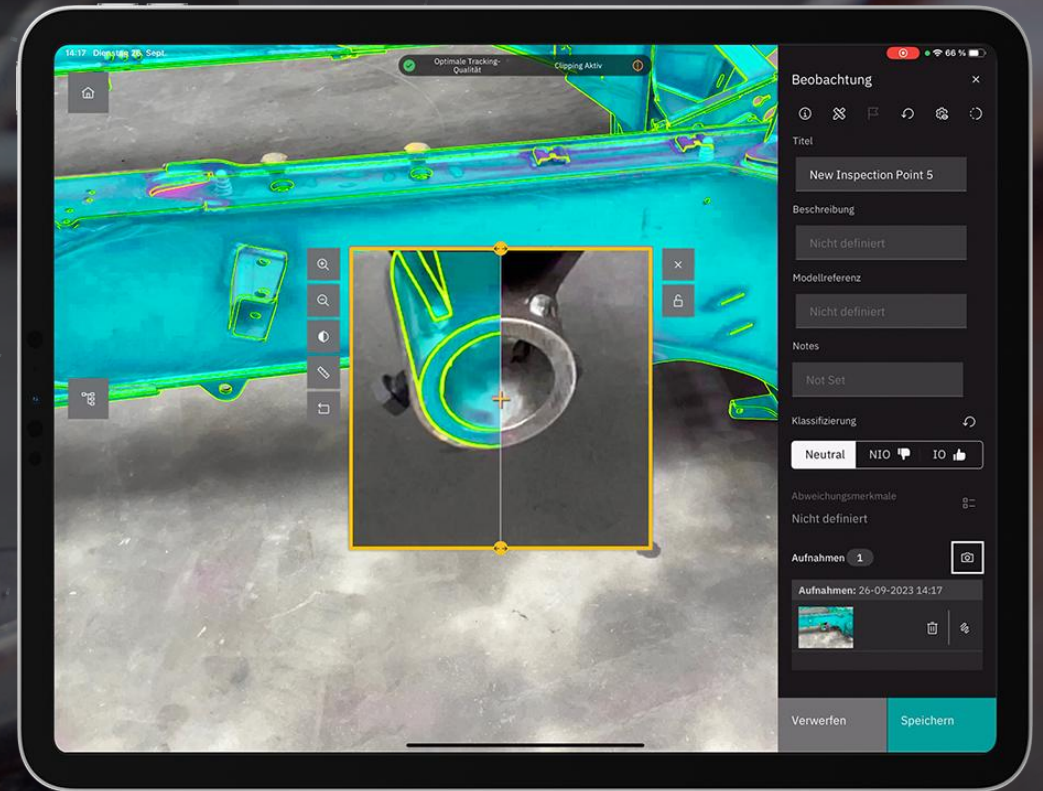


VISOMETRY 

Visual Quality Inspection The Silent Revolution in Enterprise AR

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visionLib 

VISOMETRY

Computer Vision Technology for leading industrial Augmented Reality (AR) Solutions¹

Founded: 2017, Fraunhofer IGD SpinOff

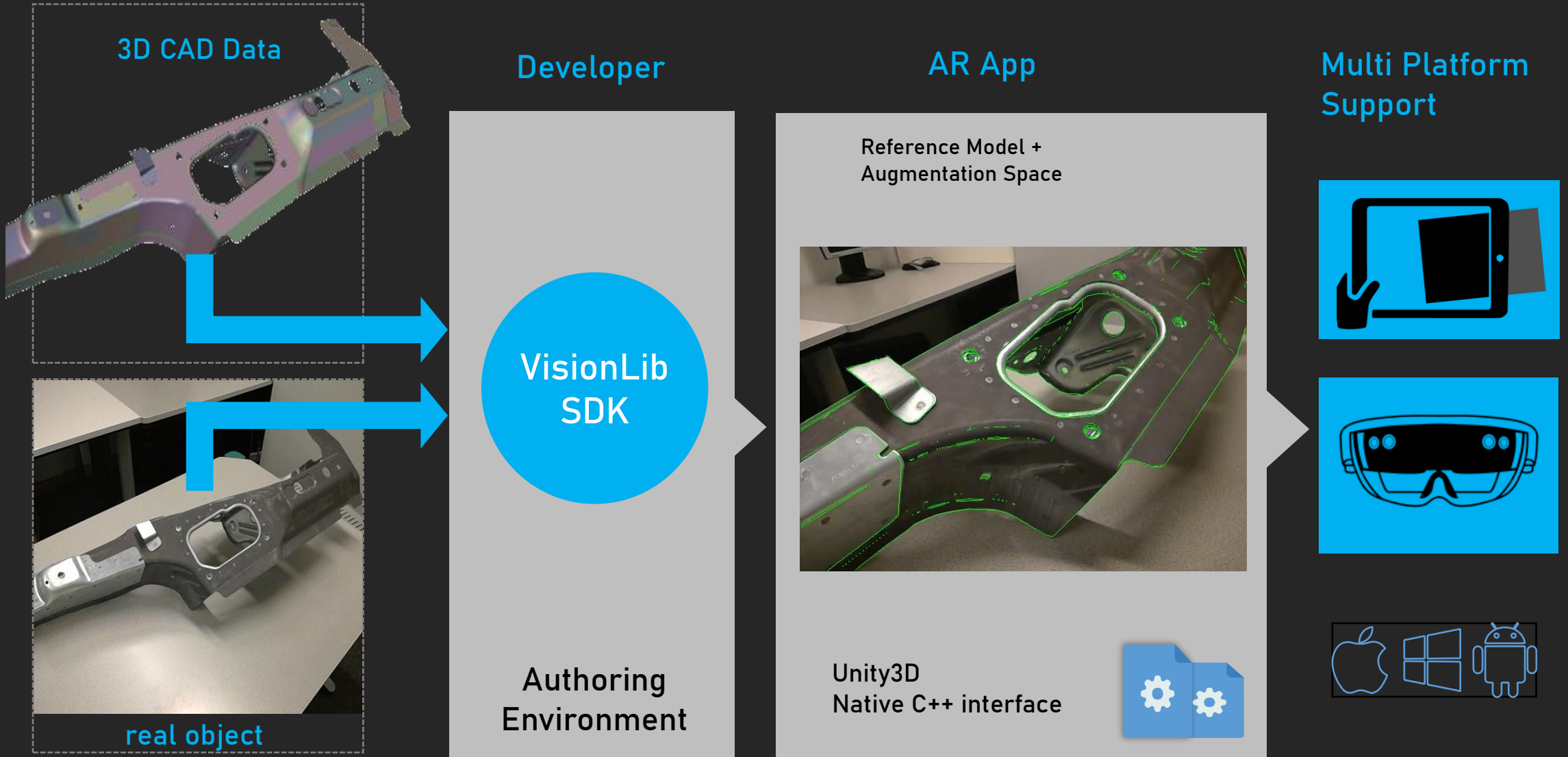
Experts & Pioneers of industrial AR, since 2002+

First to introduce defacto-Standard "Model Tracking", and „Multi Model Tracking“



Market Snapshot:
**Enterprise AR –
Leading Vendors**

¹ IoT Analytics, 2023
<https://www.linkedin.com/feed/update/urn:li:activity:7029759294958891008>



