



KINEXON



#### CASE STUDY

# BMW relies on KINEXON to bring production to the next level

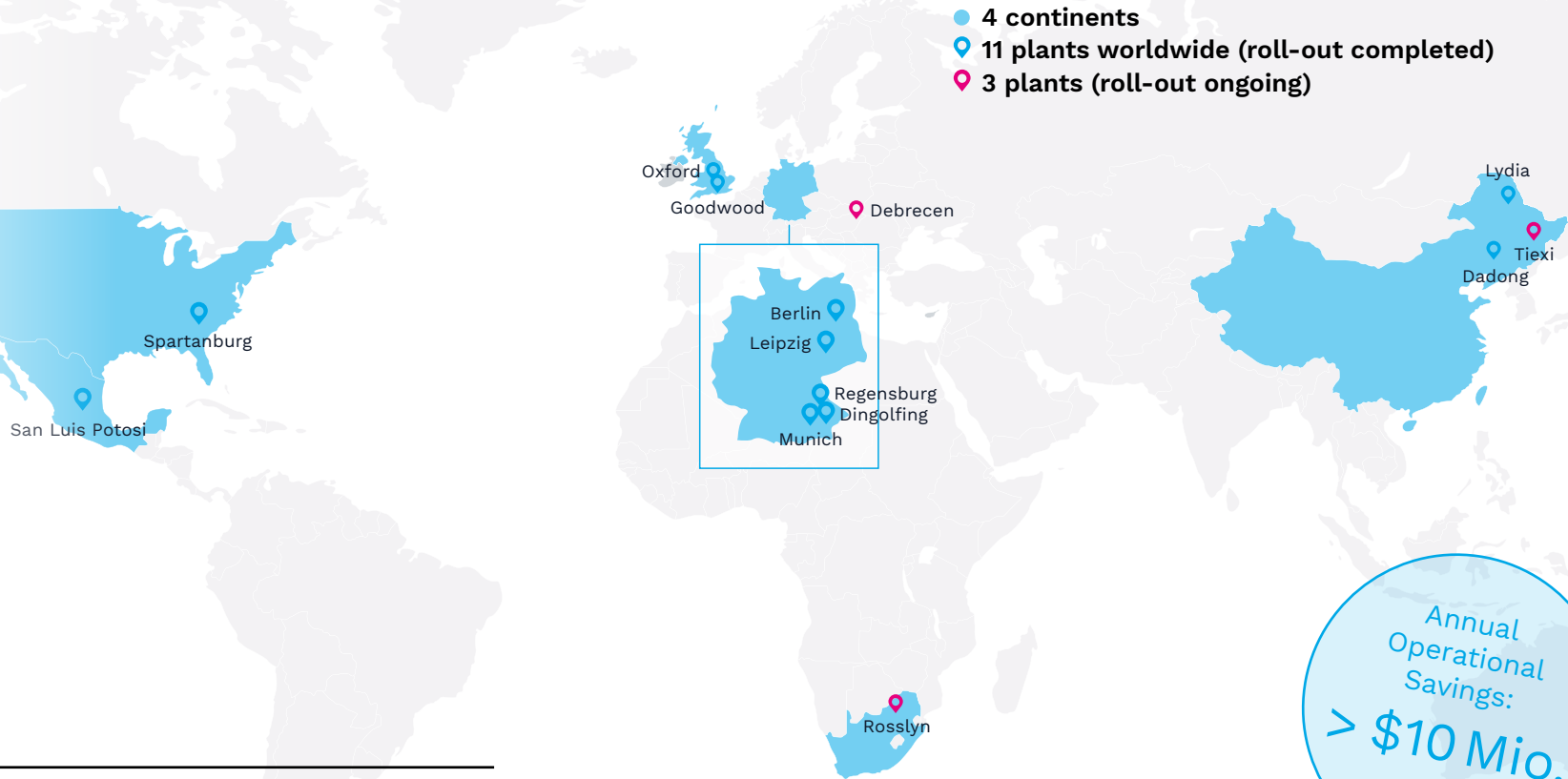
Production critical, technology-agnostic software platform that maximizes speed, transparency, and quality in assembly and logistics

“Together, BMW and KINEXON want to set new standards in digital production steering.”

Milan Nedeljković  
Board Member for Production, BMW AG

# The Project at a Glance

KINEXON OS is production-critical at 11 BMW plants across 4 continents. 3 additional plants are currently in the roll-out processes for 2023.



Annual Operational Savings: > \$10 Mio.

