5GHQ

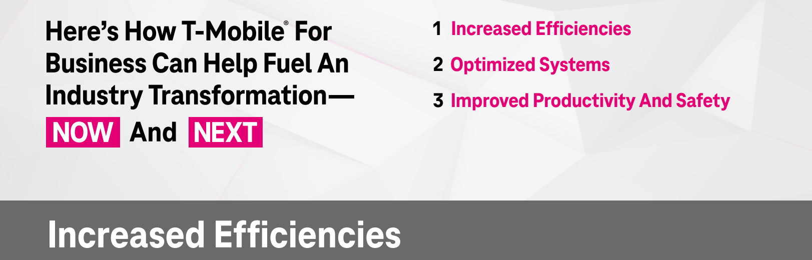
Pioneering With 5G: Manufacturing

T-MOBILE FOR BUSINESS

Here's How T-Mobile® For Business Can Help Fuel An Industry Transformation— NOW And NEXT

1 Increased Efficiencies
2 Optimized Systems
3 Improved Productivity And Safety

Increased Efficiencies



NOW

5G-Fueled Data, Automation, And Devices

With faster speeds and increased bandwidth compared to 4G, 5G can power technologies that automate production, support worker precision, and monitor supply chains.

The 5G impact on manufacturing output

$400-$650 billion
impact of 5G on U.S. manufacturing GDP by 2030[1]

Simplicity through automation

Artificial intelligence (AI) and computer vision provide automated quality control, defect detection, remote tracking, and inspection

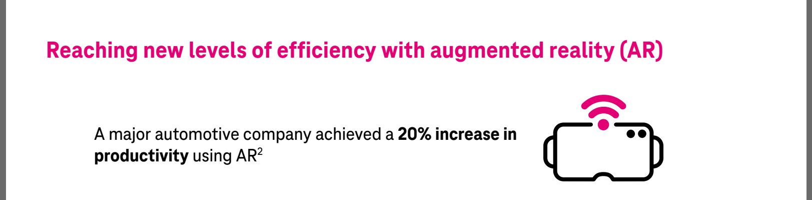
Embedded sensors offer detailed insights into assets across the entire manufacturing process to improve supply chain visibility and efficiency

Autonomous guided vehicles (AGV) and collaborative robots allow for automated processes to reduce human error and increase efficiency

Reaching new levels of efficiency with augmented reality (AR)

A major automotive company achieved a **20% increase in productivity** using AR[2]

Increased Efficiencies



NEXT

Real-time data through 5G transforms operations

To build on today's innovation, future factory floors will need ultra-low latency networks powering robots and the systems that connect them to elevate insights. 5G can offer key benefits to drive operational efficiencies.

The smart factory outlook

Smart factory market investment will grow to over $950 billion by 2030[3]

Faster speeds, lower latency, and extended reach with 5G make new approaches possible

A Fortune 100 enterprise-level company saw these outcomes using **digital twins**[4]:

$11 million avoidance in production losses

40% reduction in reactive maintenance

75% reduction in time to manufacturing outcomes

Multiple forms of automation

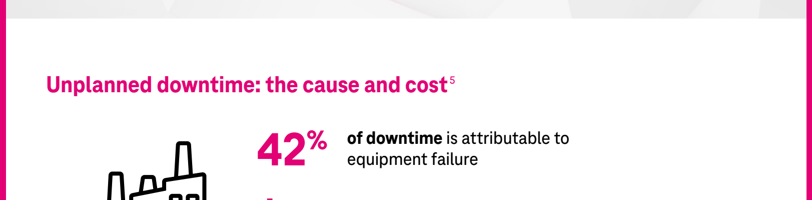
Emergence of 'dark factories' with manufacturing processes fully automated

AGVs and autonomous mobile robots (AMRs) move horizontally and vertically, equipped with sensors, cameras, radar, and laser detectors

Cobots available to large enterprises as well as small and medium-sized companies

Robots for niche, low-volume production and larger and diverse products

Optimized Systems



NOW

5G Helps Reduce Defects And Waste

When facilities aren't working in harmony, workers and companies experience negative consequences. 5G connectivity can allow manufacturers to manage a dense ecosystem of Internet of Things (IoT) devices, helping reduce waste and enhance employee workflows.

Unplanned downtime: the cause and cost[5]

42% **of downtime** is attributable to equipment failure

$50 billion **annual** cost of unplanned downtime for manufacturers

Next-level measurement to enhance manufacturing processes

Logistics tracking from factory to customer

Smart sensors for predictive maintenance

Biometrics for user identification and security

Immediate intelligence with edge computing

Aggregate and analyze data on premises in real time

Optimize and scale with Multi-Access Edge Computing (MEC)

Connect edge IoT devices with 5G to reduce latency and bandwidth costs

Reduced factory and supply chain waste with advanced analytics

Up to 50% lower forecast errors per year[6]

Demand forecasting, including predictive lead time to reduce safety stock costs, exception management labor, and purchase order labor[7]

Optimized Systems

NEXT

Data And Systems Work To Improve Interoperability

Today, 5G speed and reliability can enable real-time tracking of workers and assets. As 5G matures, it will support product-level tagging and tracking, predictive analytics, computer vision, and other data-centric systems.

