MCA II Articulated arms
Portable productivity
The MCA II, Manual Coordinate measuring Arm, is a precise, reliable and comfortable portable measuring system available in a 6- or 7-axis version. Its wireless operation and battery power make it feel perfectly at home in the metrology lab, on the shopfloor and in the field.

The MCA II can be equipped with a wide range of probing systems for laser scanning, touch trigger measurements and continuous scanning. Its flexibility makes this measurement arm the perfect partner for a wide range of measurement tasks.

**Accuracy first**
- Accuracy certified according to ASME B89 standard
- MCA II+ series (6-axis) for unsurpassed top accuracy

**Measure anywhere**
- True portable system thanks to lightweight carbon fiber and aluminum alloy components
- Wireless operation using internal battery and WiFi data communication

**Ergonomic design**
- Patented infinite rotation for effortless measurements
- Quick and repeatable change of probes thanks to the TESA kinematic joint adaptor
- Ergonomic wrist, incorporating tactile selection buttons

**Maximum up-time**
- “In the field” system verification with a NIST-traceable calibrated length standard with every arm
- Automatic probe recognition to easily change probes

An 802.11g WiFi connection allows the operator to position the computer where it is most convenient. A Li-Ion battery allows on-site inspection without AC power or cables.
MMDx /MMC Laser scanner

The ModelMaker MMDx digital laser scanner featuring ESP3 scans any material and provides a detailed digital representation of the test object in minimum time. It is ideally suited for part-to-CAD comparison, inspection of soft or fragile components and reverse engineering.

- Choice between 50mm and 100mm (MMDx) or 40, 80, 160mm (MMC) stripe widths
- Seamless integration with Focus point cloud software and other 3rd party software packages

A variety of touch trigger probes

MCA II supports a wide variety of touch trigger probes. Featuring “Automatic probe recognition” an operator can change a probe during a work session and the inspection software identifies the “plug and measure” probes automatically and without recalibration. The MCA II comes with precalibrated tips, so even new tips can be used immediately.

Automatic probe recognition make it easy to switch between different probes on 6 and 7-axis MCA II

Heidenhain encoders, offer “wide-track” bearing support that enhances performance.

Patented infinite rotation of principle axes allows inspection in difficult-to-reach areas.

Rotating grips at elbow and forearm provide low friction grip positions for better ergonomics.
<table>
<thead>
<tr>
<th>Model</th>
<th>Measuring range</th>
<th>Point repeatability(^1)</th>
<th>Volume Length Accuracy(^1)</th>
<th>Arm weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCA II 7-axis</td>
<td>1.8m (6ft)</td>
<td>0.024mm</td>
<td>0.035mm</td>
<td>9.6kg</td>
</tr>
<tr>
<td></td>
<td>2.4m (8ft)</td>
<td>0.028mm</td>
<td>0.040mm</td>
<td>8.3kg</td>
</tr>
<tr>
<td></td>
<td>2.8m (9ft)</td>
<td>0.045mm</td>
<td>0.064mm</td>
<td>8.3kg</td>
</tr>
<tr>
<td></td>
<td>3.0m (10ft)</td>
<td>0.050mm</td>
<td>0.071mm</td>
<td>8.9kg</td>
</tr>
<tr>
<td></td>
<td>3.6m (12ft)</td>
<td>0.070mm</td>
<td>0.100mm</td>
<td>9.1kg</td>
</tr>
<tr>
<td>MCA II 6-axis</td>
<td>1.8m (6ft)</td>
<td>0.016mm</td>
<td>0.023mm</td>
<td>7.6kg</td>
</tr>
<tr>
<td></td>
<td>2.4m (8ft)</td>
<td>0.020mm</td>
<td>0.029mm</td>
<td>7.8kg</td>
</tr>
<tr>
<td></td>
<td>2.8m (9ft)</td>
<td>0.029mm</td>
<td>0.041mm</td>
<td>8.0kg</td>
</tr>
<tr>
<td></td>
<td>3.0m (10ft)</td>
<td>0.034mm</td>
<td>0.050mm</td>
<td>8.2kg</td>
</tr>
<tr>
<td></td>
<td>3.6m (12ft)</td>
<td>0.050mm</td>
<td>0.068mm</td>
<td>8.7kg</td>
</tr>
<tr>
<td>MCA II+ 6-axis</td>
<td>2.4m (8ft)</td>
<td>0.017mm</td>
<td>0.025mm</td>
<td>7.8kg</td>
</tr>
<tr>
<td></td>
<td>3.6m (12ft)</td>
<td>0.043mm</td>
<td>0.058mm</td>
<td>8.7kg</td>
</tr>
</tbody>
</table>

\(^1\) Point Repeatability Test (also known as Single Point Articulation Test, or S.P.A.T.): Results analyzed via Range2 method. The probe is placed within a trihedral seat or conical socket, and individual points are measured from multiple approach angles with maximum articulation of all of the principal joints. Each individual point measurement is analyzed as a range of deviations about the average value for the point locations. This test is to assess the arm’s ability to provide similar values of a point coordinate, when the arm is articulated through the maximum possible range of motion for that single point. Accuracies are certified according to ASME B89.4.22 standard.

\(^2\) Volumetric Length Accuracy Test (Volumetric Performance Test): Results analyzed via Range2 method. Volumetric Length Accuracy is determined by using certified length standards (included with all arms) that are measured at various locations and orientations throughout the measuring volume. This test most accurately represents the reasonable expectations for machine performance in practical measuring applications. The Volumetric Length Accuracy Test is the most appropriate test for determining machine accuracy and repeatability since it involves measuring a certified length standard many times in several locations and orientations and compares the resultant measurements to the actual length. Accuracies are certified according to B89.4.22 standard.

**General conditions**

Operating temperature range: 0°C to 46°C (32°F to 115°F)

Humidity: 5% - 95% noncondensing

Vibration: (55 to 2000Hz): < 100 ms/s\(^2\)

Shock & Impact: 6ms, <1000 ms/s\(^2\)

Power requirement: Universal worldwide voltage 110-240V

Certification: CE compliant
NIKON METROLOGY SOLUTIONS

CMM LASER SCANNING
HANDHELD LASER SCANNING
ROBOTIZED LASER SCANNING
X-RAY AND CT INSPECTION
VISION MEASURING INSTRUMENTS
MEASURING/INDUSTRIAL MICROSCOPES
LARGE SCALE METROLOGY
CNC AND PORTABLE CMMS
METROLOGY SOFTWARE
METROLOGY SERVICES
ModelMaker MMDx
Portable productivity
Focus point cloud processing
LC series CMM-based line scanners
XC series multi-line Cross Scanners
ModelMaker handheld scanners
K-Scan MMDx walk-around scanner
RCA – Robot CMM Arm
K-Robot in-line inspection

XT H series industrial Computed Tomography systems
XT V series electronics X-ray inspection

iNEXIV VMA high-speed digital benchtop imaging system
NEXIV VMR video measuring system series
MM series measuring microscopes
IM series industrial microscopes
ShuttlePix P-400R digital microscope
NeoScope benchtop scanning electron microscope
Autocollimators
Profile projectors and optical comparators
Digimicro digital length measuring systems
Semiconductor inspection systems
Vision measuring software

Laser Radar large volume inspection
iGPS / iSpace large volume metrology, tracking and positioning
Adaptive Robot Control

Bridge CMMs
Horizontal arm CMMs
Gantry CMMs
MCA – Manual CMM Arm
Camio multi-sensor metrology software
CMM-Manager metrology software

Wheel/EngineTracker
DMM - Dynamic Motion Measurement
Robot calibration & testing

NIKON METROLOGY | VISION BEYOND PRECISION
Revolutionizing dimensional quality control

Nikon Metrology uniquely blends the innovation of Metris’ non-contact measuring technologies with the optical excellence of Nikon’s industrial measurement solutions. As the combined product portfolio ensures fast (sub)micron measurement of the inner and outer geometry of parts, Nikon Metrology solutions are being adopted by world-class manufacturers active in automotive, aerospace, electronics, medical, shipbuilding, cosmetics, general manufacturing and other industries.

A digital inspection process reduces time to market and cuts development costs

Manufacturing companies implementing a digital development process are more successful in reducing time to market and cutting development costs. As dimensional quality control provides the touch with reality, it is a critical factor throughout the different stages of this digital process.

Nikon Metrology’s innovations in laser scanning technology and point cloud software are key enablers of the Digital Inspection Process. Compared to inspecting directly on the physical part, “Digital Inspection” first digitizes the part and subsequently runs inspection on the acquired digital data. As a result, the Digital Inspection Process — from measurement preparation to final report — takes advantage of the typical automation capabilities and flexibility benefits of a digital approach, saving time and money at the end of the day. As the complete digital copy of the specimen remains available, full flexibility is offered to run other or more detailed analysis at any time and place.

Tracing tiny imperfections and hidden defects using cutting-edge optical and X-ray/CT technology

Gaining a deeper Insight into the Inside is crucial for small and complex components because many critical features cannot be accessed by touch probes or seen by optical sensors. For these challenging inspection tasks, Nikon Metrology offers a broad range of X-ray and Computed Tomography solutions that allow for non-destructive inspection of a wide range of products, including loaded printed circuit boards (PCBs), plastic components, castings, innovative materials, medical and consumer goods, and archeological findings.

Precision metrology instruments from Nikon ensure the finest Quality Assurance throughout production. Founded on Nikon’s optical excellence, video measuring systems, measuring microscopes and optical comparators offer submicron accuracy for measuring even the smallest of work pieces. Supporting multi-sensor capability, submicron accuracy and inspection automation, Nikon Metrology instruments can measure an unbelievable variety of parts, including complex 3D pieces and IC packages, dies, moulds and wafer carriers as well as flat panels, shadow masks and etching sheets for lead frames.

Metrology Assisted Production for first-time-right manufacturing

As large components are often very expensive because they are produced in small quantities, first-time-right production is the only valid approach. In a Metrology Assisted Production environment, accurate on-line geometry data is fed back into the process to consistently increase the precision and speed of manufacturing. Innovative large-scale metrology solutions position and track parts while they are being assembled. Alternatively, metrology data can be used to calibrate industrial robots, or drive a closed-loop feedback loop to firmly increase positional robot accuracy. Leading automotive, aerospace and other manufacturing companies rely on Metrology Assisted Production solutions from Nikon Metrology to produce higher-quality products and realize production cost and throughput time savings.

Uniquely positioned to deliver total metrology solutions

Next to the innovative non-contact metrology technologies, Nikon Metrology offers a broad range of Traditional Metrology Solutions such as CNC and portable CMM. With this complete product and service offering for the micro metrology market, Nikon Metrology is uniquely positioned to deliver total solutions. Its successful strategy turned this company into a leading metrology player and a one-stop-metrology-shop providing a broad range of fully integrated metrology solutions. In addition, Nikon Metrology customers benefit from a single after-sales services organization that delivers true economic value.

Metrology innovations, a complete solution portfolio and excellent service are what make Nikon Metrology unique in the worldwide micro metrology market.
Digital Inspection Process

Nikon Metrology laser scanning and point cloud solutions are key enablers of the Digital Inspection Process (DIP). Digital copies of prototypes, components and assemblies feed real-world information into today’s digital design-through-manufacturing process.

- **POINT CLOUD PROCESSING**
  - CMM LASER SCANNING
  - HANDHELD LASER SCANNING
  - ROBOTIZED LASER SCANNING
Focus Inspection is today’s reference for point cloud inspection. The software offers stunning performance, an intuitive user-interface, and standard macro functionality to automate the entire inspection process.

