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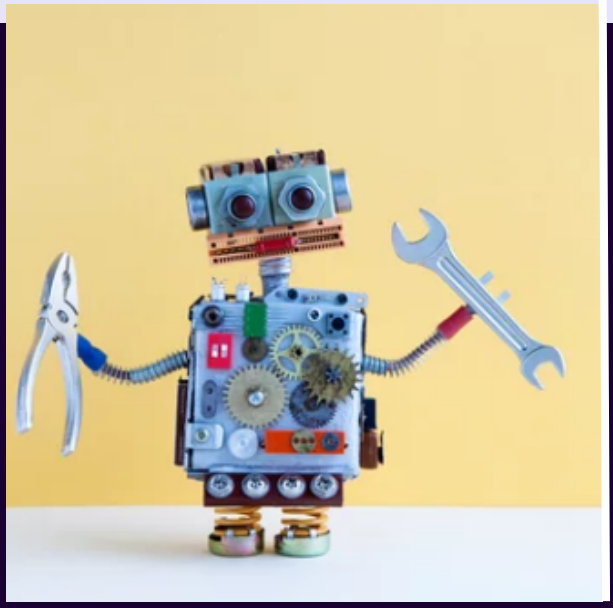
Industry 5.0

Rehumanizing Production
Where Technology Serves the Operator

Reconsidering Automation with Human-Centric Focus



For manufacturing organizations, striving for increased performance, higher output, and less defects is an ever ongoing battle.

Fortunately, in the past decades, conventional automation techniques have allowed manufacturers to achieve great efficiency gains.

Rethinking automation in function of humans

At Ansomat, we believe the role of the operator is indispensable. By equipping operators with the right tools, we enable them to follow work instructions, assemble components, and perform tightening tasks with minimal friction and without errors.

We support manufacturers in developing processes that are smooth, intuitive, and scalable, helping them manage the ever-increasing number of product variants.

In this eBook, you will discover the key trends shaping manufacturing today and explore the technologies that address the challenges of human-centered production.

Why manufacturing became so complex

1 The area of Mass Production: efficiency above all

For decades, manufacturers embraced automation and robotization to create highly efficient shop floors. The objective was clear: reduce human involvement, standardize processes, and improve quality by eliminating variability.

Mass production emerged in the early 20th century with Henry Ford and his revolutionary assembly line. Its core assumptions were:

- Standardized products
- Long production runs (often 24/7)
- Highly routinized work
- Low unit costs through economies of scale

The goal was simple: maximize efficiency.

The trade-off, however, was a severe limitation in variety and personalization. Products were designed to fit the factory, not the individual customer. As Henry Ford famously stated, customers could have any color Model T they wanted, as long as it was black, a remark that perfectly captures the dominance of efficiency and uniformity over choice and individual preference during this era.

1920

2025

2 The shift towards Mass Customization demand

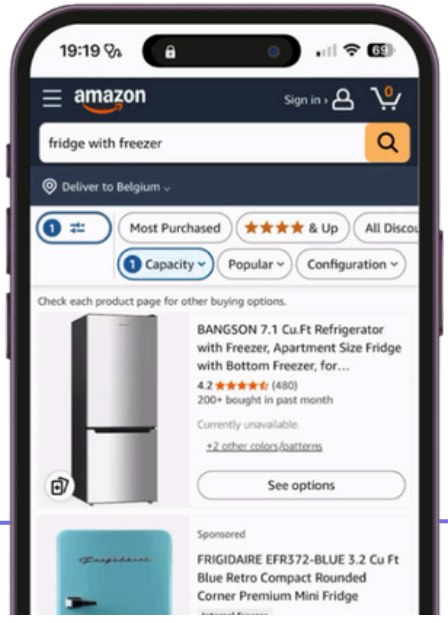
The primary driver of change has been the growing demand for customization and personal experience. A car today is no longer just a means of transportation. Customers expect a wide range of options: heated seats, parking assistance, advanced audio systems, large touchscreens, adaptive cruise control, and more.

This trend has expanded across many industries:

- Hundreds of configuration options in home appliances
- Personalized shoes and apparel
- Custom-built laptops and electronics

This evolution gave rise to mass customization, often described as high-mix, low-volume production, not only in automotive sector but far beyond.

Customers configure products, frequently online, and manufacturers are expected to deliver. The vision is a product “designed by the customer, produced by the manufacturer.”



100+ of options when searching for perfect product fit online

Full automation meets its limits

1 Machines struggle in environments where tasks change frequently

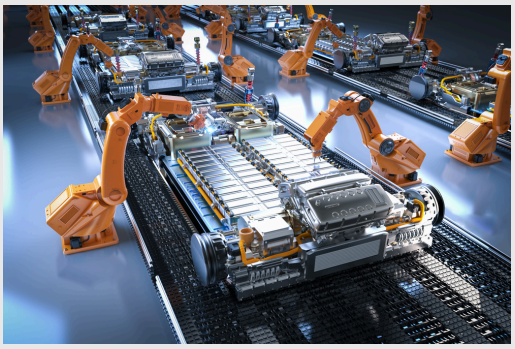
Mass customization poses a major challenge for automation. Robots excel at repetitive, standardized tasks, but struggle in environments where tasks change frequently.

Key limitations include:

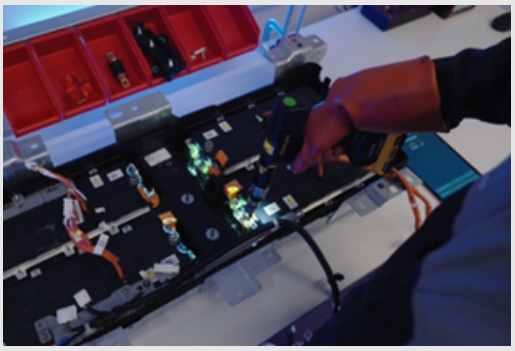
- Frequent reprogramming required for new variants
- High dependency on engineers to adapt automation systems
- Time-consuming and costly changeovers

Involving engineers to reprogram robots for every product variant is often impractical and erodes the financial benefits of automation. As a result, the return on investment is uncertain, especially in high-mix, low-volume environments.

Humans, by contrast, bring tactility, creativity, and adaptability, qualities that are essential when handling variability. Humans do not need to be programmed, can respond to unexpected situations, and can switch between tasks with ease. In this sense, humans represent the most adaptable form of automation.



Automated Line



Human Guidance

2 Robots have high investment, no guaranteed ROI

Automation and robotization involves a substantial initial investment for implementing such systems. This upfront cost can be a barrier for many companies, particularly small to medium-sized enterprises, and requires careful financial planning and justification.

Moreover, once automation systems are in place, ongoing maintenance and monitoring are essential to ensure optimal performance.

In-house engineers are often required to continuously monitor and reprogram robots, especially when new products are introduced or modifications to existing processes are made. This demands a skilled workforce capable of troubleshooting issues and adapting automation systems to evolving requirements.

Despite the potential for increased efficiency and cost savings, there is no guarantee that the business case for automation will yield positive results in every scenario.

Conclusion: Labor-driven manufacturing will remain

Humans represent the most adaptable form of automation. They can easily switch between tasks, possess creativity and can swiftly adapt to process uncertainties. Unlike machines, humans are not preprogrammed.
Hence, manufacturers are starting to recognize **the importance of semi-automation, where humans play a pivotal role**.

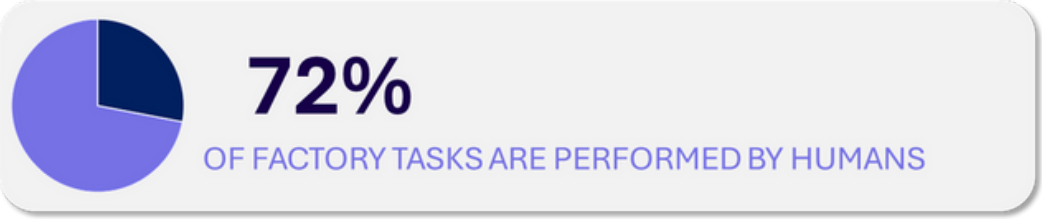
Human-driven production comes at a cost

1 Humans make mistakes

Mistakes are an inevitable part of any process, stemming from various sources, with human errors being among the most unpredictable and common.

Human errors contribute significantly to unplanned downtime. Factors such as skill gaps, memory, alertness, and fatigue all play a role. However, the primary cause of mistakes is distraction, whether from a coffee break or a shift change. Once someone is disrupted, it's difficult to recall where they left off, especially when they lose their flow.

Another major factor is "habits." People are often resistant to change, making it difficult to adopt new methods of working, even when the old ways are no longer the most efficient.



2 Growing labor shortage and knowledge loss

Manufacturers today face significant labor shortages. Staffing challenges lead to missed deadlines, production downtime, and revenue loss. At the same time, the workforce is aging, creating a widening skill gap between experienced operators and younger employees.

A critical challenge lies in tacit knowledge, the know-how that exists only in people's minds:

- Aging workforce nearing retirement
- High employee turnover
- Skill gaps among new hires
- Knowledge that is intuitive and difficult to document
- Lack of centralized knowledge management systems

3 Operational consequence of Mass Customization

While mass production maximized efficiency, mass customization aims to maximize relevance, producing what customers want rather than what factories can produce cheaply.

This shift dramatically increases operational complexity. Manufacturers must now manage:

- A growing number of components and product configurations
- Constantly shifting production schedules with frequent changeovers
- Highly complex and fragmented inventories
- Assembly processes that are more detailed, variable, and difficult to manage

Customization fragments demand into smaller batches, fundamentally altering the economics of manufacturing. Instead of producing large volumes of identical products, manufacturers must now handle shorter production runs with frequent changeovers, increased setup times, and greater coordination across planning, procurement, and production.

This fragmentation weakens traditional economies of scale, where efficiency and cost advantages were achieved by spreading fixed costs over high volumes.

The Growing Operational Gap on the Shop Floor

Mass production

- Standardized products
- Long production runs (often 24/7)
- Highly routinized work
- Low unit costs through economies of scale

Mass customization

- Large number of parts and variants
- Frequently changing production schedules & setup times
- Complex inventories
- More intricate assembly processes

Most common worker mistakes are driven by..

