VISOMETRY

twyn

VISUAL QUALITY INSPECTION FOR INDUSTRIAL MANUFACTURING

Using Augmented Reality with Twyn

SUMMARY

Shorter product life cycles, increasing complexity, and rapid innovation in product development demand a high level of flexibility in manufacturing processes and efficient resource management. Avoiding production failures and preventing costly downtimes and rework are crucial. This is where quality control takes center stage.

Twyn is Visometry's mobile Augmented Reality (AR) software platform that empowers organizations to create inspection plans and conduct real-time inspections using tablets right on-site, wherever parts are manufactured or stored.

AR overlays CAD specifications onto manufactured items, enabling inspectors to visually verify whether parts match the CAD design and are produced correctly.

INDEX

DIGITAL TRANSFORMATION WITH INDUSTRIAL AR

Augmented Reality (AR) is transforming the way enterprises operate, bridging the divide between the digital and physical realms. Whether it's in production, maintenance, or marketing, AR has firmly established itself as a vital component of industrial solutions.

With Twyn, Visometry harnesses the power of AR and digital twins to facilitate Visual Quality Inspection in industrial manufacturing.

A standard tablet transforms into a dependable inspection tool for operators. As it captures the features of inspected objects from various perspectives, the tablet's camera images are augmented with 3D CAD data in real time. These precise AR overlays enable immediate detection of any disparities between the actual manufactured objects and the CAD models (target) .

Mobile quality control, facilitated by AR and Twyn, streamlines previously manual inspection tasks and accelerates processes that have often relied on traditional measurement methods. Too frequently, high-precision yet time-consuming metrology technology is employed when an initial visual inspection would suffice for identifying deviations.

