

Technical Deep Dive: How SHINING 3D Advances Metrology 3D Scanners Through Optical Precision Technology

An Overview of Optical Technologies Supporting Accurate 3D Measurement and Industrial Inspection

CALIFORNIA, CA, UNITED STATES, September 1, 2026 /EINPresswire.com/ -- [SHINING 3D](#) offers fixed, handheld, and tracking-based metrology 3D scanning systems that leverage a range of optical measurement technologies, including LED projection and laser scanning, together with dynamic tracking and video photogrammetry, to support dimensional inspection and quality control in industrial environments.

China, September 1, 2026— SHINING 3D Tech Co., Ltd., established in 2004 and headquartered in Hangzhou, China, develops high-precision 3D vision technology for industrial metrology and digital dentistry. The company's metrology 3D scanners are used across automotive, civil aviation, energy, heavy industry, mold manufacturing, consumer electronics, and related sectors. According to company data, SHINING 3D products are sold in more than 100 countries, with overseas sales representing roughly 70 percent of total business.



SHINING 3D

Logo for SHINING 3D

Industry Context: Optical Measurement on the Factory Floor

The global 3D scanning market was estimated at USD 4.28 billion in 2024, and laser scanners accounted for 45.3 percent of total revenue, according to Grand View Research. MarketsandMarkets valued the broader 3D metrology market at USD 11.13 billion in 2024. The

automotive sector is often cited as the largest end-user segment for 3D scanning, with applications ranging from in-line inspection to reverse engineering.

Within this landscape, metrology-grade 3D scanners are designed to deliver laboratory-level accuracy in production environments. They capture dense point clouds that can be compared with CAD models, enabling dimensional inspection, geometric dimensioning and tolerancing (GD&T) analysis, and first article inspection without contact.

Company Technology Base

SHINING 3D reports a technology portfolio that includes more than 330 authorized patents and over 230 software copyrights. The company's R&D staff accounts for roughly 40 percent of its total workforce, and its primary facility in Hangzhou covers nearly 140,000 square meters. The company also maintains subsidiaries in Europe, North America, and Japan.

In addition to product development, SHINING 3D has built a metrology infrastructure around certified accuracy. Its accuracy laboratory is accredited to ISO/IEC 17025, and many of its scanner models are acceptance-tested according to VDI/VDE 2634 and ISO 10360. The company has also implemented ISO 9001, ISO 14001, ISO 45001, and ISO/IEC 27001 management systems.

Structured Light with Blue LED Fringe Projection

Structured light scanning projects a known pattern onto an object and analyzes how the pattern changes across the surface. A camera records the deformed pattern, and software calculates 3D coordinates from the distortion. Blue light shortens the wavelength and reduces sensitivity to ambient light, which helps when measuring complex industrial parts.

SHINING 3D's fixed high-precision inspection metrology systems use this approach. The OptimScan Q12 HD is a blue LED structured light scanner with four 12.3-megapixel cameras. In small-range mode, the scanner offers 0.004 mm accuracy and a point distance of 0.02 mm. The large range covers 220 x 150 mm, while the small range covers 80 x 50 mm. Operators can switch between ranges without changing lenses.

The system also includes Monocular-Stereo Fusion (MSF), which automatically combines monocular and stereo data to reduce blind spots at grooves, slots, and joints. This is a common problem in conventional scanning.

Handheld Laser Scanning with Hybrid Light Sources

For applications that require portability, SHINING 3D offers handheld metrology 3D scanners using blue laser and infrared VCSEL light sources. Blue laser scanning is well suited for dark and reflective surfaces, while infrared VCSEL enables marker-free scanning of feature-rich parts. The FreeScan Omni is a wireless standalone scanner with certified accuracy of 0.02 mm. It reaches scan speeds of 7,619,000 points per second and offers multiple scan modes: 93 laser

lines for high-speed scanning, 25 parallel lines for detailed areas, one line for deep pockets, and infrared mode for large marker-free surfaces. The device has built-in computing, a 5.5-inch touchscreen, and hot-swappable batteries. The most valuable feature is its on-device inspection using PTB-certified SHINING3D Inspect software.