.. a broad range of factors that introduce significant variability into the production process. These factors disrupt consistency, increase cognitive load, and make it more difficult for operators to perform tasks reliably.

01. Skill gap

The search for skilled labor and proficient operators is a daunting task, worsened by a significant skill gap between younger and older generations. The knowledge transfer between these age groups is often hindered, leaving valuable expertise trapped within the minds of experienced workers. Meanwhile, the scarcity of engineers capable of spearheading digital initiatives further compounds this challenge. Despite the emphasis on STEM education, not every individual is suited to pursue a career in engineering. Some prefer routine tasks over while other seek more stimulating challenges.

02. Human fallibility

Human fallibility is another critical concern in manufacturing operations. Operator mistakes, whether intentional or unintentional, can occur at any moment, after a coffee break, during a chat with a colleague, or between shifts when fatigue sets in. These distractions can lead to errors that jeopardize both productivity and product quality.

03. Lack human traceability

Compounding this issue is the lack of real-time visibility into operator activities on the shop floor. Unlike machines, which can be monitored and analyzed for performance data, operators' actions remain largely vague, making it challenging to ensure consistency and adherence to protocols.

04. Ineffective training

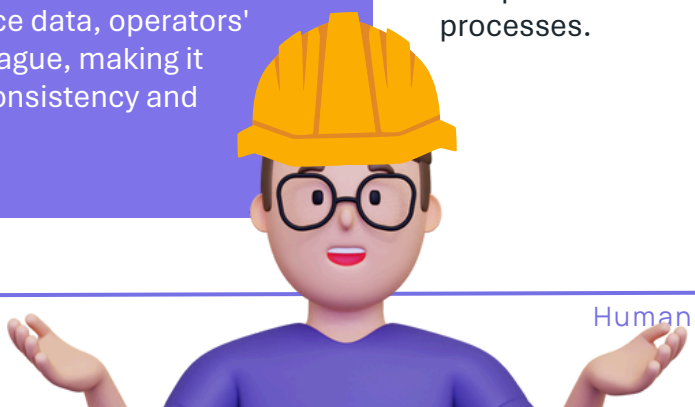
Another obstacle lies in shop floor training. Although training programs strive to improve skills, their efficacy can fluctuate, and there's always the chance that employees will depart after receiving the investment. Moreover, the delivery format of training can be dubious. Lengthy classroom sessions can cause operators to lose focus and fail to fully comprehend the material. Additionally, supervisors may invest excessive effort in overseeing operators, rather than engaging in more value-added tasks, due to concerns about potential errors.

05. Globalization

Globalization introduces another layer of complexity, particularly in culturally diverse work environments where language barriers and differences in expectations can impede communication and collaboration. Operators may struggle to fully grasp the nuances of their tasks or the broader objectives of the manufacturing process, leading to misunderstandings and inefficiencies.

06. Complexity production

This places a considerable burden on operators who must navigate the complexities of ever-changing tasks and processes.

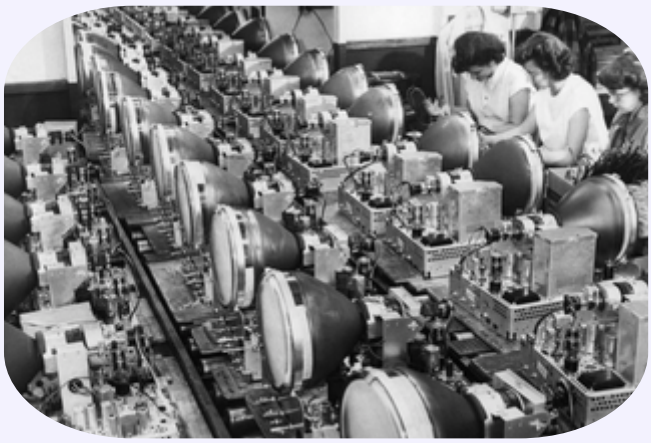


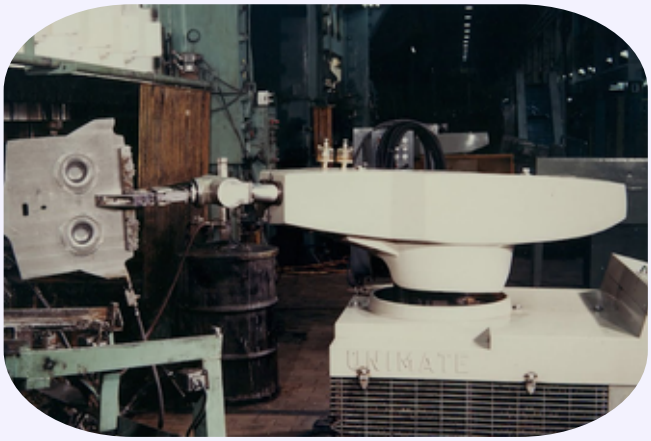
From foudation of Automation to Human-Centric Production

Pre-1960

Foundation of Automation

Before robots, automation began with mechanical control systems, relay logic, and early mass production concepts. Innovations such as the assembly line, statistical quality control, and basic electromechanical automation laid the groundwork for later robotization by standardizing work and processes.





1980-1990

Robotization starts

Robotization starts with the first industrial robot arms entering factories. In 1961, the first industrial robot was deployed at a General Motors car plant, marking the beginning of modern automation. The primary goal was to remove humans from monotonous, heavy, and dangerous tasks, especially in welding and material handling.

1980-1990

Acceleration of Automation

Automation expands rapidly with the widespread adoption of CNC machines and increasingly automated automotive assembly lines. At the same time, computers begin supporting production planning and control, leading to early ERP systems that connect manufacturing with business operations.

1990-2000

Digital Networked Factories

PCs and industrial networks start controlling machines and processes. Programmable Logic Controllers (PLCs) become the standard control platform in factories, enabling reliable, repeatable automation. This period establishes the foundation of “factory automation” as it is still understood today.

2000-2010

Smart robots & IT integration

Robots gain improved sensing, machine vision, and processing power, allowing more flexible and precise automation. Human–robot collaboration begins to emerge, introducing early cobots. Production systems become increasingly integrated with IT and supply chain software, improving transparency and coordination.

2010–2023

INDUSTRY 4.0

Industry 4.0 was built on the promise of maximum automation, where robots, machines, and software take over repetitive and standardized tasks. Factories were designed to operate continuously with minimal human intervention, focusing on full automation, 24/7 machine operation, extensive data extraction from production equipment, and highly standardized processes. This approach delivered major productivity gains, particularly in highly automated environments such as paint shops and body shops, and proved extremely effective for high-volume, low-variant production.

2023 - NOW

INDUSTRY 5.0

As products become more complex and customer demand shifts toward personalization, the limits of full automation are increasingly visible. Industry 5.0 represents a clear shift from technology-first thinking to human-centric, semi-automated production, where humans are no longer replaced by technology but empowered by it.

Rather than aiming for maximum autonomy, systems are designed to keep people in control, supported by intelligent tools. AI accelerates rapidly to assist operators, engineers, and planners through decision support, automated engineering tasks, and intuitive interfaces. These operator-focused technologies guide people through their work, reduce complexity, and eliminate errors to the highest possible degree, combining human flexibility and intelligence with the strengths of automation.

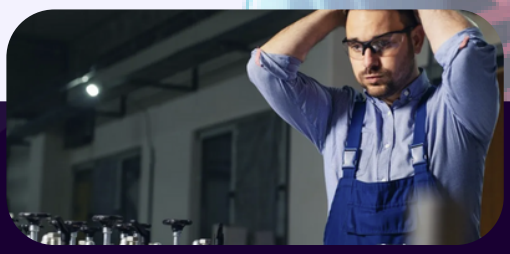
Technology in function of humans

Humans as the backbone of a factory

1

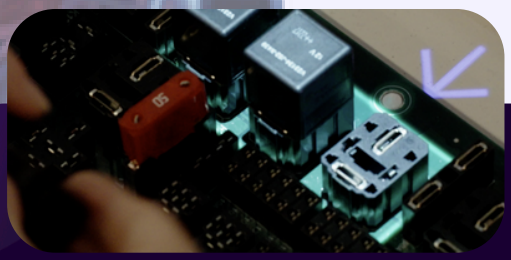
Guidance on the job for any skill

2



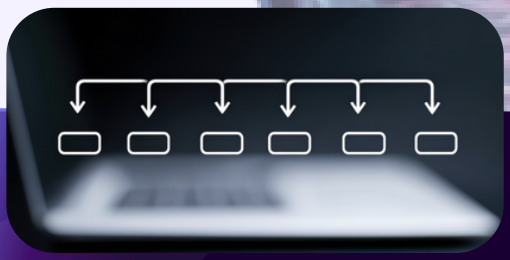
Eliminate worker mistakes & reduce rework

3



Facilitate training on-the-job

4

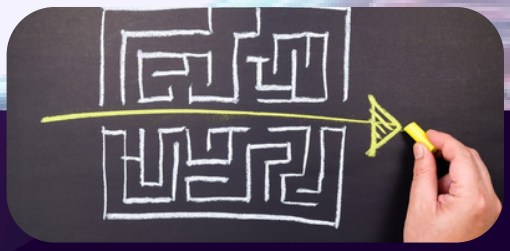


Dynamic work instructions changing with variant

5

Paperless factory

6



Easy to configure and adjust instructions

7

Broader workforce employability

8

Full transparency human actions on the shop floor

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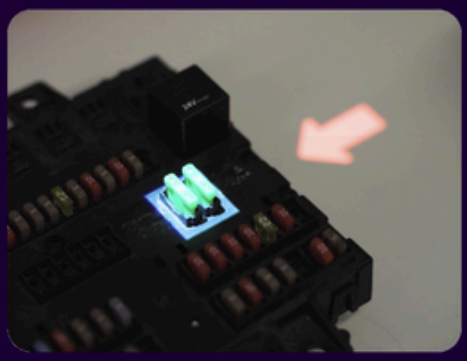
Operator Guidance Software

Work Instruction Solutions

Digital Work Instructions



Augmented Reality

Companion App

Digital Work Instructions

The backbone of operator-assisted operations

In a world where manufacturing processes are becoming increasingly complex, the need for accurate, efficient, and up-to-date instructions has never been greater. Digital work instructions are rapidly replacing outdated paper manuals, static PDFs, and PowerPoint slides across shop floors. These modern, interactive instructions transform the way operators perform their tasks, reduce errors, and bring consistency to manual operations.

