



**MOTIUS**  
WE R&D.

# Sensor Development

Motius GmbH

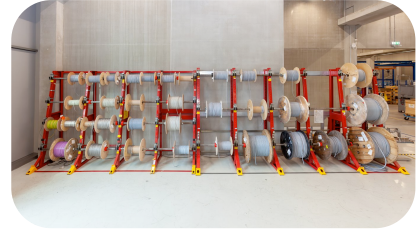
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# Sensor Development

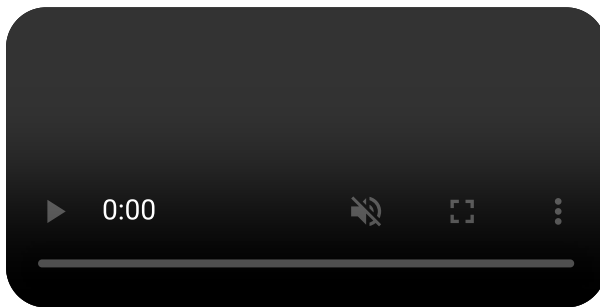
Motius develops smart sensors, using off-the-shelf component, open-source technologies, and our broad domain knowledge in manufacturing and special machinery.

Our customers improve their OEE, save downtime, and even open up new digital services for their own customer base.



## LAPP eKanban

LAPP eKanban enables intelligent and data-driven consumption monitoring of cable reels. The unwound cable amount is captured in near real-time, enabling previously unattainable inventory planning.



With LAPP eKanban, you benefit from more precise forecasting of your cable stock, can avoid production bottlenecks and organise your processes more efficiently and reliably across the board.

### **Leaner Warehouses**

Thanks to higher supply security and timely automatic reordering, LAPP eKanban enables leaner inventory management. This reduces capital commitment costs and optimizes the use of your warehouse space.

### **Higher Productivity**

Through seamless digital inventory management, customers gain confidence in their stock levels for the first time, leading to fewer unexpected production stops and increased productivity.

### 🔄 Smart Automatic Reordering

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Benefit from supply security through automatic notifications for timely reordering.

### 🛒 Improved Purchasing

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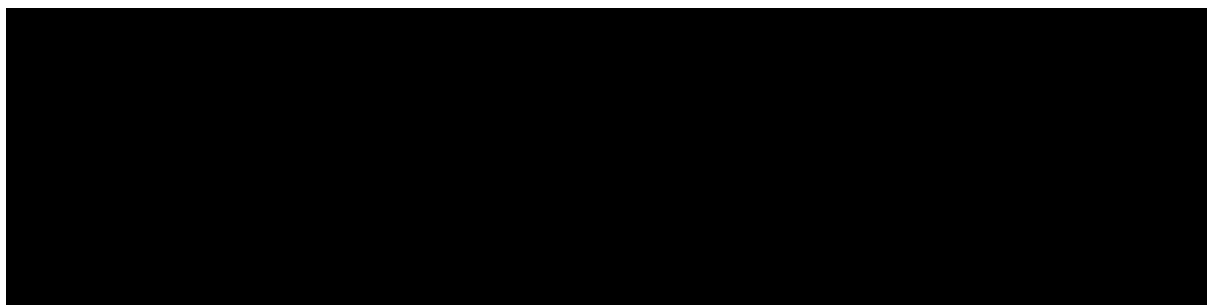
Complete tedious routine tasks, such as annual cable inventory, digitally at the push of a button and increase process efficiency.

## Allianz Industrie 4.0 Award

Lapp won the Allianz Industrie 4.0 Award in November 2025 for the LAPP eKanban product, and its role in transforming businesses to digital workflows and "Industry 4.0".

## Rieter Track&Trace

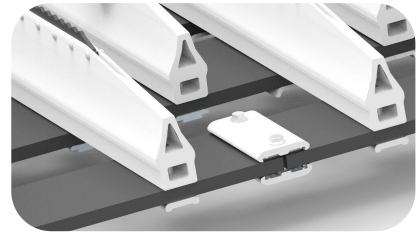
Track & Trace as a sensor and computer vision kit that tracks yarn bobbins in textile manufacturing. RFID tags and QR codes allow end-to-end traceability of yarn batches.



We developed a custom sensor, as well as a computer vision solution that tracks bobbins visually in places where RFID would be too noisy. We simulated the efficiency of the algorithm using [NVIDIA Omniverse IsaacSim](#).

## Kässbohrer Lidar Sensor

During track assembly of snowcats, an automated torque wrench in the factory gave unreliable screw tightness detection using torque feedback alone. Our team used a Lidar and a simple gantry system to measure how far into the threads each screw was seated, and sends an OK / Not OK signal to the main PLC that controls this step in the assembly process.