Focus Inspection provides feature and full part-to-CAD 3D inspection, starting from point cloud data or meshes from CMM scanners, handheld scanners or Computed Tomography (CT). Focus Inspection visualizes inspection results in easy-to-interpret, interactive graphics and reports.

Features
- Superior point clouding handling
  - Up to 100 million points
  - Powerful and automated feature detection algorithms
- Full inspection toolbox
  - Full part comparison to CAD or STL
  - Complete set of 2D and 3D features
  - GD&T (Geometric Dimensioning & Tolerancing)
  - Wall thickness, flush & gap, and directional comparison
- Flexible reporting and data sharing
- All inspection functions fully automatable
- Dedicated inspection modules (e.g. Turbine Blade Inspection)

Benefits
- High productivity and data processing consistency with minimum effort
- Operator-independent results with accurate feature detection algorithms
- Designed for industrial use by operators and engineers
- Inspection automation without requiring programming skills
- Easy-to-interpret and interactive reporting to facilitate decision making
Focus Scan – Fast, easy and accurate data capture for CMM laser scanning

Focus Scan is the driver software for Nikon Metrology laser scanner integrations on CMMs. It provides off-line and on-line scanner path definition, and acquires and pre-processes the raw point cloud data. The software is fully integrated with Focus Inspection, Reverse Engineering and Automation. Focus Scan’s off-line module enables users to create, modify and prove out part programs using 3D CAD models, allowing CMMs to be used exclusively for measurement.

Focus RE Basics - Straightforward reverse engineering

Focus RE Basics quickly creates CAD surface models from individual point clouds using a straightforward workflow. Reverse engineering is typically applied when original CAD data is missing, to create CAD from handmade clay models, to update designs, or as input for rapid prototyping of freeform parts and products.
Digital laser scanning boosts inspection performance

The all-digital LC60Dx brings laser scanner in the accuracy range of tactile measurement, while offering the advantage of capturing a multitude of measurement points. Equipped with state-of-the-art CMOS technology and powerful on-board data processing, the LC60Dx scanner more than triples today’s common scan rates. This enables manufacturers to drastically reduce the inspection cycle time for freeform parts, or boost the number of features that can be scanned in the same time frame.

The LC50Cx laser scanner offers an adequate productivity with its 50mm stripe width and scanning rate of 45 stripes per second. And LC15, with its smaller field of view perfectly suits digitizing small or detailed objects with higher point density and tighter tolerances.

To effectively scan surfaces with varying color or high reflectivity, LC60Dx and LC50Cx provide automatic real-time adjustment of sensor settings for each individual point of the laser stripe.

**Features**

- Laser stripe width of 60mm (LC60Dx), 50mm (LC50Cx) or 15mm (LC15)
- Accuracy of 9μm (LC60Dx), 19μm (LC50Cx) and 4μm (LC15) in multi-stylus test comparable to EN/ISO 10360-5 MPE_{t}
- Enhanced Sensor Performance (ESP3) incorporates dynamic point-per-point adaptation of laser source intensity.
- Scanning rate 75,000 (37,500) points/sec for LC60Dx (LC50Cx)
- Fully compatible with Renishaw PH10M(Q) and automatic change racks (ACR)
- Data collection over multi-wire is integrated into most CMM brands and types
- Designed for minimum warm-up time and maximum operational stability and robustness

**Applications**

Inspection and reverse engineering of mobile phones, turbine blades, tools, castings, dies, sheet metal parts, plastics, etc.

**Related solutions**

- Bridge, horizontal arm and gantry CMMs
- Focus point cloud software, Inspection and Reverse Engineering software
- Camio multi-sensor CMM software

**BENEFITS OF CMM-BASED LASER**

- Simplified measurement and processing setup
  - Teach scan paths or indicate scan area on CAD
  - Import feature properties and GD&T information directly from CAD
  - Macro functionality for fully automated scanning and inspection

- Reduced measurement time
  - Reduction of probe head movements
  - XC65D(-LS) scanner captures full feature information in a single movement
XC65D(-LS) Cross Scanner

Full 3D capture of complex features and surfaces

Incorporating 3 lasers in a cross pattern, the XC65D captures all full 3D details of features, edges, pockets, ribs and freeform surfaces in a single scan. By digitizing complex features from 3 sides, the Cross Scanner acquires the complete 3D geometry of the features, driving the accurate extraction of positions and dimensions.

The Cross Scanner’s entirely digital operation boosts scanning frequency and drives intelligent laser intensity adaptation to scan any surface without user interaction.

Features
- Cross-pattern of 3 lasers to obtain full 3D view in one scan
- Drastically reduces time-consuming probe head indexing and eliminates C-axis
- Fast digital scanner operation including high-speed CMOS camera technology
- XC65D-LS longer stand-off variant for optimum capture of deep pockets and slots
- Accuracy 9µm (XC65D) and 12µm (XC65D-LS)

Applications
- Inspection sheet metal features (slots, holes, etc.)
- Inspection of castings and complex surfaces
- Feature inspection
- Gap & flush inspection

The XC65D is the scanner of choice for sheet metal, plastics and composites inspection applications.

The scanner’s high field of view depth results in major time savings when inspecting automotive cast parts.

SCANNING

- Unique capability to measure freeform and fragile surfaces
  - Detailed description of freeform surfaces in short time interval
  - Non-contact measurement eliminates the need to touch fragile and delicate parts
  - Powerful reporting with colored CAD deviation maps
  - Input for reverse engineering, rapid prototyping, finite element calculations, and digital archiving
ModelMaker MMDx/MMc

Intuitive scanning and one-click analysis

The ModelMaker handheld laser scanners are ideally suited for portable 3D inspection and reverse engineering applications. MMDx camera technology is a major leap forward in 3D laser scanning, as it introduces high frame rate and a large stripe width up to 200mm for ultra-productive scanning. MMDx incorporates Enhanced Sensor Performance (ESP3) to scan all sample materials and surface finishes in a single move.

The digital camera benefits from a true non-interpolated resolution of more than a thousand points per stripe, providing optimum resolution for efficient scanning of freeform surfaces and features. ModelMaker is compatible with MCA series and many 3rd party articulated arms in addition to the K-Series Optical CMM system.

Features
- Multiple stripe widths available from 40 to 200mm
- Accuracy down to 10μm (1σ)
- Enhanced Sensor Performance for scanning materials with varying surface materials and reflectivity
- Out-of-the-box scanning with direct plug into PC
- Focus software for handheld 3D laser scanning
  - Real-time rendered scan visualization
  - Localizer-driven scanning menu
  - Mesh creation and processing
  - Part-to-CAD comparison

Benefits
- Ergonomic solution thanks to lightweight housing and full scanner control at your fingertips
- Superior scanning accuracy for freeform and feature inspection
- High scanning throughput through fast digital data capture
- Robust design for use under all shopfloor conditions

Applications
- Part-to-CAD inspection
- Inspection of geometric features
- Gap & flush inspection
- Reverse engineering – from concept studio clay to class A surfaces
- Input for rapid prototyping

Related solutions
- MCA II articulated measuring arms
- K-Series Optical CMM
- Focus point cloud processing software

MMDx scanner is available in 50/100/200mm stripe width
K-Scan MMDx

Walk-around scanning in large work volumes

K-Scan MMDx is a handheld walk-around laser scanner for portable metrology applications in a large work volume. Continuous and precise probe tracking through the system’s Optical CMM and 20 infrared markers integrated into the laser scanner device eliminate all mechanical constraints for effortless scanning.

Accurate performance and superior ergonomics make K-Scan MMDx a user-friendly handheld scanning solution. K-Scan MMDx is the ideal tool for accurate part-to-CAD inspection and productive reverse engineering of large components. Dynamic referencing guarantees consistent measurement results even when the camera or the measurement object moves during scanning.

Features

• Measuring volume of 17m³ expandable by adding more cameras
• Stripe width between 50 to 200mm (depending on the selected scanner type)
• Lightweight carbon fiber probe design
• Dynamic referencing to measure instable or moving parts
• SpaceProbe available for tactile measurements

Benefits

• Measure anywhere
• Effortless handling through probe tracking and ergonomic design
• High scanning throughput and superior accuracy
• Multi-camera setup enlarges work volume to capture complete car or truck

Applications

• Full surface and feature inspection of larger parts
• Flush & gap inspection
• On-site troubleshooting
• Solving assembly problems

Related solutions

• K-Series Optical CMM
• SpaceProbe
• Focus point cloud processing software
### RCA - Robot CMM Arm

**Automation – Accessibility – Mobility**

RCA combines the best of two worlds by offering the automation capability of a traditional CMM and the mobility and part accessibility of an articulated arm. To accelerate repetitive 3D inspection, RCA interfaces a highly accurate internal 7-axis articulated arm with an external skeleton driven by electric motors.

This unique concept creates an in-line inspection robot that drives a 3D laser scanner along the programmed sensor motion path. The capability to access inner cavity locations of specimens, such as vehicle body shells, is a major leap forward compared to traditional CMMs and even articulated arms.

### Applications

- In-line or next-to-line sheet metal inspection
- Feature and surface inspection
- Full part-to-CAD inspection
- Flush & gap inspection
- Repetitive on-site inspection of castings and machined aerospace parts
- Troubleshoot production issues by having RCA temporarily inspect production samples

### Related solutions

- Laser scanners
- Camio multi-sensor metrology software

### Features

- Inspection volume up to 4.2m diameter
- Optimal scanning through continuous adaptation of scanner orientation
- Excellent material scanning and fast data acquisition
- Handheld control panel runs on Camio software
- Internal metrology arm
  - Premium encoder technology
  - Stiff carbon fiber axes
- Operating temperature range from 0 to +45°C (32 to 113°F)
- Integrated controller
- Off-line programming from CAD

### Benefits

- Robotized laser scanning for fast part-to-CAD inspection
- Absolute measurement accuracy
- Full access to inner cavity locations of body shells and other specimens
- Docking stations facilitate fast and repeatable RCA installation

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**Extreme accessibility and powerful automation capabilities are RCA’s major strength**
K-Robot

In-line robotized scanning and inspection

K-Robot is a flexible, productive and accurate metrology solution for in-production-line inspection using an industrial robot. The Optical CMM dynamically tracks the location of K-Robot’s ModelMaker laser scanner while the robot is running an automatic scanning job. High scanning accuracy is guaranteed, as proven metrology components of K-Robot obsolete cyclic robot calibration and eliminate the influence of robot warm-up, drift and backlash.

Features

- Global absolute accuracy: better than 100µm in the entire work volume
- Robust against ambient light conditions
- Inspection results in Microsoft Excel and SPC-compatible formats
- Automatic rapid digitizing for part-to-CAD inspection or adaptive machining
- Excellent material scanning and fast data acquisition
- Operating temperature range from +15 to +35°C (59 - 95°F)

Benefits

- Truly absolute measurement accuracy
- Eliminates effects of robot warm-up, drift and backlash
- Interfaces to any robot brand, size and accuracy level
- High scanning accuracy and throughput
- Off-line teaching and programming

Applications

- Feature and surface inspection
- Gap & flush
- Sheet metal and body-in-white as well as forged or molded parts
- Partial in-line inspection of the entire production volume
- Complete bypass inspection of production samples

Related solutions

- ModelMaker laser scanners
- K-Series Optical CMM
- Adaptive Robot Control

K-Robot’s independent metrology chain and closed feedback loop guarantee high scanning accuracy.