3D CAD Data

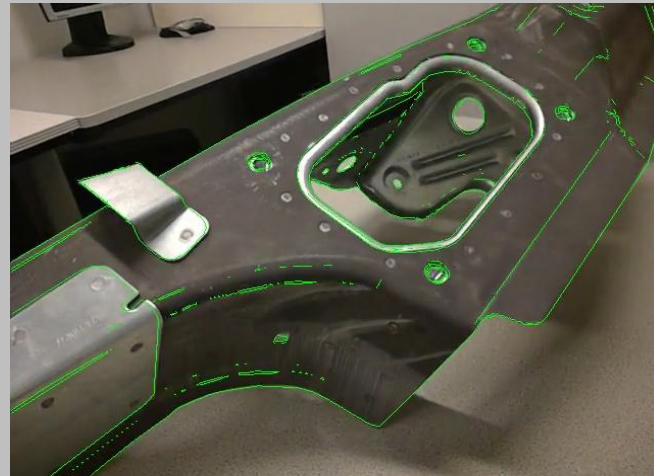
Developer

AR App

Multi Platform Support

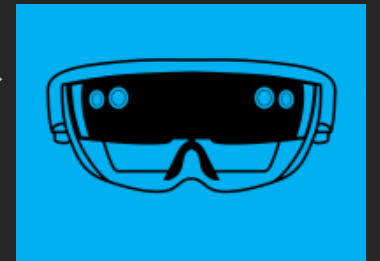
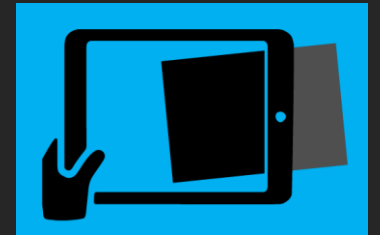
VisionLib SDK

Reference Model + Augmentation Space



Authoring Environment

Unity3D Native C++ interface



real object

Industrial-grade tracking

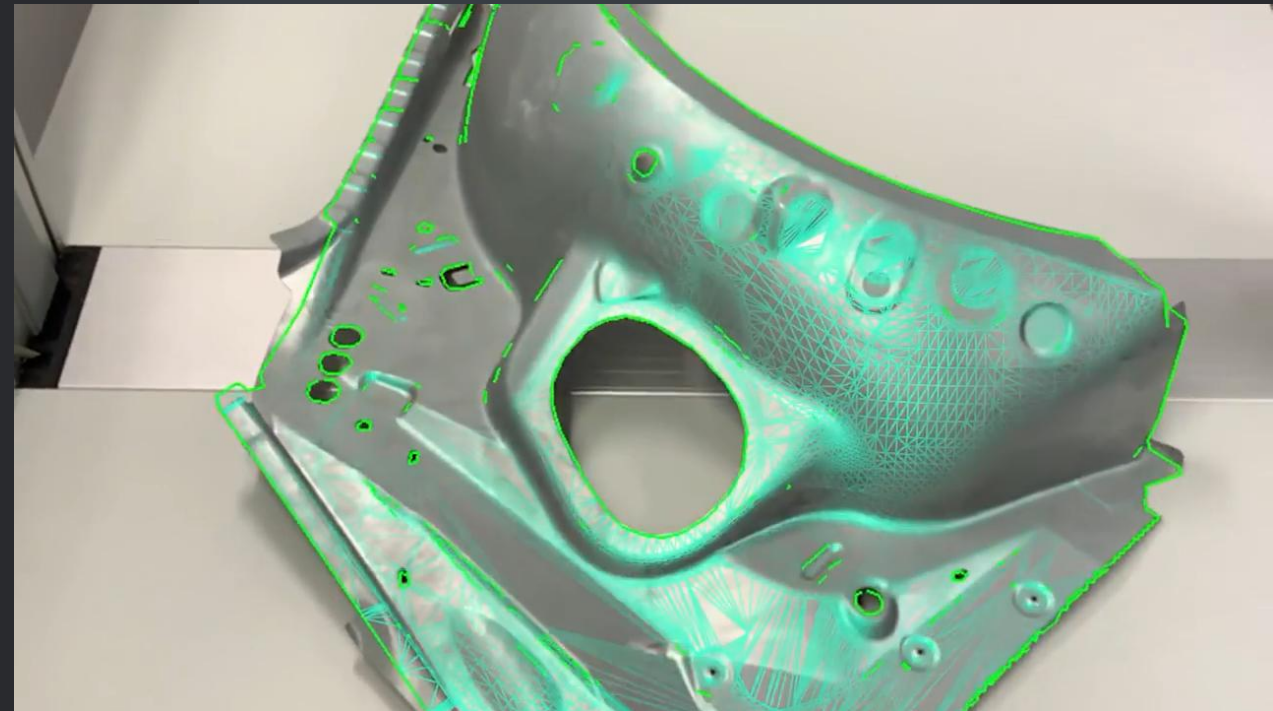
SLAM

- universal, variable accuracy
- Manual alignment
- Spontaneous “holograms”, inaccurate position; pre-recorded for persistence
- Not suited for most industrial use cases



Model Tracking

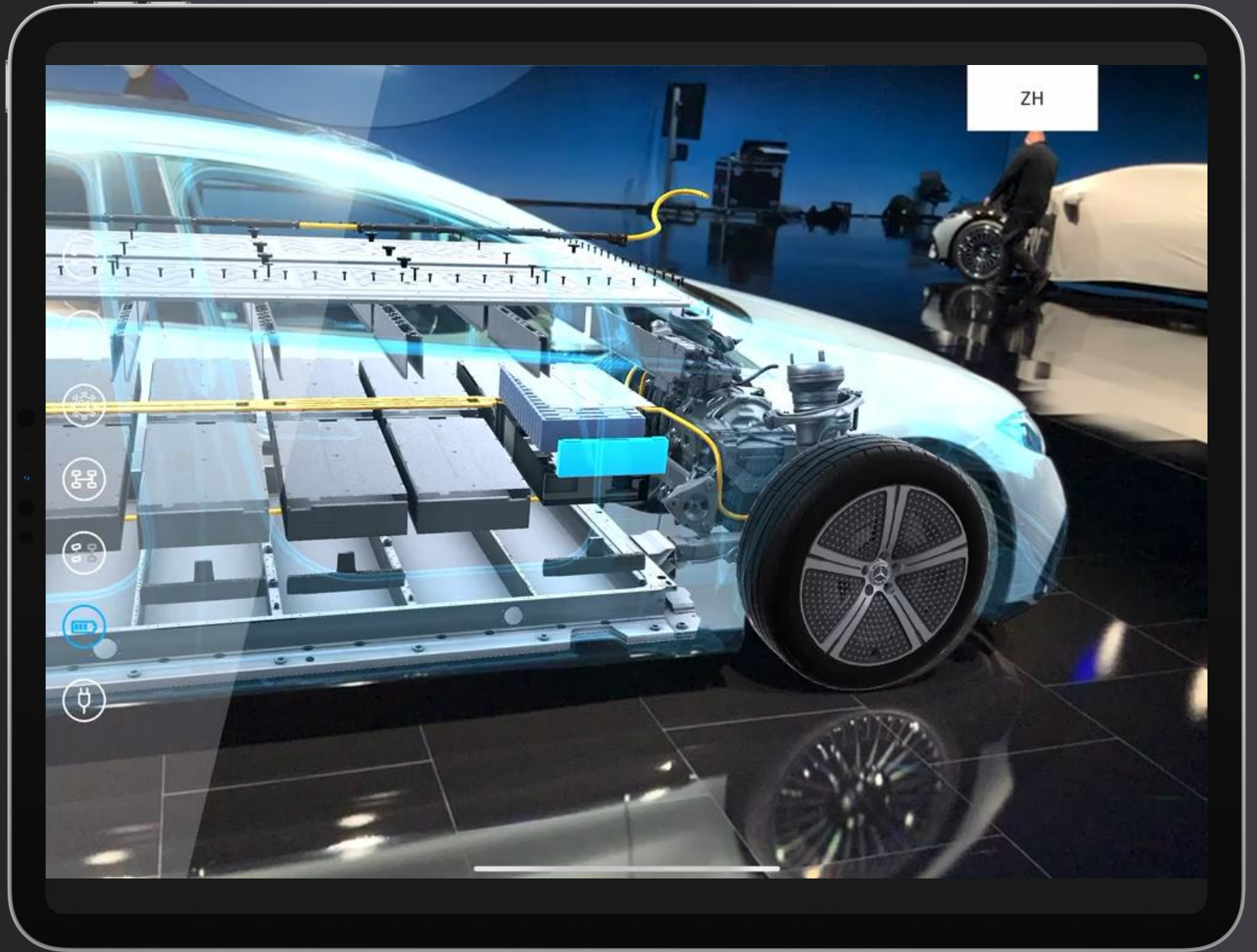
- 3D-Modell-based, high precision
- autom. alignment (registration)
- Precisely anchored content, time-stable, markerless: no object preparation
- Defacto-standard for industrial Use Cases



