



KINEXON



SUCCESS STORY

Towards Logistics 4.0: How MTU Aero Engines Achieves Complete Material Flow Visibility with Real-Time Asset Tracking



Table of Contents

The Background	3
The Challenges	4
MTU's Journey to Real-Time Asset Tracking	5
The Solution The Interplay of Smart Hardware and Software Solutions	6
The Benefits for Engine Maintenance and Repair	9
The Outlook Track & Trace Is Only the Start	10
About KINEXON	12

The Background

Knowing exactly where to find things is essential, whether it's a custom-made part, an urgent production order, or the last few modules required to reassemble an engine after maintenance. That's the thinking behind a project MTU Aero Engines has been working on. The project's goal is to obtain a comprehensive, real-time overview of every part that is produced and every repair job that is carried out on MTU's premises. To achieve this, the company has decided to set up a comprehensive track & trace solution. In addition to ensuring full transparency of all on-site manufacturing processes, the new system also drives medium-term efficiency gains in material flow and production operations, thanks to the digitalization and automation of key processes.

MTU's experience is a valuable reference for operation and production planners, and innovation managers focused on digital and automated solutions.



The Challenges

Before the introduction of track & trace, MTU faced significant challenges with transparency and accuracy in their intralogistics. Workers manually recorded production steps and tracked parts across the shop floor by entering data into software. This process often led to outdated or inaccurate information, as unlogged movements, such as shifting pallets to create space or overlooked shipping processes, created inefficiencies and reduced overall transparency.

“In the past, much of this information was unreliable and delayed,” says Lucas Burgey, project manager for MTU.

Track & trace addresses these issues by maximizing transparency in intralogistics—the flow of goods and materials both on- and off-site. An efficient track & trace system continuously monitors the location of individual parts, component assemblies, and even entire engines, automatically logging their route through various production stages.



MTU's Journey to Real-Time Asset Tracking

Planning for the logistics 4.0 project got underway in late 2020. One of the first steps was to install numerous transmitters, or beacons, in the production facilities to enable real-time positioning and localization. Initially, the site tested out a simple position-tracking system for cage pallets and drawer cabinets, “just to get some basic experience in using the technology,” Burgey says. In addition to tracking their location, this trial system also provided information on whether containers were full or empty. After conducting a detailed analysis, MTU opted for an ultra-wideband (UWB) system.



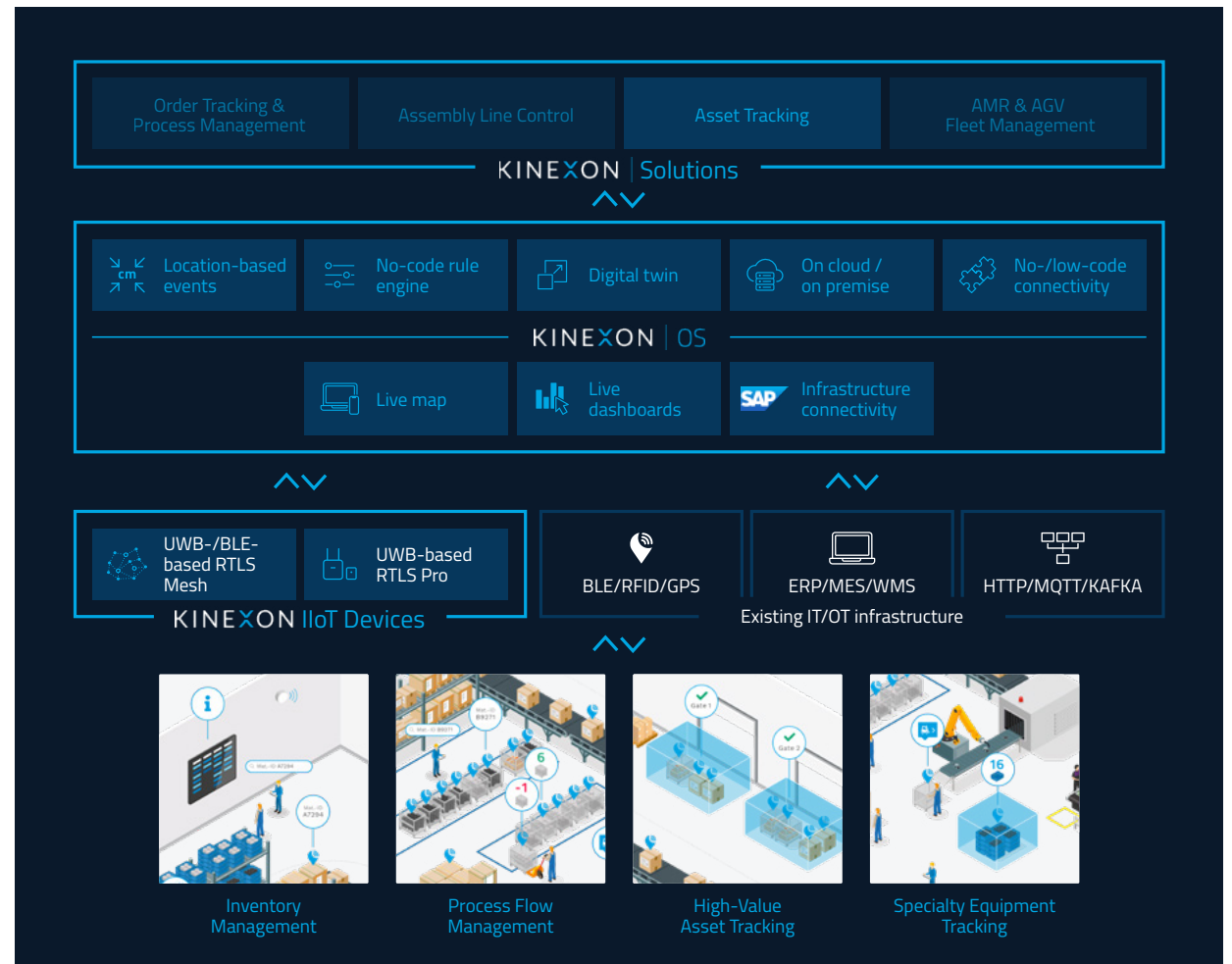
Martin Roth, Project Manager at MTU Aero Engines and Lucas Burgey, Project Manager at MTU Aero Engines are driving the project forward.

