can navigate freely in a facility with a high density of connected devices.

## Result

- Improved safety for workers
- Increased efficiency for quality inspection workers
- 150% ROI by year five, driven by operator labor reduction (46%), decreased downtime (49%), rework reduction (3%) and decreased cost of quality inspection (2%)<sup>1</sup>

30% less scrap material handling issues<sup>2</sup>

49% decreased downtime<sup>3</sup>

# Asset condition monitoring in manufacturing

Enabled by a private cellular network, asset condition monitoring enables manufacturers to perform predictive maintenance and avoid downtime.

Maintenance is an ongoing challenge for manufacturers. This industry also seeks to understand machine utilization and effectiveness.

Cellular connectivity can help aggregate data through asset condition monitoring, which can help pre-emptively schedule maintenance and identify potential sources of downtime.

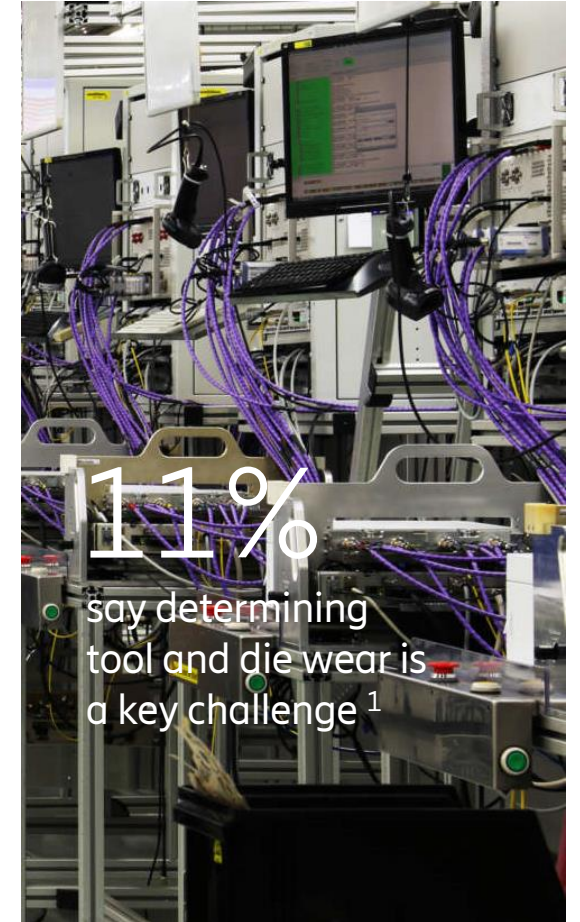
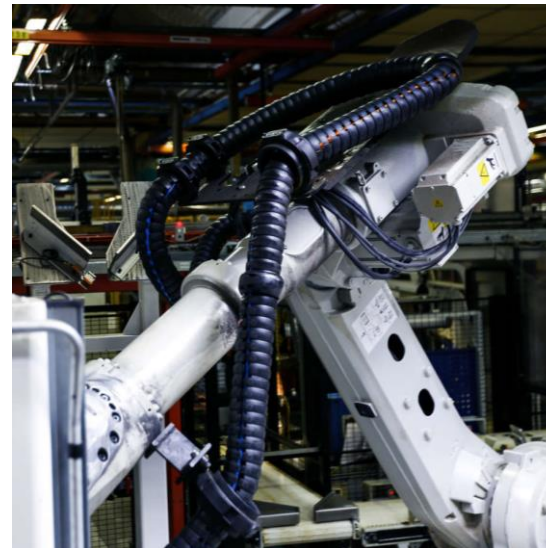
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11%

say determining tool and die wear is a key challenge <sup>1</sup>



# Asset condition monitoring in manufacturing



## Challenge

Manufacturers need to know the condition of machines and avoid downtime, which can result in over-maintenance and time lost to servicing or unplanned outages.

Asset condition monitoring is needed to identify potential downtime risks and understand machine utilization. Assets need to securely transfer data in real time with reliable connectivity to ensure instant notifications before asset breakdowns.



## Solution

A private cellular network enables a smart manufacturing facility to efficiently process and manage data.

The status of key assets can be analyzed via a centralized dashboard, whether the assets are on a single site or in multiple factories around the world. Operators can easily monitor machinery running unattended, thanks to real-time customizable notifications of the performance and status of assets, including the ability to coordinate measuring machines (CMMs) and laser trackers.

The high-reliability, high-bandwidth connection makes 5G private network ideally suited for asset condition monitoring, helping manufacturers avoid premature replacement of parts and keep machines running longer.

## Result

- Decreased downtime and cost of maintenance material
- Improved ergonomic environment
- 151% ROI by year five, driven by decreased downtime (52%), maintenance material cost savings (36%) and more efficient use of labor resources (13%)<sup>1</sup>

10% reduction of spare parts<sup>2</sup>

3 years needed for full payback<sup>3</sup>

# Collaborative robots in manufacturing



High density environment factories can benefit greatly from the use of 5G cellular for collaborative robots (cobots), to perform inspections and operational tasks.