Most common cases for

Enterprise AR

Marketing



Training

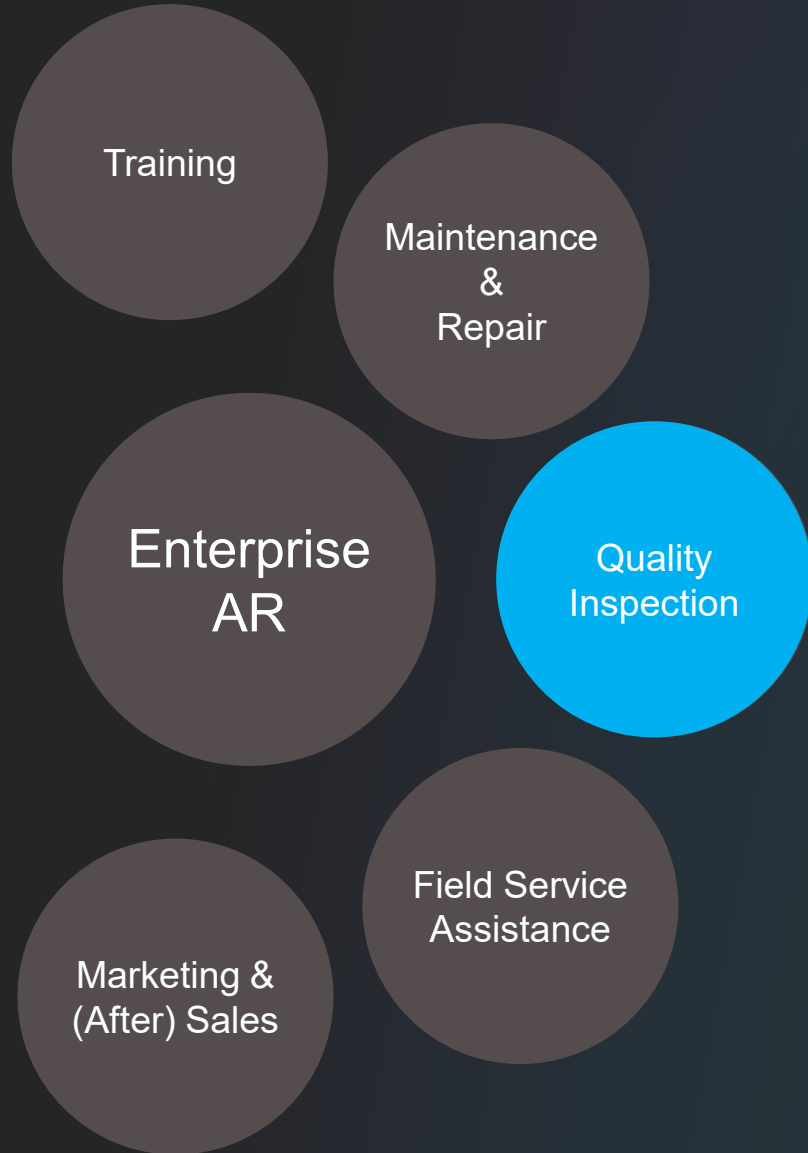


Maintenance & Repair – an ›evergreen‹ in Enterprise-AR



Maintenance & Repair





Quality Inspection has become one of AR's Killer Cases –

Here's why & what makes it different

It takes much to scale a case – why?

(Much) Authoring.

Tools, Tool Chain, Comprehension Concept

Workflow for Enterprise Cases



Retrieving Data

2D Techn. Drawings

Audio, Video, Text

PDF/PPT Instructions

Manual Authoring:
Converting Data to Information for AR

Express Instruction in 3D:

Helper Geometry
 Animation(s)

Mediation Conception

Spatial Guidance/
 Wayfinding

Authoring:
Tracking

Tracking \neq
 Augmentation Data

Scanned Targets

**Delivery/
 Device**

Not every AR device
 Fits to the job

“Hands-free for
 Work” - problem

**Interactive
 AR-Viewer**

Presentation might not
 match to reality

Maintenace & Repair
Training

Lots of effort.
Is the benefit there?

ROI --- is it worth the effort?

Competes with other solutions,
e.g. VR training

Where is Quality Inspection different?

Low to No Authoring.

CAD = Information
Target/Actual Comparison

Why AR for Quality Inspection?

Mobile, Fast, Digital – Confident & Convenient Inspections

Interactive Target/Actual Comparison

Thanks to AR overlays, manufactured components can be checked against their CAD/digital twins on a tablet

CAD specifications superimposed on the part:

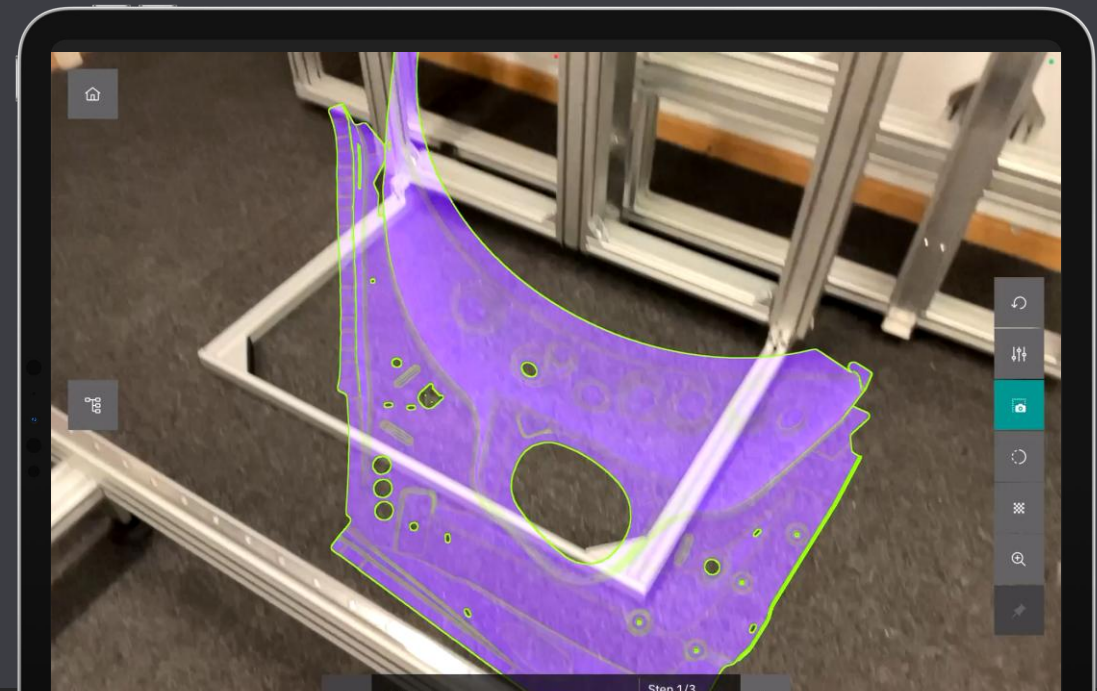
Immediately see, whether there are deviations or if production was according to spec

Easily create inspection plans and perform inspections in real time – regardless of where parts are produced or stored.