Whether you're managing high-mix low-volume production, onboarding new staff, or trying to eliminate costly mistakes, digital work instructions offer a scalable solution that aligns with your digital transformation goals.

99% ↓
paper manuals

99% ↑
worker action traceability

What are digital work instructions?

Digital work instructions are interactive, often visual, step-by-step instructions delivered through pc screen. They break down complex tasks into manageable steps, providing visual cues, guidance, and checks that make it easier for operators to complete their work correctly and efficiently.

By moving away from printed manuals and outdated files, manufacturers ensure that operators always follow the latest version of the process, increasing standardization and reducing human error.

What are the benefits?

Up-to-date and consistent instructions

Paper-based instructions can easily get lost require revision and become obsolete. With digital-based instructions, you always have the latest and up-to-date version at hand. By moving away from printed manuals and outdated files, manufacturers ensure that operators always follow the latest version of the process, increasing standardization and reducing human error.

Comprehensive instructions

Wrong understanding of instructions can have serious consequences. Digital work instructions are a proven productivity builder. Using images, video's, symbols, drawings, complex procedures are communicated in a more comprehensive way. Typically, these are built by more experienced workers to capture tribal knowledge leading to operator mindfulness and limits stress for younger, unexperienced operators.

Paperless factory

Transform your factory into a fully paperless environment where workers are guided through every manual process using digital, step-by-step work instructions. By reducing the need for paper-based instructions, digital work instructions can help reduce paper waste and contribute to sustainability efforts

Skill-dependent instructions

Display tailored instructions based on each worker's skill level, experience, and language preference. Automatically track and update skill proficiency over time, accounting for both improvement and degradation based on actual performance.

Cope with unlimited number of variant products

Present comprehensive customized instruction sets for each product variant without the requirement of creating separate instruction sets per variant, thanks to intelligent built-in algorithms.

Skill Competence Matrix
Enable dynamic recipe creation based on user skills.

Variant Management
Manage thousands of product variants efficiently through intelligent algorithms.

Version Control & Approval Flows
Maintain full version history with approval processes and rollback options

User Management
Define user roles and permissions to control access.

Media Library
Centralized storage for all images and visuals, with annotation tools.

Flexibe Step Types
Diverse instruction formats: images, videos, checklists, data input fields,...

Multi-Operator Collaboration
Support for multiple operators working simultanuously

Real-Time Alerts & Messaging
Instantly notify users of important events or when worker acquires assistance.

Companion app

The backbone of operator-assisted operations

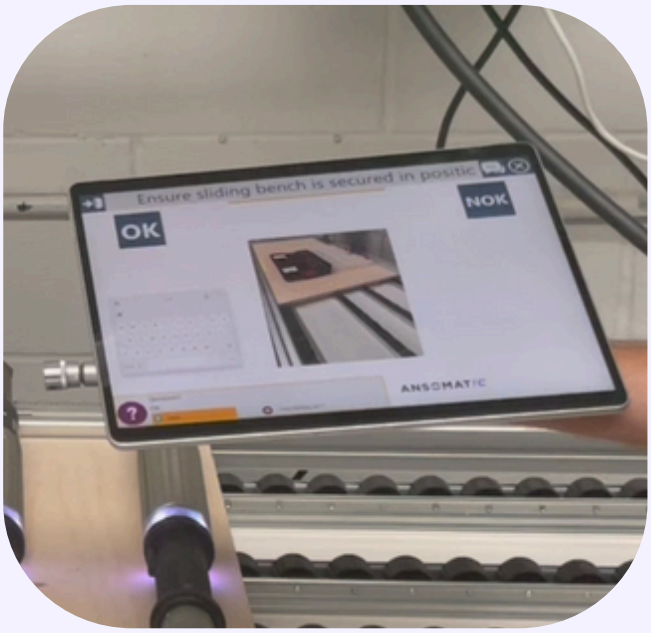
Mobile and tablet-based work instructions offer the same clear, detailed information you access on your PC screen; however, they add powerful advantages such as portability, touch-friendly navigation, and instant on-the-go accessibility.

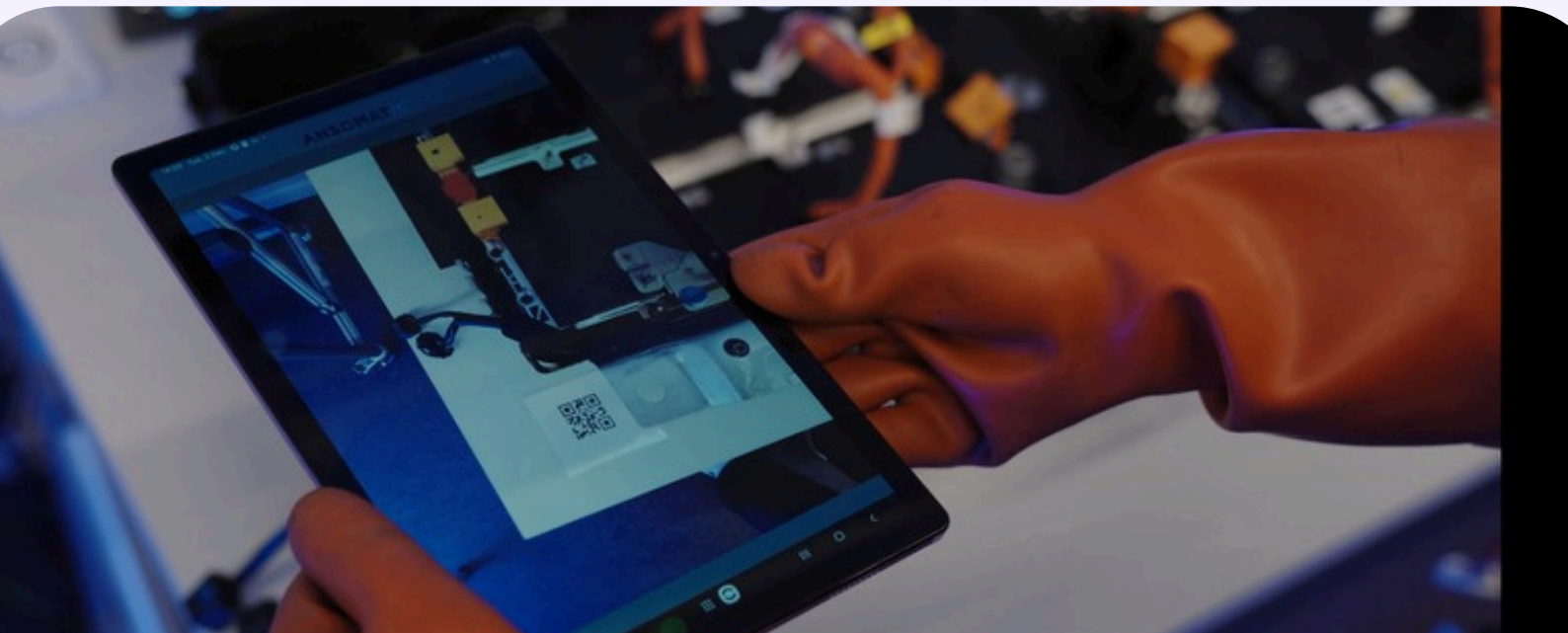
With these digital tools, operators can quickly reference procedures, confirm each step in real time, and capture critical data directly from the workspace, all while moving freely between tasks.

When to go mobile?

If any of these apply to your shop floor, it’s time to consider a mobile-first approach:

- Your work **area is too large** for a single static display.
- Some parts are **difficult to access** (e.g., underneath or inside vehicles).
- Operators **frequently move** across workstations and need mobile confirmation.
- You need to **capture pictures for traceability**, ensuring accurate documentation and quality assurance throughout the process.





What are the benefits?

Always have the right information at your fingertips

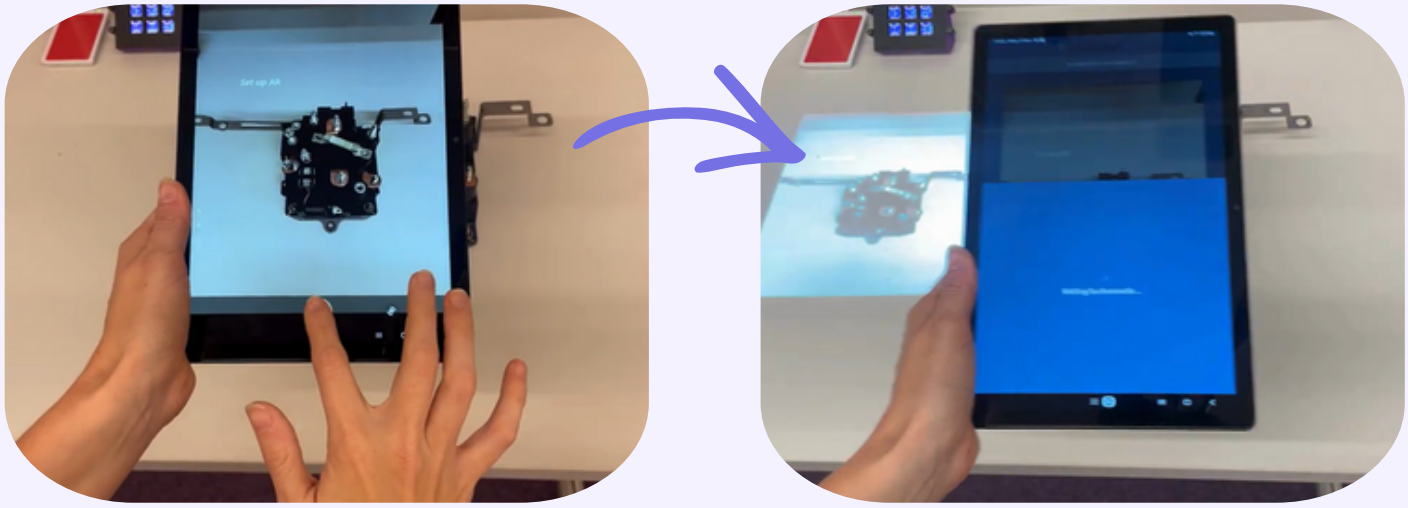
Empower your operators with real-time, interactive work guidance, anytime and anywhere. The Companion App delivers step-by-step instructions directly to your team. Therefore, it's perfect for complex builds, large assemblies, and dynamic operations where static screens simply can't keep up. As a result, your workforce stays focused, informed, and productive at all times.