Fast repetitive laser scanning for in-production-line inspection.
Get the inside picture of complex electronics or industrial parts, by literally looking into the internal structure. Then use CT capability to qualify and quantify any inner or outer dimension, all in a smooth, non-destructive process.

- XT H 225 INDUSTRIAL CT SCANNING
- XT H 450 HIGH-POWER CT SCANNING
- XT V 130 ELECTRONICS X-RAY INSPECTION
- XT V 160 ELECTRONICS X-RAY INSPECTION
**Full inner and outer inspection of industrial components**

Detailed capture and measurement of internal component and assembly features is often vital for quality control, failure analysis and material research. XT H 225 offers a powerful micro-focus X-ray source, a large inspection volume, and high X-ray and CT imaging resolution. XT H 225 suits a wide range of applications, including inspection of small castings, plastic parts as well as material research.

**Features**
- Powerful 225kV micro-focus source with optional rotating target
- Real-time X-ray visualization, fast CT reconstruction
- CT measuring volume up to 250mm and 600mm height
- 5-axis fully programmable part manipulator
- Customizable macros automate measurement workflow
- Small footprint and castors & roller for easy handling

**Benefits**
- Flexibility combined in a single system: X-ray for quick visual inspection, CT for in-depth analysis
- Fast data capture and high-quality images
- Fast operation with interactive joystick navigation
- High-resolution digital imaging and processing
- Safe system requiring no special precautions or badges
- Tight integration with industry standard post-processing applications

**Applications**
- Evaluation and measurement of precision plastic parts and small castings, complex mechanisms, internal components, part-to-CAD comparison, etc.
- Detailed failure analysis
- Advanced material research and analysis of biological structures
- Digital archiving of models
- Troubleshooting of assembly issues

**Related solutions**
- XT H LC (Large Cabinet)
- Inspect-X software
- Focus Inspection software
- A wide range of customer-specific CT configurations can be provided

**Related images:**
- Part-to-CAD analysis
- Dimensioning
- Spurs of gold in calcite
- Cylinders fitted in holes
- CT of foam structure
- Snail fossil with offspring

An X-ray source with rotating target boosts X-ray flux by up to 5 times, enabling customers to obtain faster CT data acquisition or achieve higher CT data accuracy in the same time span.
XT H 450 for CT inspection of blades and castings

High power 450kV micro-focus source

The XT H 450 sets a new reference for turbine blade measurement and NDT of small to medium castings. At the core of this powerful equipment is a 450kV micro-focus source, providing superior resolution and accuracy.

The curved linear array detector optimizes the collection of X-rays by eliminating scatter phenomena that typically corrupt 2D radiographs of blades and other metal parts.

Features

• Unique 450kV micro-focus source
• Measuring volume up to 600mm diameter and 600mm height
• High efficiency linear detector 5-axis fully programmable turntable manipulator with precision ball screws and linear slides
• Dedicated application for automatic pass/fail inspection of turbine blades

Applications

• Detailed analysis of the internal structure of turbine blades
• Automated pass/fail inspection of blades
• Inspection of high density parts (e.g., metal parts, castings) with a need for micron accuracy

Benefits

• Flexibility combined in a single system: X-ray for quick visual inspection, CT for in-depth analysis
• Fast data capture and high-quality images
• High-resolution digital imaging and processing
• Safe system requiring no special precautions or badges

Related solutions

• XT H 225
• A wide range of customer-specific CT configurations can be provided

X-ray inspection of turbine blade
CT volume model of turbine blade

X-ray of chainsaw
X-ray of engine casting
CT volume model of engine casting
With the advent of many newer type of electronic components, surface inspection is no longer an option. As most electrical connections remain hidden for the eye, the ability to run premium quality real-time X-ray is more important than ever before. Designed for 100% (μ)BGA, multi-layer and PCB solder joint inspection, the XT V 130 X-ray system is a high-precision, flexible solution that facilitates defect analysis in loaded PCB boards. The system’s Inspect-X software offers automated inspection functions and (optional) automatic board identification, which ensure high inspection throughput rates.

### Applications

- **Electronic and electrical components**
  - Broken wedge bonds, lifted ball bonds, wire sweep, die attach, dry joints, bridging/shorts, voiding, BGA, etc.
- **Populated and unpopulated PCBs**
  - View surface mount defects i.e. misaligned devices, solder joint porosity and bridging
  - Detailed inspection of vias, through-hole plating and multi-layer alignment
  - Wafer-level chip scale packages (WL CSP)
- **BGA and CSP inspection**
- **Non-lead solder inspection**
- **Micro-electro-mechanical systems (MEMS, MOEMS)**
- **Cables, harnesses, plastics and many more**

### Features

- Proprietary micro-focus source with 3 micron focal spot size
- True tilt angles up to 60° for easy inspection of internal features
- High, 16-bit resolution imaging and image processing tools
- Large tray for loading multiple boards
- Optional rotation table (360° continuous)
- Optional CT upgrade

### Benefits

- X-ray inspection workhorse for electronics quality assurance
- Macro-based automation requires no programming skills
- Component-specific automated pass/fail analysis, off-line visualization station and automatic report generation
- Ready to automate complex tasks with VBA
- On-line operation with intuitive joystick navigation
- Low-cost maintenance with open-tube technology
- Safe system requiring no special precautions or batches
- Small footprint and low-weight for easy installation

**Related solutions**

- XT V 160
- Inspect-X
Top-class inspection system for miniaturized electronic components

Component connections on today’s compact and densely populated PCBs are hidden by other components, making X-ray the only viable inspection solution. XT V 160 is an easy-to-use, cost-effective and high-quality PCB inspection system targeting production facilities and failure analysis laboratories.

In automated inspection mode, samples can be inspected at the highest throughput. In manual mode, intuitive software and high-precision sample manipulation enable operators to visualize and evaluate the tiniest internal defects and deficiencies.

Features
- NanoTech™ source with submicron focal spot size
- True 75° tilting angle for optimum inspection of BGAs
- Fast data capture and high-quality imaging
- Large tray for loading multiple boards
- Customizable macros automate measurement workflow
- Remote validation station available

Benefits
- Flexibility combined in one system
  - Interactive visualization
  - Fully automatic X-ray inspection
  - Optional CT for in-depth analysis
- Maximum magnification at unrivalled angles (up to 75°)
- Fast operation with intuitive GUI and interactive joystick navigation
- Low-cost maintenance with open-tube technology
- Safe system requiring no special precautions or badges
- Small footprint

Applications
- Solder reflow analysis
- BGA connectivity and analysis
- Solder void calculation
- Through hole measurement and inspection
- Die attach voiding measurement
- Ball bond analysis
- Stitch bond analysis
- Micro BGA / chip on chop analysis
- Pad array analysis
- Dry joint detection and analysis

Related solutions
- XT V 130
- Inspect-X

Under any combination of rotation, tilt and magnification, the region of interest is consistently locked into the center of the field of view.
Precision metrology instruments ensure the finest quality assurance throughout production. Founded on Nikon’s optical excellence, video measuring systems, measuring and industrial microscopes and optical comparators set new standards for measuring even the smallest of work pieces.
Multi-sensor CNC video measuring system

The iNEXIV VMA-2520 is a lightweight and compact multi-sensor benchtop measuring system for fast, full-automatic and high-accuracy features. It is ideally suited for a wide variety of industrial measuring, inspection and quality control applications. The iNEXIV is designed to measure 3D workpieces, is touch probe ready, integrates the latest imaging processing software, and incorporates a new 10x optical zoom system and laser auto focus option.

The standard 10x zoom optics meet the industry’s demanding needs for superb resolution at high magnifications while offering a wide field of view at low magnifications. Low distortion optics and high-intensity white LED illumination sources improve contrast to enhance throughput. This combination assures reproducible measurements even for colorful parts.

Applications
- Mechanical parts (e.g. metal and injection molding parts)
- Electronic devices
- Dies
- Molds
- Medical devices

Related solutions
- iNEXIV video measuring systems
- VMA Automeasure software

Features
- Space-saving body weighing only 72kg
- 250 x 200mm xy stroke and 200mm z stroke
- Sophisticated VMA AutoMeasure software
- High-speed and highly accurate laser autofocus (option)
- Multi-sensor ready: vision, laser and touch probe

Benefits
- High accuracy through white LED illumination and use of aluminum alloy materials in the construction of the system
- Fast stage controls increase inspection yield
- New zooming optics make 3D part measurement easier
- Advanced image processing algorithm and intelligent search capability

Related images:
- iNEXIV VMA-2520
- Vision autofocus
- Aluminum die casting part
NEXIV VMR series

Legendary optics combine with ultra-precise automated video measurement

Nikon offers a complete line of NEXIV vision systems, each possessing Nikon’s trademark optical quality and rugged design for the highest precision measuring tasks. The NEXIV automated video inspection systems range from small to ultra-wide measurement platforms, and offer a variety of optical head options.

Applications

- Mechanical parts (e.g. machined, casted, stamped, etched and molded parts)
- Electronics (e.g. MEMS, probe cards, SMD, PCB, connector)
- Semiconductor packaging and advanced packaging technology (e.g. wafer-level CSP, flipchip)
- LCD-array process and flat panel display devices
- High-precision dies and molds
- Medical devices

Related solutions

NEXIV VMR systems are available in different stage sizes:
- NEXIV VMR-1515 (150x150mm)
- NEXIV VMR-3020 (300x200mm)
- NEXIV VMR-6555 (650x550mm)
- NEXIV VMR-10080 (1000x800mm)
- NEXIV VMR-12072 (1200x720mm)

Features

- Model types providing between 80μm and submicron accuracy
- Submicron accuracy achieved by robust hardware design and maximum magnification module VMR–Z120X, featuring 8-step zoom up to 120X
- Sophisticated VMR AutoMeasure software
- High-speed and highly accurate laser autofocus
- Optional 3D surface analysis, gear evolution, real-time SPC and rotary index

Benefits

- Broad size range of stages available (up to 1200x720mm)
- Advanced intelligent search enhances accuracy for increased productivity
- Excellent edge detection through advanced video edge probes and Nikon’s proprietary edge detection algorithm (patent pending)
- Fast stage controls increase inspection yield

Larger NEXIV VMR systems offer stages with strokes up to 1200x720mm. They are ideally suited for measuring PCB patterns, display panels and large-size workpieces, such as FPD devices.
MM-800/400/200 series of measuring microscopes

Measuring microscopes integrating digital imaging with industrial metrology

Nikon’s measuring microscopes offer performance, convenience and an unprecedented degree of flexibility for upgrading and expansion. The MM400/800 Series deliver complete digital control for maximum measuring accuracy in demanding industrial environments. Measuring microscopes are excellently suited to inspect and measure 2D and 3D small parts.

The MM-200 is a compact and lightweight measuring microscope with an affordable price for all who require precision and accuracy for measuring a variety of metal, plastic and electronic parts in all industries; especially automotive and electronics.