Intuitive: use with little prior experience, little training required.

Verify quickly, intuitively & conveniently whether ...

- parts have their geometric features exactly where they are supposed to be
- Assemblies have missing parts
- components are properly assembled



Challenges for Enterprise Cases



Retrieving Data

CAD
Checklists,
PDF/PPT Instructions

Minimal to no authoring:

Content & Tracking

Tracking = Augmentation
data

Checklists & directing
instructions

(no animations /
mediation needed)

Delivery/ Device

Tablets fulfill every need

- Easy to use & interact
- Hands-free not
necessary

Visual QI & Instant Documentation

Outperforms Manual QI
Supplements metrology

Quality Inspection in AR with Twyn

CAD Model Usage & Optimisation

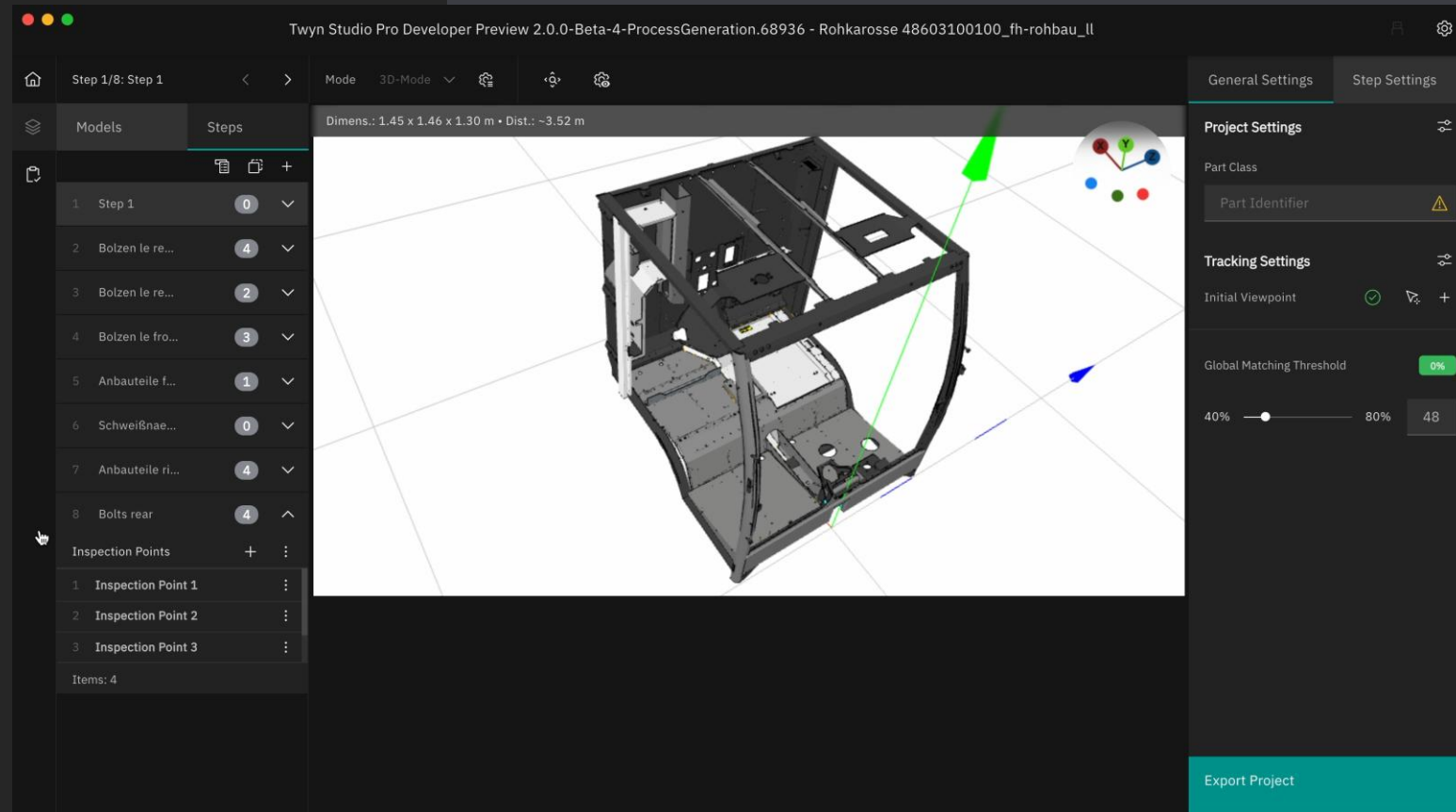
Minimal setup = More time & focus on inspections

- Preparation, simplification & optimization of CAD structures directly in Twyn
- no additional software necessary
- Simplify structure, reduce irrelevant details

Mobile-friendly: CAD data optimized for mobile devices.

Support for common formats – STEP, JT, Catia, Creo, NX, ...

Speeds up & simplifies quality inspections - especially for complex parts.



Automatic Registration & Tracking – in Real-Time

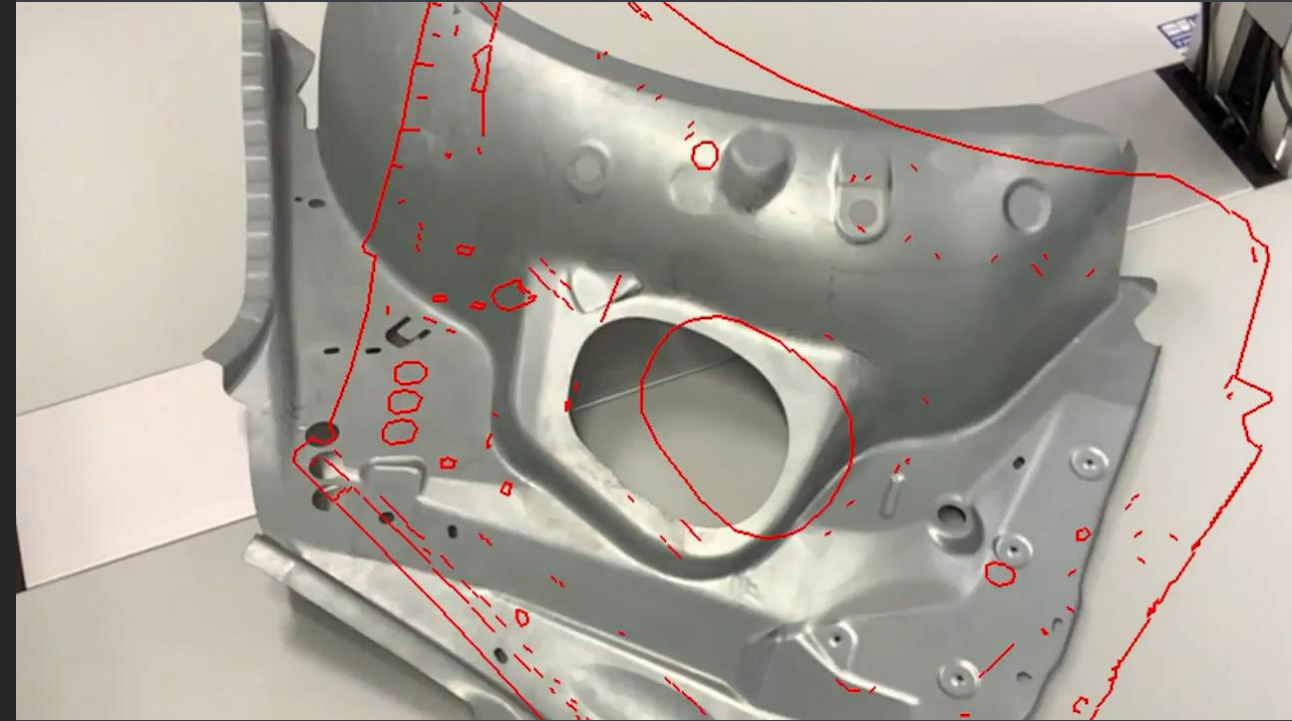
Quick Visual Comparisons – yet accurate

Using the tablet's camera, Twyn automatically locates, registers and 'tracks' inspected components

Model-Tracking: Accurate, markerless, real-time detection and tracking of inspected items based on CAD models.

