



**Volkswagen Slovakia**  
delivered by CEIT

#### AUTOMOTIVE

The new navigation of forklifts, which helps drivers to follow the optimum path and avoid bottlenecks, helped to decrease the complete distance travelled among the fleet by 10%.

# 20%

increase of warehouse  
utilization

## Background

### Five Car Brands under a Single Roof

[Volkswagen Slovakia](#) is the only automotive facility in the world producing **five different car brands** within a single factory in sizes coming from the compact cars to luxury SUV's (Volkswagen Touareg, Audi Q7, Porsche Cayenne, Volkswagen up!, ŠKODA Citigo, SEAT Mii). Total production reached 361,776 cars in 2017.

The company is driven by a "NUMBER ONE" strategy with the overall commitment to "make all industry processes and products more effective, innovative and at the highest possible quality." The strategy sets out the need for innovation delivered by **industry digitization**. That translates to the deployment of the Digital Twin of the factory empowered by indoor positioning RTLS; all to increase the **utilization of handling equipment and overall efficiency**.

## Goals

### Accelerate Innovation Through Digitization

A core aim of the project was to **digitize all movement within the hall** and introduce precise localization of intralogistics, including AGVs and forklift tracking; to enable process visibility, its overview and the possible drilling down to a tracked object and its historical data.

The system should meet the following requirements:

- Get real-time process visibility to **verify current processes**
- See the overall **operation time** of the fleet and its objects
- Compare the ratios of **run/stop time, distance traveled** and **loaded/unloaded trips** to optimize fleet utilization
- Get an immediate **visual summary** of the movement within a time period
- Reveal traffic density and its bottlenecks to **optimize fleet movement**

*"Sewio has given us an enterprise Indoor Positioning System that we can rapidly deliver innovative solutions to our customers. Our previous experience with other indoor positioning technologies and their deployment within automotive industry showed us that harsh metallic environment is the common attribute of all the projects and the main reason why technologies other than Sewio failed. Sewio UWB TDoA based technology is not just a right-first time option for industry projects, but often the only reliable solution on the market."*



**Peter Mačuš**  
CTO of Ceit Group a.s

- The ability to select and **replay path** of any of the moving object at a selected time in the past to uncover driving into any restricted zones or get the context of the situation that preceded **the incident to prevent it in the future**
- The simulation of **proposed process** updates in a real model and time frame
- **Navigation** of drivers so they know where to go and what is the closest path without obstacles

## Challenges

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### A Variable and Harsh Metallic Environment

A crucial aspect of implementing the real-time location system into the stock of metal pallets was to ensure its reliability within a harsh metallic environment. Unlike other RTLS technologies, Sewio's [indoor positioning system](#) is based on **ultra-wideband technology** with a **TDoA algorithm**, which is proven to be reliable when used within metallic industrial environments. Yet, VW also needed to know the exact roll of the forklift to identify where the forks are directed in real time, therefore, the magnetometer sensor needed to be used. As the magnetometer is based on a magnetic field, it is, from its nature, affected by the presence of metal. In this case, Sewio's unique algorithms had to eliminate the interference to ensure **reliable roll information**.

It was also important that 30% of the whole tracked area represented a **completely variable warehouse** that could turn from a completely empty area to being fully blocked within a timeframe of just a few hours. Even in this variable environment, the indoor positioning system should work in the same way without the need of any intervention or reconfiguration.

Given the number of moving objects, both manually and automatically driven, the system had to be able to cope with high traffic density, its peaks and **occurrences of multiple objects within close proximity of each other.**

Finally, the high traffic within the hall means that the anchors could be hit even if they are mounted at high heights, therefore a flexible mounting and further encapsulation had to be used.

### Solution

## All Environments Catered for

The delivered indoor positioning system covers the hall and its warehouse with a total area of **10,000 m<sup>2</sup>** with hundreds of shelves, tracking **70 objects** – both automatically navigated AGVs and manually driven forklifts. The system works with **50 cm accuracy** and a refresh rate of **333 milliseconds**. Sewio's technology allows combined installation in a grid and zigzag arrangement, which lead to only **66 receivers** (=anchors) needed, therefore, a significant cost reduction.

**10,000 m<sup>2</sup>**

area covered

**66**

receivers

**70**

tracked objects

By leveraging the scalability and flexibility of Sewio's technology, together with [CEIT](#)'s Ella software platform, enabling Digital Twin, Volkswagen Slovakia is empowered to meet its current objectives of making their industry processes more effective through digital innovation. Moreover, as an end-to-end solution, Sewio and CEIT can provide future extensibility that can be used for ongoing optimization in any of the remaining factory halls.

*"The top-notch inhouse technical support of Sewio with a dedicated engineer made our project deployment easy and swift. Having remote troubleshooting tools as a part of RTLS Studio keeps our project moving and our customers happy."*



**Peter Mačuš**  
CTO of Ceit Group a.s

## Results

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# Turning Chiefs of Logistics into Innovation Heroes

CEIT delivered their Ella platform on top of Sewio's real-time location system for Volkswagen Slovakia in only six months. Within a matter of weeks after the system's launch, the new platform was already delivering a strong ROI and had reached the following numbers.