Avoid costly downtimes and rework

Ensure precision and speed in inspection

Document your findings for reproducibility

Inspect your parts, anywhere, anytime

Enhance your throughput

Keep it simple: intuitive solution


Tracking Quality Perfect
Clipping Active
Step 1/2

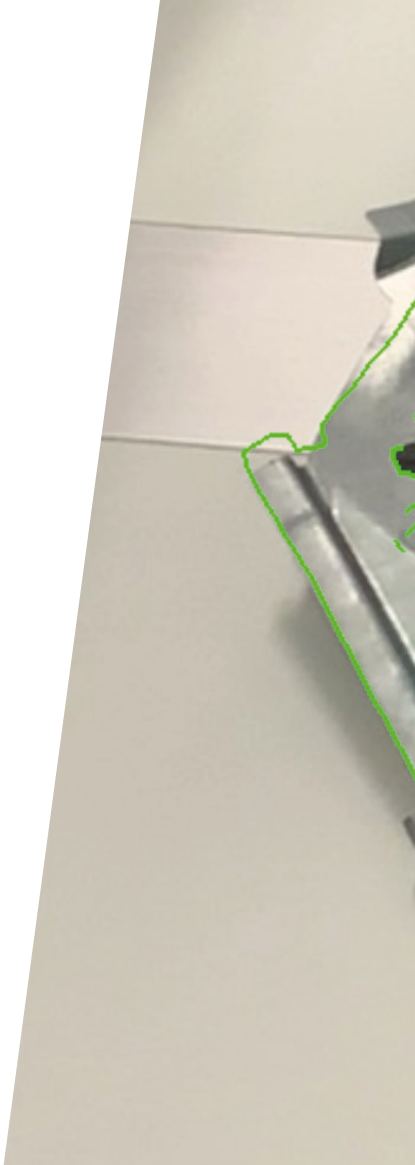
CAD-BASED TRACKING WITH VISIONLIB

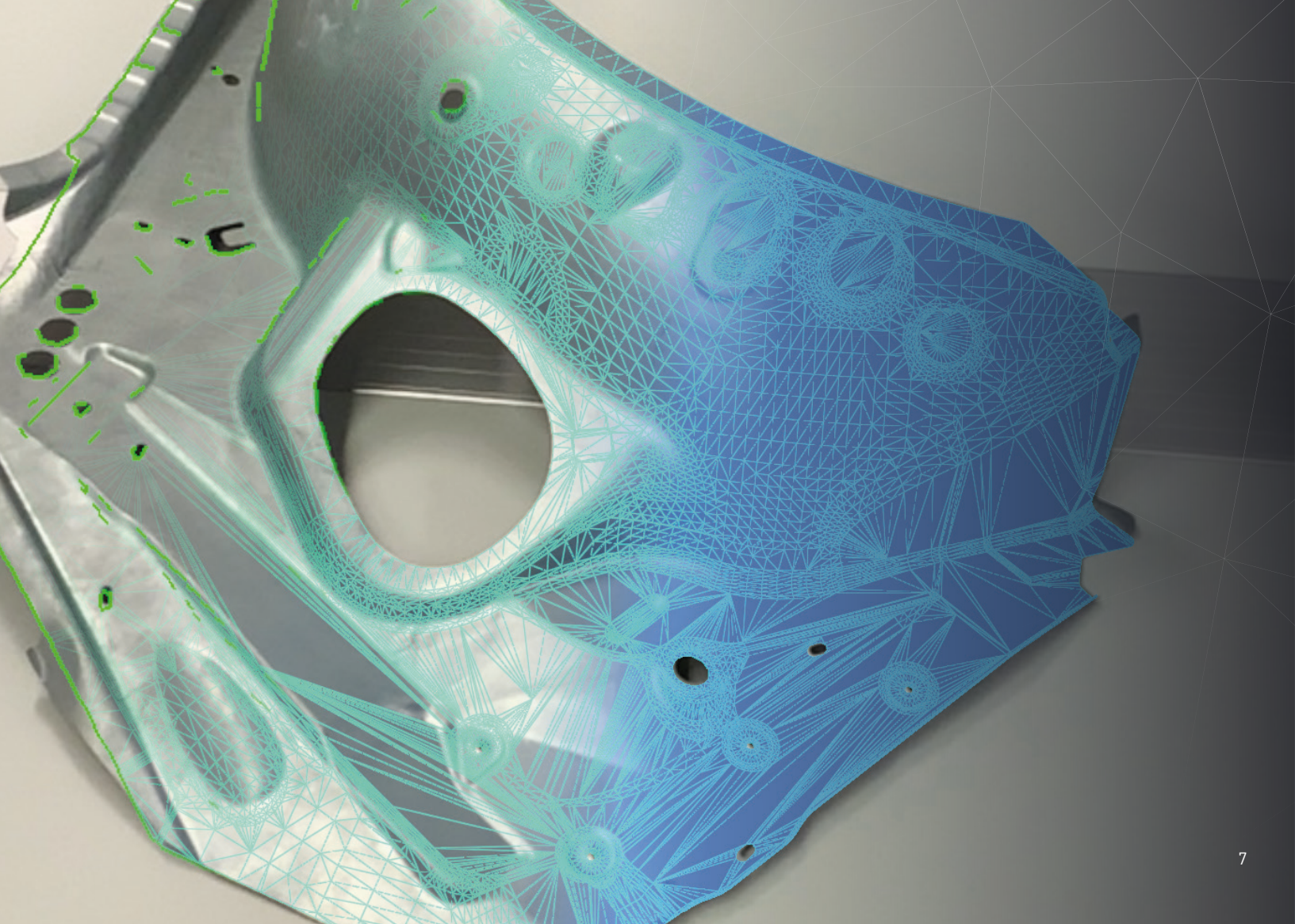
Twyn's object detection and tracking are powered by Visometry's VisionLib Engine. This software development Kit (SDK), already chosen by leading international companies in various sectors such as automotive and mechanical engineering, serves as the foundation for a wide range of AR applications that demand high-performance object recognition and precise tracking.

Using CAD data, VisionLib provides reliable and stable position determination of objects in camera images, enabling Twyn to achieve precise, marker-less, real-time detection of inspected items. Thanks to this automatic object registration, Twyn supports on-site part inspections without the need for additional preparations.

While AR technologies in consumer applications determine the camera pose in static environments, VisionLib can also track moving objects in dynamic scenarios and under varying lighting conditions—regardless of the object's surface properties (whether light or dark, matte or reflective).

Moreover, VisionLib is not limited to registering a single part ("standard model tracking"); it can track multiple objects independently and synchronously ("multi-model tracking"). This capability allows Twyn to automatically check and verify different sub-components of an assembly relative to each other.