No CAD or edge preparation necessary

No Teaching, No Markers: it neither requires markers nor another preparation of parts



- + challenging lighting conditions
- + moving objects / camera
- + independent from surfaces (light, dark, matte, reflective)
- rotation-symmetric objects
- objects with no distinct geometry

Performing Inspections

Digital Inspection Plans - Guided Inspection via Spatial Indicators

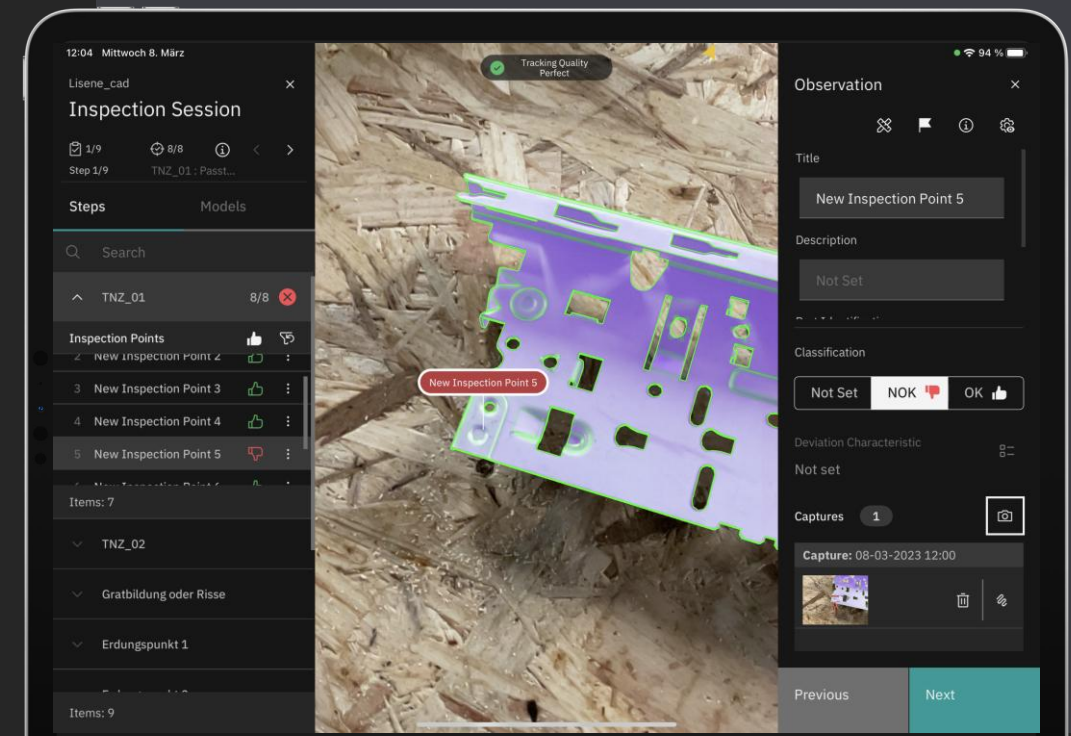
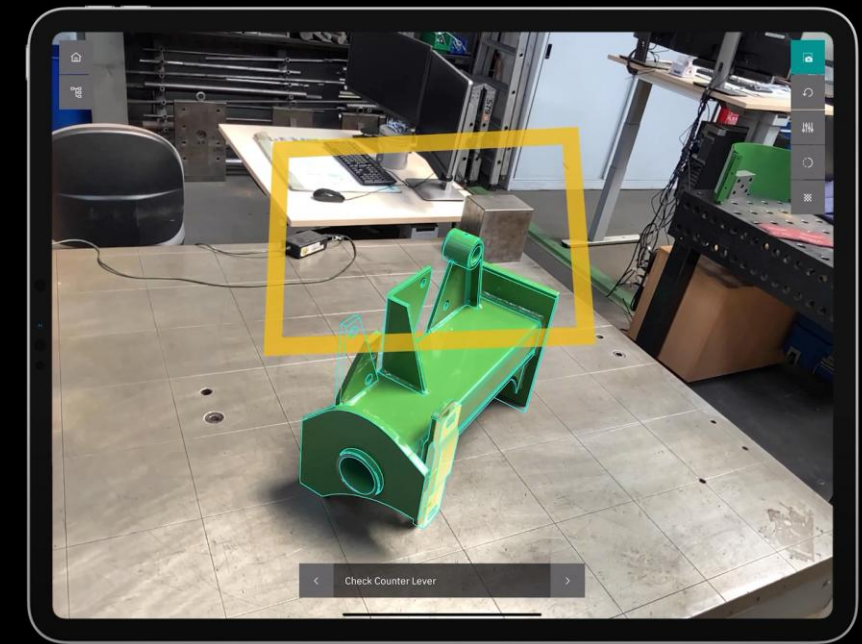
Consistent Procedures, Results & Reports

Twyn users can follow with detailed inspection plans to check predefined areas of features.

Step-by-Step instructions with comprehensive checklists guide through the process

Visual Indicators – mark & highlight important points/areas spatially, facilitating inspections of complex assemblies

Ensure consistent procedures, results and uniform documentation – regardless of users and their experience