Applications

- Lab-on-a-chip
- MEMS
- Plastic manufacturing (e.g. injection molded parts)
- Medical devices
- Microelectronics and optoelectronics
- Micro tooling
- Surface analysis
- Cracks & failure analysis

Features

- Seamless integration with Nikon digital cameras and E-Max metrology software
- High-intensity white LED illuminator is standard for brightfield use
- Backpack interface facilitates automated illumination, XY stage and Z data control through an external computer running E-Max software
- Optional TTL Laser Auto-Focus
- For larger workpiece measuring, a stage up to 12x8 inch is available

Benefits

- Excellent geometric data processing and storage
- Ease of operation greatly improved through various motorized controls and ergonomic design
- Added body strength allows for using larger stages
- Expanded observation range by offering many options in illuminators and light sources
- A fully motorized high-power microscopy model is also available for digital imaging capability

Related solutions

- NEXIV and iNEXIV video measuring systems
- Industrial microscopes
Eclipse series of industrial microscopes

Industrial microscopes at the forefront of optical and technological innovation

Nikon Metrology offers a complete portfolio of industrial microscopes for a wide range of applications, from basic models to sophisticated systems for high-end inspection. The Eclipse range featuring optical and digital microscope systems offers outstanding versatility, performance and productivity to tackle practically any application.

Features

- Choice of observation methods: brightfield, darkfield, polarizing, Nomarski DIC, episcopic, diascopic, epifluorescence, etc.
- Upright or inverted microscopes
- Premium ergonomics for comfortable viewing through tilting eyepiece tube, easy accessible controls, electrostatic protection, vibration isolation, etc.
- Nikon’s acclaimed CFI60 optics achieve new levels of brightness, contrast and operability

Eclipse L300 microscope series of for large-size flawless inspection of LCDs and wafers

Configured for 300mm wafer and mask inspection, the Eclipse L300 Series also satisfies the need for flat panel display backend inspection. The L300 Series utilizes Nikon proprietary CFI60 optical system, offering high resolution, contrast and transmittance.

Eclipse L200 series of microscopes for inspecting 200mm wafers and masks

Combined with Nikon’s superior CFI60 LU/L optical system and an extraordinary new illumination system, this microscope provides brighter images with greater contrast. The L200 series is ideally suited for the inspection of wafers, photo masks and other substrates.

Eclipse LV150 series of microscopes for industrial inspection

The Eclipse LV150 Series microscopes provide superb performance when inspecting semiconductors, flat panel displays, packages, electronics substrates, materials, medical devices, and a variety of other samples.

Small-footprint Eclipse LV100 series delivers superb optics and ergonomics

Nikon’s Eclipse microscopes are renowned for their ability to produce clearer images with higher contrast. The LV100 delivers brighter images, lower power consumption and less heat generation, thereby reducing the chance of heat-induced focus drift.

Eclipse MA200

A inverted metallurgical microscope optimized for digital imaging and ergonomic efficiency. Its unique box design allows easy access to the sample on the stage and nosepiece, with a footprint, one third of the conventional model.

SMZ series of stereo microscopes

Nikon zoom stereomicroscopes offer users the most extended zoom range of any such instrument, along with modularity, comfort and ultra-high-performance optics.

Related solutions

- LV UDM / AZ 100 step-in models for basic optical inspection
- Modular design concept and huge choice of accessories (e.g. illuminators, objective lenses, stages, wafer loaders) to meet the inspection requirements
- Availability of microscope variants for dedicated inspection purposes (e.g. polarizing capability, metallurgical use)
- Availability of motorized nosepieces and digital imaging
**ShuttlePix P-400R digital microscope**

**A handheld microscope offering portability and ease-of-use of a digital camera**

ShuttlePix 400R is a revolution in microscopy. A handheld digital microscope enabling you to take images everywhere, even on places where you never could imagine using a microscope. ShuttlePix features Nikon optics to guarantee razor sharp images and feels as comfortable as a digital camera. Featuring 20x optical zoom with up to 400x magnification and a 4-segment LED ring light, it allows to capture highly detailed images in any light conditions. And what’s more, one can even use the ShuttlePix as a digital desktop microscope. This portable microscope targets a wide range of industrial applications that require fine image recording and inspection without having to move the sample.

**Applications**

- Industrial parts and materials
- Pipe lines and structures
- Car, boat and airplane engines and frames
- Electronics
- Molded parts
- Artwork restoration and conservation
- Forensic investigation

**Related products**

- Motorized Z-axis stand
- Sample stages (sliding tilting, etc)
- Touch panel monitor

**Features**

- 20-400x zoom range spanning from low to high magnifications (20x optical zoom)
- Integrated 4-segment ring LED illumination
- Desktop use with motorized Z-axis stand and touch panel microscope control.
- Extended depth of focus (EDF) on the motorized focusing stand controller
- TIFF and JPEG image storage through USB or SD card
- Complete set of accessories

**Benefits**

- Point-and-shoot image indoors or outdoors, regardless of the lighting conditions
- Ergonomic, handheld microscope with Nikon optical quality
- Multi-purpose use in the field and in the lab
- No microscope knowledge or experience required to operate ShuttlePix
- Dedicated applications software supports graphic analysis and reporting

**Image Descriptions**

- Cast metal
- Crack in wall
- Electronics
- Painting

**Desktop use with motorized Z-axis stand and touch panel microscope control**

**Point-and-shoot image indoors or outdoors, regardless of the lighting conditions**
**NeoScope benchtop SEM**

**Combining digital camera familiarity with scanning electron microscope (SEM) capability**

The NeoScope benchtop SEM microscope features the powerful electron optics of an SEM, but is as simple to operate as a digital camera. Offering the high resolution and depth of field of a powerful SEM, NeoScope helps accelerate the pace of failure analysis of manufacturing materials.

Basic operation of the NeoScope is simple with auto focus, auto contrast and auto brightness controls. Samples can be loaded and imaged in less than three minutes, without requiring any special sample preparation. Pre-stored parameter files (recipes) allow the user to quickly and automatically set up the NeoScope for a wide variety of material samples. The NeoScope operates in both low and high vacuum modes and has three settings for accelerating voltage.

Offering image resolution up to 25nm, NeoScope also offers a depth of field unmatched by optical microscopes for superior live imaging and image capture. Additionally, a magnification range of 10X-20,000X is possible without any adjustments or lens changes. The specimen stage accommodates samples up to 50mm thick so that clear crisp images are possible even with larger samples.

For a wide range of samples from biological to materials, NeoScope has high vacuum and low vacuum modes, secondary electron and back scattered electron imaging, and three selectable accelerating voltages of 5, 10, and 15kV.

Basic operation through the sophisticated Graphical User Interface (GUI) is as familiar as a digital point and shoot camera with automatic settings for biological and materials samples. Manual control is also available.

**6B/6D Autocollimators**

**Brightfield and darkfield instruments for checking alignment and measuring angles**

Nikon Metrology’s autocollimators check alignment and measure very small angular deviations to measure flatness or height by simple geometry. Darkfield model autocollimator is perfect for measuring small, flat mirrors. Brightfield model autocollimator utilizes hallmark Nikon optics to illuminate surface details.

**Applications**

Applications involve surface flatness inspection, alignment of components with reflective surfaces (e.g. CD player pickup lens) as well as measurements related to machine tools (e.g. straightness in movement of stages, angles of indexers).
Profile projectors V-24B/20B/12B series and Horizon 14E/16E series

Optical comparators with an effective screen diameter up to 600mm diameter

Nikon’s profile projectors apply the principles of optics to the inspection of manufactured parts, by projecting the magnified silhouette of a part on a screen. To suit your specific application, each profile projector comes with multiple projection lenses, each featuring a different magnification, working distance and field of view size.

The V-24B top model has a large effective screen diameter of 600mm. Its superior magnification accuracy is ideal for measuring and inspecting profiles, surface conditions and other aspects of large workpieces.

The Horizon line of horizontal benchtop comparators yield powerful, reliable illumination for surface and profile inspection and measurement.

Applications
- Profiles (metal and plastic manufacturing)
- Surface conditions
- Other part aspects
- Crack and failure analysis

Related solutions
Different profile projector types are available:
- V-24B (Screen diameter 600mm, except for EC)
- V-20B (Screen diameter 500mm)
- V-12B (Screen diameter 300mm)
- Horizon 16E (Screen diameter 400mm, only for USA)
- Horizon 14E (Screen diameter 350mm, only for USA)

MF-1001/MF-501 Digimicro

Nikon’s most advanced photoelectric digital length measuring systems

Flawless contact measurements of dimensions, thickness and depth

The MF-1001 and MF-501 Digimicro series offer flawless contact measurements of dimensions, thickness and depth. They feature measuring length equal to 100mm and 50mm respectively and accuracy of 1µm at 20°C. Stands are available in ceramic, steel or granite for added stability and a wide variety of probe tips are available to suit most applications
Advanced, versatile semiconductor inspection and wafer management systems

Manufacturing equipment from steppers to the most sophisticated inspection systems has given Nikon invaluable experience in the field of microelectronics. This experience has allowed Nikon to become a worldwide leader in microelectronics technology and in the manufacture of advanced instruments designed specifically for the inspection of semiconductors and flat panel displays.

Features

- Advanced and versatile semiconductor inspection systems
- Built for factory automation and contamination-free inspection
- Laser autofocus and CFI optics achieve new levels of brightness, sharpness, contrast and operability
- Integrated graphical software for wafer inspection and review

Automatic AMI-3000 and 2000 macro inspection systems feature high throughput and exceptional sensitivity.
The AMI-3000 automatic macro inspection system brings together all of Nikon’s expertise in semiconductor manufacturing to enhance macro inspection precision, providing quantified reference criteria and enabling more efficient process management.

P3 lithography inspection platform designed to improve product yield by capturing yield-limiting defects
The Nikon P3 system is designed for automated pattern profile management and line width roughness monitoring of 300mm wafers with fully incorporated macro defect detection, EBR inspection, and automatic defect classification for unsurpassed performance down to the 55nm node.

Optistation 3200, 3100, 3000, 7 and V series of 300mm wafer inspection systems
Nikon’s advanced and versatile Optistation semiconductor inspection solutions provide advanced micro/macro systems to efficiently trace defects and monitor process quality. Optistation systems are designed for highly accurate and efficient 300mm wafer inspection.

NEXIV Foup series of non-contact, fully automated wafer carrier measuring systems
The NEXIV VMR-C4540 is designed for use with 300mm Front Opening Unified Pod (FOUP) & Front Opening Shipping Box (FOSB) wafer carriers. It provides all dimensional measurements required for wafer carrier fabrication including control of deformation due to aging of wafer carriers.

Eclipse series of semiconductor microscopes and NWL series of advanced IC inspection wafer loaders
Eclipse semiconductor microscopes are configured for (300mm) wafer and mask inspection as well as LCD inspection of flat panel displays. The NWL200 series is the first lineup of sophisticated wafer loader for IC inspection microscopes.

Related solutions

- Eclipse series of semiconductor microscopes
- A choice of high-performance illuminators and image processing options
- Integrated DUV microscope modules supporting present and future design rules
- Flexibility in loader type and positioning
- DART series of wafer inspection and review software
AutoMeasure software

User-friendly software that makes measuring automation simple

AutoMeasure integrates an intuitive wizard menu, customizable GUI and engineer/operator mode within a multiple-language environment. AutoMeasure software runs on INEXIV VMA and NEXIV VMR video measuring systems.

E-Max Series of data processing software

FOV measurement with advanced digital imaging processing technology

The E-MAX series software offers state-of-the-art image processing that supports general-purpose measurement for a wide range of manual measuring instruments, including measuring microscopes and profile projectors.

DART series of wafer inspection and review software

Integrated software package to fully automate the inspection process

DART is an integrated software package that can fully automate the wafer inspection process. It allows users to recall, review and classify defects based upon an integrated graphical map. It offers a choice of image archiving, defect review, post probe review and online communication features. Ideal for use with Nikon Optistation and NWL wafer loader systems, the DART software automatically controls all routine functions, including programming and point-to-point/die-to-die inspection.