Support for more devices, delivery of more data

More connection points help streamline workflows and improve end-to-end visibility of supply chains

More sensors capture better data that heightens security, safety, and compliance

Higher volumes of data can be more quickly analyzed for insights via data analytics

5G accelerates predictive analytics advantages

Forecast demand more accurately

Enhance **proactive maintenance**

Help **prevent system failures**

Improve decision-making with **real-time updates**

Implementing cloud-based AI solutions with 5G

60% of manufacturers expect to use AI across a range of business processes in three years' time—and 59% identify quality control as the top priority[8]

Production process validation

Safety enforcement

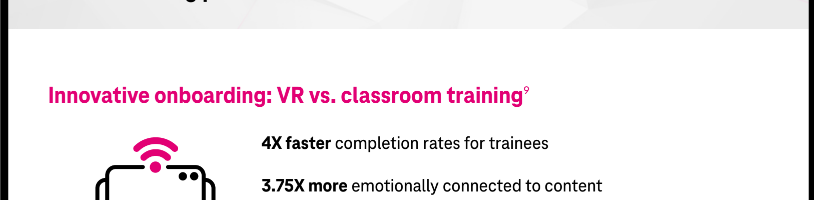
Precision die-cutting

Packaging standards

Barcode analysis

Maintenance and repair

Improved Productivity And Safety



NOW

Better Training, Fewer Injuries

Making factories more productive and safer for workers starts day one and extends through every element of daily operations. Companies are relying on 5G-powered technologies to connect the dots for safer manufacturing processes.

Innovative onboarding: VR vs. classroom training[9]

4X faster completion rates for trainees

3.75X more emotionally connected to content

40% more confident to act on what they learned

Addressing injuries in manufacturing

340,000 fatal **manufacturing injuries** occurred in 2020 in the U.S.[10]

IoT safety solutions:[11]

Worker wearables for safety compliance, location tracking, fall detection, and machinery communication

Machine vision for defect detection and downtime prediction and prevention

Sensors and devices for strengthening legacy systems, including fire suppression and facility HVAC

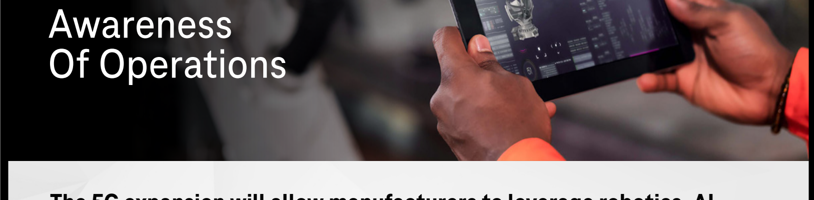
Geofencing to enhance safety in hazardous areas

Demarcate areas

Enable mobile push notifications

Scale machine and wearable sensors

Improved Productivity And Safety



NEXT

Real-Time Awareness Of Operations

The 5G expansion will allow manufacturers to leverage robotics, AI, AGVs, and machine learning in ways we're just beginning to imagine. This will result in next generation factories that greatly enhance worker safety while maintaining production integrity.

5G speeds and low latency expand security and safety features with HD video from cameras and drones

Support for coming generations of 8K and other HD improvements for **real-time, on-site monitoring**

Monitor for disruptions or failures throughout factories

Prevent accidents by detecting dangerous situations with data analysis

Faster, better insights from cloud, AI, and machine learning technologies

5G adds intelligent features to wireless vehicles

With sensors and software connected on 5G, **wireless AGVs can more easily move heavy pallets, products, and equipment** in warehouses and factories to improve worker safety

Looking to the future with 5G

91% of manufacturers believe 5G connectivity will be important to the overall future of their business[12]

Sources:

1. McKinsey & Co / **2.** Institution of Mechanical Engineers / **3.** PR Newswire / **4.** CGTech / **5.** Wall Street Journal / **6.** McKinsey / **7.** MIT Center for Transportation and Logistics / **8.** MIT Technology Review / **9.** PwC / **10.** U.S. Bureau of Labor Statistics / **11.** Industrial Safety and Hygiene News / **12.** Manufacturing Institute

5G HQ

Ready To Find Out How T-Mobile For Business Can Support Your Manufacturing Organization's Goals?

Learn More Today.

T-MOBILE FOR BUSINESS