## PROJECT OVERVIEW

> 4,000

KINEXON OS users  
in total at BMW

~14 million

sqf production area  
covered by KINEXON OS worldwide

65,000

assets  
are tracked daily by KINEXON OS

> 500,000

screw fittings  
are processed in KINEXON OS  
per day

20,000

vehicles  
are tracked daily by KINEXON OS

## IMPACT

> \$10 million

savings  
in annual operational cost

99.98 %

ability  
to generate system uptime

> 50 million

automated telegrams  
instead of manual work

# Unlocking the Potential

Maximize Speed, Transparency, and Quality in Assembly and Logistics



## Autonomous Operations via Real-time Location Data

enables faster cycle speed and a powerful digital twin of the plant.



## Reduction of Proportional Production Cost

through the elimination of manual production steps and times.



## Full Transparency over the Entire Value Chain

thanks to continuous data and seamless process documentation.



## Smart Manufacturing & Digitalization Strategy

through higher flexibility, visibility, and scalability in production.



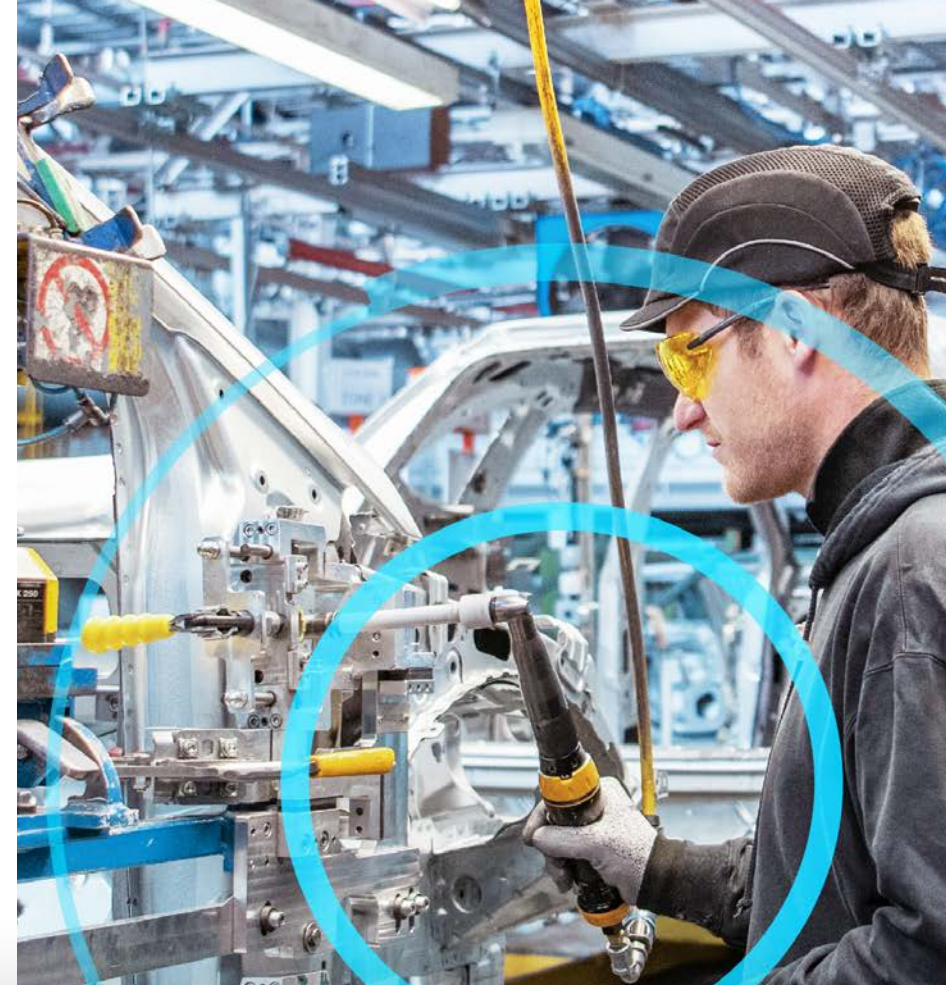
## Achievement of Zero-Fault Target

via automatic assurance of quality control.



## Gaining Maximum Scalability

through no-code/-low code approach and direct enablement on the shopfloor.



“Automotive production at the BMW Group is a lot like top-flight sport in that it’s about high-performance processes. The real-time locating platform KINEXON OS forms the backbone for fully digitalizing our production. It’s an innovative operating system that makes our highly complex manufacturing processes transparent and raises efficiency in production even further.”



**Milan Nedeljković,**  
Board Member for Production, BMW AG

# About the Project



## THE CUSTOMER

With its four brands, BMW, MINI, Rolls-Royce, and BMW Motorrad, the BMW Group is the **world's leading premium manufacturer** of automobiles and motorcycles and provides premium financial and mobility services.

The BMW Group production network is comprised of **31 production and assembly facilities** in 15 countries; the company has a global sales network in more than **140 countries**.

In 2021, the BMW Group sold over **2.5 million passenger vehicles** and **more than 194,000 motorcycles worldwide**.