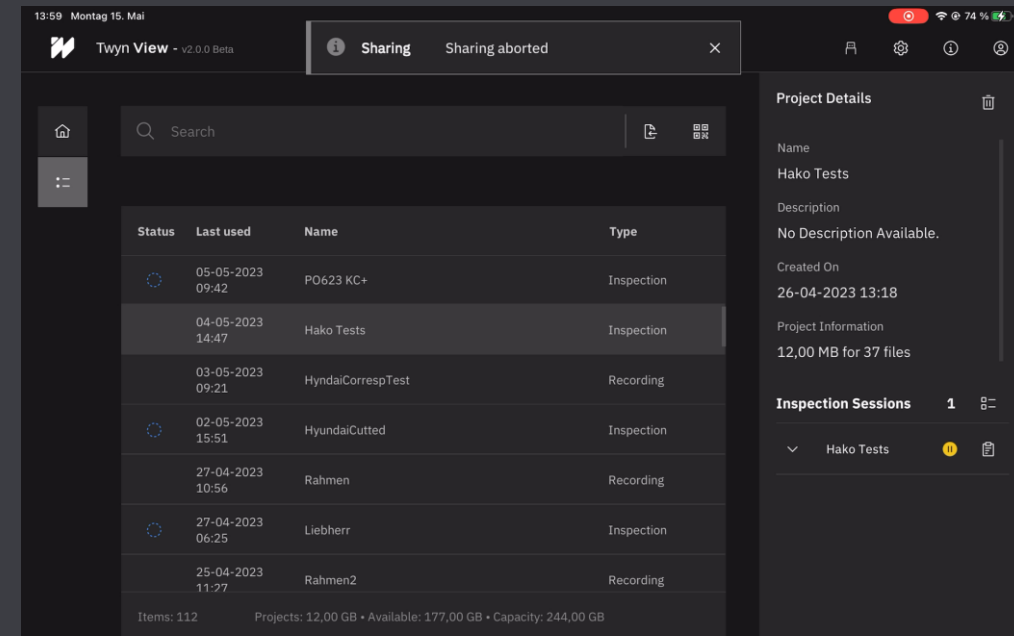
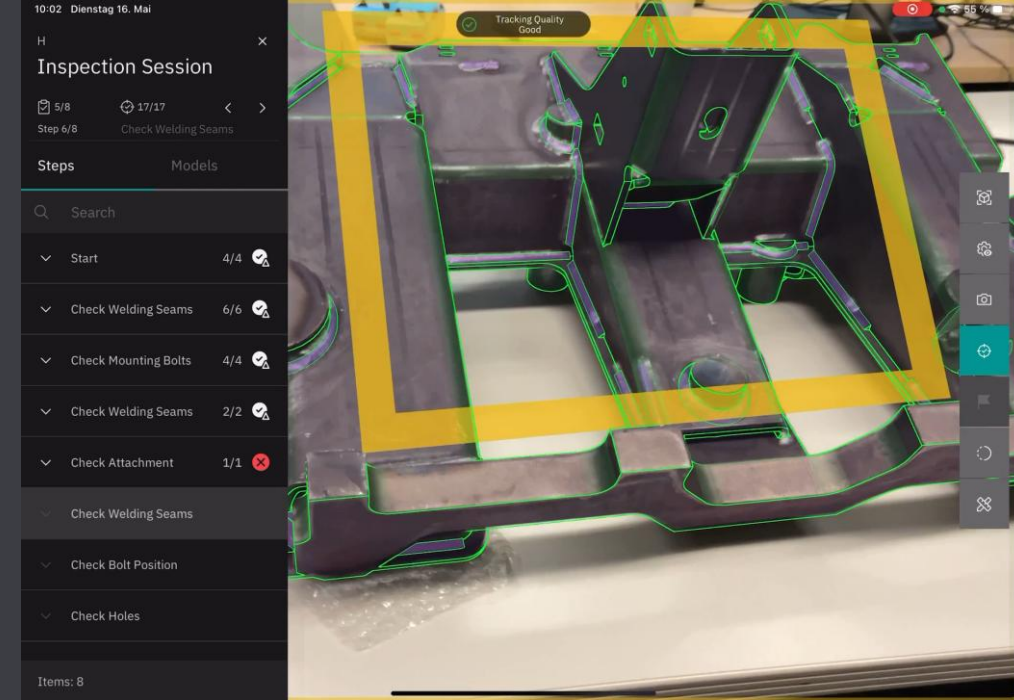
Real-Time Documentation & Reporting

Comprehensive documentation of inspection data & customizable digital reports

- Photo evidence, marks & notes
- Spatial documentation of findings/incidents
- Classification & deviation characteristics
- Increase traceability, streamline communication between quality, production and design teams

Branded & customizable reports with data points, photo evidence, etc. can be exported & shared in various formats (e.g. XLS, CVS, or PDF).

For example, via email, Cloud, Zoom, or MS Teams



Start Session

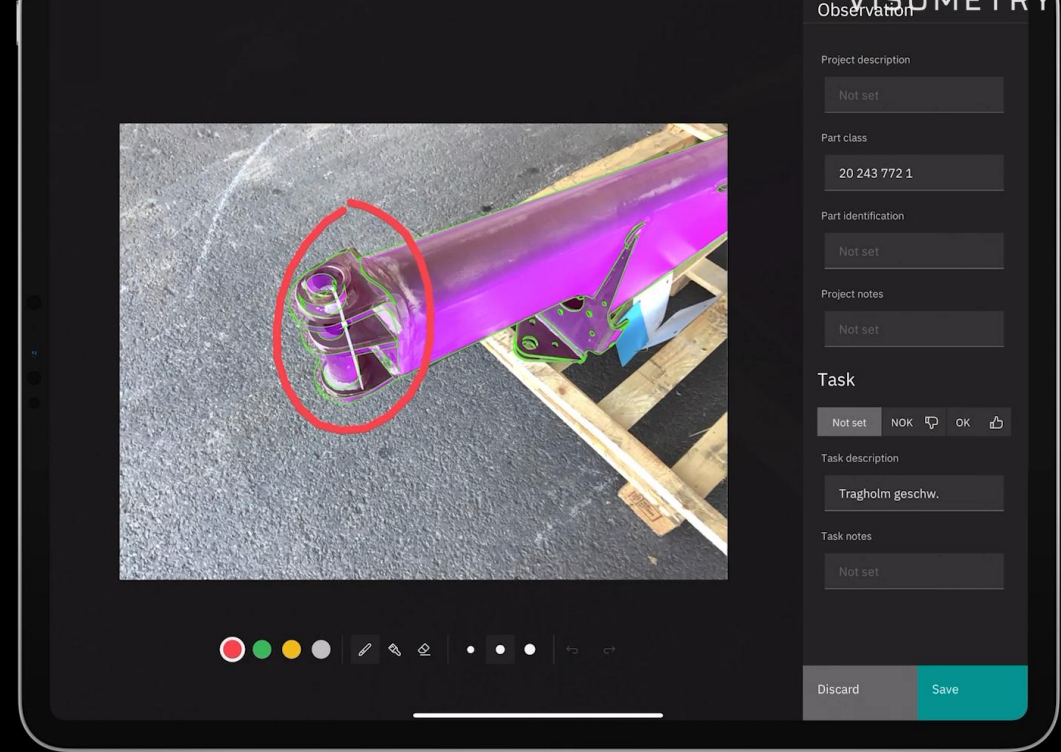
Application Areas

Incoming- & Outgoing Inspections

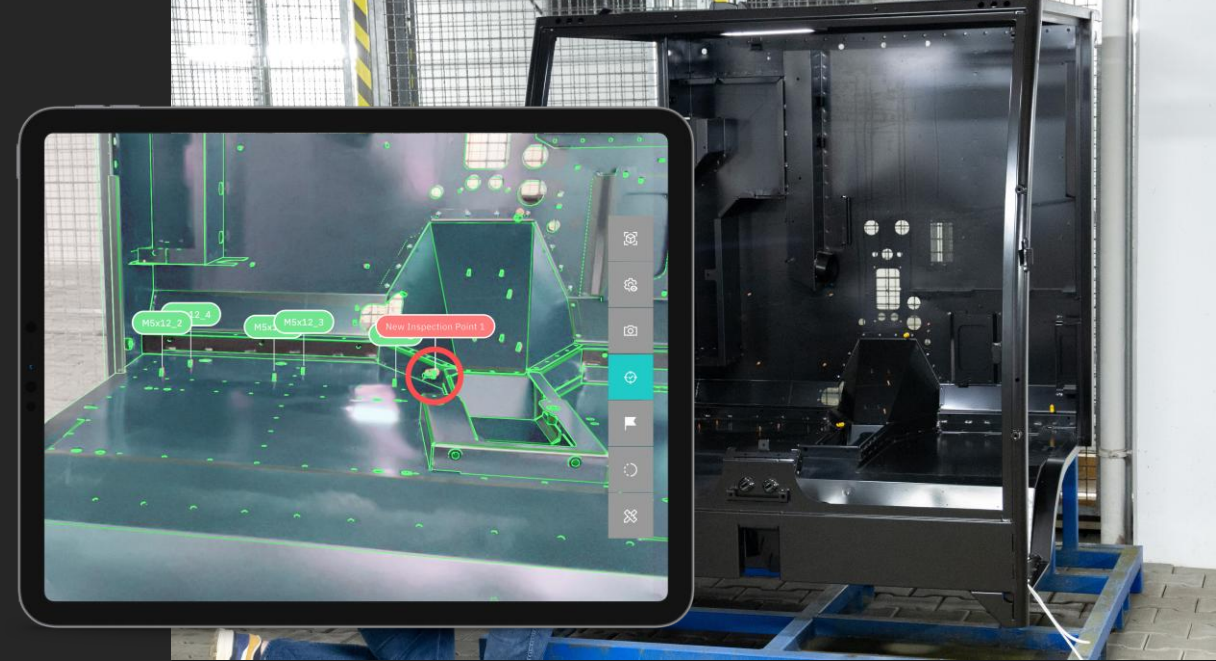
Easy cross-company cooperation with suppliers