**20%**

increase of warehouse utilization

**10%**

less distance traveled attributed to forklift navigation

**20%**

is the maximum difference in OEE among fleet after its balancing

**6 months**

deployment time

A fundamental part of the solution is the newly obtained real-time overview of all the movement within the hall. The location analytics includes crucial data of operational, down and idle time, distance traveled and the efficiency of each machine in the fleet. **The heat map and spaghetti diagrams** help visualize the flow and reveal the traffic density, actual path for each machine at a given time, where the machines drive (and shouldn't) and where and at what time the biggest bottlenecks happen. A comparison between work shifts as well as between each machine also helps in the following **optimization of processes**.

The increased visibility, providing real and traceable insights, helps management to verify and improve the processes, minimize stop times, increase the ratio of loaded/unloaded trips and optimize the flow, resulting into minimization of differences of OEE between each forklift to a **20% difference**.

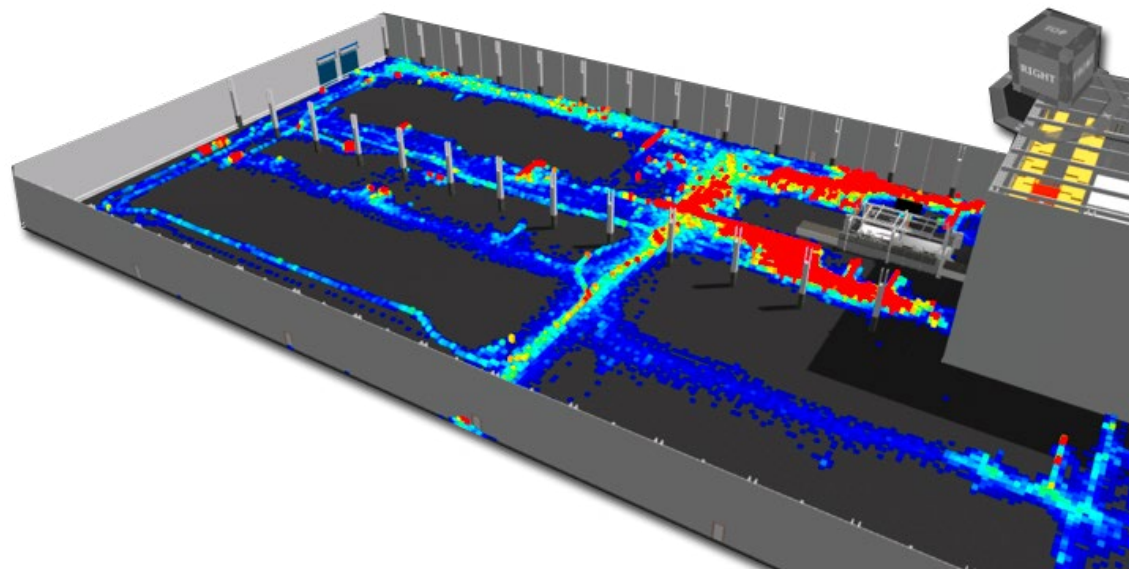
The new navigation of forklifts, which helps drivers to follow the optimum path and avoid bottlenecks, helped to **decrease the complete distance travelled among the fleet by 10%**.

Knowing where forklifts are and aren't driving, loaded and unloaded, revealed underutilized warehouse space. By the following optimization the warehouse area **"has been expanded" by 20%** without any construction, just by its improved utilization.

Also, any of the process updates can be firstly applied within a **digital twin**, therefore, simulated in a real model to avoid any negative side effects or fails.

Based on the results, the next steps might include not only the expansion of the system to other halls but also adding new use cases. Those include the prevention of collisions by giving warning signals to the drivers, slowing down forklifts automatically at cross roads, tracking site visitors and employees for safety reasons, knowing exactly where every single person is in case of an emergency, etc.

Furthermore, with the accelerator data knowing what (speed, direction, etc.) preceded a collision, it will be easier to avoid it. As the receivers are already in place, any other use cases can be added with minimal additional costs, and the systems sets its own way for ongoing optimization.



## Key Factors for Choosing Sewio RTLS

- Unlike RFID and Bluetooth, Sewio's UWB based technology works with **higher precision** and has the ability to work in **harsh metallic and variable environments**
- The bigger area with dozens of receivers makes **TDoA the clear winner against TWR** (with TWR bigger numbers of receivers (approx. > 20) would make the configuration practically impossible)
- The guaranteed **long battery life** of more than a year, even with the short refresh rate needed for tracking movement, decreases the total cost of ownership
- The ability to **scale the system** easily and quickly to track more objects and expand the system to more halls
- Sewio's unique technology algorithms enabling the usage of a magnetometer in a metallic environment
- Onsite **inhouse affordable support** from both the partner and vendor, as well as the available remote troubleshooting tools for easy issue reproduction and quick fixing
- The extensibility of the technology by adding other inertial sensors (revolutions per minute, shake sensor)
- Short time for deployment (six months from signing of the contract)
- Wide partner network of Sewio technology certified partners to choose from based on their expertise and availability
- Continuous Track & Trace; unlike RFID and other technologies

Partner

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 **CEIT**

CEIT is a technological company that brings to industrial enterprises innovation for productivity and efficiency growth. CEIT focuses on the automation of internal logistics, optimization of production and logistics processes, and complex solutions for smart factories and Industry 4.0.

**CEIT, a.s.**

Univerzitná 8661/6A

010 08 Žilina

Slovak republic

<http://www.ceitgroup.eu>

**Peter Mačuš**

[Peter.Macus@ceitgroup.eu](mailto:Peter.Macus@ceitgroup.eu)

+421 918 817 700