## KINEXON

### THE SOLUTION PROVIDER

KINEXON is a **global technology leader** that develops groundbreaking solutions for **connected and automated operations** in the **automotive, manufacturing, and aerospace industries**.

The company is a pioneer of next-generation on-premise and cloud software, connected devices, and indoor location services. KINEXON's end-to-end solutions **capture, analyze and automate processes**.

Headquartered in Munich, Germany, KINEXON has grown to more than **300 employees** across offices in **Munich and Chicago**.

## THE CHALLENGES

### → Converting manual processes to automated operations

BMW plans to automate assembly control with real-time, accurate position data to improve production efficiency and reduce costs. Digitized assembly control replaces manual processes with automation, using auto-identification technology to track part location and improve inventory accuracy.

### → Moving from complex environments to seamless interconnectivity

BMW tackles complex environments by offering standard interfaces for seamless interconnectivity in its manufacturing solutions. The Tugger Train Navigation System, which uses UWB location data, enables real-time tracking of materials and increases transparency in production planning. BMW also uses advanced tracking technology for transparent yards and build-shy strategy to minimize rework efforts due to supply chain disruptions.

### → Turning operational risk into industrial-grade reliability

BMW needs critical software to prevent costly production stops. Automated tool control is essential to achieving this goal by monitoring and controlling assembly line tools in real-time, reducing human error and improving reliability. Authorized personnel access critical tools and components, enhancing security, and reducing unauthorized use.

### → Transitioning from vendor dependency to full autonomy

BMW seeks to optimize manufacturing efficiency by achieving full autonomy in supply chain management and reducing vendor dependency. A dynamic truck steering system will manage supplies of all sizes seamlessly, ensuring timely and accurate delivery. This eliminates data silos and opaque processes caused by separate proprietary middleware.

# Faster Assembly Speeds at Higher Quality

Eliminating error-prone manual efforts

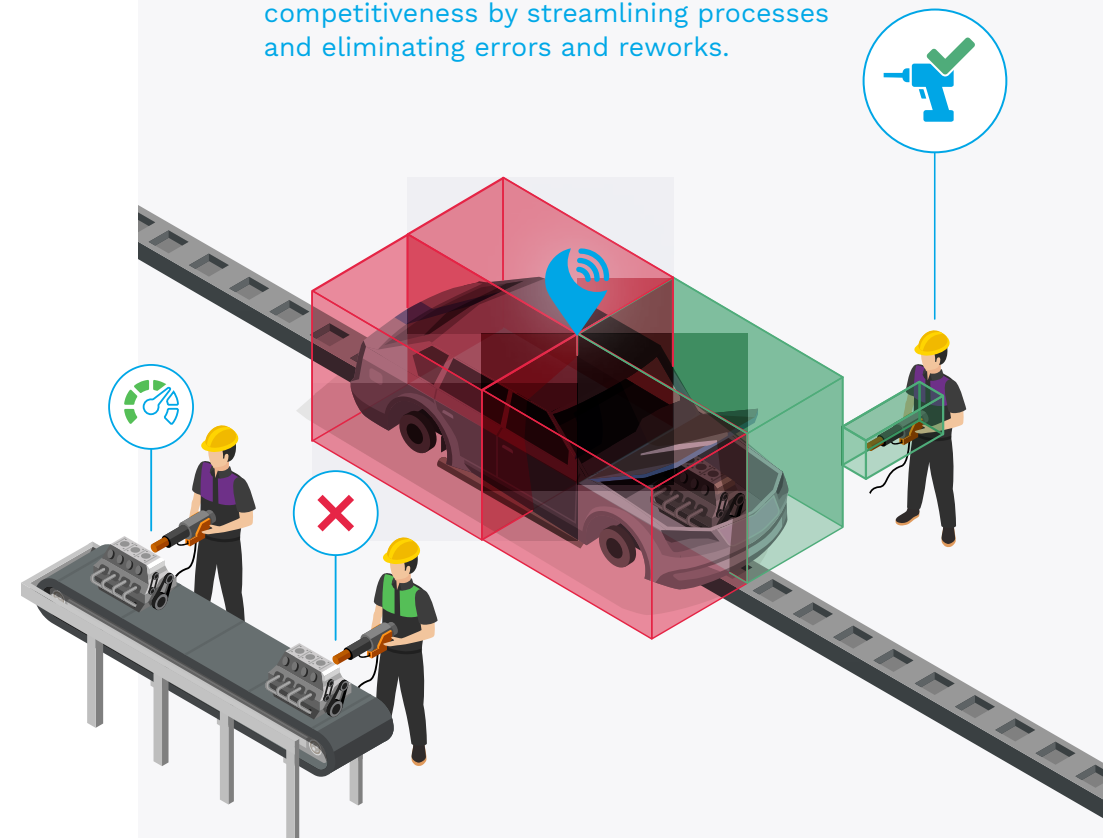
## 1 TOOL CONTROL

Tool Control is a highly desirable use case in the automotive industry. BMW, as an OEM, benefits from utilizing the centimeter-level accuracy of Ultra-Wideband (UWB) technology for tool control and management. By defining specifications for tools, parts, and vehicle types, UWB data is utilized to manage and control tightening sequence and torque settings within various assembly stages.