NIS-Elements software

Comprehensive device control and image analysis, visualization and archiving tools

NIS-Elements revolutionizes imaging software for the microscopy market by combining automated intelligence to microscopes, cameras, components and peripherals with powerful archiving, analysis, visualization and archiving tools. Its intuitive interface simplifies workflow and speeds up image acquisition times while providing a versatile range of features, such as image stitching, object counting and volume views.
Nikon Metrology assists customers in successfully deploying metrology-driven manufacturing capability. Metrology assisted production builds on accurate geometric data to consistently increase the precision and speed of design, manufacturing and assembly operations.
Laser Radar MV330/350

Automated, non-contact large volume inspection

Laser Radar is a versatile metrology system that offers non-contact and true single-operator inspection. As it is CNC-programmable, it is ready for completely automated unattended operation. Laser Radar incorporates patented laser reflection technology that allows for direct surface and feature measurement at high data rates. As a result, Laser Radar eliminates the tedious use of photogrammetry dots, spherically mounted retroreflectors (SMRs) or handheld probes, slashing inspection time and operator overhead. Laser Radar is able to scan dark diffuse and highly reflective material and finish surfaces at challenging incident angles.

Applications

- Inspection of fuselage, wing, wing/body connection, landing gear door and jet engine blade
- Gap and step inspection of jet engine cowling
- Automated inspection of riveting hole positions
- Mold, first article and serial inspection of composite parts
- On-machine verification of large machined parts
- Dimensional verification of forged and molded parts before milling process starts
- Measuring wind turbine blades and concentrated solar panels
- Verification of space telescope hardware, parabolic antenna and heated surface

Related solutions

- iGPS and iSpace

Features

- Measurement range for MV350 up to 50m, MV330 up to 30m
- Vision Scan inspection mode captures up to 2000 points per second
- Accuracy from 24µm (2m distance) to 201µm (20m distance)
- Powerful hole and edge measurement capabilities
- Expanded line of sight using mirrors
- All acquired data referenced to a single contiguous coordinate system
- Supports a variety of large volume metrology software

Benefits

- Productivity multiplier thanks to fast measurement and low operator overhead
- Non-contact measurement ideal for delicate and inaccessible specimens
- Automation saves on operator expenses and manipulation errors
- Reliable range measurements on composite materials
- Seamless integration in measurement process

Laser Radar’s use in green energy markets is increasing because it is capable of measuring large and delicate structures such as solar panels and wind turbine blades.
iGPS/iSpace

Modular positioning, tracking and measurement system for factory-wide deployment

iGPS is a modular large scale metrology solution that transforms large fabrication facilities into accurate metrology-enabled areas. Within the facility, an unlimited number of handheld measurement probes or tracking sensors (fixed on tools and components) can operate concurrently.

Unique iGPS capabilities in terms of scalability, robustness and concurrent use provide quick return on investment as well as a solution that grows along with expanding manufacturing operations.

Predefined iSpace configuration packages use iGPS technology to track multiple measuring devices — handheld probes, articulated arms and laser radars — that can be operated concurrently.

Applications

• Large scale positioning and tracking suited for aerospace, shipbuilding, train, etc.
• Part joining and assembly
• Dynamic tracking of parts, tools, robot positions, AGVs and ship models in water tanks
• Handheld large volume inspection in automotive (engineering lab, racing workshop), aerospace and other industries like casting and turbine blade production
• Automatic annotation of handheld NDT measurements with positional information

Features

• Expand measurement volume by extending transmitter network (iGPS)
• Measurement volumes ranging from 400 to 1200m³ (iSpace)
• Continuous health monitoring and transmitter redundancy
• Unlimited number of users and applications within the iGPS-enabled working volume
• Multiple devices can be equipped with iGPS receivers for accurate positioning

Benefits

• Supports factory-wide deployment (iGPS)
• Easily deployable for measuring the dynamic positioning of handheld probes, articulated arms, laser radars and other measurement equipment (iSpace)
• Uniform accuracy throughout the entire workspace
• Scalable, accurate and robust solution
• Concurrent use of an unlimited number of handheld probes and tracking sensors
• Point localization accuracy down to 200µm

Related solutions

• iProbe - 6DOF tactile measurement probe
• IMCA - iSpace enabled articulated arm
• Integration Services & Technologies

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Related solutions

• iProbe - 6DOF tactile measurement probe
• IMCA - iSpace enabled articulated arm
• Integration Services & Technologies
Adaptive Robot Control activates a closed metrology-driven feedback loop that firmly increases the precision of industrial robots. Regardless whether robots are deployed for machining, inspection, applying beads or manipulating objects, roboting tasks are consequently executed with 0.1mm absolute accuracy, irrespective of degrading phenomena like play, mechanical flexibility, backlash or thermal effects.

**Applications**

- Accurate drilling and riveting on wings and fuselages where the motion of the part is monitored
- Robot machining (drilling/fettling/milling) where the motion of the tool is monitored
- High-precision placement of objects or tools
- Accurate material depositing (sealant, tape layering, etc.)

**Related solutions**

- K-Series Optical CMM
- Robot calibration & testing
- Integrated Services & Technologies

**Features**

- Dynamic tracking and closed feedback loop to robot controller
- Tracking volume of 17m³ (expandable)
- Tracking sample rate up to 1000Hz
- Simultaneous measurement of up to 1,024 points
- Accuracy down to 0.1mm in the entire working volume of the robot

**Benefits**

- Independent metrology chain for industrial robot applications
- Providing high level of absolute robot accuracy
- Portable and scalable solution
- Investment is only a fraction of new product equipment with comparable accuracy

Adaptive Robot Control - driven by Optical CMM or iGPS - establishes a closed feedback loop that nearly eliminates the influence of robot warm-up, drift and backlash.
A complete portfolio of CMMs and articulated arms

**TRADITIONAL METROLOGY SOLUTIONS**

**BRIDGE, HORIZONTAL ARM, GANTRY CMM PORTFOLIO**

**ARTICULATED MEASURING ARMS**

**MULTI-SENSOR CMM SOFTWARE**

**TACTILE SOFTWARE FOR CNC, MANUAL AND PORTABLE CMMS**
High-performance ceramic and aluminum bridge CMMs

LK’s ceramic bridge and spindle components coupled with proven air-bearing design provide the ultimate in stiffness and stability, altogether delivering significantly improved repeatability.

With super-light aluminum as a key structural component and air bearings on all axes, C3 bridge CMMs are high-specification and cost-effective metrology solutions for small to medium size applications.

Features

- Standard volume ranges
  - LK from 800x700x600 to 6000x2500x2000mm
  - LK V-SL from 1000x700x600 to 2500x2000x1500mm
  - C3 from 500x400x400 to 3300x2000x1500mm
- Flexible multi-sensor platform: touch probes, analog scanning and laser scanning
- High capacity (loads) table
- LK V-SL performance
  - Repeatability from 0.5μm
  - Velocity up to 51 m/min
  - Volumetric accuracy equals 0.7μm + L/600mm

Benefits

- Premium performance
- High velocities/accelerations for low cycle times
- Excellent accuracy and repeatability
- Total solution for digital inspection

Applications

- Machined and pressed parts
- Plastic moldings
- Casting and forgings
- Touch trigger and non-contact inspection
- Digitizing, scanning and reverse engineering

Related solutions

- CMM laser scanners
- Camio multi-sensor metrology software

LK V-SL provides the ultimate scanning and inspection performance by delivering sub-micron accuracy.
C3 bridge CMMs are high-specification, cost effective metrology solutions.
Horizontal arm CMM

The fastest high accuracy horizontal arm CMMs on the market

Nikon Metrology’s complete range of horizontal arm CMMs provides unequalled performance in speed, accuracy and repeatability.

Ceramic guideways and air bearings used in the construction of LK H CMMs, offer stability at high velocity and acceleration. LK horizontal arm CMMs provide unique access to the measuring envelope and can be supplied as subfloor or floor level installations, or as part of fully-automated measurement cells.

Features

- Multiple CMM configurations available: table, rail, twin, etc.
- Standard volume ranges
  - LK H-T (Table variant) from 1000x400x600 to 5000x1600x2000mm
  - accuracies from 1.9μm + L/250mm
  - LK H-R (Rail variant) from 4500x1600x2000 to 10000x1600x3000mm
  - accuracies from 10μm + L/200mm
- Supports laser scanners and touch sensors

Benefits

- Premium performance
- High velocities/acceleration for low cycle times
- Excellent accuracy and repeatability
- Flexible multi-sensor platform: touch probes, analog scanning, laser scanning
- High-capacity (loads) table

Applications

- Automotive full body and panels inspection
- Inspection of large parts such as mold tools, housings, castings, etc.
- Integrated in-line inspection
- Touch trigger and non-contact inspection
- Digitizing, scanning and reverse engineering

Related solutions

- CMM laser scanners
- Camio multi-sensor metrology software
Nikon Metrology offers truly flexible and reliable gantry CMMs when size really matters. In addition to high accuracy with maximum volume, gantry CMMs support a variety of probing solutions, including touch-trigger digital, analogue and laser options. Nikon Metrology also provides customized gantry CMM projects that meet customers’ exacting requirements.

LK gantry CMMs are constructed using materials with high thermal stability to guarantee optimum accuracy.

**Features**
- Standard volume ranges
  - LK V-G from 3000x2500x1500 to 10000x7000x4000
  - accuracies from 4.5μm + L/200mm
- High-performance air bearings
- Supports tactile styli and laser scanners
- Use of materials with high thermal stability and optimized dimensional characteristics
- LK CMMs feature granite rails with ceramic Y and Z guideways

**Benefits**
- Elevated guideway combines high accuracy with maximum volume
- Ceramic guideway allow for larger machine volume
- Superior reliability and performance
- Multi-sensor support
- Integration pallet transfer systems available

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**Ceramics for LK PREMIUM performance**

Stress-free ceramic guideways are most dimensionally stable, provide high and long-lasting measurement accuracy, and require minimum machine verification, saving both time and money.
MCA II - Manual CMM Arm

Full flexibility and portable productivity

MCA II is a precise, reliable and comfortable portable measuring system that can be equipped with a wide range of probing devices. Battery operation and wireless data communication enable users to quickly set up the portable system and efficiently utilize it in the metrology lab, on the shopfloor and in the field.

MCA II comes in different sizes and in two accuracy variants. The 6-axis version is ideally suited for touch trigger measurement. Equipped with the brand new ModelMaker Dx, the MCA II is an ultra-modern and accurate handheld scanning combination that handles every inspection task, regardless of specimen size, material and location.

Features
- 6 and 7-axis versions
- High accuracy in volumetric length accuracy test - 16µm for 6-axis version (6ft) - 25µm for 7-axis version (6ft)
- Quick and repeatable sensor exchange and support of multiple sensors (laser scanner and tactile probe)
- Lightweight and thermally stable arm thanks to advanced carbon fiber and aluminum alloy components
- Ultrafast Wireless WiFi data transmission for scanning and tactile measurements
- Li-ion battery offering hours of measurement autonomy for arm and scanner
- Effortless single-handed operation through integrated pneumatic counterbalance and infinite-rotation arm joints

Benefits
- Scan and go! - Easy and fully integrated solution for 3D scanning using an articulated arm
- True portability and robust operation allow users to measure anywhere
- Ergonomic design and quick repeatable sensor exchange increase productivity and ensure that the focus is on the inspection job
- Get instant graphic feedback or evaluate measuring reports at a later convenient time

Applications
- Full part-to-CAD inspection
- Feature inspection
- Flush & gap inspection
- On-site troubleshooting
- Solving assembly problems
- Data collection for reverse engineering

Related solutions
- ModelMaker laser scanners
- Focus software

MCA comes in 6 or 7-axis versions for touch trigger or laser scanner measurement
Camio multi-sensor metrology software

The benchmark for efficient multi-sensor CMM operation

Camio is a fully integrated multi-sensor software platform for off-line programming and on-line inspection. It redefines the world of CMM measurement, featuring powerful tools that efficiently drive laser scanners as well as a wide variety of touch sensors.