Seamless access in hard-to-reach areas

In confined or hard-to-access spaces, switching between devices or returning to a workstation can disrupt workflow. However, with the mobile Companion App, operators can view, complete, and confirm tasks instantly on their device. This means no interruptions, no barriers, and no lost momentum, even in the most challenging environments.

Reduce instruction setup time

Creating work instructions can be time-consuming. Fortunately, the Companion App automatically captures process images and uploads them to your media library. These can also be instantly projected onto the work area. Consequently, your team can generate ready-to-use visual work instructions in just minutes. In addition, this automation minimizes manual documentation and speeds up setup, allowing you to maintain efficiency and consistency across operations.



Take picture with app

instantly projected onto work area

Built-in Barcode Scanning

Scan and analyse barcodes directly, replacing traditional scanners.

Seamless Step Confirmation

Operators can confirm step completion or input values directly through the app, reducing friction and increasing productivity.

Picture Capture for Traceability

Operators can take pictures of each part, automatically stored for full traceability and quality assurance.

Automatic Instruction Generation

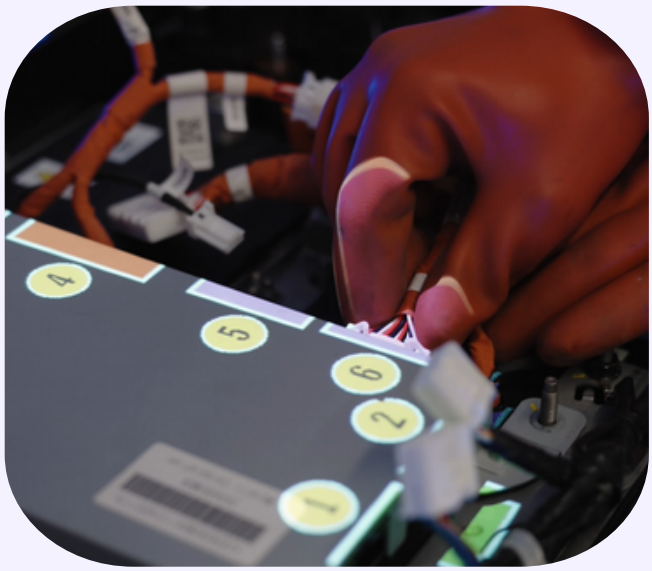
Take pictures that are automatically uploaded to the media library

Augmented Reality

AR is set to reshape how manufacturing operates

Augmented reality (AR) instructions using a projector involve projecting step-by-step guidance, visuals, and markers directly onto the physical workspace or components. Instead of relying on manuals or screens, workers see instructions overlaid precisely where actions need to be performed. This makes tasks like assembly or quality checks more intuitive, as the projected information highlights exact locations, sequences, and actions in real time.

By turning the work surface itself into an interactive guide, projector-based AR reduces errors, speeds up workflows, and improves accuracy without the need for wearable devices.

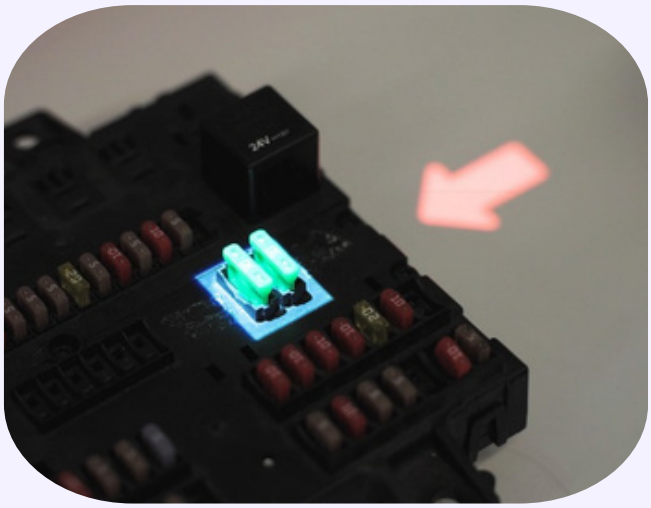


39% ↑
worker confidence boost

50% ↓
training time

55% ↓
worker mistakes

When to consider Augmented Reality?



If these situations sound familiar on your shop floor, it may be the right time to adopt AR:

- **High staff turnover** - You have lot of turnover of employees and you want to onboard new hires quicker
- **High product variation or frequent changeovers** - when operators need to assemble many variants or adapt to new processes quickly, AR reduces complexity and onboarding time.
- **Mixed skill levels among operators** – You want to support less experienced workers with clear, step-by-step visual guidance so they can perform at a higher level with confidence.

What are the benefits?

Visuals tell more than a 1000 words

Humans are naturally visual learners. Images, graphics, and animations communicate complex ideas more clearly than text alone, making it easier for shopfloor people to absorb and retain information. With Projection-based augmented reality, visual instructions are brought to life in real-time, right where the work happens.

100% training on the job

Traditional classroom training separates learning from real work, slowing adaptation and lowering confidence. Augmented enables on-the-job training with real tasks and tools, speeding up learning through hands-on experience.

Fresh hires match the performance of experienced members

New hires can become productive more quickly, and seasoned workers can learn new processes without stepping away from their stations. Digital work instructions are customizable based on skill level, ensuring that each operator receives the right amount of support, exactly when it's needed.

Eliminate guesswork

The intuitive guidance eliminates guesswork, reduces hesitation, and increases focus. The immersive nature of AR enhances confidence and accuracy, leading to faster task completion and fewer worker errors.

Better ergonomics

Projection-based AR improves ergonomics by keeping instructions directly in the operator's line of sight, reducing neck and wrist strain caused by repeatedly looking away at screens or manuals. It also minimizes unnecessary movements by projecting guidance onto the workspace, allowing operators to stay in natural, comfortable postures.

Project Any Type of Visual
Pictures, videos, 3D model, shapes, color, text,..

Drag & Crop Interface
Speed up AR-instruction creation through drag&drop onto the work area.

Instant Picture Upload
Picture taking from phone directly projected.

Skill-Based Projection
Project more or less visual cues depending on operator skills.

Use a common projector

ansomat

Operator Guidance Software

Tools & Decive Connections

Machine Vision

3D sensor

Real-time location system

Electric screwdrivers

Other

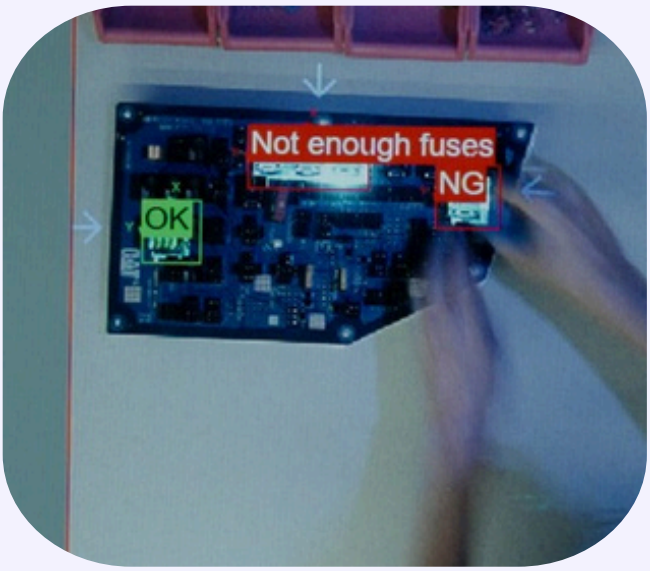
Machine Vision

Doing work right. Every time.

Digital work instructions are essential for guiding operators to do the right thing. But while they define what needs to be done, they don't always guarantee that each step is executed correctly.

That's where vision systems play a vital role, validating every step of the process to ensure consistent, error-free execution. It's not just about doing the right work, it's about doing the work right.

Using 2D image capture and pixel-level processing, vision systems can monitor and validate operator actions, inspect products for shape, color, or surface irregularities, and verify the exact position and orientation of components in real time.

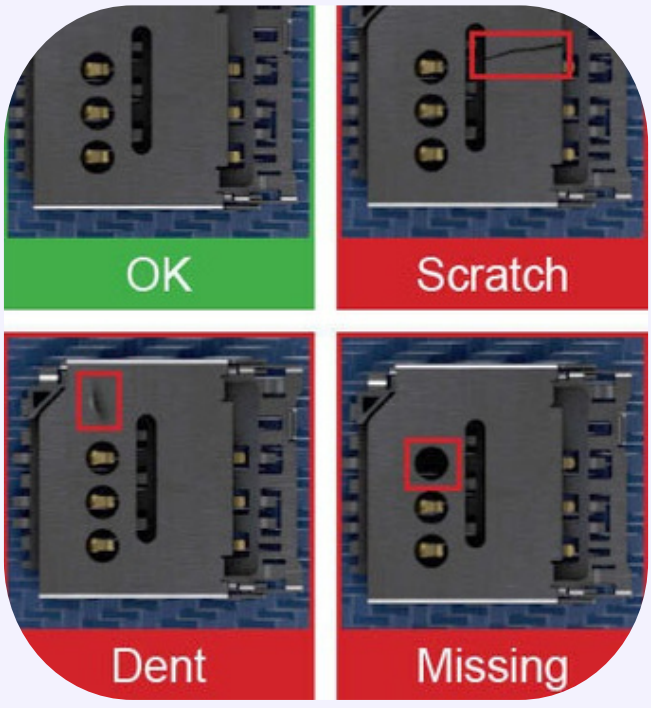


90% ↓
operator error reduction

39% ↑
peace of mind

26% ↓
need supervision

When to consider Machine Vision



If these situations sound familiar, your production line could greatly benefit from vision-based error-proofing:

- You **aim to improve first-time-right performance**, ensuring operators complete each task correctly from the start.
- You need to **verify the presence** or absence of **components** before the assembly moves to the next stage.
- You want to **inspect products** in fine detail, using rule-based or **AI-driven judgment** to detect shape, color, or surface irregularities.
- You seek to **eliminate subjective human judgment** and establish objective, repeatable monitoring mechanisms.
- Your process involves **moving or dynamic objects**, requiring reliable 2D tracking and validation in real time.