Dynamic Tracking and Automatic Stitching for Large Objects

Large assemblies and oversized components need a measurement system that can maintain accuracy over a wide volume. The FreeScan Trak Nova Series combines an optical tracker with a handheld scanner to capture real-time 3D data without requiring coded markers on most parts. Accuracy is up to 0.02 mm, and scan speed reaches 7,600,000 points per second. The system offers a field of view up to 2600 x 2200 mm and includes 62 laser lines in high-speed mode, 25 parallel lines for detail, and one line for deep pockets.

Video Photogrammetry and Volumetric Accuracy

When 3D data is stitched across many scans, errors can accumulate. Video Photogrammetry is a technique that uses images to establish a high-accuracy reference framework around the object. SHINING 3D has implemented video photogrammetry (VPG) in several scanner models, replacing the need for separate camera systems and reducing preparation time.

VPG continuously tracks reference points and optimizes their spatial positions during scanning. This improves volumetric accuracy for large objects. For example, the FreeScan Omni achieves a volumetric accuracy of 0.02 mm + 0.015 mm/m with VPG. The FreeScan Trak Nova Series reports up to 0.046 mm + 0.012 mm/m in extended volume with VPG.

Inspection Software

Metrology scanning becomes useful when the captured data can be processed into clear measurements. SHINING 3D's SHINING3D Inspect software is PTB-certified and supports 3D comparison against CAD models, cross-section analysis, feature and dimension measurement, GD&T evaluation, and report generation. SHINING 3D's scanners also integrate with external platforms such as PolyWorks inspector, Geomagic Control X.

Industrial Applications

Automotive manufacturers use metrology 3D scanners for body panel inspection, sheet metal deviation analysis, battery system quality control, and tooling validation. Civil aviation and aerospace teams use them for engine blade geometry checks, damage assessment, and structural component verification. In the energy sector, scanners measure turbine blades,

pipeline sections, and heavy equipment.

Marine and shipbuilding operations use handheld scanners to digitize hull sections, propellers, and onboard components under field conditions. In consumer electronics, fixed structured-light scanners inspect housings, connectors, and small precision parts. Mold manufacturers use 3D scanning to monitor tool wear, validate repair work, and compare machined surfaces against design data.

For reverse engineering, scanned data can be converted into CAD-compatible models when original design files are unavailable. This workflow is common in legacy part replacement, product redesign, and custom modification.

Selecting a Metrology 3D Scanner

Selection begins with object size. Components smaller than 500 mm generally benefit from fixed blue-light scanners like the OptimScan series, which provide high resolution and repeatability. Medium and large parts in the 500–2500 mm range are often inspected with handheld scanners such as FreeScan Omni series, FreeScan Combo series and FreeScan UE series, which combine accuracy with portability. For structures larger than 2500 mm, dynamic tracking systems like the FreeScan Trak Nova Series help control volumetric accuracy over large scan volumes.

The required accuracy tier also matters. Traceable calibration certificates based on VDI/VDE 2634 and ISO 10360 provide a documented basis for decision-making.

Operators should also evaluate environmental factors. Wireless scanners reduce cable restrictions on shop floors. Marker-free tracking reduces preparation time on large parts. Inspection software compatibility and reporting features affect how easily results can be shared with engineering teams.

Outlook

The demand for digital measurement data is increasing as manufacturers adopt automated quality management and digital traceability. Metrology 3D scanners that combine certified accuracy, efficient scanning modes, and integrated inspection software are well positioned to support this transition. SHINING 3D's fixed, handheld, and tracking-based scanner solutions reflect this approach.

Official company website: www.shining3d.com

SHINING 3D

Shining 3D Tech Co., Ltd.

+ +86 571 8299 9050

marketing@shining3d.com

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