Cobots work side by side with operators to conduct manufacturing tasks such as operational work, drilling or assembly, as well as automated quality inspections of products that are still on the production line. In this way, all parts can be automatically inspected, not just samples, which is necessary due to customers expecting zero defects.

With cobots, factories can more efficiently inspect every part without increasing the time to do so, improving the overall quality as well as customer satisfaction.

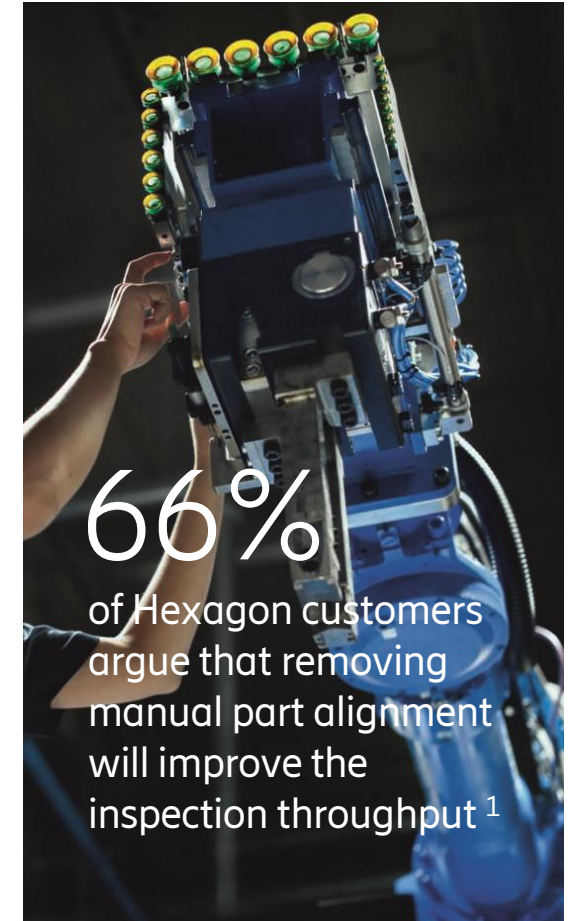
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# Collaborative robots in manufacturing



## Challenge

When manufacturing products, the most difficult step of running a measuring routine is aligning parts. Operators are required to watch the equipment during an inspection about one-third of the time. Additionally, customers expect zero defects and in order to accomplish this goal, manufacturers must inspect 100% of the products they make, which increases the amount of testing required.

With cobots, factories can achieve inspection of every part without increasing the time it takes to do so, which improves overall quality and customer satisfaction. In order to be successful, cobots must connect wirelessly to the facility network.

## Solution

A private cellular network can provide the reliable, low latency connection that cobots require.

Cobots can move freely around the around the production environment to conduct inspections or move materials. The processing of a large amount of data, as well as highly reliable, low-latency connectivity that is secure and able to provide real-time data transfer.

Even though cobots are amidst hundreds or thousands of other connected devices in a factory, a private 5G cellular network provides the needed stable, high-bandwidth, low latency connection even in high density environments.

## Result

- Increased employee safety and ergonomic environment
- Significant reduction of scrap
- 144% ROI by year five, driven by more efficient use of labor (68%), decreased downtime (19%) and fewer quality issues (3%)<sup>1</sup>

57%

of Hexagon customers feel a flexible measuring system will reduce time needed for inspections<sup>2</sup>

10%

decreased cost of quality inspections<sup>3</sup>

# AR for quality inspections in manufacturing



Smart manufacturing environments can benefit from augmented reality to provide rich media and complex analysis visualization, to improve quality inspections.

The cost of poor quality in manufacturing can be extremely high—increasing by a factor of 10 if issues are first detected by the customer and not the manufacturer.<sup>1</sup> More than a third of manufacturers surveyed<sup>2</sup> said comparing parts to spec is difficult for them to do. Plus, they're time-consuming – 48% of manufacturers<sup>3</sup> said automated part identification and measurement would simplify the quality workflow.

Augmented reality, enabled by cellular, can significantly improve productivity, efficiency and operations for a smart manufacturing facility.

Hexagon

**Case type:** Concept/research

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Source: 1. Spectral Applications; 2. Hexagon; 3. Hexagon; 4. Hexagon Manufacturing Intelligence Statistics (2017)



# AR for quality inspections in manufacturing



Hexagon

## Challenge

Manual inspections require specific experience and skills, and manufacturing is facing challenges hiring the right talent and ensuring their skills are applied in the right way. Augmented reality (AR) can help with quality inspection and diagnosis before these areas become costly issues.

A manufacturing facility must be able to provide reliable, highly secure, high-throughput, real-time wireless data transfer to deal with the rich media and complex analysis required for the factory floor.



## Solution

A private cellular network provides the security, high reliability and low latency needed for geo-referenced 3D CAD models or other rich media used in smart manufacturing.