Very high accuracy, the Lidar can detect a few turns of variation between screws

Our solution was developed, tested, and integrated into a production line within a few months

## Approach

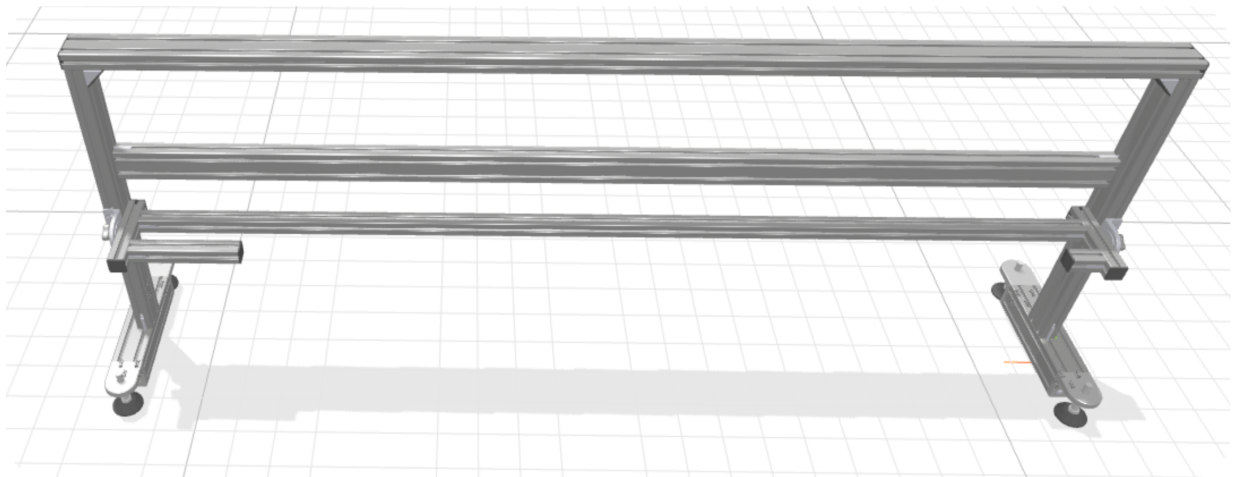
When screws move through the assembly line, a gantry system activates and sweeps its laser sensor across each row, measuring distances while tracking position to create a detailed surface profile. The control system collects this data and streams it to the operator interface, where software algorithms clean the measurements, remove noise, and convert readings to physical dimensions.

The system then searches for **screw head signatures using pattern matching**, identifies each screw's location, and calculates how far each one protrudes from the plate surface. By comparing these measurements against expected values, the optical system delivers reliable tightness verification with a standard deviation of 0.3mm from ground truth for properly tightened screws, **replacing unreliable torque monitoring with precise visual inspection** that meets industrial quality standards.

## Components

### Gantry System

- Custom-designed gantry framework mounted around the assembly mechanism
- Multi-axis adjustment capabilities (height and angle) for optimal laser range and minimal reflections
- Integrated spindle assembly for precise laser positioning along scanning axis
- Flexible positioning enables adaptation to various product configurations



*CAD model of the gantry carrying the linear actuator and the laser*

### **Control Integration**

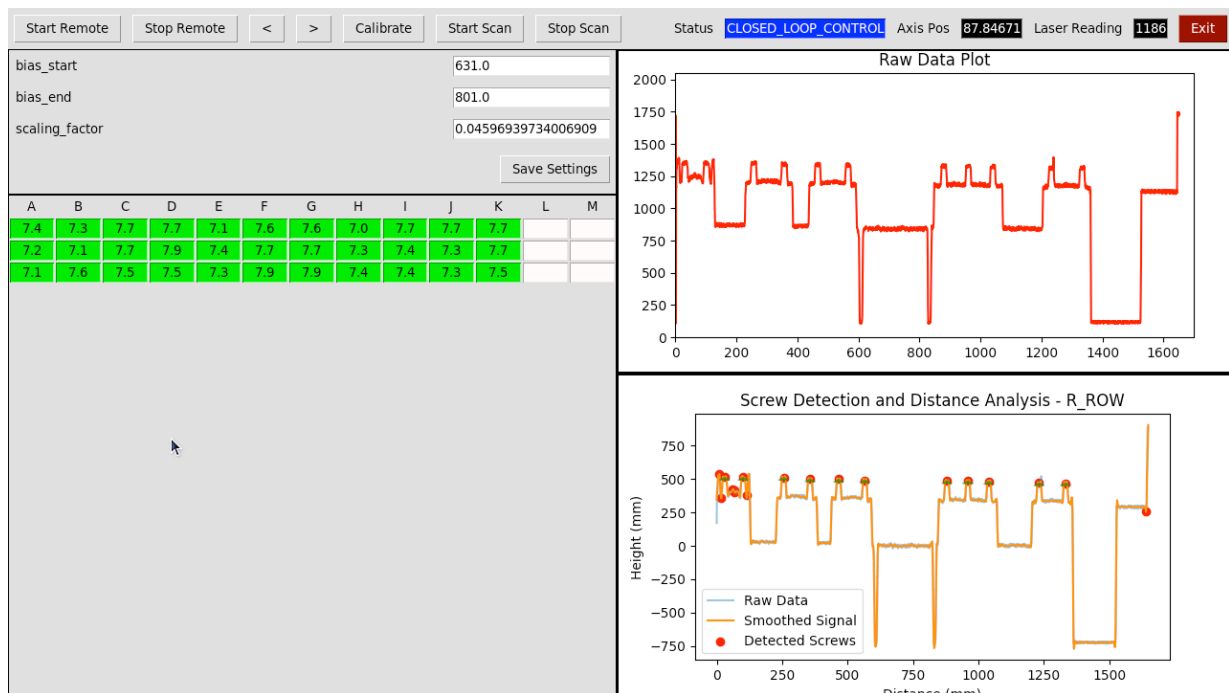
- Self-contained control box mounted within gantry structure
- Dedicated power supplies for laser sensor, motor drive, and control electronics
- Distributed control architecture with specialized boards:
  - Motor control board for spindle positioning
  - High-resolution ADC board for laser signal processing
  - Central microcontroller for synchronized data acquisition