KINEXON's tool control solution automatically configures the tool to the correct settings and initiates all subsequent steps in real-time, ensuring that fasteners are installed to their individual torque specifications with bolt-level accuracy. This technology not only prevents assembly errors but also promotes safety and longevity of the product, making it a highly beneficial investment for BMW.

## KEY BENEFITS

- **Accelerated Assembly:** increases assembly speed and throughput to optimize manufacturing processes.
- **Enhanced Safety and Quality:** reduces safety and quality limitations in complex assembly processes, allowing for more precise and accurate control of tool operations, leading to fewer defects, errors, and reworks.
- **Elimination of Human Error:** minimizes the need for costly reworks and increases production yields, reducing expenses while ensuring consistently high-quality results.
- **Cost Savings:** provides significant cost savings for customers, increasing profitability and competitiveness by streamlining processes and eliminating errors and reworks.



# Mastering Batch Size 1

Achieving autonomy in complex environments

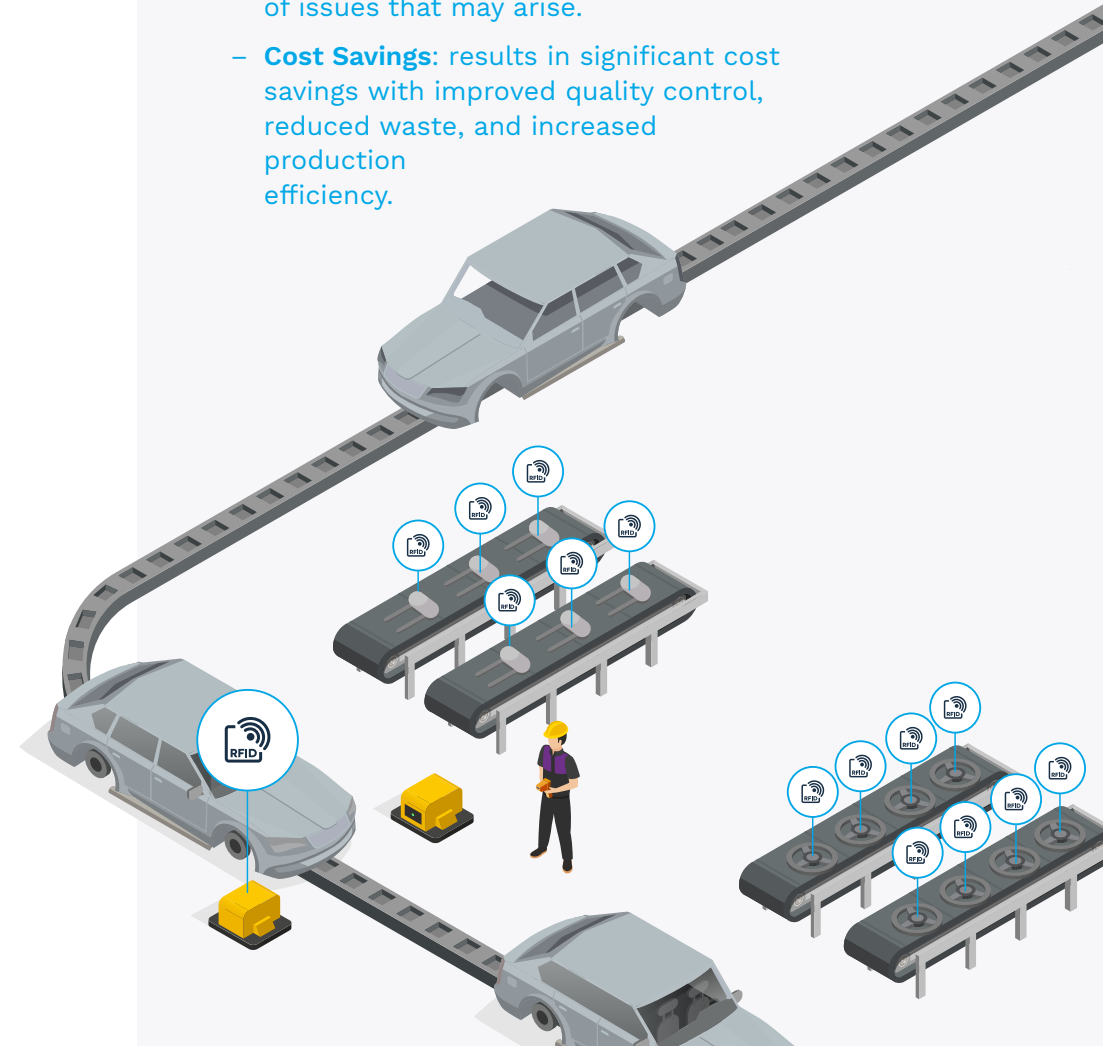
## 2 AUTO-ID AND DIGITIZED ASSEMBLY CONTROL