What are the benefits?

Monitor operators and eliminate human error

Even the most skilled operators can make mistakes, often with costly consequences. Vision systems drastically enhance operational accuracy by continuously monitoring manual actions using computer algorithms.

Detect errors at the source

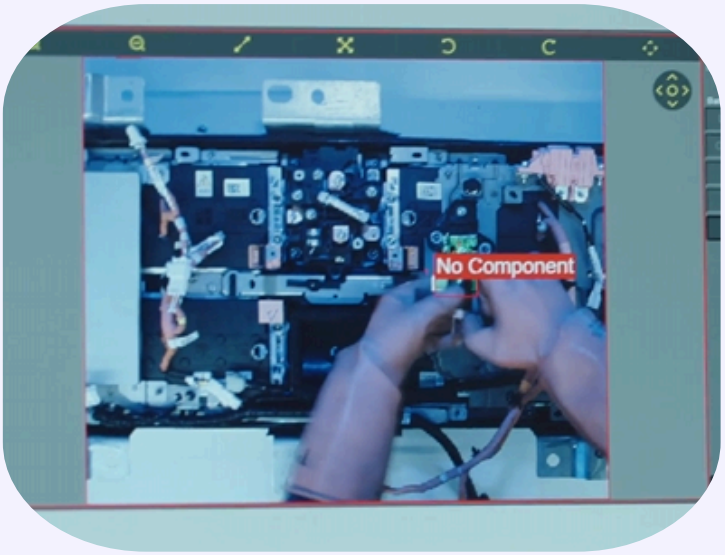
The earlier an error is caught, the lower its impact. Vision systems detect flaws at their origin, whether in base materials, component misplacements, or assembly mistakes, preventing issues from propagating downstream.

Automate process flow

With vision verification, operators no longer need to manually confirm each step. Once the system detects correct completion, the process advances automatically, increasing efficiency and maintaining a smooth workflow.

Give real-time feedback on potential mistakes to operator through AI tools

Advanced, AI-powered vision systems can provide real-time feedback on the cause of a detected error. This enables operators to understand what went wrong, take corrective action immediately, and resume production without delay.



AI-Powered Tools
Provide clear reson codes and corrective guidance when errors occur.

Auomated Repair Flow
Repair flow is triggered if system fails to detect required action

Real-Time Vision Feedback
Live video feeds from the vision system to increase transparency actions taken

Follow moving objects
Vision system that tracks and validates moving objects

3D Sensor

Automate process workflows

Sensors are a powerful tool to automate process confirmation. Instead of manually clicking a button to confirm each completed step, a sensor can automatically detect that an action has taken place.

This enables hands-free operation and guided process flow, allowing operators to move through steps seamlessly and efficiently.

When to consider 3D sensor?

If any of these apply to your shop floor, it’s time to consider a mobile-first approach:

- **Hand gesture confirmation** - Ideal for recognizing hand movements or confirming operator actions without physical contact.
- **Virtual confirmation** - Define virtual buttons that allow operators to proceed through instructions simply by moving their hand within a sensor-defined zone.
- **Picking confirmation** - Guide operators to the correct bin or component location and automatically confirm when the item has been picked.

Tightening Tools

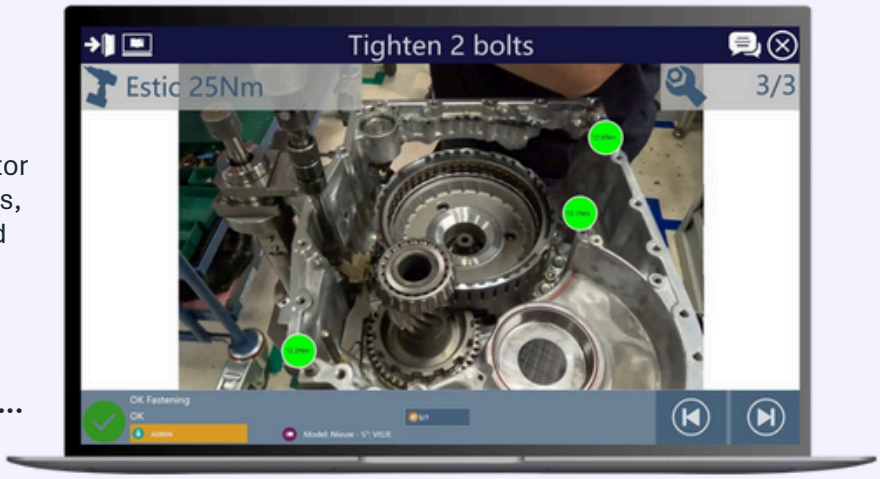
Driving assembly precision with smart tools

For over 30 years, Ansomat has developed extensive expertise in tightening technology, thus these tools hold no secrets for us.

That's why we excel at integrating our operator guidance systems with smart tightening tools, ensuring superior accuracy, traceability, and process reliability.

What is it about?

Check Ansomat Assembly Solutions page...



Tightening tools in combo with Operator Guidance

You should consider smart tightening with operator guidance when:

- Safety-critical or quality-critical joints must be tightened
- Torque and angle results need to be monitored, verified, and recorded
- Multiple product variants or options are built on the same station or line.
- Error-proofing (Poka-Yoke) is needed to prevent missed or wrong fasteners.
- Automatic tool program selection is required based on product ID, barcode, RFID or selected socket
- Traceability and documentation of each tightening result are mandatory.
- Process interlocking is needed, next step is allowed only after a successful tightening (OK signal).

What are the benefits?

Visual bolt sequence guidance

Clear, on-screen visualizations display the correct tightening sequence with real-time torque and angle feedback.
Operators instantly understand the required order and receive confirmation for each completed step.

Automatic repair flows

If a bolt isn't tightened correctly, the system can block progression or trigger a repair workflow.
You define what happens next - for example:

- How many retries are allowed
- Whether all bolts should be re-tightened
- Or if supervisor intervention is required

Traceability & Birth Certificates

Every tightening event is automatically recorded, linked to the product's serial number and operator ID, ensuring full traceability and audit readiness.

Integrates with 99% tools on the market

Our operator guidance solution integrates seamlessly with nearly all tightening tools available on the market.

We take a **brand-agnostic** approach, ensuring full flexibility and integration across your production environment.

Live Torque & Angle Display

AR Bolt Sequence Projection

Tool Calibration Tracking

Smart Socket Selector & Program Linking

Tool Position Control via arms, RTLS, Machine Vision

Real-time location systems

Track any action in 3D space with RTLS

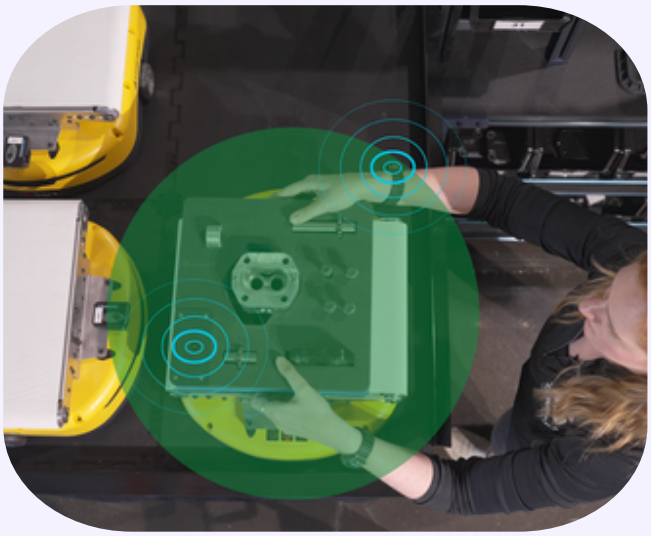
In modern manufacturing environments, precision and visibility define performance. Real-Time Location Systems (RTLS) enable ultra-accurate 3D tracking, delivering real-time insight with precision down to 1.5 mm.

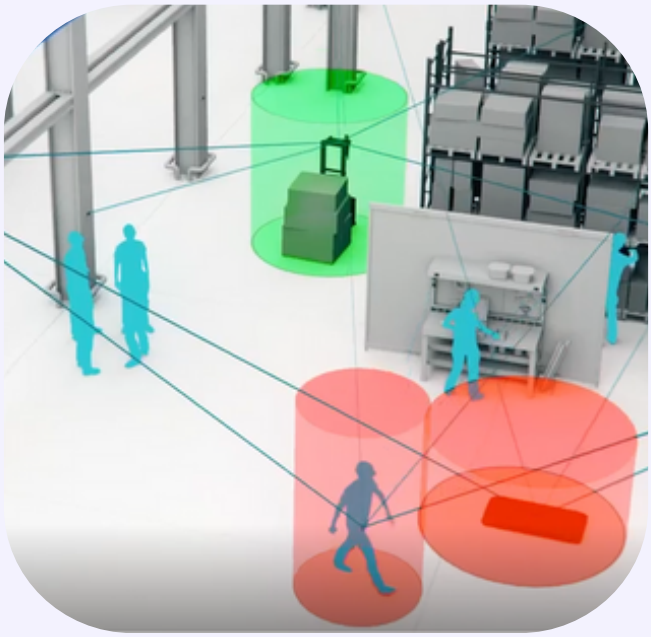
Designed for factory-scale operations, this advanced technology allows manufacturers to track, monitor, and verify every critical event with confiden

What is RTLS about?

A Real-Time Location System (RTLS) creates a digital twin of your shopfloor, constantly monitoring the 3D position of tagged objects. Using advanced ultrasonic technology, strategically placed anchors across the facility capture the exact spatial location of each tag with hyper-accurate precision.

Consequently, manufacturers can track tool movements, verify worker actions, and optimize material flow and this all in real time.