User-friendly programming techniques as well as drag-and-drop and wizard-based functionality provide new and experienced users all efficient means to create DMIS CMM inspection programming from CAD product model data.

Features

- Integrated solution for on-line and off-line programming
- Full and exact compliance to the DMIS standard
- Support of wide range of CAD file formats: CATIA® v4 & v5, Pro/E®, UG®, Parasolid®, HOOPS®, STEP® and IGES®
- Multi-sensor programming and simulation
- Powerful laser scanning feature inspection

Benefits

- Support 3rd party CMM through I++ interface
- Switch between touch trigger probing, analog or laser scanning with minimum program modifications
- Access to GD&T data from leading CAD software packages
- Production mode operation, reducing cycle time up to 25%

Applications

- Automotive sheet metal and powertrain
- Aerospace airframe and components
- General precision engineering
- Reverse engineering
- Medical manufacturing

Related solutions

- Bridge, horizontal arm and gantry CMMs
- RCA Robot CMM Arm
CMM-Manager metrology software

A full-featured metrology software for manual, CNC and portable CMMs

CMM-Manager is a task-oriented, highly intuitive software for tactile measurements using manual, CNC and portable CMMs. It is a fully integrated CMM measurement environment featuring walk-in quick-measure, one-click CAD measure, collision-free CAD teach, virtual simulation, real-time verification, CAD and datum alignment, and many more smart functions.

Large intuitive icons and measurement guidance for operator make CMM-Manager a highly intuitive, easy-to-use metrology software for portable inspection tasks on the shopfloor, in the lab as well as in the field.

Features

- CAD based graphical programming
- Automatic collision detection
- Smart alignment features
- Automatic probe recognition
- Leap frogging to extend measurement volume for portable measurement
- Drag and Drop web-ready graphical reporting

Benefits

- Focus on quick and accurate measurement results
- Easy to use, yet very complete metrology software
- Single software package for CNC, manual and portable measurement

Retrofit capabilities

- CNC or Manual CMM: Nikon Metrology CMM, Sheffield Cordax, Brown & Sharpe, Mitutoyo, Zeiss, Starrett, Renishaw UCC1/UCC2 controller
- Portable CMM retrofits: MCA, Faro, Romer/CimCore, K-Series Optical CMM

Easy-to-use software capable of measuring complex parts

Quick data interpretation through color-coded local geometry deviation

K-Series Optical CMM with SpaceProbe for large volume measurements
Wheel/EngineTracker

The reference for wheel and engine displacement measurements

WheelTracker is an optical contactless wheel and engine motion measurement system. It measures up to four wheels and offers an optional camera for engine motion measurement. WheelTracker operates on all road surfaces in all weather conditions, and streams the data directly into a data acquisition system or laptop.

Features
- Full 6-DOF motion measurement
- Non-contact optical measurement
- Low mass added to wheels
- All-weather proof
- Accuracy down to 80µm

Benefits
- Synchronized measurement of 4 wheels and engine
- Compact and quick setup
- High dynamic accuracy

Applications
- Dynamic kinematics and compliance (K&C) evaluation
- Toe and camber evolution during maneuvers
- Lap recording for road simulators on test and race tracks
- Wheel and engine packaging testing
- Full-speed performance tests
- Emergency stop and ABS testing
- Vehicle dynamics tests (bump steer, roll steer, dive, etc.)
- Ride and handling evaluation
DMM - Dynamic Motion Measurement

Optical motion measurement

DMM is the perfect tool for motion and deformation measurement and evaluation by accurately measuring the individual LED point coordinates. It is a digital metrology system that accurately measures the dynamic evolution of point coordinates. DMM's Optical CMM measures displacements and deformations of points and objects at high accuracies and sampling rates, providing detailed insight into motion characteristics and space envelopes.

Features
- Tracking volume of 17m³ (expandable)
- Tracking sample rate up to 1000Hz
- Simultaneous measurement of up to 1,024 marker points

Benefits
- Measurement of dynamic and quasi-static motion
- High accuracies and sampling rates
- Direct data streaming to third party systems
- Portable and scalable solution
- Easy setup and standalone operation

Applications
- Door and roof closure testing
- Suspension degradation testing
- Body component vibration testing
- Motion/deformation verification of fuselage, wing, flaps, slats, landing gear and doors
- Real-time tracking of 6-DOF actuators
- Thermal deformation testing
- Dynamic tracking of ship models in water tanks

Robot calibration & testing

Providing absolute robot accuracy in industrial environments

Besides tracking scanners (K-Scan MMDx and K-Robot), the K-Series Optical CMM can be deployed to calibrate industrial robots. In combination with the robot calibration software ROCAL, a robot signature is generated that takes into account all identified kinematic and flexibility parameters, leading to unmatched absolute accuracies across the entire working volume of the robot.

Features
- Tracking volume of 17m³ (expandable)
- Accuracy down to 400μm in the entire working volume of the robot.
- Optimize specific applications using Roboscope™, the digital oscilloscope for robot motion

Benefits
- Providing high level absolute robot accuracy
- Portable and scalable solution
- Off-line calibration & testing avoids reteaching robot programs on-site

Related solutions
- Adaptive Robot Control
- K-Series Optical CMM
Nikon Metrology services and support

A vision of Total Customer Support

Nikon Metrology provides ISO9001/2000 and UKAS accredited metrology solutions to a wide range of industries and bluechip customers in a global marketplace, utilizing a worldwide network of highly trained metrology experts. The complete range of services including helpdesk support, training, maintenance programs, retrofit capabilities and contract work, enables our customers to get the maximum value out of their Nikon Metrology solutions or to solve their inspection issues in the shortest possible time.

HELPDESK
Instant help – the skills and technical knowledge to solve your application/software problems by dedicated helpdesk engineers.

METROLOGY TRAINING/SEMINARS
Knowledge base – on-site/off-site, basic, intermediate and advanced software and hardware training and seminars using dedicated staff with hands-on experience.

PROGRAMMING CONSULTATION
Operational assistance - highly-skilled engineers provide part programs or programming consultation - expertise which can reduce your product inspection costs.

MAINTENANCE AND CALIBRATION
Technical service – the manpower, state-of-the-art technology and logistics to maximize reliability, uptime and equipment performance.

SUB-CONTRACT INSPECTION
Nikon Metrology offers a wide range of subcontract inspection work. The broad product portfolio includes the right tool for every inspection challenge of the customer. On top of Nikon Metrology own inspection service facilities, Nikon Metrology also has a broad worldwide network of Nikon Metrology Service Centers, that are accredited by Nikon Metrology to perform contract inspection work.

- UKAS accredited CMM sub-micron, temperature-controlled inspection offering the capability to measure all component types and sizes.
- Laser scanning work for part-to-CAD inspection or Reverse Engineering
- X-ray and CT inspection work for electronics and industrial applications

UPGRADES AND RETROФITS
Existing CMMs often see an improvement in performance, life expectancy, and accuracy with the retrofit of an advanced Nikon Metrology CMM controller, powerful DMIS-compliant Camio Studio or CMM-Manager software or an innovative Nikon Metrology scanner. A full range of hardware upgrades and retrofits is available to meet all of your current and future needs.

SOFTWARE UPGRADES
The rapid development of CMM metrology software means that CMMs may face operational issues with outdated software, regardless whether supplied by Nikon Metrology or as part of your existing CMM system. Nikon Metrology retrofits your CMM with the latest, easy-to-use Camio or CMM-Manager 3D metrology software, either through Nikon Metrology-Controller technology, proprietary protocol support or via the I++ DME open protocol standard. Whether you use manual or CNC CMMs, Nikon Metrology has an extensive range of software products designed to support your programming and reporting applications.
REQUEST FOR INFORMATION

Yes, I would like to receive specific information regarding Nikon Metrology and its products and applications

1. Tick the products and applications of your interest
   - Coordinate Measuring Machines (CMMs)
   - Articulated measuring arms
   - CMM laser scanners
   - Handheld laser scanners
   - RCA - Robot CMM Arm
   - X-ray and Computed Tomography
   - Vision measuring instruments
   - Measuring and industrial microscopes
   - ShuttlePix - Portable digital microscope
   - NeoScope scanning electron microscope
   - Semiconductor inspection systems
   - Laser Radar for large volume metrology
   - iGPS / iSpace for large scale tracking and positioning
   - Dynamic measurement (DMM and Wheel/EngineTracker)
   - CMM retrofits
   - Service work / Integration services / Training

2. Tick the items you would like to receive
   - Nikon Metrology Demo CD including company brochures, product information, movies and case studies
   - Nikon Metrology News magazine featuring product news and customer testimonials

3. Please provide your personal contact information
   - First name ___________________ Last name ___________________
   - Company _____________________________
   - Job title ______________________________
   - E-mail ________________________________
   - Phone _________________________________
   - Address _______________________________
   - Zip _______ City __________ State/province ___________________
   - Country ______________________________

Please fax this page to +32 16 74 01 03, or submit your information request on www.nikonmetrology.com.
K-Series Optical CMM solutions
supporting a variety of metrology applications

Handheld measurements

Robot metrology

Motion analysis
The portable K-Series Optical CMM system forms the core of different metrology solutions. As it faces no mechanical constraints whatsoever, users can freely walk around and take points or scan surfaces as desired. The metrology area activated by the Optical CMM fits an entire vehicle and can be expanded easily. The Optical CMM is also suitable for measuring dynamic motion and researching transient events. Its third use relates to industrial robots. By tracking robot movement in real time, Optical CMM technology drives increased positional accuracy for robotized inspection and manufacturing tasks.
A wealth of applications …

Automotive
K-Series optical measurement solutions have a broad automotive application reach: from design and prototyping up to in-line inspection supporting final assembly.

- Digitizing physical models
- Fixture verification
- Body and trim inspection
- Body closure analysis
- Comfort analysis
- Body & chassis development
- Degradation analysis
- Robotized in-line inspection
- Robot-guided manufacturing

Motorsport
K-Series Optical CMM systems are vital metrology tools in the development, testing and legal verification of sports cars. Nikon Metrology supplies systems to FIA and leading racing teams in Formula 1 and NASCAR. Motion measurement is a key enabler of in-depth chassis development and testing.

Aerospace
In aerospace, Nikon Metrology optical sensors are used to test the kinematics of structures, such as landing gears and wing flaps. By providing highly accurate positional feedback in closed loop, machining stations can operate faster and at higher precision.

Naval engineering
A typical naval engineering application is testing scale model designs of ships in a towing tank. The dynamic motion of these ships is accurately tracked using the Optical CMM system.

Structural engineering
The Optical CMM system is also suitable for deformation analysis of large structures, such as scale models of buildings, steel and concrete structures, and landing gears. The concurrent use of multiple Optical CMMs creates an extended unified measurement volume.