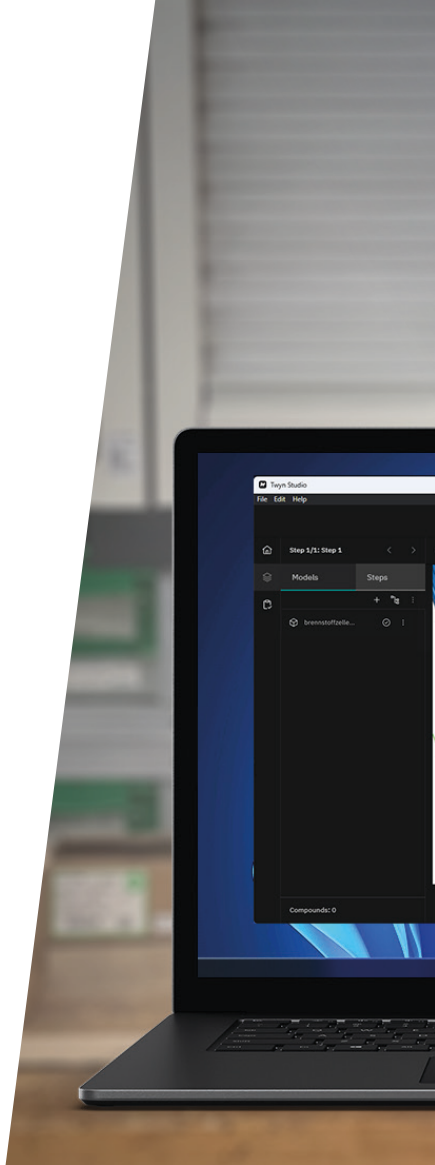


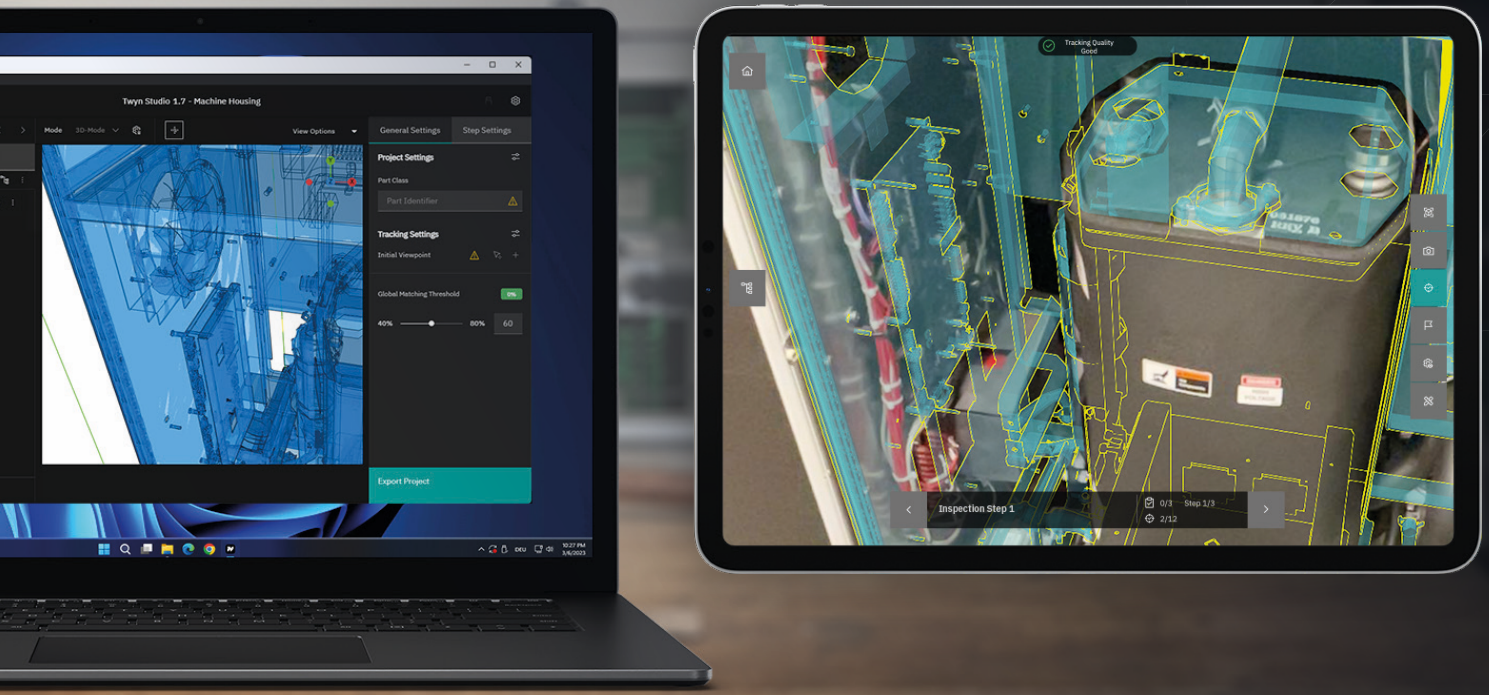
TWYN SOFTWARE PLATFORM

Twyn is the ideal solution for companies looking to simplify and streamline their quality control processes using an intuitive and forward-thinking technology that requires minimal setup time while delivering trusted results. It comprises two integrated components: Twyn Studio and Twyn View.

Twyn Studio is the desktop tool for engineers. Installed on a computer, it is used to set up new inspection cases and design and edit inspection routines. The intuitive user interface allows users to define inspection procedures structured into different steps, which will then be executed by quality inspectors on-site. For each step, a viewing or inspection area can be defined, precisely indicating the position where the operator should move the tablet in relation to the assembly being inspected.

The **Twyn View** mobile app transforms iOS tablets into powerful mobile quality control tools. Once created in Twyn Studio, operators can easily load and run inspection routines on their mobile devices. During inspections, annotations and remarks can be added and further processed as comprehensive reports in Twyn Studio once on-site sessions are completed.




Twyn Studio 1.7 - Machine Housing
Mode
3D-Mode
View Options
General Settings
Step Settings
Project Settings
Part Class
Part Identifier
Tracking Settings
Initial Viewpoint
Global Matching Threshold
0%
40%
80%
60
Export Project
Tracking Quality
Good
Inspection Step 1
0/3
Step 1/3
2/12

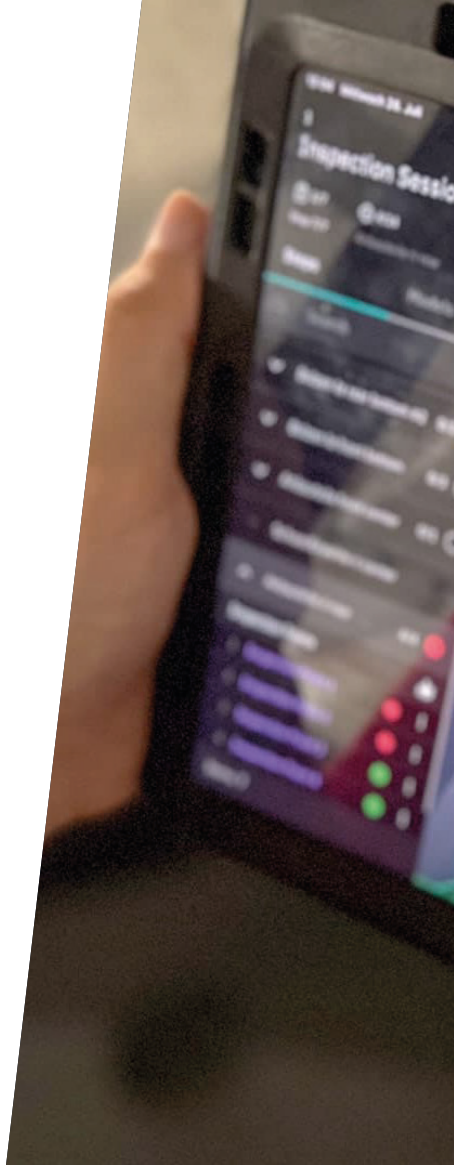
FEATURES

Twyn offers a wide range of key features and functionalities designed to support various industrial quality inspection applications.

AR accurately and consistently overlays the CAD model directly onto the inspected object, making deviations between the target and the actual object immediately visible.

Twyn uses the tablet's camera to automatically register and track manufactured items in real time. It provides precise markerless detection and tracking of inspected items based on CAD models. This forms the foundation for fast yet accurate visual comparisons, eliminating the need for pre-preparation or markers when analyzing parts.