When to consider RTLS

If your shop floor faces any of the following challenges, it's time to use RTLS solution:

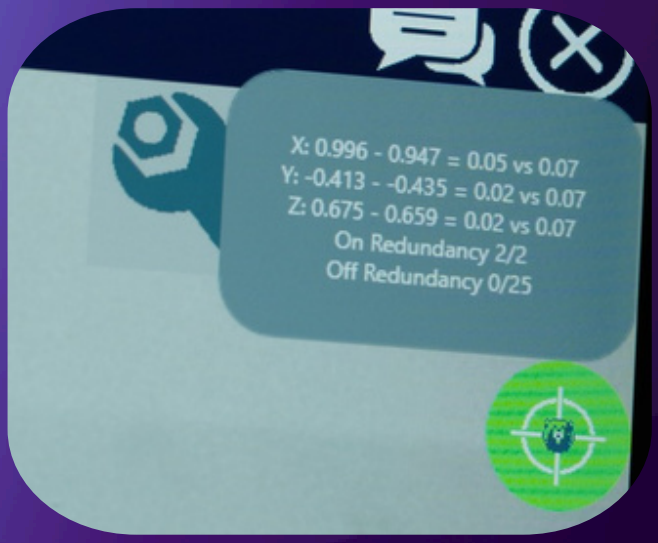
- Eliminate wasted time searching for misplaced parts or tools.
- Ensure perfect assembly accuracy, with bolt and torque sequence verification, even at 1.5 mm precision.
- Automate process verification by confirming worker actions such as picking, kitting, or tightening without manual input.
- Reduce operator errors through guided workflows and intelligent position-based instructions.

Use Cases & Value Explained

Horizontal & Vertical Tool Position Control

RTLS tracks tools in full 3D, providing complete spatial awareness on the shopfloor. Unlike conventional systems with limited viewpoints, it continuously measures exact tool position in any orientation, ensuring consistent accuracy whether the operator works upright, angled, or inverted.

This delivers reliable data for torque control, sequence validation, and uniform assembly quality, minimizing human variability and enabling micron-level precision across all workstations.



Position Tracking in Challenging Areas

RTLS provides reliable position tracking across the entire shop floor, even in obstructed or hard-to-reach areas where camera-based systems lose visibility. Because ultrasonic anchors aren't limited by line of sight, coverage can be expanded easily by adding more anchors, without complex recalibration or lighting requirements.

This flexibility ensures consistent accuracy and improves productivity, process control, and quality across the facility.

Picking & manual handling confirmation

RRTLS can validate manual actions like picking or kitting, adding automation and traceability to human-driven processes. Paired with projection-based guidance, RTLS enables "virtual buttons," where operators confirm steps simply by moving their hand through a projected area while wearing a lightweight tracked bracelet.

This creates a hands-free, ergonomic, and hygienic confirmation method that replaces physical buttons or scanners while maintaining full process verification.

3D Tool Position Control

Asset & Material Tracking

Hyper-Accurate Measurement (up to 1.5 mm accuracy)

Picking & Kitting Confirmation

ansomat

Operator Guidance Software

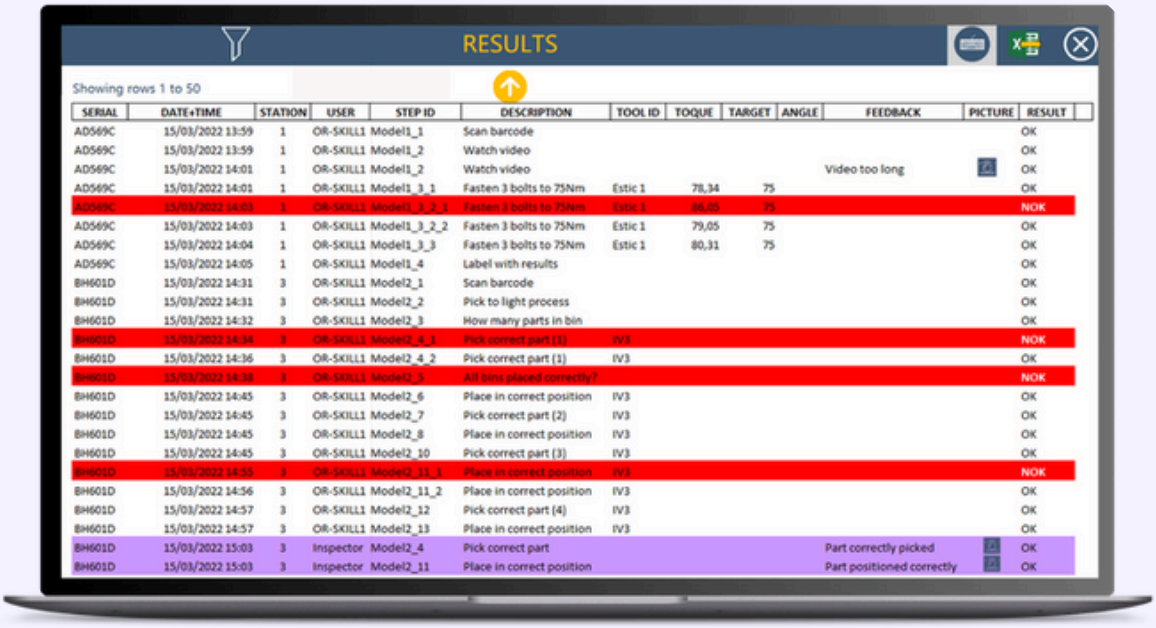
Human Performance Traceability

Data capture & traceability

Full shop floor transparency of human actions

Studies shows humans perform nearly 75% of factory-floor tasks, yet their work remains largely invisible to analytics. Improving visibility into human operations unlocks improvement opportunities far beyond machines. Operator guidance systems not only prevent errors but also capture detailed process data, creating a digital record of every build, what was done, by whom, and when.

This data resolves disputes, reveals bottlenecks, uncovers patterns, and even predicts issues. With tools like Power BI, it becomes actionable insight that drives smarter decisions and continuous improvement.



SERIAL	DATE+TIME	STATION	USER	STEP ID	DESCRIPTION	TOOL ID	TOQUE	TARGET	ANGLE	FEEDBACK	PICTURE	RESULT
AD569C	15/03/2022 13:59	1	OR-SKILL1	Model1_1	Scan barcode							OK
AD569C	15/03/2022 13:59	1	OR-SKILL1	Model1_2	Watch video							OK
AD569C	15/03/2022 14:01	1	OR-SKILL1	Model1_2	Watch video					Video too long		OK
AD569C	15/03/2022 14:01	1	OR-SKILL1	Model1_3_1	Fasten 3 bolts to 75Nm	Estic 1	78,34	75				OK
AD569C	15/03/2022 14:03	1	OR-SKILL1	Model1_3_2_1	Fasten 3 bolts to 75Nm	Estic 1	88,05	75				NOK
AD569C	15/03/2022 14:03	1	OR-SKILL1	Model1_3_2_2	Fasten 3 bolts to 75Nm	Estic 1	79,05	75				OK
AD569C	15/03/2022 14:04	1	OR-SKILL1	Model1_3_3	Fasten 3 bolts to 75Nm	Estic 1	80,31	75				OK
AD569C	15/03/2022 14:05	1	OR-SKILL1	Model1_4	Label with results							OK
BH601D	15/03/2022 14:31	3	OR-SKILL1	Model2_1	Scan barcode							OK
BH601D	15/03/2022 14:31	3	OR-SKILL1	Model2_2	Pick to light process							OK
BH601D	15/03/2022 14:32	3	OR-SKILL1	Model2_3	How many parts in bin							OK
BH601D	15/03/2022 14:34	3	OR-SKILL1	Model2_4_1	Pick correct part (1)	IV3						NOK
BH601D	15/03/2022 14:36	3	OR-SKILL1	Model2_4_2	Pick correct part (1)	IV3						OK
BH601D	15/03/2022 14:38	3	OR-SKILL1	Model2_5	All bins placed correctly?							NOK
BH601D	15/03/2022 14:45	3	OR-SKILL1	Model2_6	Place in correct position	IV3						OK
BH601D	15/03/2022 14:45	3	OR-SKILL1	Model2_7	Pick correct part (2)	IV3						OK
BH601D	15/03/2022 14:45	3	OR-SKILL1	Model2_8	Place in correct position	IV3						OK
BH601D	15/03/2022 14:45	3	OR-SKILL1	Model2_10	Pick correct part (3)	IV3						OK
BH601D	15/03/2022 14:55	3	OR-SKILL1	Model2_11_1	Place in correct position	IV3						NOK
BH601D	15/03/2022 14:56	3	OR-SKILL1	Model2_11_2	Place in correct position	IV3						OK
BH601D	15/03/2022 14:57	3	OR-SKILL1	Model2_12	Pick correct part (4)	IV3						OK
BH601D	15/03/2022 14:57	3	OR-SKILL1	Model2_13	Place in correct position	IV3						OK
BH601D	15/03/2022 15:03	3	Inspector	Model2_4	Pick correct part					Part correctly picked		OK
BH601D	15/03/2022 15:03	3	Inspector	Model2_11	Place in correct position					Part positioned correctly		OK

When to consider human action recording?

Key Challenges:

- **Lack of transparency:** there is often no detailed tracking of human activities on the shop floor, such as which operator performed a specific task, on which serial number, at what time, and with what result. This lack of traceability makes it difficult to identify root causes when issues arise.
- **High variability**: human performance fluctuates, creating inconsistencies in quality and output.
- **Limited data for improvement**: absence of detailed operator data hinders effective and measurable continuous improvement initiatives.

Dashboards & KPIs

Real-time KPI monitoring & data analytics

When to consider ?

- You face **costly rework** but lack clear visibility into **what's causing it**.
- You don't have a **deep root cause understanding** of recurring issues. For example, whether they stem from skill levels, specific teams, shift changes, or missed tightening steps.
- You want to establish benchmarks and measure performance trends (e.g., number of mistakes per week or per shift).
- You're ready to analyze beyond simple product OK/NOK results, and instead measure at a step-by-step level to gain a competitive edge.
- You want to quantify the cost of errors and the savings achieved through improvement initiatives.