A large international customer base
Airbus, Audi, Benteler Automobiltechnik, BMW, Boeing, Bombardier, Bugatti, Chrysler, Fanuc, Ferrari, FIA, Ford, Gehl, General Motors, Honda, Hyundai, Jaguar, John Deere, Kawasaki Heavy Industries, KUKA, Lockheed Martin, Magneti Marelli, Opel, Plastic Omnium, PSA, Renault, Skoda, Staubli robotics, Toyota, Volkswagen, Volvo Cars, Weidmann Plastics, etc.
A K-Series Optical CMM system can be used for handheld and robotized 3D inspection, motion analysis and robot metrology. Regardless of the application, the measurement principle is the same. Three linear CCD cameras of the Optical CMM localize the infrared LEDs incorporated into the carbon fiber housing of a touch probe or 3D laser scanner.

To make K-Series Optical CMMs fit for purpose, they come in two measurement volumes. The K500 is used for measuring smaller parts and subassemblies. The larger measuring volume of the K600/610 is suited for full-vehicle analysis or measuring larger specimens.

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**Cost reductions**

K-Series Optical CMMs are suitable for multiple applications. Their flexibility and mobility speed up interventions and reduce production stops.

**Portable or mobile**

The optical K-Series measurement systems are available in both portable and mobile configurations. Whether used at a single plant or at different locations, there is always a system configuration that fits your needs.

**Solid state quality**

The carbon fiber structure makes the system truly solid state. There are no moving parts that potentially deteriorate accuracy over time.

**Dynamic Referencing**

The initial alignment of a work piece is monitored by 3 LEDs mounted directly on the part. The camera-to-part position is constantly monitored and updated, avoiding the need for leap-frogging.

**Proven competitiveness**

K-Series Optical CMMs are set up quickly and offer high measuring flexibility, thanks to features such as dynamic referencing and automatic probe recognition. They outperform articulated arms in terms of accuracy, and span a larger measuring volume without mechanical constraints. Optical CMMs are less sensitive to bright ambient light and shiny part surfaces compared to white light scanning systems.
A K-Series Optical CMM excellently supports handheld CMM measurements. It is a flexible system that can be equipped with a digital ModelMaker Dx laser scanner or a SpaceProbe. Users value the fact that they can freely walk around and take points or scans as desired.

K-Scan MMDx

The K-Scan MMDx is a walk-around scanning solution combining the digital ModelMaker Dx laser scanner with the portable K-Series Optical CMM. K-Scan is ideally suited for on-site 3D digitizing tasks requiring minimum setup and fast results. Operating the scanner with a laser stripe width up to 200mm is as easy and efficient as a paintbrush job. The 6m working range of the Optical CMM is more than sufficient to take measurements in and around a full vehicle. The dense point clouds that are acquired can be graphically analyzed in Focus Inspection or Focus RE Basics software, or in 3rd party packages.

- Portable ModelMaker Dx laser scanner
  - Minimum setup time
  - On-site scanning
  - Ergonomic design
- Optical tracking of laser scanner
  - Effortless measurements
  - Walk-around scanning without mechanical constraints
- Non-contact scanning
  - Full digital copy of parts
  - Suitable for flexible or fragile parts

SpaceProbe

The ergonomic SpaceProbe is used for traditional touch trigger or analog scanning measurements. Automatic tip detection supports a variety of ball and point probes and extensions.

- Robust, lightweight design
- Ergonomic position of trigger buttons to control measurements
- Sound and LED measurement feedback
- Wireless kit available
- Multiple probe tip extensions for cavity measurement, for example
- Analysis in CMM-Manager or 3rd party tactile measurement software
Robot metrology accelerates repetitive inspection and assembly tasks. With K-Series Optical CMM, Nikon Metrology ensures that robots operate accurately and reliably all the time. Some customers use the metrology system to calibrate robots up-front, or monitor one or more robots in real time to optimize robot precision. In any case precision is guaranteed, delivering predictable results all the way through.

- Absolute robot accuracy through calibration or continuous robot tracking
- Improved accuracy for repetitive inspection and assembly tasks
- Better economics by combining metrology with industrial robots
- Quick metrology setup and smooth system integration

**Robotized part-to-CAD inspection**

As the ModelMaker Dx laser scanner is being tracked accurately, K-Robot obsoletes cyclic robot calibration and eliminates the influence of robot warm-up, drift and backlash.

**Adaptive Robot Control (ARC)**

Adaptive Robot Control combines off-the-shelf robot and metrology technology to establish a closed feedback loop that firmly increases the precision of industrial robots. Regardless whether deployed for machining, inspection, applying beads or manipulating objects in a cell, robotized tasks are consequently executed with 0.1mm absolute accuracy. This is because on-line robot tracking obsoletes the impact of degrading phenomena such as play, mechanical flexibility, backlash or thermal effects.

**Robot calibration and testing**

Besides tracking objects in real time, the K-Series Optical CMM can be used to calibrate industrial robots up-front. In combination with the robot calibration software ROCAL, off-line robot calibration generates a robot signature that takes into account all identified kinematic and flexibility parameters, delivering 0.4mm absolute accuracy across the entire working volume.

### Impact of metrology on robot accuracy

<table>
<thead>
<tr>
<th></th>
<th>Absolute accuracy</th>
<th>Eliminates influences of drift, backlash, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard robots</td>
<td>2-5 mm</td>
<td>No</td>
</tr>
<tr>
<td>Off-line robot calibration (ROCAL)</td>
<td>0,4 mm</td>
<td>No</td>
</tr>
<tr>
<td>On-line robot tracking (ARC, K-Robot, etc)</td>
<td>0,1 mm</td>
<td>Yes</td>
</tr>
</tbody>
</table>

High scanning accuracy is guaranteed, as K-Robot eliminates the influence of robot warm-up, drift and backlash.

Continuous robot monitoring and adaptation through Adaptive Robot Control yields highest absolute accuracy.

Robot calibration using K-Series Optical CMM and ROCAL software introduces absolute robot accuracy.
Validating simulation models using physical prototypes and pre-series parts is a critical activity in automotive, aerospace, naval and civil engineering. K-Series DMM (Dynamic Motion Measurement) combines high-speed optical sensors and modular software applications to respond to these challenging motion analysis tasks.

K-Series DMM eliminates cumbersome setup work because the sensors can be mounted and calibrated in minutes, instead of hours. The use of infrared LED markers allows for more accurate measurement of high-frequency macro motions by adding only a few grams of instrumentation mass to the test piece.

**Dynamic motion measurement**

K-Series DMM (Dynamic Motion Measurement) is the perfect solution for motion and deformation measurement and evaluation. It is a digital metrology system that accurately tracks the point coordinates of infrared LED markers attached to the objects under investigation.

- Quick and easy transducer setup
- Limited instrumentation mass
- Sampling rate up to 1000Hz
- Measure up to 256 3D or 85 full-motion markers
- Direct data-stream interfaces to HBM, National Instruments, Dewetron, etc.

To maintain high quality standards, car manufacturers run door slam tests to acquire motion and displacement data of various door, lock and body points. This is critical information in the assessment of the dynamic loading conditions that occurs during a door slam sequence.

K-Series DMM can also be used to capture the wheel motion and displacement of a car on a test bench. Such rig tests efficiently and realistically simulate the changing loading conditions the vehicle undergoes during normal use.

**Wheel and engine tracking**

WheelTracker is an optical contactless wheel and engine motion measurement system. It measures up to four wheels and offers an optional EngineTracker camera for engine motion measurement. WheelTracker operates on all road surfaces in all weather conditions, and streams the data directly into a data acquisition system or laptop.

- Full 6-DOF motion measurement
- Non-contact optical measurement
- Low mass added to wheels
- All-weather proof
- Accuracy up to 80μm

The WheelTracker product is the on-board version of the K-Series Optical CMM. Mounted on the car body using a carbon fiber structure, it tracks the 6-DOF motion of wheels. Fully weatherproof, it measures wheel motion up to 200Hz with accuracy up to 0.08mm, on any road surface.

Based on the same technology, the EngineTracker measures the motion of the engine during test drives. Using the acquired data, the available engine space envelope can be evaluated realistically.
### Specifications

#### Optical CMM

<table>
<thead>
<tr>
<th>Measurement volume (m³)</th>
<th>Measurement distance (m)</th>
<th>Volumetric accuracy (μm)</th>
<th>Temperature range (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K500</td>
<td>11</td>
<td>up to 90</td>
<td>10-35</td>
</tr>
<tr>
<td>K600</td>
<td>17</td>
<td>up to 90</td>
<td>10-35</td>
</tr>
<tr>
<td>K610</td>
<td>17</td>
<td>up to 60</td>
<td>10-35</td>
</tr>
</tbody>
</table>

* Full specifications are available in product data sheets

#### K-Scan MMDx

<table>
<thead>
<tr>
<th>K-Scan MMDx100</th>
<th>K-Scan MMDx200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. stripe length</td>
<td>100mm</td>
</tr>
<tr>
<td>Scanning speed</td>
<td>Up to 150 stripes/s (80,000 pts/s)</td>
</tr>
<tr>
<td>Laser class</td>
<td>2M</td>
</tr>
</tbody>
</table>

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Glass Reading Scale
Used to measure projection images on the screen. 200mm and 300mm scales—both in 0.5mm increments—are available. Accuracy: \((15 + L/20)\) mm

Glass Scale Set
Used to check the magnifying accuracy of the projector being used. It is equipped with a 50mm standard scale in 1mm increments (accuracy - \(3 + 7L/100\) mm), a 300mm reading scale in 0.1mm increments (accuracy - \(6 + L/50\) mm), and a 6x magnifier. \(L:\) measurement length

Auxiliary Oblique Halogen Surface Illuminator
This 24V-150W halogen illuminator is used to illuminate workpieces having low surface reflectivity such as printed matter, cloth, or leather.

Chart Clip Type LL
Used to measure charts on the screen. Comes standard with all projectors except the V-12B.

Accessory Cabinet
Used to store accessories. Measures (W x D x H): 450 x 600 x 740mm (17.7 x 23.6 x 29.1 in.)

Green Filter, ND Filter, DIA Adapter A
The green filter is used for black-and-white photography or for viewing edges of a workpiece with greater sharpness. The ND filter is used to adjust brightness. Both filters must be used with the DIA Adapter A.

Specifications and equipment are subject to change without any notice or obligation on the part of the manufacturer. March 2008 ©2006/2007/2008 NIKON CORPORATION

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* L = measurement length
PROFILE PROJECTOR

V-24B

Profile projector with an effective 600mm screen diameter
Large effective screen diameter of 600mm. Superior magnification accuracy is ideal for measurement and inspection of the profiles, surface conditions, and other aspects of large workpieces.

Large stage mountable
A large stage with wide cross-travel can be mounted. The up/down stage movement is motorized, accommodating workpieces as tall as 250mm.

Halogen light source
The halogen light source provides sufficient brightness regardless of whether contour or surface illumination is used, making measurements and observations simple and easy.

Concentric and parfocal
Projection lenses from 5x up to 100x have the same parfocal distance and are all concentric. This simplifies operations when magnifications must be changed often.

Highest magnification accuracy
Featuring a magnification accuracy of –0.05% with contour illumination and –0.075% with surface illumination (0.1% and 0.15% when a 200x lens is used), this instrument’s accuracy is extremely high when compared with other models.

PROJECTION LENSES

Five types of projection lenses are available for the V-24B profile projector, each featuring a different magnification, working distance, and field of view with a different diameter. Select the appropriate one to suit your application.