Load CAD model, set inspection start point, transfer to iPad — three clicks is all it takes to start inspections. The CAD twin-based setup and the automatic (optical) model alignment enable immediate use of the system in the field.

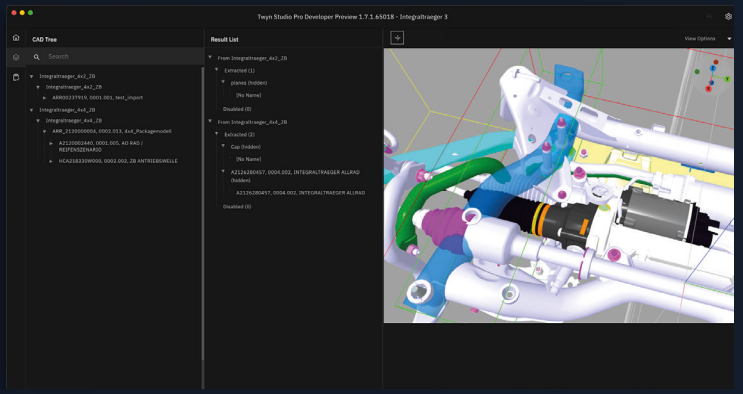



Tracking Quality Critical
Automated Part Inspection Active
Check for deviations is finished.
Restart
Inspection Point 1
Inspection Point 2
Inspection Point 3
Inspection Point 4

CAD model preparation in Twyn Studio

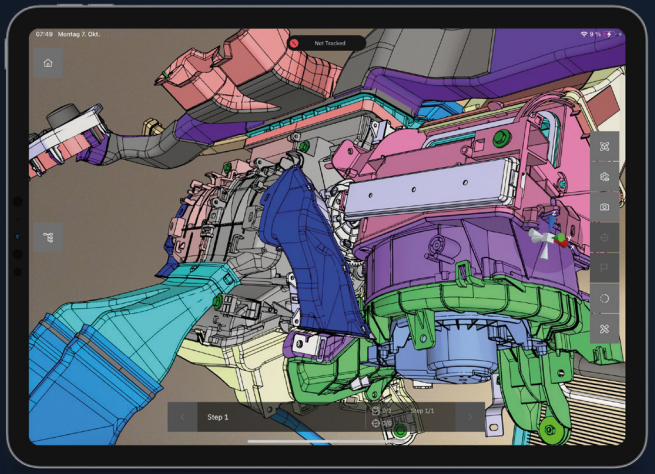
Inspecting complex CAD models can be time-consuming, costly, and challenging, often requiring multiple software tools. Twyn simplifies this process by allowing users to prepare, optimize, and streamline CAD structures by removing unnecessary details to focus on essential inspection elements. This accelerates quality inspections, especially for highly complex parts.

CAD data provided by Twyn is optimized for mobile devices. With minimal setup time, quality inspectors can immediately focus on their inspection tasks as procedures are managed directly within Twyn Studio, eliminating the need for additional software.



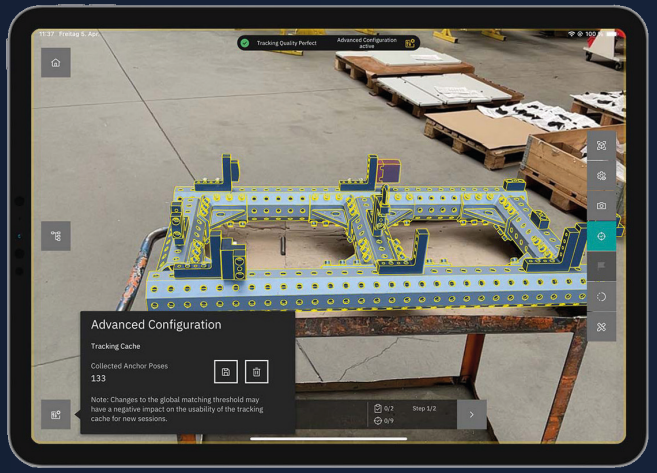
Best-in-class CAD visualization

Every fine detail, such as construction lines, is clearly visible with our best-in-class CAD rendering. Enhanced edge visualization ensures you never miss a detail during quality inspections.



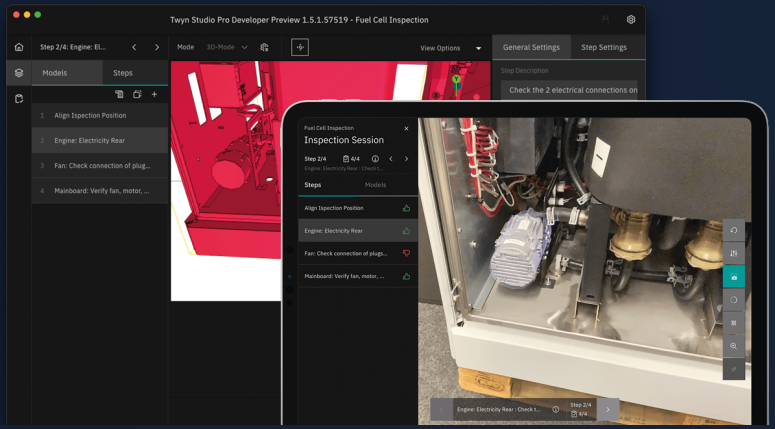
Tracking cache

With Twyn, you can speed up tracking initialization by saving anchor poses in a tracking cache. In addition to the initialization pose, these anchor poses serve as entry points to begin tracking. They can be easily and automatically created during the inspection. Once a tracking cache has been saved, it is directly applied to all new sessions of the same inspection project.