To meet the growing demand for quality control and documentation in the face of increasing numbers of new models and derivatives, BMW leverages RFID for safety-critical and customizable components, such as mirrors, headrests, and steering wheels. This technology allows for large-scale tracking and content verification, ensuring that each vehicle is assembled correctly to meet the unique specifications of individual customers.

With approximately 12,000 vehicles produced each day, and no two models alike, BMW's Digitized Assembly Control is a critical tool that drives significant value for the company in managing its complex manufacturing processes.

### KEY BENEFITS

- **Real-time Verification:** real-time component verification during the assembly process, providing manufacturers with precise and up-to-date information about the status of their products.
- **Customized Quality Control:** offers advanced quality control options to ensure that each product meets the customer's exact specifications and requirements.
- **Enhanced Reliability and Assembly Efficiency:** provides real-time information and analysis of the assembly process, allowing for rapid identification and resolution of issues that may arise.
- **Cost Savings:** results in significant cost savings with improved quality control, reduced waste, and increased production efficiency.



# Increasing resiliency and minimizing rework efforts

Real-time locating and transparency

## 3 TRANSPARENT YARDS AND BUILD-SHY STRATEGY

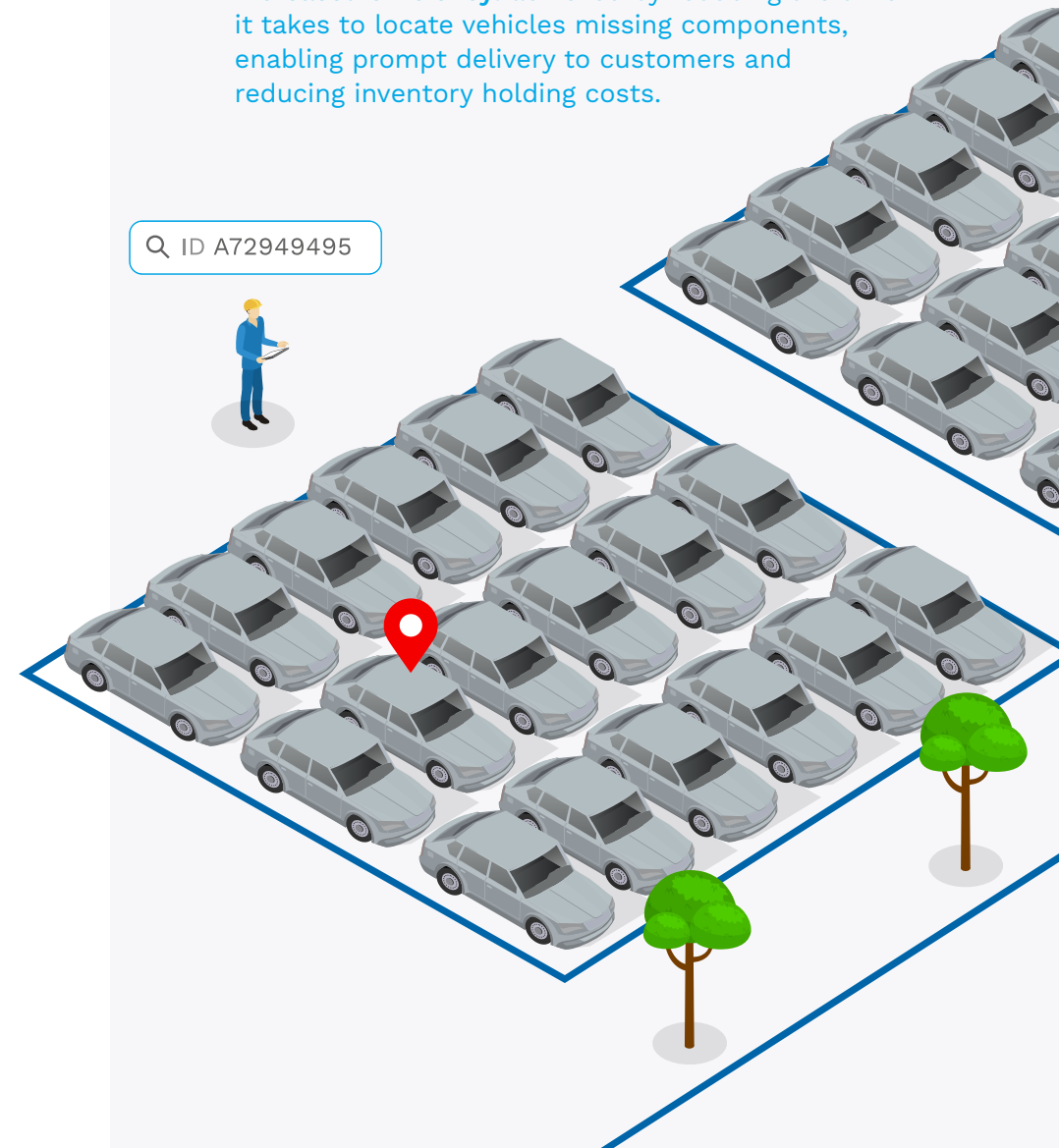
Due to unforeseen supply chain disruptions and shortages, not all assembled vehicles are finished and ready to ship, missing advanced parts that rely on electronic components, like heated seats.