The Solution

The Interplay of Smart Hardware and Software Solutions

How the KINEXON OS Platform Optimizes Visibility and Transparency of Moving Assets

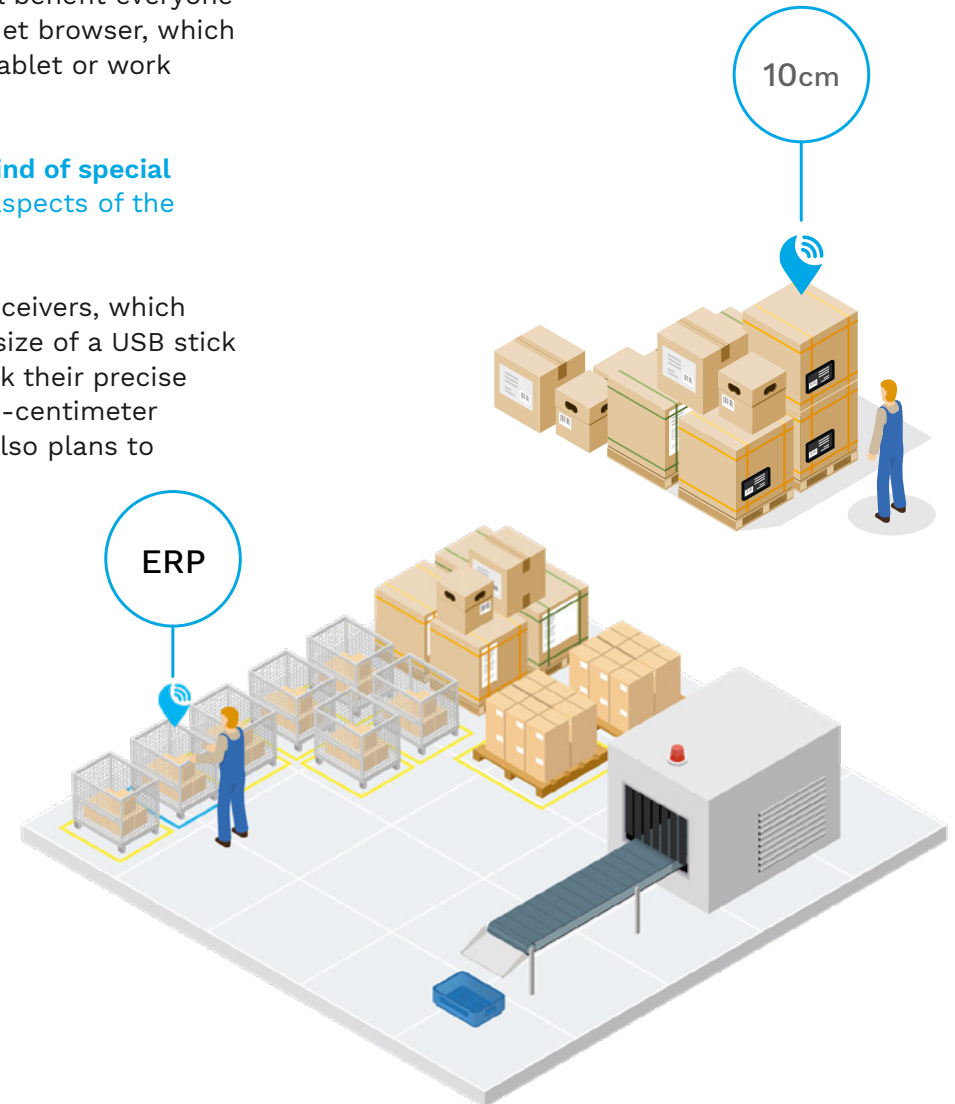
Track & trace caters to many different applications, but at the heart of all of them is KINEXON OS. This operating system integrates all location data and combines it with floor plans of the production facilities, maps of the company's premises, and any production data and