Provide live view shopfloor performance

Bottleneck & trend detection

Enable data-driven decision making

ansomat

Use Cases & References

More references:
www.ansomat.co/references

Airplane Wing Assembly

Problem

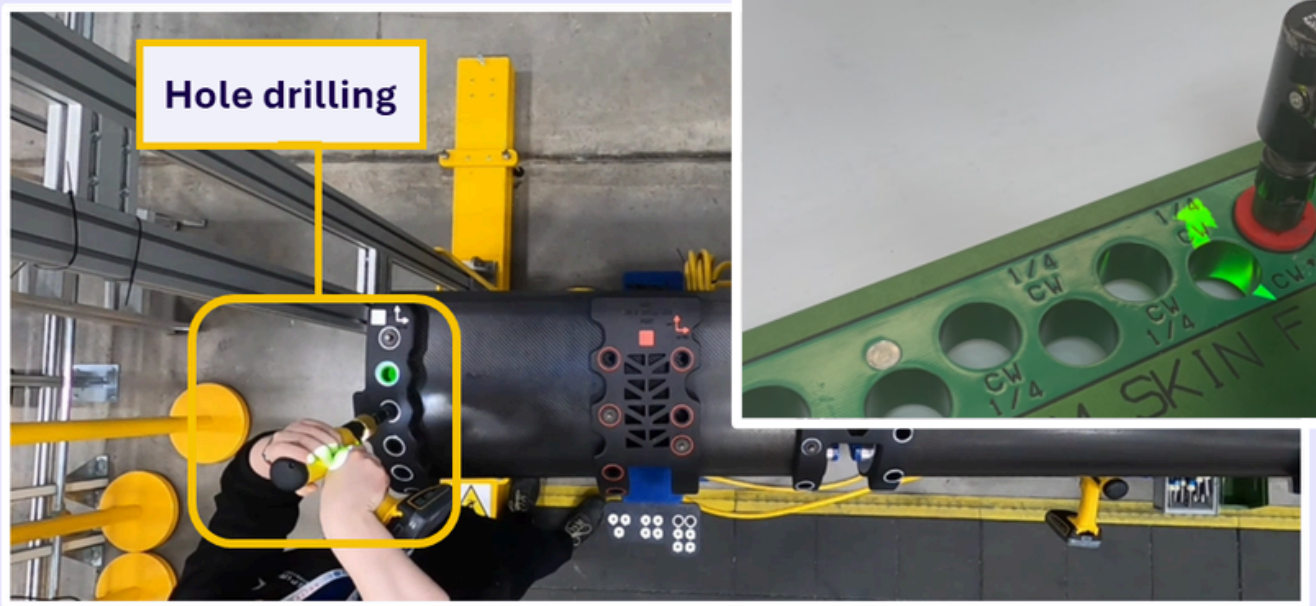
- Uncertainty about correct hole drilling
- Large parts make QC difficult and costly
- Paper instructions with no validation & no operator performance traceability

SOLUTION → ENSURE ACCURATE HOLE DRILLING

"Support accurate work for long aerospace parts"

- **AR guides correct drilling location**
- **Sliding vision + projector cover 14m workspace**
- **Instruction videos preview next task**
- **RFID-based tool registration**
- **Digital twin validates quality via logged actions**

Increase product quality and first-time right



Aero Booster Assembly

SAFRAN

Problem

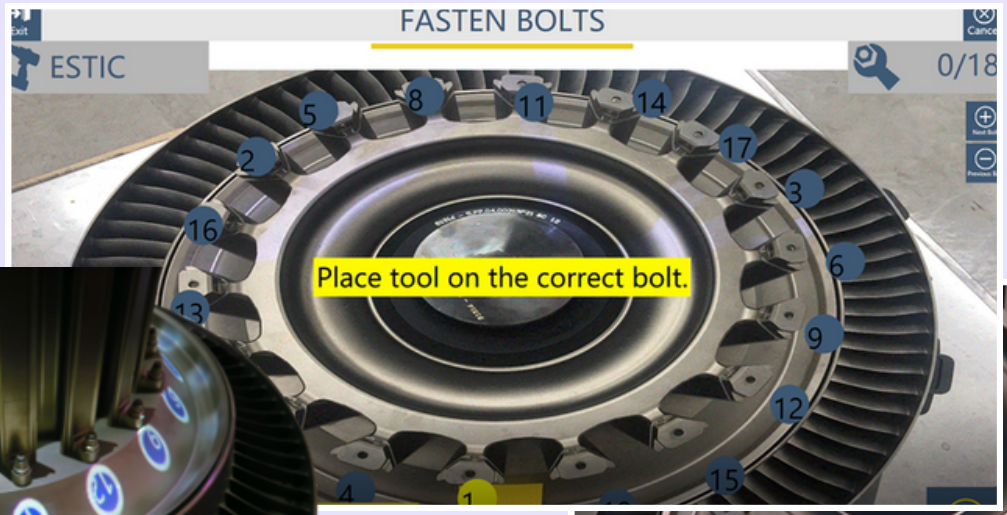
- Aero-booster bolts require a strict 18-bolt cross sequence
- Errors occur when bolt sequence isn't followed

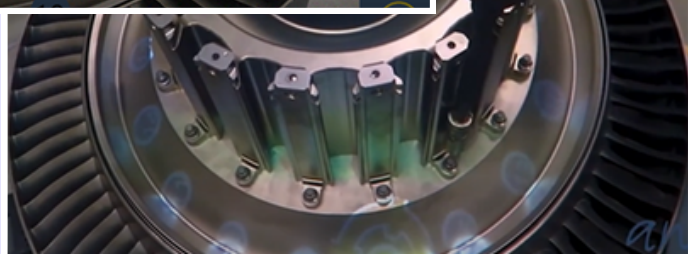
SOLUTION → TOOL POSITION CONTROL CROSS SEQUENCE

"Ensure correct position cross tightening "

- **Projection** bolt sequence onto the booster **(Augmented Reality)**
- **Verify position** of the **booster** through **machine vision**
- **Track tool position with vision** to flag incorrect bolt position (ESTIC)
- **Take image** of completed booster through **vision**
- **Record full torque/angle traceability** for every tightening

- Enable operator rotation
- Reduce production errors wrong tightening sequence





Airplane Seat Assembly

Collins Aerospace

Problem

- Aero-booster bolts require a strict 18-bolt cross sequence
- Errors occur when bolt sequence isn't followed

SOLUTION → GUARANTEED PRECISION & TRACEABILITY

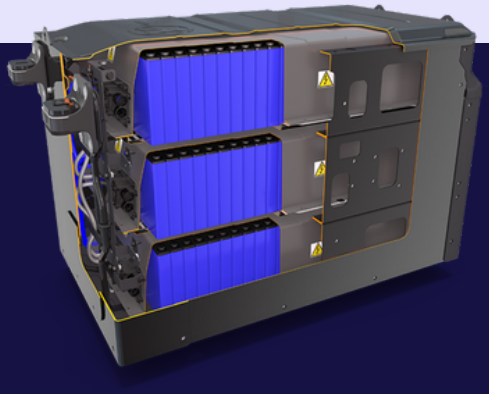
"Ensure consistency, compliance and error-free assembly"

- **Step-by-step visual guidance displayed on a PC** or workstation
- **Stanley tool integration** provides real-time **torque** and **angle** feedback (STANLEY)
- **Full traceability of all operator actions** incl. torque

- Enable operator rotation
- Reduce production errors wrong tightening sequence

EV Battery Assembly

LEYLAND TRUCKS
A PACCAR COMPANY



Problem

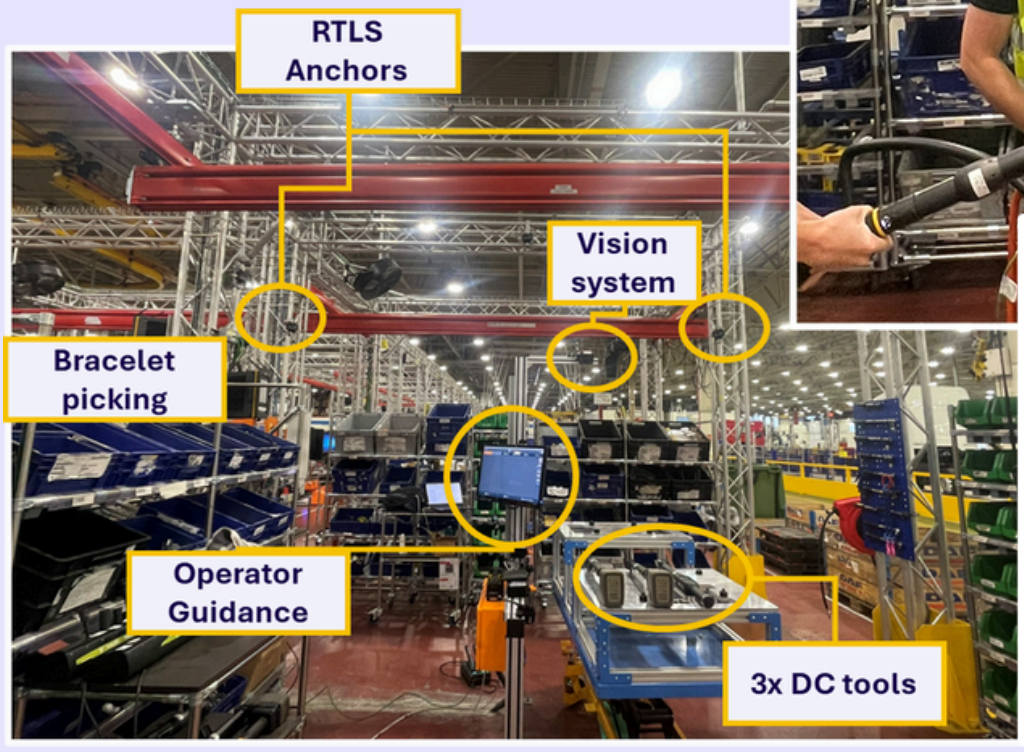
- New EV product → needs flexible configuration
- Many fastening points & screw variants
- No full errorpoofing nor traceability