By strategically locating these vehicles using advanced tracking technology, they're minimizing rework efforts.



### KEY BENEFITS

- **Effective localization:** missing components are quickly located, reducing delays, and improving customer satisfaction.
- **Elimination of unproductive search times:** enables more efficient use of resources and reduces delays in the delivery of vehicles to customers.
- **Increased efficiency:** achieved by reducing the time it takes to locate vehicles missing components, enabling prompt delivery to customers and reducing inventory holding costs.



# Optimizing Material Flow and Assembly

Unifying all location technologies in one hub

## 4 TUGGER TRAIN NAVIGATION

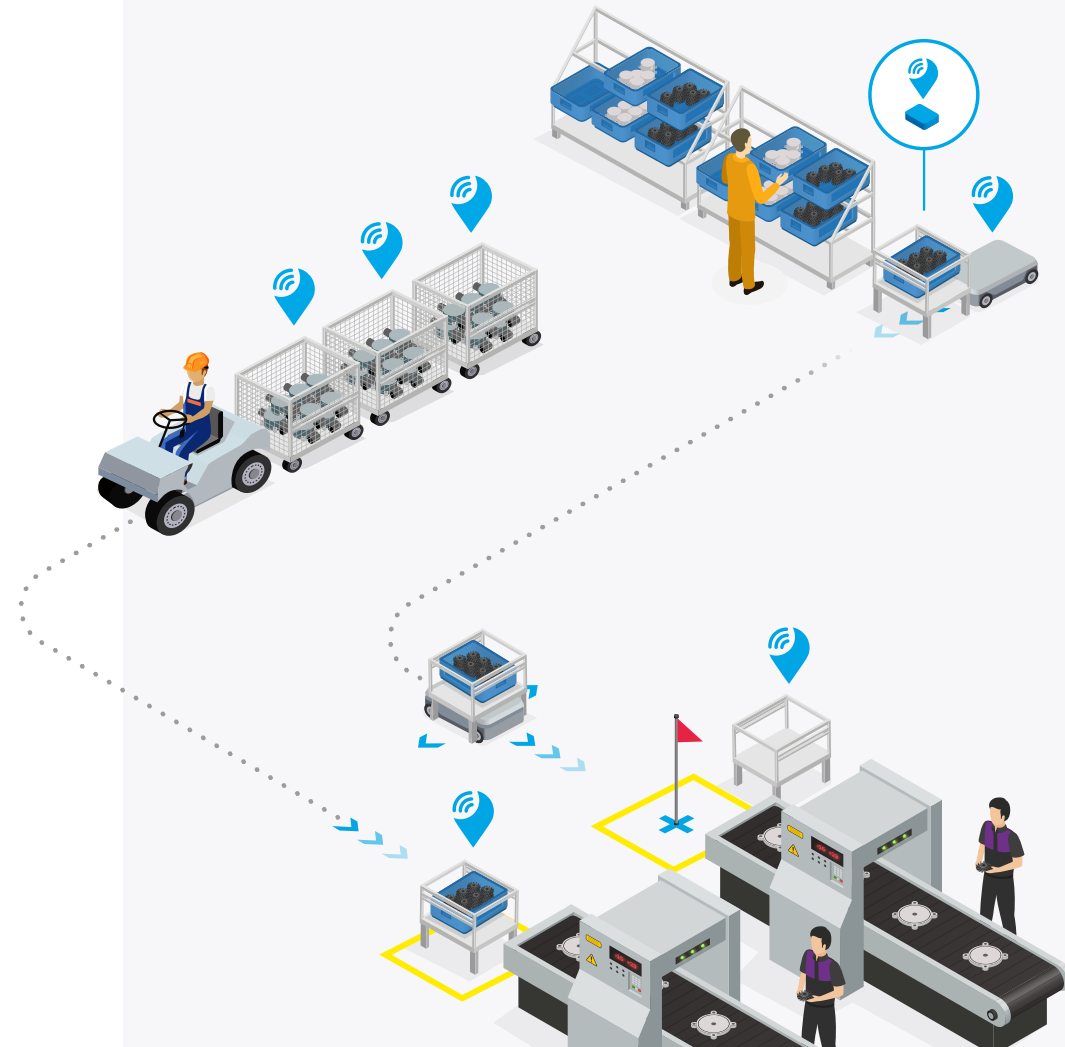
KINEXON's Tugger Train Navigation System is a technically advanced solution that offers manufacturers the benefit of precise navigation and pick-up instructions for tugger trains and picking vehicles.