Pre-built and interchangeable audit plans streamline collaboration across the organization

- **Supplier companies** use OEM's pre-defined plans to ensure manufactured components meet the specification – before they are shipped (outgoing inspection)
- **Manufacturing companies** can use AR to quickly identify deviating parts that don't match specifications, before putting them into production (incoming goods inspection)
- Risks for production errors are caught at an early stage



Automotive engineering: Body-in-White Inspection with AR



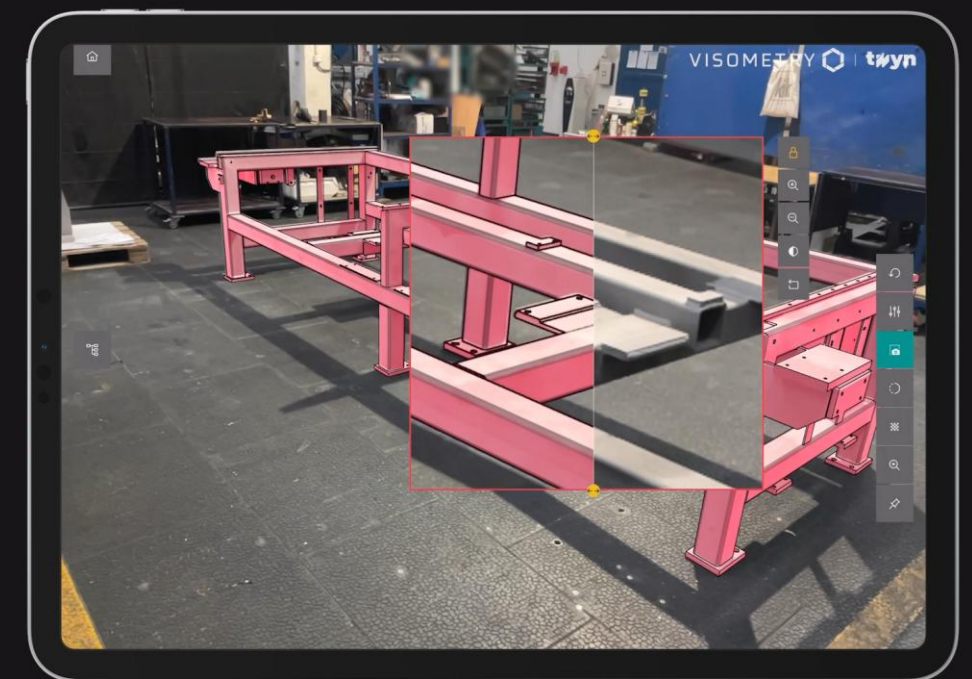
- Check that all geometric features of the body frame are in the right place - such as welding points, bolts, etc.
- Critical for proper integration of trims + components (e.g. door locks and handles, electronic components, seats), chassis subassemblies and engine parts



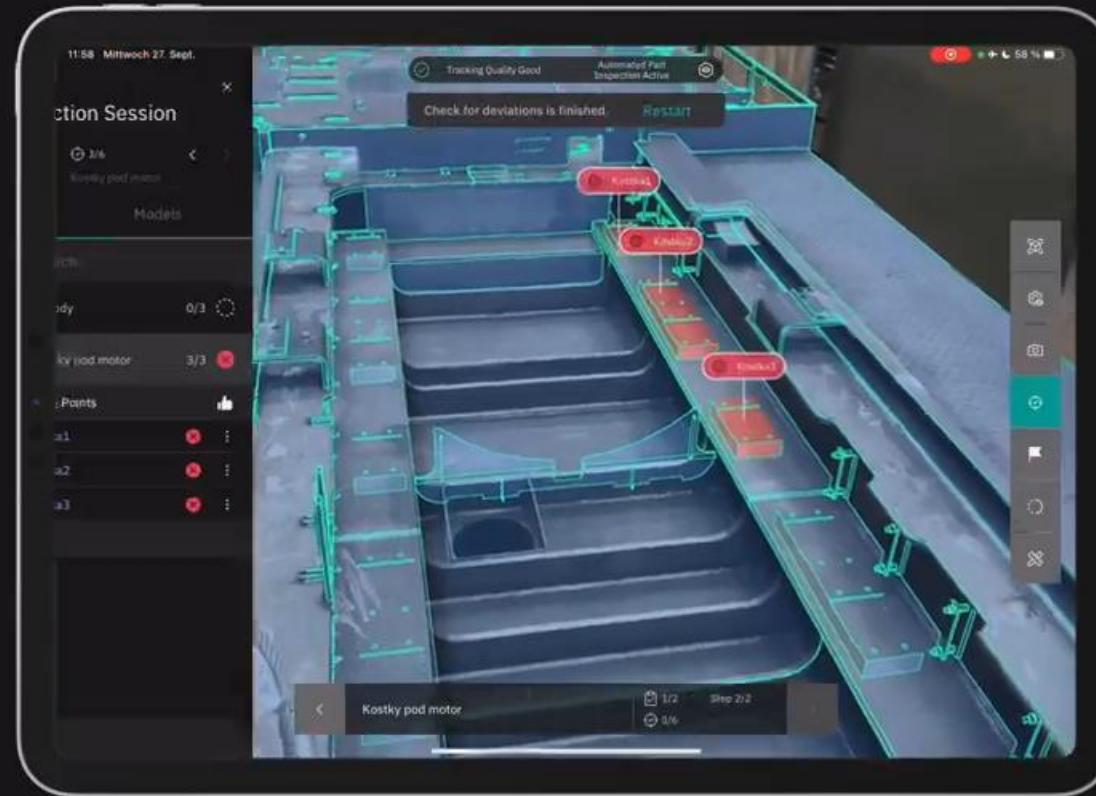
Welding, metal & mechanical engineering

Checking small & large welded constructions

Performing checks with a flexible mobile system. Large parts do not have to go to the test bench first, but can be recurringly checked during production process.



Application Example: Large Part On-Site Inspection

VISOMETRY  | **twyn**

Application Example: Large Part On-Site Inspection



Customer use case: Automotive production equipment



Toolmaking

Check production equipment & machinery before use

Tools for efficient machining and assembly of parts are essential for industrial manufacturing. They ensure that parts are manufactured according to specified requirements.