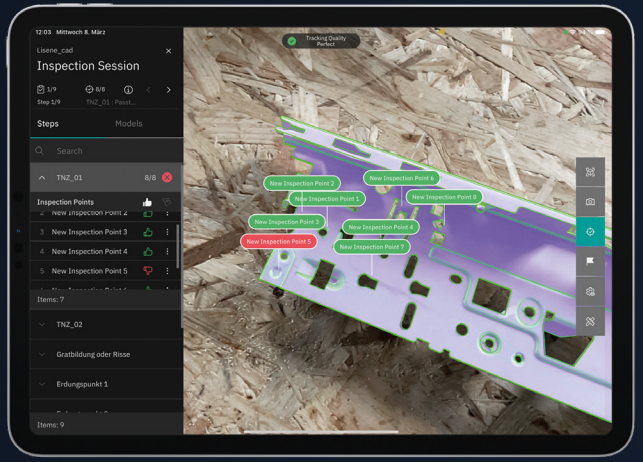
Inspection plans

Twyn provides valuable guidance to operators through step-by-step instructions presented as comprehensive checklists. This ensures consistent procedures, results, and documentation, regardless of the user or their level of experience. Existing plans can also be uploaded to Twyn and reused as a basis for new inspections.



Inspection points for complex parts

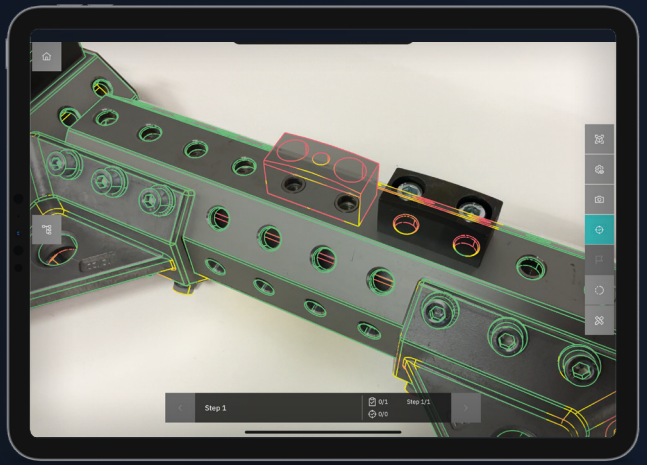
Twyn's spatial "inspection points" enable you to pinpoint specific areas that require special attention. Instead of relying on a broad overview of the entire object, multiple features can be categorized and grouped. This approach ensures a precise, intuitive, and faster way to conduct inspections and document observations and results. Once verified, inspection points are highlighted with dedicated indicators and visualized with distinct colors, allowing you to easily track the status of each inspected feature.



Assisted deviation detection

This feature speeds up and simplifies your quality inspection sessions by automatically detecting deviations between the CAD model and the real object in real time.

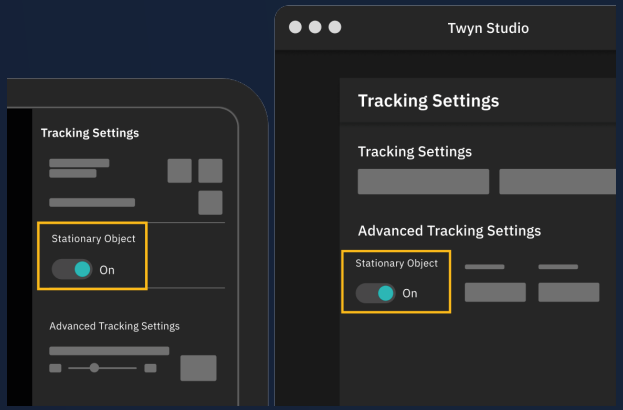
Misaligned structural elements like holes, edges, or misplaced parts are automatically analyzed and highlighted, providing real-time feedback to the operator — without the need for prior CAD model preparation.



Tracking stability for stationary objects

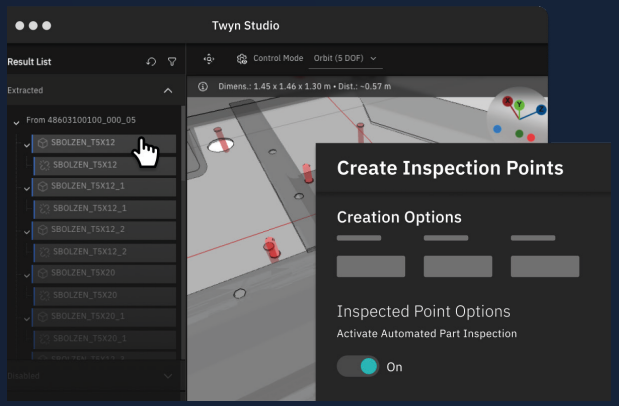
Even large components that are only partially captured by the tablet's camera are easy to track with Twyn.

Using a combination of the iPad's SLAM sensors and model-based tracking, Twyn ensures stable tracking even when moving around the object or in areas with minimal geometric structures. This enables a precise and reliable CAD overlay and simplifies the target/actual comparison between CAD model and real part.