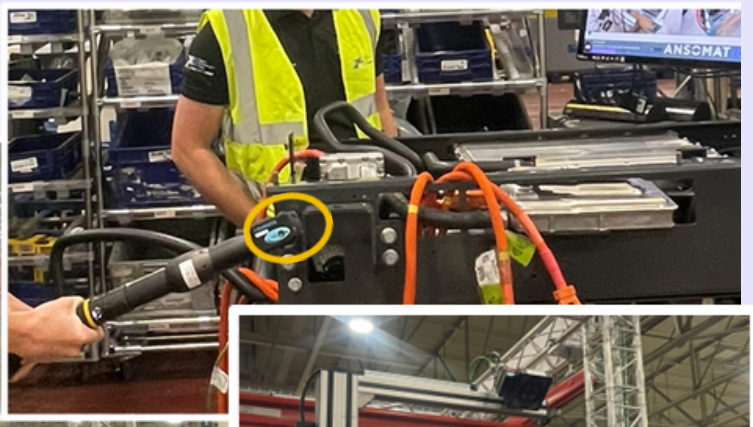
SOLUTION → NO FAULT FORWARD NEW EV BATTERY

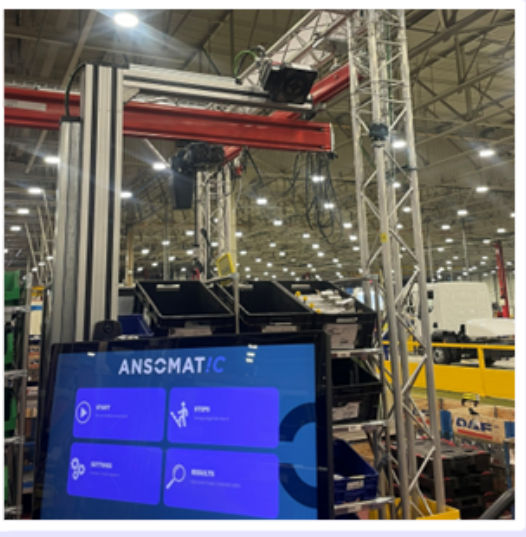
« Progress only after correct execution»

- **MES integration** to automatically trigger production order
- **Digital step-by-step guidance** for all variants
- **Machine vision** for process validation (KEYENCE)
- **DC fastening tools** with torque and angle control
- **RTLS-based precise tool positioning**
- **Bracelet-based picking** to replace conventional pick-to-light hardware

- 92% First-time right
- Strond reduction **rework & scrap**
- **Faster NPI ramp-up** & operator **training**







Engine Assembly

AUTOCRAFT Solutions Group

Problem

- OEM supplier contract awards increasingly depend on Tier-1 supplier's ability to prove consistent quality control
- Proving process standardization and repeatability is challenging when relying on manual operations

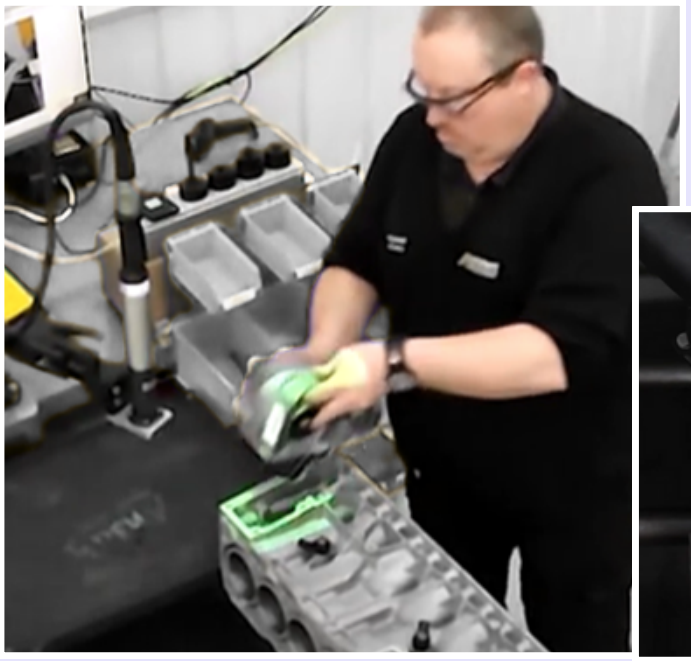
SOLUTION → NO FAULT FORWARD ASSEMBLY

« The flexibility of a human combined with repeatability of a machine! "

99% first-Time-right

- **Project work instructions (AR)** onto engine
- **DC tools with socket selection** control (ESTIC)
- **RTLS-based positioning** to ensure precise fastening
- **Machine Vision** workflow verification (KEYENCE)
- **In-process image** capture for traceability
- **Pick-to-light** bearing selection (SICK)
- **Digital birth certificate** per engine

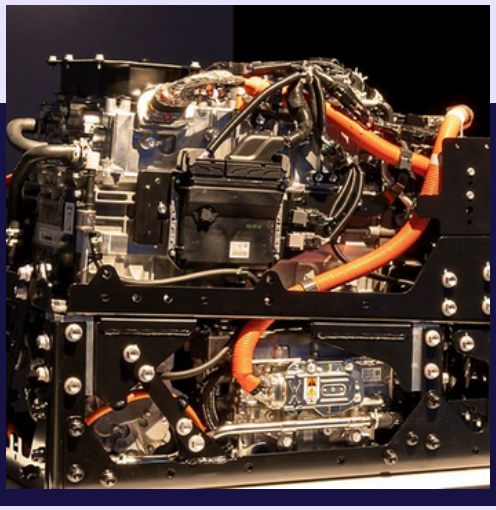
> Thanks to Ansomat solution we can reduce training time from 3 months to 1 week
>
> **Simon Warburton – CTO**



Our ARIA - Augmented Reality Interactive Assembly system controls the build sequence

Hydrogen Fuel Cell Assembly

TOYOTA



Problem

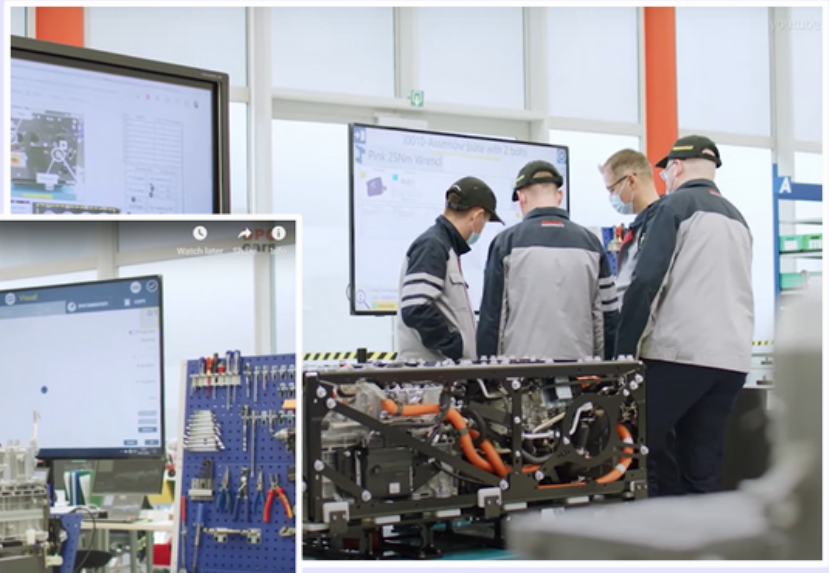
- Hydrogen is nascent, requiring flexible processes for continuous improvement
- Strict compliance requirements demand full traceability

SOLUTION → PROCESS CONTROL NEW PRODUCT

« Configure, adapt, improve the process instantly"

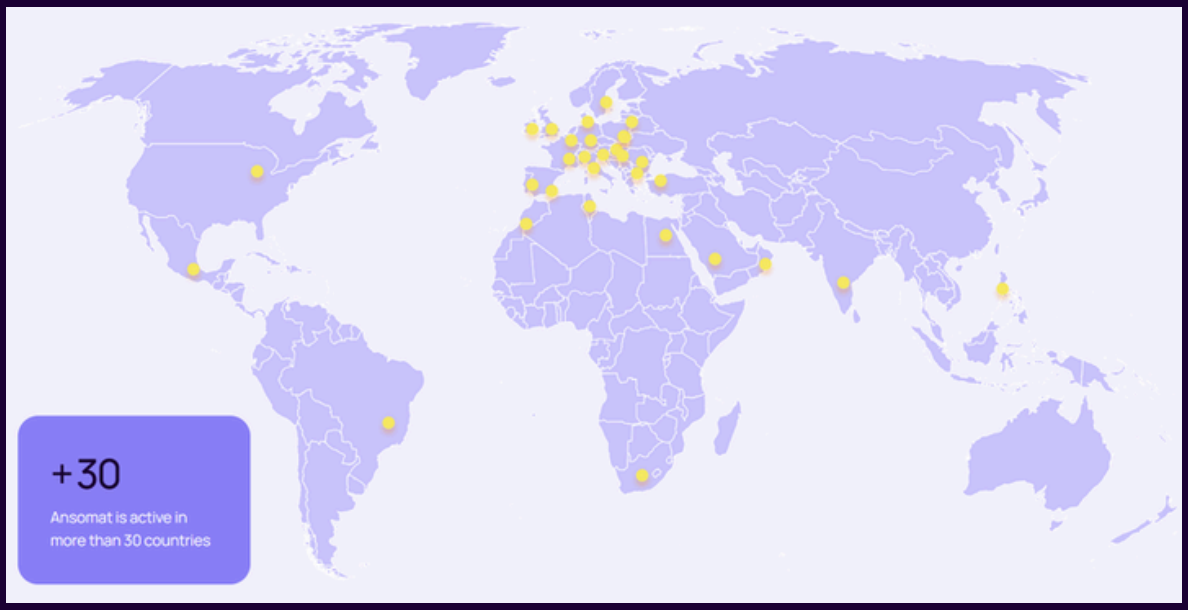
- **Barcode scanner** for automatic **program selection**
- **Digital work instructions** with **visual bolt sequence**
- **Intelligent torque wrenches** for controller tightening
- **Tool position control** to ensure correct bolt order
- **Pick-to-light system f**or correct part selection
- **Full traceability: torque, angle, operator ID,...**

- 100% built-in quality at source
- Full traceability human actions & reporting



Triggered by our expertise?

Global Presence



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