- 3D-to-3D matching facilitates inspection of the many customer specific and complex details
- Digital process, independent of location, even for large components and assemblies



Vision-Assisted Inspections

Auto-Inspection

- Critical prerequisite for proper integration of trims + components (e.g. door locks and handles, electronic components, seats, ...), chassis, subassemblies and the engine

Verify:

- Production accord/ to specification
- Completeness
- Quantity
- Position



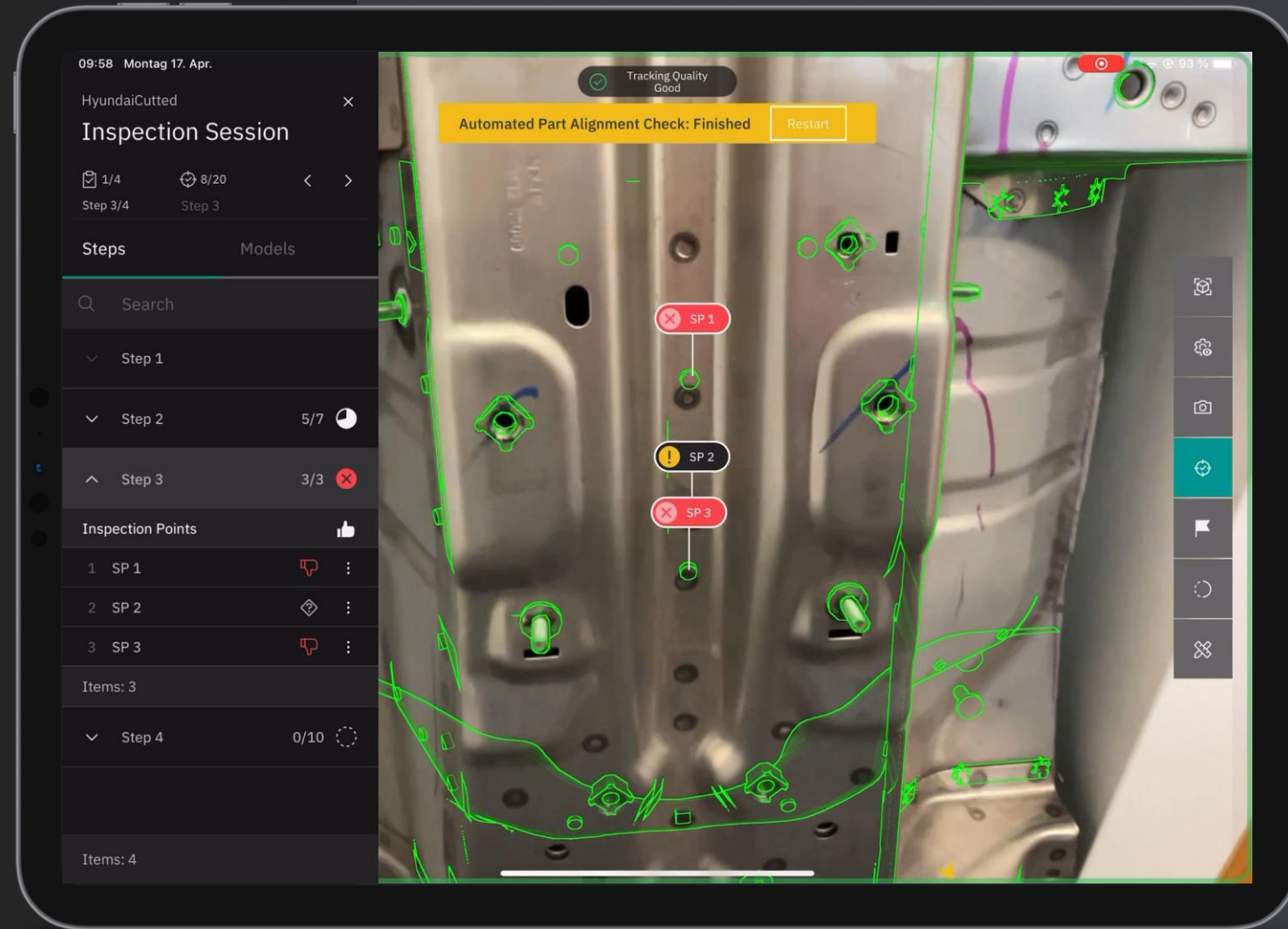
Verify Bolts, Studs & Welding Spots

Support through automated Inspection via Image Processing

- Particularly ideal for large number of features or inspection points
- Perfect for recurring- & intermediate inspections to ensure that all geometric features of the body frame are correct - such as spot welds, studs, etc.
- AR makes it easier to increase sampling & inspection rates

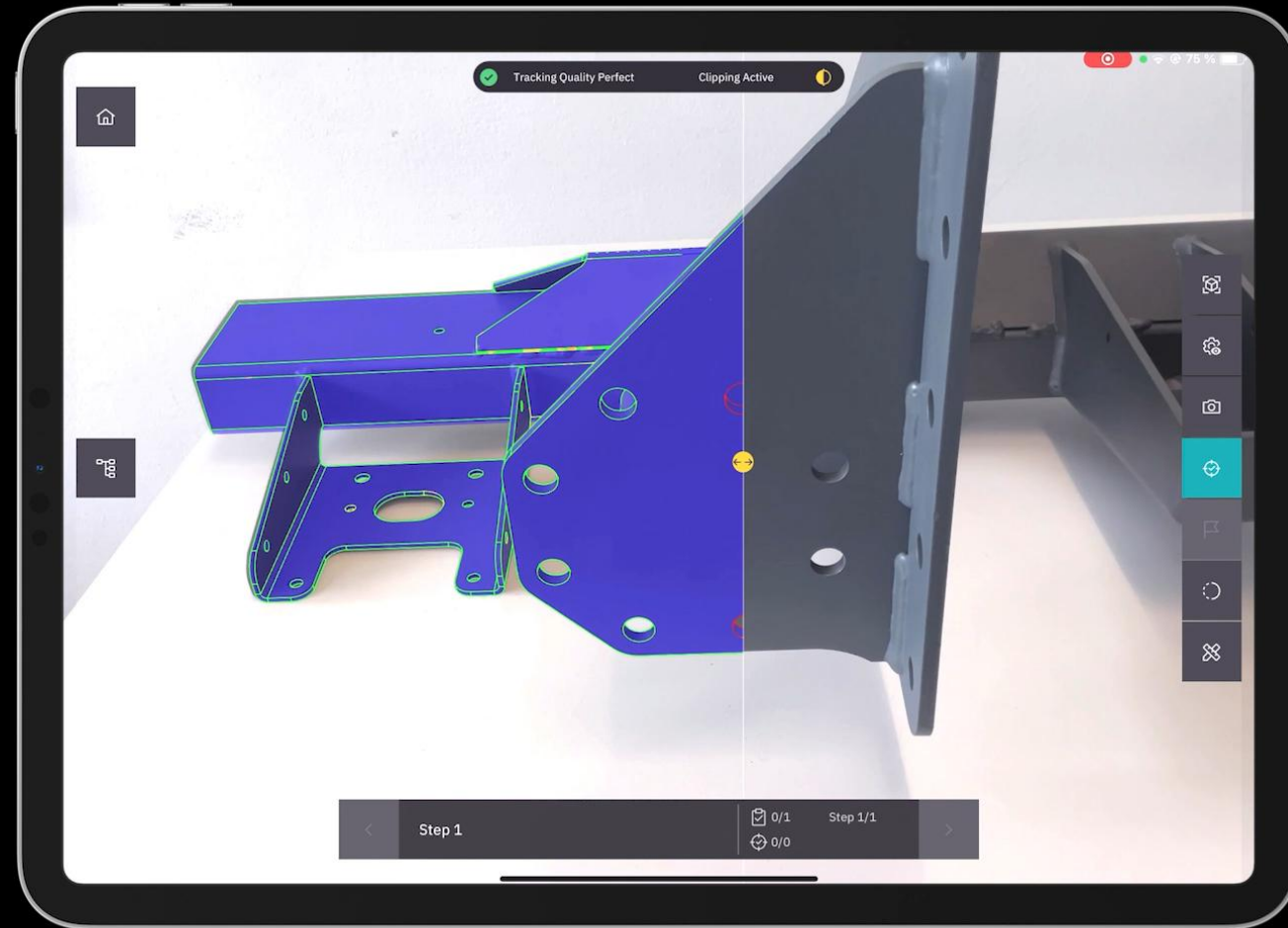
Verify:

- Completeness
- Amount
- Position



Automated Deviation Detection

Detection of mismatching shapes



VISOMETRY 

twyn

visionLib

Thank you
for your attention!



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