rules that have been stored in the system. Dix says, “The overall vision is to tie together the physical and digital worlds without human intervention, enabling support processes such as transport and ordering to be launched and logged automatically. The time and efficiency gains will benefit everyone involved.” All this information can be accessed and managed from a standard internet browser, which means users can enjoy all the benefits not just on their desktop PC, but also on a tablet or work smartphone on the shop floor itself.

“**You can carry around all these features in your pocket without needing some kind of special industrial device,**” says project manager Martin Roth, who is responsible for the IT aspects of the KINEXON OS implementation.

Apart from the software, the other key element of the system is the multitude of receivers, which are known as tags. Currently, these are KINEXON’s UWB-based X-Tags. Roughly the size of a USB stick or a lighter, these can be attached to a drawer cabinet, pallet or picking cart to track their precise location. This short-range radio technology of UWB can locate objects with up to 10-centimeter precision, a level of accuracy that met the company’s requirements. The company also plans to incorporate smarter, more complex tags to gain access to additional information.



How the KINEXON IIoT Devices Enhance Real-Time Digital Twins By Equipping Industrial Assets



ACCURATE POSITIONING

X-Tags are compact sensors that emit and process UWB signals, similar to popular devices like Apple AirTags. However, instead of being detected by passing smartphones, the signals are captured by anchors permanently installed throughout the production hall. This setup enables precise tracking of X Tag sensors, which can be easily attached to various objects, ensuring accurate positioning within the facility.



REAL-TIME OBJECT LOCATION AND ENHANCED COMMUNICATION

Advanced beacons enable real-time object localization with impressive accuracy. By detecting UWB radio signals from sensors throughout the production hall, multiple beacons can pinpoint an object to within less than a meter in just seconds. This technology enhances tracking and supports bidirectional communication, allowing beacons to receive commands for next steps. Workers can easily initiate these commands using a tag, streamlining operations and significantly improving efficiency on the shop floor.

