What is 5G?

What are the use cases for the Manufacturing sector?

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1. Digital Catapult: a brief intro
2. What is 5G and why is it so special?
3. What is the status of 5G in the UK?
4. 5G use cases: benefits and challenges
1. What is 5G and why is it so special?

- 5G has several unique features.
- 5G is well suited to Manufacturing for its versatility and its ability to serve a large number of uses case.
“5G has the potential to change things in the same way that electrification revolutionized manufacturing in the early 20th century.”

Sherif Hanna, Director of Product Marketing, Qualcomm
So we all know what 5G is...

- **eMBB** (enhanced Mobile BroadBand)
  - Peak speed 20 Gbps
- **mMTC** (massive Machine Type Communication)
  - 1 million device connections/km²
  - High energy efficiency
- **URLLC** (Ultra Reliability Low Latency Communication)
  - 1 ms latency
  - 10⁻⁹ error-rate, ultra reliability

Network Slicing
5G - Driving the automation of everything
5G is the network technology that supports the widest range of applications. Manufacturing use cases are extremely varied and require very different network capabilities. 5G is versatile. Compared to other technologies, 5G offers the broadest range of capabilities.

Source: Ericsson, China Mobile
2. What are the use cases for 5G in the Manufacturing sector?
5G use cases in manufacturing can be grouped into 5 clusters

- Time-critical process optimization inside factory
- Non time-critical optimizations inside factory
- Remote maintenance and control
- Seamless intra-/inter-enterprise communication
- Connected goods

5G for Smart Manufacturing
Example 1: 5G Connected Robots allow 260% productivity gain vs 4G.

5G, thanks to ultra Reliable Low Latency Communications (uRLLC), can make a significant impact on real-time automation productivity.

Nokia experiments comparing a assembling robot connected to a 4G vs a 5G network.
The number of parts that the robot assembled was:
• in 4G 12 parts and
• in 5G, 31 parts,
ie +260% productivity gain
Example 2: 5G connected quality control allows 20% gain in troubleshooting.

Challenge: Ericsson produces electronic boards in a factory in Tallinn. Its workforce is highly skilled and trained. However, its quality control processes are time consuming as it takes time to identify and correct any fault.

Mihkel Tedremaa, Product Technology Manager, says: “We found out that while working on a faulty unit, roughly half of a technician’s time goes to non-value add activities such as finding and linking schematics with layout files, fault info and troubleshooting instructions.”

Solution: Technicians are fitted with augmented reality troubleshooting (ART) glasses. The glasses are connected in 5G to a fault data and troubleshooting instructions database in the cloud. The technician can find the fault more quickly thanks to the extra layer of digital information that is added to the real-world image. This frees up time for solving the issue.

Also, the technician troubleshooting actions are feedbacked real-time in the cloud database which allows sharing the data faster between production sites.

Results: 20% more efficient in troubleshooting

Example 3: 5G cuts production costs and CO2 emission

Challenge: MTU Aero Engine is the world number one jet turbine producer. One of the turbine component, so-called blade integrated disks (blisk), are high-tech components where the disk and blades are produced as a single piece and serve the purpose of compressing the air inside jet engines. They are milled out of solid pieces of metal and have extremely high requirements towards accuracy and surface integrity.

Thomas Dautl, Director of Manufacturing Technology, MTU Aero Engines, says: “A blade-integrated disk is a high-value component. The milling process takes 15-20 hours and the total lead time is around 3-4 months, including coating processes and quality checks. The new 5G-based production technology will help make our operations more efficient.”

Solution: Applying 5G in the manufacturing industry has many important benefits in terms of costs, quality, and flexibility. The ultra-low latency and very high bandwidth make it possible to control machines in real-time, reducing manufacturing costs and improving quality of products.

Results (expected):
- Cost Savings: approximately EUR 27 million for one single factory, and up to EUR 360 million globally
- CO2 emissions from both the production of blisk and their operation in jet engines can be reduced by some 16 million tons annually on a global basis.

Jet engines powered by 5G
Example 4: 5G improve quality performance

Challenge: Nokia produces pieces of equipment that require complex assembling where risks for error is significative.

Solution: Applying 5G to the video monitoring of the production lines coupled with video analytics allow real-time feedback on errors made during production as they happen.
What are the benefits?

Cost savings
Less CO2 emission
Additional revenue
Improved safety
etc.
What are the benefits? and challenges?

Cost savings
Less CO2 emission
Additional revenue
Improved safety
etc.

Technical
Educational
Cultural
Regulatory
Economical
Financial