By using UWB location data, the system enables real-time tracking of the location and status of tugger trains, sequence cars, and materials, increasing transparency and allowing for more accurate production planning and management. This leads to increased efficiency and reduced costs, as the system eliminates the need for manual scans and unproductive search times.



### KEY BENEFITS

- **Just-In-Time Production:** streamlines the production process, reducing search times and minimizing the need for manual intervention.
- **Decreased Cycle Times and Automated Processes:** increases cycle times and eliminates manual processes, reducing the risk of errors and delays, and providing manufacturers with real-time data.
- **Increased profitability and competitiveness** in the market by reducing search times and eliminating manual processes.



# Automated Traffic & Cargo Control

Through Location-based Process Automation

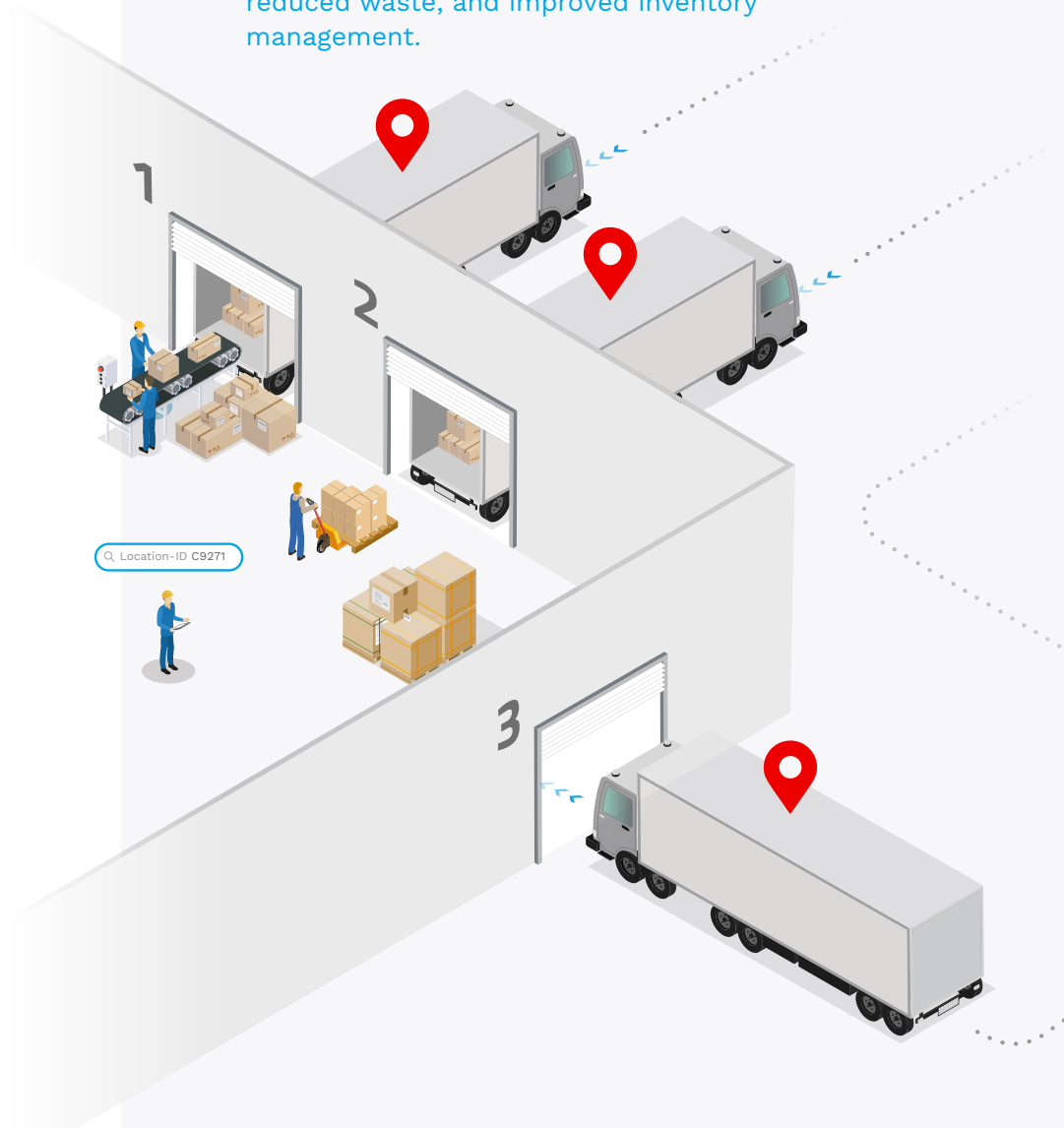
## 5 DYNAMIC TRUCK STEERING SYSTEM

This use case enables the efficient maneuvering of supplies across BMW's vast manufacturing sites. With thousands of parts, suppliers, and cargo trucks entering and leaving the facilities, coordination and traffic control are crucial to ensure the timely and accurate delivery of supplies to the appropriate assembly lines.

The Dynamic Steering System allows for seamless management of supplies, from small semiconductors to larger assembly parts, ensuring that everything arrives at the right place at the right time, improving the overall efficiency of the manufacturing process.