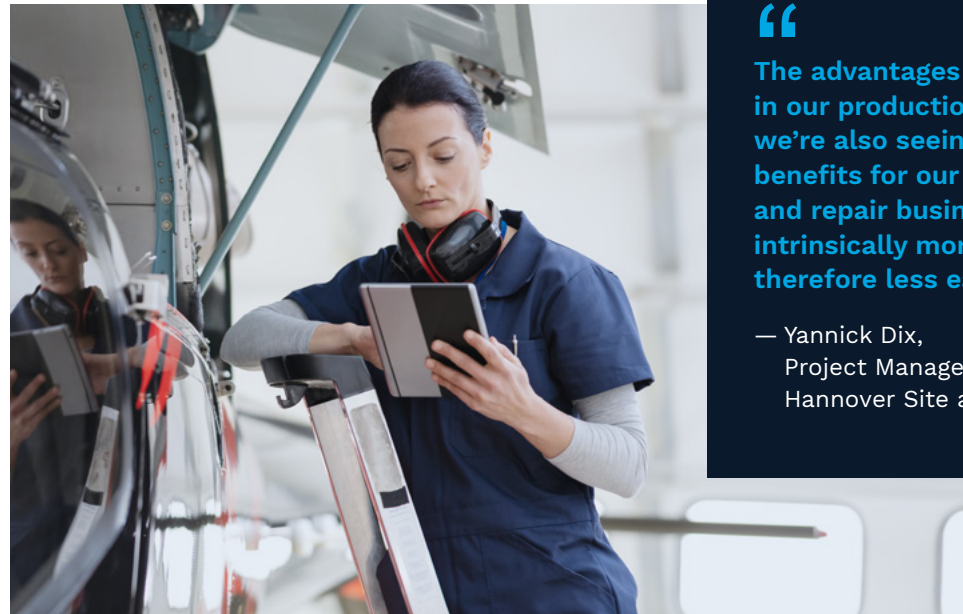


SMART RECEIVERS

At MTU, ePaper Tags serve as intelligent devices that communicate with users through a nearly five-inch e-ink screen. Equipped with two control buttons, employees can easily check status information and initiate the next step in an object's journey, such as advancing it to the next stage in the production process. Additionally, these ePaper Tags include a sensor that transmits positioning information, enhancing overall operational efficiency.

The Benefits for Engine Maintenance and Repair

With track and trace, MTU now benefits from real-time, accurate tracking, which enhances efficiency and provides a clearer view of their production process. Looking at MTU Maintenance, engines are regularly disassembled into thousands of individual parts before being repaired and reassembled into a functioning engine. “Right now, this process relies on a lot of analogs, paper-based methods,” Dix says. “The first thing we decided to do was to track the material-handling equipment that we use to transport and deliver picked engine components to the assembly area.” In the future, this process will also incorporate automated guided vehicles (AGVs), which will be equipped with vehicle tags. Later on, the company also plans to tag commonly used tools as well as some of the larger modules of dismantled engines to help workers find what they need quicker.



“

The advantages for the processes in our production are clear, but we're also seeing some major benefits for our maintenance and repair business, which is intrinsically more volatile and therefore less easy to plan.”

— Yannick Dix,
Project Manager at the
Hannover Site at MTU

The Outlook

Track & Trace Is Only the Start



Over the next few months, MTU intends to gradually equip all its other locations with localization technology.

In the medium term, the company is also planning to add a variety of other tracking solutions. UWB can achieve impressively accurate positioning results on the MTU premises. However, there are also cases where the company might need to track the location of an asset off-site, which can be achieved using Bluetooth data and traditional GPS services; for example, when an engine is being moved from one location to another. The location data acquired by these systems can also be processed within KINEXON OS, thereby providing the company with important additional information. **“The new system is part of a broader automation and digitalization strategy,”** says Burgey.

Location-based services can then be harnessed to optimize operating times, reduce costs, and foster optimization and control of processes in the production environment— “all with a high degree of automation and growing intelligence, thanks to increasing amounts of data

from a variety of sources,” Roth says. He notes that the number of use cases they have developed has already reached the high double digits, with varying levels of complexity. The fully autonomous flow of materials may still be a vision, but technology is already laying the foundations for numerous exciting use cases on the path toward the digital factory.



“

The first step is to track fixtures and machining tools, then we can move on to tracking repair jobs and managing other resources. But this is only the start of the journey.”

— Martin Roth,
Project Manager at MTU Aero Engines

“

In the future, the real-time data and information collected by the system will give us a more efficient way to manage and plan logistics concepts along the entire supply chain. This won't apply just to MTU parts, but also to all sorts of other resources, such as tools, fixtures and any other materials that MTU uses to add value.”

— Lucas Burgey,
Project Manager at MTU Aero Engines

KINEXON

KINEXON provides the leading AI-powered IIoT platform for businesses to connect and automate operations.

As global technology leader in indoor location services KINEXON's real-time locating system and AMR & AGV Fleet Management offer solutions across automotive, manufacturing, and aerospace sectors to achieve real-time visibility and traceability of moving assets, along with actionable insights to drive automation.

Leading customers such as BMW, SIEMENS, Airbus, Continental, or MTU Aero Engines utilize KINEXON's solutions to digitize and orchestrate physical processes, thereby enhancing efficiency, productivity, and quality while preparing for AI-supported operations.

Headquartered in Munich, Germany, with another office in Chicago, USA, over 250 employees drive innovation in the IoT landscape. For more information, visit www.kinexon.com.

Interested in discussing your use case?
Schedule a meeting with our experts now!

[Schedule a Meeting](#)

Interested in real KPIs and metrics?
Discover how BMW saved more than \$10 million in annual operational costs.

[Read the Case Study](#)



KINEXON is a registered trademark of KINEXON GmbH.
All other trademarks are property of their respective owners.

©KINEXON GmbH, August 2024 | PUBLIC - Unlimited distribution