Automation of inspection project set-up

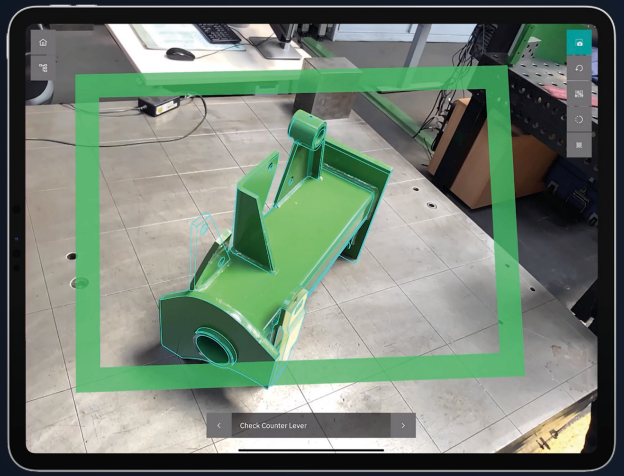
The automatic creation of inspection points is extremely helpful for accelerating quality inspection sessions. Alongside manual creation, this significantly simplifies project configuration, especially when many elements such as bolts or screws need to be inspected. You can create inspection points and group them into ideal inspection views to further streamline your quality control process.



Inspection viewpoints

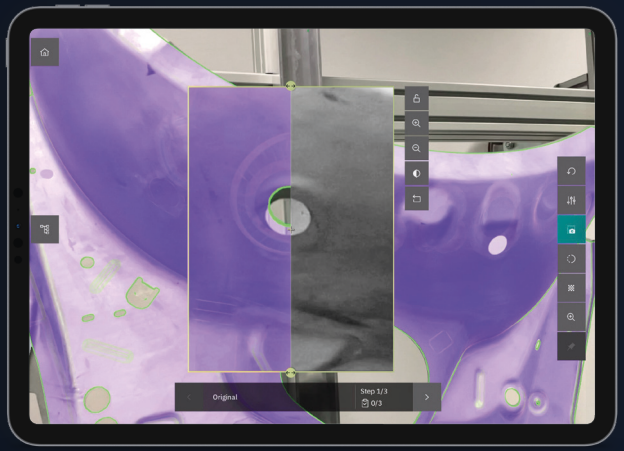
Visual indicators utilize 3D pointers to mark and highlight areas of interest, simplifying inspections of complex assemblies by guiding users to specific features or elements.

You can even set up inspection viewpoints directly in Twyn View on the iPad. This allows you to define optimal inspection positions directly at the object, ensuring they align with real-world conditions. By positioning viewpoints in the actual inspection environment, ergonomic constraints and accessibility are considered from the start. This approach also guarantees consistent results and standardized inspection reports.



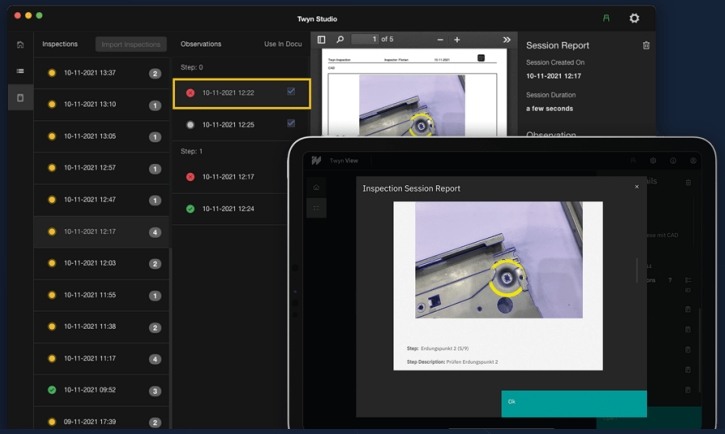
Interactive zooming & clipping

The lens tool empowers users to conveniently examine large or complex objects by magnifying specific areas, facilitating detailed inspections of small features or hard-to-reach points. Interactive clipping and other viewing options provide a straightforward visual comparison between the target and the actual object in AR, ensuring a rapid yet thorough inspection.