### KEY BENEFITS

- **Effective Piloting:** Efficient handling of incoming cargo to ensure timely and safe delivery, which improves the overall efficiency of the manufacturing process.
- **Real-Time Documentation:** provides up-to-date and accurate records of supply movements, enabling better inventory management and reducing errors
- **Cost Savings:** achieved through increased efficiency, reduced waste, and improved inventory management.



# KINEXON OS, the Software for Connectivity and Autonomous Operations

Industry-Leading Expertise  
& Innovation: KINEXON a  
Perfect Partner for BMW

“Due to country-specific regulations, new software has always been tied to high costs and complex onboarding processes in the past. **Our goal was to break down these barriers and build a central data hub where all localization and identification information of our production sites worldwide is captured.** With KINEXON OS we have succeeded in gaining a holistic picture of our activities around the globe and in **converting the data into automation applications that add value.**”



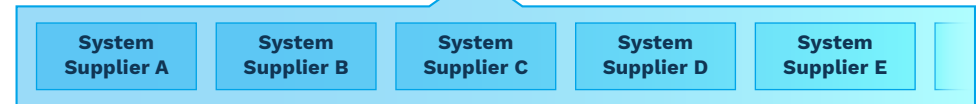
Tobias Mayr,  
Head of Platforms, BMW AG



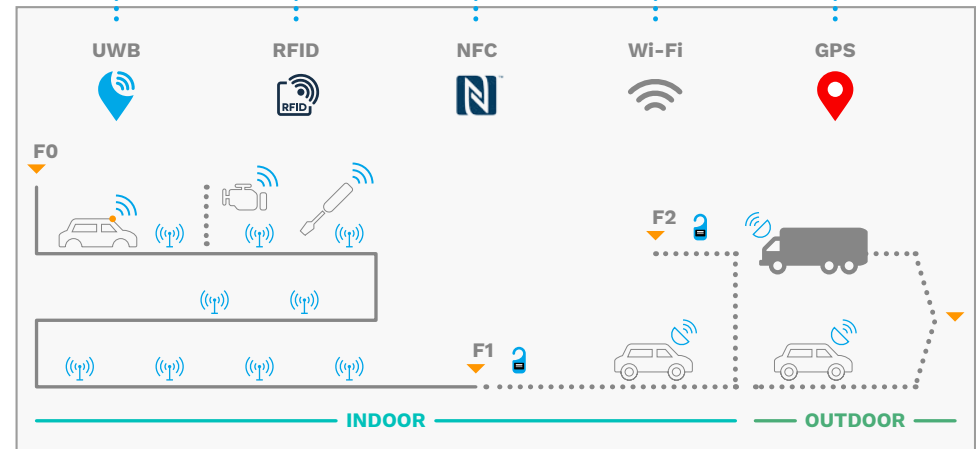
Backend Systems



KINEXON OS



Hardware Layer



KINEXON Anchor



KINEXON X-Tag



KINEXON e-Paper Tag



KINEXON Vehicle Tag



# KINEXON



## KINEXON Industries GmbH

Schellingstrasse 35  
80799 Munich, Germany


info@kinexon-industries.com  
+49 89 200 61 65-0



## KINEXON Industries

200 S Wacker Dr, Suite 3100  
Chicago, IL 60606

info@kinexon-industries.com  
+1 (347) 630-0208



X:	4443.66
Y:	245.45
Z:	153.67



X:	4443.66
Y:	245.45
Z:	153.67



X:	4443.66
Y:	245.45
Z:	153.67