### **Communication Infrastructure**

- Ethernet communication over 10BASE-T1S
- Real-time data transmission between measurement system and operator interface
- Remote touch display interface running an integrated QA software

### **Data Acquisition**

- Simultaneous sampling of motor encoder position and laser distance measurements
- Microcontroller synchronization ensures precise coordinate correlation
- Generates high-density coordinate datasets (x-position, distance) along scan profiles



*Example results of the QA tool after a few runs*

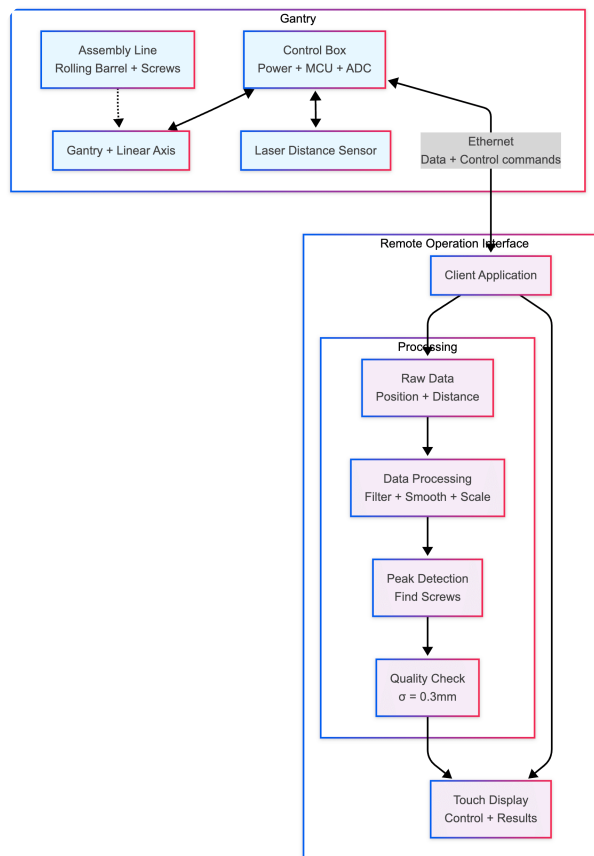
## Quality Assessment Algorithm

- **Primary Check:** Compares measured distance between screw head top surface and plate top surface against known screw head height specifications
- **Secondary Check:** Analyzes plate deformation patterns by comparing measured profiles against established baseline measurements
- **Calibration System:** Automated calibration routines accessible through touch interface

## Operator Interface

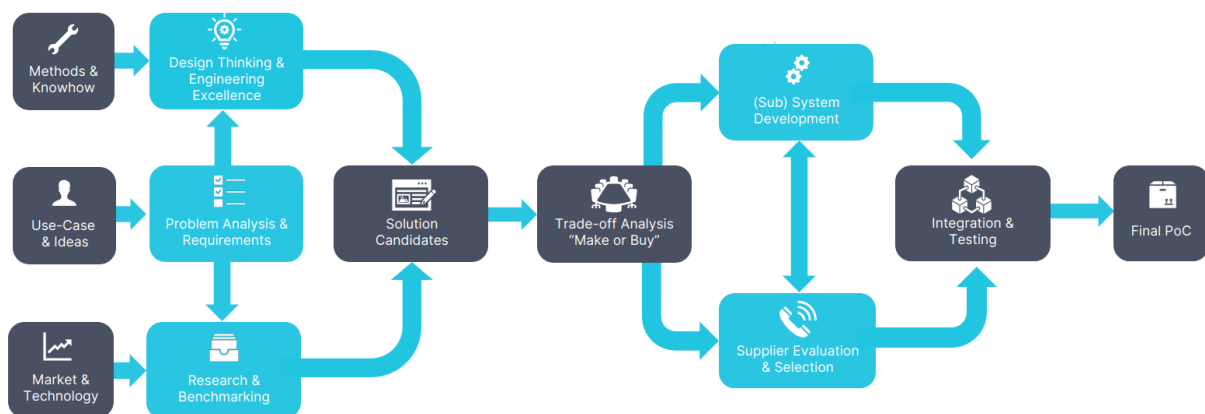
- Touch-screen control for scan initiation/termination
- Real-time visualization of measurement data
- Integrated calibration tools and system configuration
- QA reporting and data logging capabilities