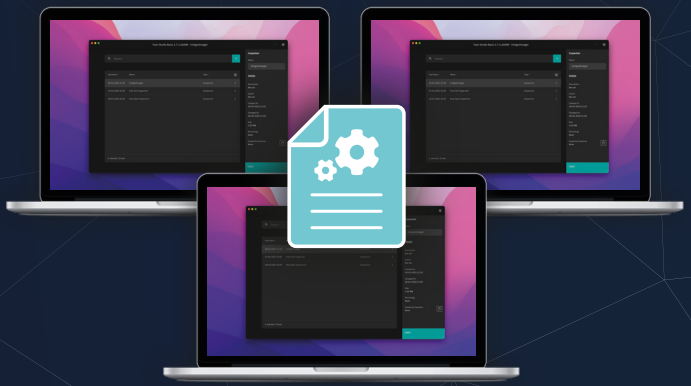
Customizable digital reports

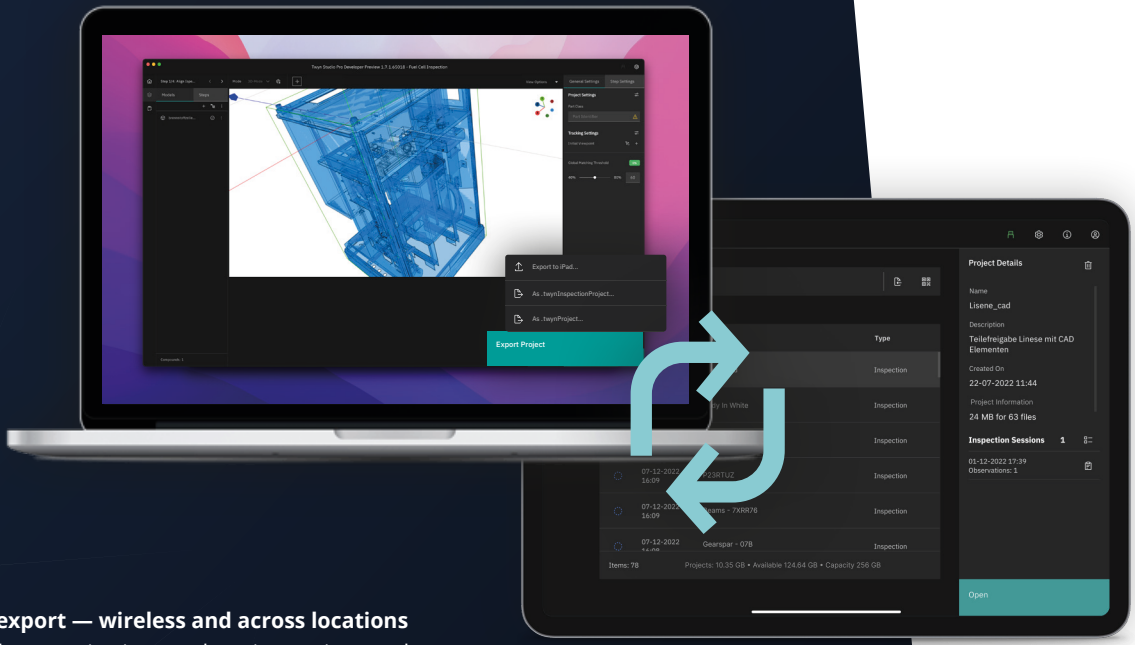
Twyn facilitates the thorough documentation of quality inspection results. Annotations and markups enhance traceability and streamline communication between quality, production and construction teams. Additionally, with a camera always in place, Twyn enables users to capture images of relevant features, supporting efficient and comprehensive reporting. Branded and customizable reports provide concise summaries of inspection results. They can be exported in various formats (including XLS, CSV, and PDF) and easily shared with quality and production teams, as well as suppliers.



Shared project workspace

With Twyn Studio, quality managers and inspectors working remotely at different Twyn workstations can access a shared workspace and exchange individual project files. This approach ensures a consistent and up-to-date project state while avoiding redundant data. Inspection data can be seamlessly exported from Twyn Studio and imported into Twyn View remotely, ensuring smooth project transfers and maintaining standardized workflows across multiple locations.





Flexible import & export — wireless and across locations

Twyn not only enables organizations to share inspection results in various formats, but also supports multiple distribution methods, including cloud, Microsoft Teams, and email. Different stakeholders can share data regardless of their IT infrastructuresinfrastructure, offering maximum flexibility and control over the sharing of inspection projects.

CAD optimization

A best-in-class CAD optimization algorithm automatically prepares models for AR. This allows users to work with their original CAD files without worrying about compression, all while ensuring unambiguous and high-quality rendering tailored for industrial applications.

CAD/3D support

Twyn supports the most common and relevant 3D CAD formats for industrial and manufacturing applications — eliminating the need for prior conversion. These formats include JT, STEP, CATIA, and IGES, among others.

Markup tool

Users can utilize a pen tool to highlight deviations and aberrations and add 2D annotations. This facilitates comprehensive reporting and enhances communication between the quality and production teams.

Code scanner

Twyn enables operators to link parts with inspection procedures and documents using their IDs. Regardless of the user conducting the quality check, simply by scanning the ID, the corresponding inspection process and proof plan are accessed and executed instantly.

Multi-language capabilities

Twyn supports Chinese, Czech, Dutch, English, French, German, Italian, Japanese, Korean, Polish, Portuguese, Slovak, Spanish, and Turkish for both the user interface and reporting. These languages can even be set separately for inspection and reporting. Documentation and video tutorials are also available in 14 languages.

The multi-language capabilities not only further enhance the user experience but also enable organizations to optimize collaboration across locations by sharing documentation and reports in multiple languages.

INDUSTRIAL APPLICATIONS

Twyn's design and features make it ideal for various industrial applications, improving the overall production life cycle.

Outgoing & incoming inspection

Efficient quality inspection with Twyn optimizes cross-company collaboration, guaranteeing that manufactured components comply with CAD specifications before they are shipped (outgoing inspection). Likewise, organizations can promptly identify parts from suppliers that do not align with CAD specifications (incoming inspection). Production errors are thus detected at an early stage.

First article inspection

Deviations from product specifications and faulty machining can result in delays, failures, and costly returns.

Twyn can systematically inspect components according to specific plans before they go into mass production. Defined checklists enable the digital documentation of inspection results and part conformity. This ensures that a new or modified manufacturing process consistently produces parts that meet requirements.


13:38 Dienstag 26. Sept.
2609mm
Inspection Session
1/2
Step 2/2
2/2
Automatic
Steps
Models
Search
Step 1
Automatic
2/2
Inspection Points
1 Holder1
2 Holder2
Items: 2
Tracking Quality Perfect
Automated Part Inspection Active
Check for deviations is finished.
Restart
Holder1
Holder2

Assembly check

AR and Twyn enable inspectors to digitally verify whether add-on parts are complete or whether engineering design drafts will fit into an assembly. They can identify errors before proceeding to the next production stages, preventing costly delays, downtime, and rework. In addition, different variants can be evaluated without the need to create physical prototypes, saving companies both time and materials.

Large part on-site inspection

With Twyn, operators can perform quality inspections at any location, right where components are manufactured or stored. This capability is particularly crucial for large parts and components, as they cannot be easily transported to measurement rooms or test areas or inspected using fixed inspection solutions.

Jig and fixture construction

Jigs and fixtures are essential tools for establishing manufacturing, requiring precise positioning and alignment to facilitate reliable machining. Twyn streamlines this process by allowing real-time, digital verification and adjustment of alignments. This way companies can avoid costly errors and rework during machining operations.

