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Global Nano-scale Automatic Optical Inspection System Market 2026 by Manufacturers, Regions, Type and Application, Forecast to 2032

https://marketpublishers.com/r/GDEC36959BF1EN.html
Date: June 2026
Pages: 109
Price: US$ 3,480.00 (Single User License)
ID: GDEC36959BF1EN

Abstracts

According to our (Global Info Research) latest study, the global Nano-scale Automatic Optical Inspection System market size was valued at US$ 2572 million in 2025 and is forecast to a readjusted size of US$ 4499 million by 2032 with a CAGR of 8.3% during review period.

In 2025, the global production of nanoscale Automated Optical Inspection (AOI) systems is expected to reach approximately 4,500 units. Nanoscale AOI is a high-precision, automated optical inspection device primarily used in semiconductors, microelectronics, and high-density printed circuit boards to rapidly and non-contactly detect microscopic defects, solder joint quality, and surface morphology. Its principle involves capturing images of the target surface using high-resolution cameras, achieving nanoscale magnification through precision optical systems, and then applying image processing algorithms to compare, identify, and classify defects, detecting dimensional deviations, surface imperfections, solder joint faults, and morphological anomalies. The system typically integrates three-dimensional imaging, optical interferometry, or structured light measurement, along with pattern recognition and artificial intelligence algorithms, to accurately analyze and record fine features. This enhances production yield and product consistency, reduces human inspection errors and costs, and provides a reliable online quality control solution for high-end electronics manufacturing, semiconductor packaging, and microelectromechanical systems (MEMS).

The nano-level automatic optical inspection system is a high-end precision testing device widely used in semiconductor packaging, optical components and precision electronics industries. At present, the global market is mainly occupied by overseas

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leading enterprises with high technical barriers. Relying on mature optical algorithms, sophisticated hardware and long-term research and development accumulation, foreign brands maintain a dominant position in the market. Although domestic manufacturers started relatively late, they benefit from strong downstream manufacturing demand and complete industrial supporting conditions. Local enterprises keep increasing research investment, improving detection accuracy and equipment stability, and gradually narrowing the technological gap with imported products. As high-end manufacturing continues to upgrade, manufacturers have raised higher requirements for product fineness, yield and intelligent quality inspection, which drives the growing market demand for nano optical inspection equipment. In the long run, the industry presents a steady upward trend. With huge room for domestic substitution, intelligent, high-precision and integrated equipment will become the mainstream development direction, bringing broad market prospects and sustainable growth momentum to the whole industry.

This report is a detailed and comprehensive analysis for global Nano-scale Automatic Optical Inspection System market. Both quantitative and qualitative analyses are presented by manufacturers, by region & country, by Detection Object and by Application. As the market is constantly changing, this report explores the competition, supply and demand trends, as well as key factors that contribute to its changing demands across many markets. Company profiles and product examples of selected competitors, along with market share estimates of some of the selected leaders for the year 2025, are provided.

Key Features:

Global Nano-scale Automatic Optical Inspection System market size and forecasts, in consumption value ($ Million), sales quantity (Units), and average selling prices (K US$/Unit), 2021-2032

Global Nano-scale Automatic Optical Inspection System market size and forecasts by region and country, in consumption value ($ Million), sales quantity (Units), and average selling prices (K US$/Unit), 2021-2032

Global Nano-scale Automatic Optical Inspection System market size and forecasts, by Detection Object and by Application, in consumption value ($ Million), sales quantity (Units), and average selling prices (K US$/Unit), 2021-2032

Global Nano-scale Automatic Optical Inspection System market shares of main players,

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shipments in revenue ($ Million), sales quantity (Units), and ASP (K US$/Unit), 2021-2026

The Primary Objectives in This Report Are:

To determine the size of the total market opportunity of global and key countries

To assess the growth potential for Nano-scale Automatic Optical Inspection System

To forecast future growth in each product and end-use market

To assess competitive factors affecting the marketplace

This report profiles key players in the global Nano-scale Automatic Optical Inspection System market based on the following parameters - company overview, sales quantity, revenue, price, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include KLA Corporation, Applied Materials, Inc., Onto Innovation, Inc., Camtek Ltd., Toray Engineering Co., Ltd., Hitachi High-Tech Group, ASML Holding N.V., Lasertec Corporation, MueTec GmbH, Koh Young Technology Inc., etc.

This report also provides key insights about market drivers, restraints, opportunities, new product launches or approvals.

Market Segmentation

Nano-scale Automatic Optical Inspection System market is split by Detection Object and by Application. For the period 2021-2032, the growth among segments provides accurate calculations and forecasts for consumption value by Detection Object, and by Application in terms of volume and value. This analysis can help you expand your business by targeting qualified niche markets.

Market segment by Detection Object

Patterned Wafer Defect Inspection

Unpatterned Wafer Defect Inspection

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Mask/Reticle Defect Inspection

Others

Market segment by Optical Imaging Method

Bright-field Defect Inspection

Dark-field Defect Inspection

Others

Market segment by Resolution

Low Resolution (10–50 µm)

Medium Resolution (1–10 µm)

High Resolution (

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