## Architecture



*The automation workflow during track assembly*

## Our Approach



We start with learning and understanding:

- How does your process look like?
- How does the value added chain look like?
- Where are already known problems?

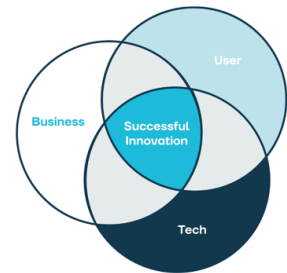
- Which areas do have high and low automation?
- What are the **potential Use Cases** for further automation?



**Fluid & Modular  
Know How**



**End-to-End  
Support**



**Holistic Innovation  
Approach**

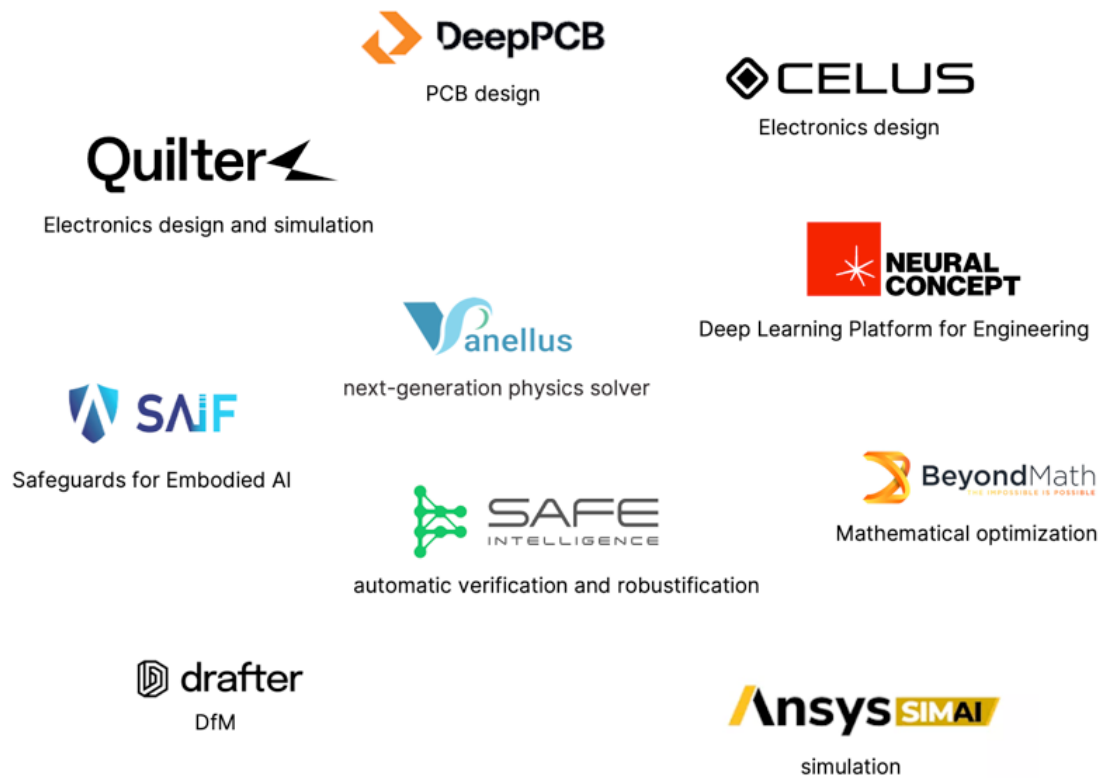
**Market and Technology** - Which products on the market could solve a problem? - What are their strengths and weaknesses?

**Customize** - How can we customize, combine or integrate solutions on the market to achieve the best results?

### **Concept to Build own Solution**

- How long until ROI?
- Higher risk but also high rewards by outperforming competitors

### **AI Tooling**



We are an AI service company with our own R&D AI agent product, and a deep integration of the latest AI tooling into our engineering processes.