AR devices enable instant support and measurement for technicians, maintenance workers and operators throughout the entire facility. Instructions can be rapidly visualized, and experts can even support on-site personnel remotely.

The wireless connectivity, extremely accurate positioning and the ability to handle a high density of connected devices anywhere in the factory makes a 5G private network ideally suited for this use case.

## Result

- Instant support and measurement for workers throughout the facility
- Improved ergonomic environment
- 68% ROI by year five, driven by more efficient use of labor (46%) and decreased quality inspection costs (34%)<sup>1</sup>

**46%** decreased cost of operator labor<sup>2</sup>

**50%** reduced CO2 impact from service expert travels<sup>2</sup>

# Digital twins for manufacturing

Digital twins' visual representation can be used to determine how to best streamline the production environment without physically changing any processes.

In order to increase efficiency and agility while reducing time and go-to-market costs, manufacturers need to accurately track and trace components in production, which can be difficult and time-consuming when they need to make changes.

Digital twins, enabled by cellular connectivity, can significantly improve insights to processes and the environment for manufacturing.

Hexagon

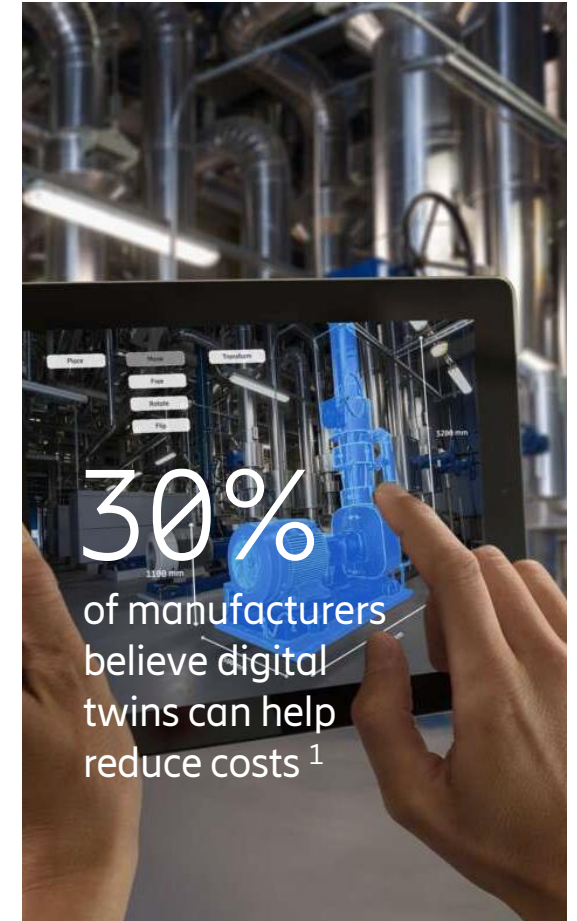
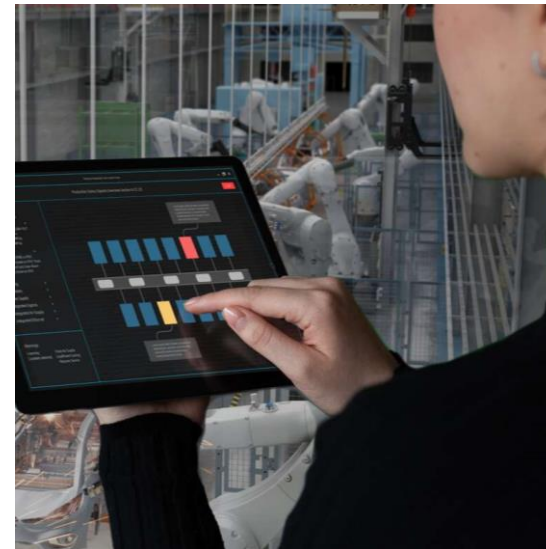
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# Digital twins for manufacturing



Hexagon

## Challenge

Manufacturers encounter challenges to staying competitive when they're hindered by the inability to accurately track and monitor assets. A digital twin is a virtual model that can help optimize operations.

To create this virtual representation, a digital twin needs to process and manage massive amounts of data from 3D mapping sensors, LIDAR and other sources. Connectivity with high reliability and the ability to handle a large connection density is critical to support digital twins.



## Solution

A private cellular network enables real-time transfer of large data volumes required by digital twins.

Private cellular networks provide high bandwidth and reliable connectivity even when there is a high density of connected devices.

With the digital twin, manufacturers gain a rich visualization of the current and past state of the production environment, empowering them to plan for future states with "what-if" scenarios.

The ultra-high security of a 5G-ready private network is ideally suited to protect the large amounts of critical factory data collected from facility devices.

## Result

- Optimized production flow from improved bottlenecks and inefficiencies
- Increased employee satisfaction
- 28% ROI by year five, driven by optimized production flow (60%), decreased configuration time (31%), rework reduction (6%) and decreased downtime (3%)<sup>1</sup>

20% less rework required<sup>2</sup>

20% reduction in scrap<sup>2</sup>