Toolmaking

Tools for efficient part processing and assembly are crucial in industrial manufacturing. They ensure that components are produced to specified requirements. Often custom-made, they are complex and expensive to create and need to be optimized through multiple iterations before the final tools can be built.

Twyn's flexibility and the ability to virtually simulate various configurations in AR streamline these processes digitally, significantly reducing the number of required iterations.

Body-in-white construction

Twyn is used to verify that car body frames have all their geometric features, including welding points and studs, correctly positioned. This step is critical and serves as a prerequisite for the seamless integration of trims (e.g. door locks and handles, electronic components, and seats), chassis sub-assemblies, and the engine.

Product design and development

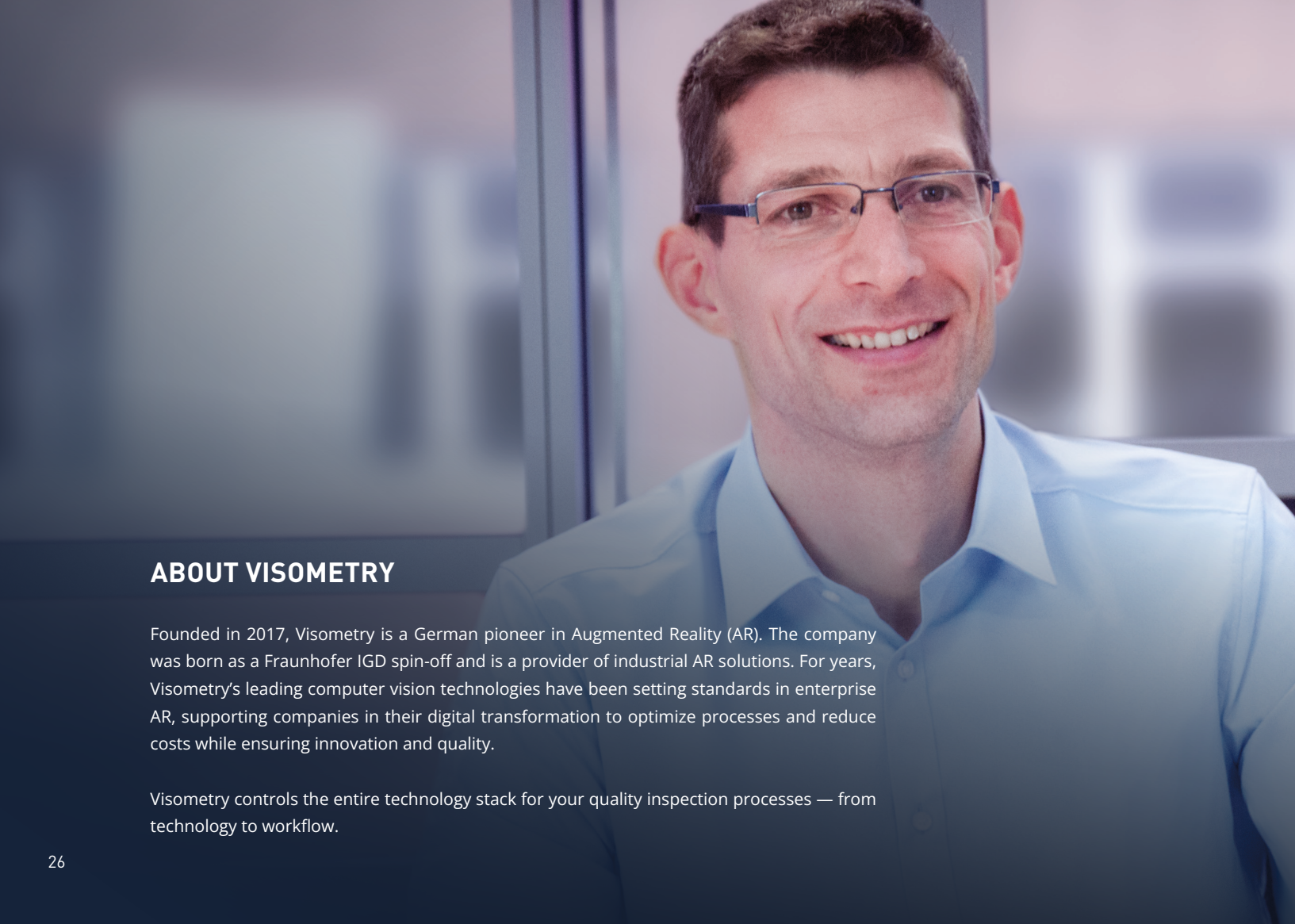
Twyn facilitates both the visualization and assessment of ideas and prototypes before they become final products. This enables manufacturers to minimize unnecessary iterations, saving both time and money associated with producing physical prototypes and products.

Quality gates in »manufacturing to order«

Twyn's ability to verify parts against their CAD specifications simplifies the establishment of quality gates throughout the production process. This helps identify errors as they arise, preventing costly downtimes and rework.

Maintenance and repair

Twyn is used to support various maintenance practices and audit requirements aimed at keeping equipment, devices, and machinery operational. By comparing the target state with the actual state, it is possible to directly and intuitively identify errors for repair, replacement, and servicing.



ABOUT VISOMETRY

Founded in 2017, Visometry is a German pioneer in Augmented Reality (AR). The company was born as a Fraunhofer IGD spin-off and is a provider of industrial AR solutions. For years, Visometry's leading computer vision technologies have been setting standards in enterprise AR, supporting companies in their digital transformation to optimize processes and reduce costs while ensuring innovation and quality.

Visometry controls the entire technology stack for your quality inspection processes — from technology to workflow.

VISOMETRY

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