<table>
<thead>
<tr>
<th>Magnification</th>
<th>Diameter of field of view</th>
<th>Half mirror</th>
<th>A</th>
<th>B</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>5x</td>
<td>120</td>
<td>Detachable</td>
<td>174</td>
<td>24</td>
<td>502</td>
</tr>
<tr>
<td>10x</td>
<td>60</td>
<td>Detachable</td>
<td>106</td>
<td>26</td>
<td>330</td>
</tr>
<tr>
<td>20x</td>
<td>30</td>
<td>Built-in; fixed</td>
<td>46</td>
<td>113</td>
<td></td>
</tr>
<tr>
<td>50x</td>
<td>12</td>
<td>Built-in; switchable</td>
<td>39</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>100x</td>
<td>6</td>
<td>Built-in; switchable</td>
<td>35</td>
<td>81</td>
<td></td>
</tr>
</tbody>
</table>

*Part of the field of view is vignetted when the 9V Stage and a 5x lens are used under contour illumination.

SYSTEM DIAGRAM

SPECIFICATIONS

- Type: Vertical optical axis
- Image: Inverted and reversed
- Screen: ø600mm (23.6 in.); etched center crossline, 1-minute protractor, inclined 4° off vertical
- Lens mount: 3-lens turret mount, screw type
- Projection lens: 5x, 10x, 20x, 50x, 100x
- Magnification accuracy: ±0.05% for contour illumination, ±0.075% for surface illumination
- Light source: 24V-150W halogen for both contour and surface illumination
- Max. workpiece height: 250mm (9.84 in.)
- Stage: 99 Stage directly mountable
- Power input: AC 100-120V (CSA), 220-240V (CEE), 240V (SAA)
- Dimensions: 1,180 x 1,100 x 1,900mm (46.5 x 43.3 x 74.8 in.)
- Weight: 800kg (1,766 lb.)
PROFILE PROJECTOR

V-20B
Profile projector with an effective 500mm screen diameter

Large effective screen diameter of 500mm. Permits mounting of a large stage and includes a built-in digital counter and digital protractor.

Parfocal projection lenses
All projection lenses have the same parfocal distance and feature long working distances. The built-in half mirror eliminates the need to adjust illumination each time the magnification is changed. With improved images with excellent quality, while enabling observation in a comfortable posture by adjusting the eye-point height.

Workpieces up to 20kg measurable
The stage up/down movement unit is rigidly built, and if the 10 x 6 stage is used, workpieces as heavy as 20kg can be loaded. The measurable range has been increased to 250 x 150mm.

Stage Adapter S
For the V-20B
This adapter is used to mount a stage other than the 10 x 6 Stage to the V-20B profile projector.

SPECIFICATIONS

Parfocal projection lenses
All projection lenses have the same parfocal distance and feature long working distances. The built-in half mirror eliminates the need to adjust illumination each time the magnification is changed. With improved images with excellent quality, while enabling observation in a comfortable posture by adjusting the eye-point height.

Workpieces up to 20kg measurable
The stage up/down movement unit is rigidly built, and if the 10 x 6 stage is used, workpieces as heavy as 20kg can be loaded. The measurable range has been increased to 250 x 150mm.

Stage Adapter S
For the V-20B
This adapter is used to mount a stage other than the 10 x 6 Stage to the V-20B profile projector.

PROJECTION LENSES

Five types of projection lenses are available for the V-20B profile projector, each featuring a different magnification, working distance, and field of view with a different diameter. Select the appropriate one to suit your application.

<table>
<thead>
<tr>
<th>Magnification</th>
<th>Diameter of field of view</th>
<th>Half mirror</th>
<th>A (mm)</th>
<th>D (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5x</td>
<td>100</td>
<td>Built-in, fixed</td>
<td>73</td>
<td>149</td>
</tr>
<tr>
<td>10x</td>
<td>50</td>
<td>Built-in, switchable</td>
<td>79</td>
<td>215</td>
</tr>
<tr>
<td>20x</td>
<td>25</td>
<td>Built-in, switchable</td>
<td>85</td>
<td>313</td>
</tr>
<tr>
<td>50x</td>
<td>10</td>
<td>Built-in, switchable</td>
<td>80</td>
<td>130</td>
</tr>
<tr>
<td>100x</td>
<td>5</td>
<td>Built-in, switchable</td>
<td>90</td>
<td>130</td>
</tr>
</tbody>
</table>

*Part of the field of view is vignetted when the 5x or 10x projection lens are used under contour illumination.

SYSTEM DIAGRAM

V-20B configured with 10 x 6 Stage + DP-E1

**PROFILE PROJECTOR V-20B**
Profile projector with an effective 500mm screen diameter

Large effective screen diameter of 500mm. Permits mounting of a large stage and includes a built-in digital counter and digital protractor.

Parfocal projection lenses
All projection lenses have the same parfocal distance and feature long working distances. The built-in half mirror eliminates the need to adjust illumination each time the magnification is changed. With improved images with excellent quality, while enabling observation in a comfortable posture by adjusting the eye-point height.

Workpieces up to 20kg measurable
The stage up/down movement unit is rigidly built, and if the 10 x 6 stage is used, workpieces as heavy as 20kg can be loaded. The measurable range has been increased to 250 x 150mm.

Stage Adapter S
For the V-20B
This adapter is used to mount a stage other than the 10 x 6 Stage to the V-20B profile projector.

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Vertical optical axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image</td>
<td>Inverted and reversed</td>
</tr>
<tr>
<td>Screen</td>
<td>ø500mm (19.7 in.); protractor screen; inclined 8°</td>
</tr>
<tr>
<td>Lens mount</td>
<td>3-lens turret mount; screw type</td>
</tr>
<tr>
<td>Projection lens</td>
<td>5x, 10x, 20x, 50x, 100x</td>
</tr>
<tr>
<td>Magnification</td>
<td>±0.1% for contour illumination accuracy ±0.15% for surface illumination</td>
</tr>
<tr>
<td>Light source</td>
<td>24V-150W halogen lamp</td>
</tr>
<tr>
<td>Ax. workpiece</td>
<td>150mm (5.9 in.)</td>
</tr>
<tr>
<td>Stage</td>
<td>10 x 6 Stage directly mountable; 8 x 6, 6 x 4, 4 x 4 (3), 2 x 2 Stage mountable via adapter</td>
</tr>
<tr>
<td>Power input</td>
<td>AC 100-120V (CSA), 220-240V (CEE), 240V (SAA)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>570 x 1,200 x 1,300mm (W x D x H)</td>
</tr>
<tr>
<td>Weight</td>
<td>260kg (573 lb.)</td>
</tr>
</tbody>
</table>
Increased maximum workpiece height
Because the rigidity of the instrument is increased, thanks to CAE (Computer-Aided Engineering) design, workpieces as tall as 100mm can be loaded.

Built-in digital counter and protractor
The V-12BDC and V-12BDC types come with a digital XY counter, while the V-12BDC and V-12BDC types have a built-in digital protractor for greater ease of use.

Erect images
Projection images are erect and unversed for easy measurements, and their quality is as sharp as inverted images.

Switchable vertical/oblique illumination
The built-in surface illuminator can be switched between vertical and oblique illumination, making detection of edges in resin parts and other workpieces much easier.

Four-step zooming condenser lens
When contour illumination is used, this condenser lens delivers the right amount of light to suit the magnification of the projection lens selected. (The DIA condenser must be used with this lens when the magnification is 200x or 500x.)

EPI Condenser Lens
Under surface illumination, the EPI condenser lens is necessary when 200x or 500x projection lenses are used.

DIA Condenser Lens
Under contour illumination, the DIA condenser lens is necessary when 200x or 500x projection lenses are used.

PROJECTION LENSES
Three projection lenses can be mounted on the rotary turret at one time. All projection lenses boast high resolution and minimal distortion, while their working distances are longer than competitive lenses.
### ACCESSORIES

#### Stages (mm/in.)

<table>
<thead>
<tr>
<th>Stage Type</th>
<th>Surface Area</th>
<th>Crossbar travel</th>
<th>Reading method</th>
<th>Tool installation</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 x 6</td>
<td>170 x 190</td>
<td>300 (11.8)</td>
<td>Linear encoder</td>
<td>Screw hole 6-M6</td>
<td>15 (33)</td>
</tr>
<tr>
<td>8 x 6</td>
<td>170 x 190</td>
<td>300 (11.8)</td>
<td>Linear encoder</td>
<td>Screw hole 6-M6</td>
<td>15 (33)</td>
</tr>
<tr>
<td>6 x 4</td>
<td>170 x 190</td>
<td>300 (11.8)</td>
<td>Linear encoder</td>
<td>Screw hole 6-M6</td>
<td>15 (33)</td>
</tr>
<tr>
<td>2 x 2</td>
<td>170 x 190</td>
<td>300 (11.8)</td>
<td>Linear encoder</td>
<td>Screw hole 6-M6</td>
<td>15 (33)</td>
</tr>
</tbody>
</table>

#### Rotating Tables (mm/in.)

<table>
<thead>
<tr>
<th>Rotating Table Type</th>
<th>Surface Area</th>
<th>Crossbar travel</th>
<th>Reading method</th>
<th>Tool installation</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>170 x 190</td>
<td>300 (11.8)</td>
<td>Linear encoder</td>
<td>Screw hole 6-M6</td>
<td>15 (33)</td>
</tr>
<tr>
<td>4</td>
<td>170 x 190</td>
<td>300 (11.8)</td>
<td>Linear encoder</td>
<td>Screw hole 6-M6</td>
<td>15 (33)</td>
</tr>
<tr>
<td>O3L</td>
<td>170 x 190</td>
<td>300 (11.8)</td>
<td>Linear encoder</td>
<td>Screw hole 6-M6</td>
<td>15 (33)</td>
</tr>
<tr>
<td>2 x 2</td>
<td>170 x 190</td>
<td>300 (11.8)</td>
<td>Linear encoder</td>
<td>Screw hole 6-M6</td>
<td>15 (33)</td>
</tr>
</tbody>
</table>

#### Tool installation screw positions (mm/in.)

- 10 x 6, 8 x 6, 6 x 4, 4 x 4 and 2 x 2 stages require 10-M6 depth 10 tool installation screw holes.
- T grooves may be specially ordered for 2 x 2 rotating boards.

#### Rotating Table Specifications

<table>
<thead>
<tr>
<th>Table diameter (in.)</th>
<th>Glass insert diameter (in.)</th>
<th>Rotation range</th>
<th>Tool installation</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>165 (6.5)</td>
<td>360° (uncalibrated)</td>
<td>Screw hole 6-M6</td>
<td>Approx. 33 (73.0)</td>
</tr>
<tr>
<td>4</td>
<td>165 (6.5)</td>
<td>360° (uncalibrated)</td>
<td>Screw hole 6-M6</td>
<td>Approx. 33 (73.0)</td>
</tr>
<tr>
<td>O3L</td>
<td>165 (6.5)</td>
<td>360° (2&quot; reading)</td>
<td>T groove/Screw hole 2-M6</td>
<td>Approx. 36 (80)</td>
</tr>
</tbody>
</table>

### Standard 300mm Scale

- Gauges stage travel accuracy up to 300mm.
- Both 10mm-interval sensor patterns and calibrations are provided.
- Made of low heat-expansion glass, for minimizing influence of heat.
- Accuracy: Within ±0.5µm against compensation values

### Magnet-type V-Block Fixture

- For 8 x 6, 6 x 4, and 4 x 4 stages.
- The dedicated V-block fixture is available for the stage type O3L.

### Tilting Center Fixture

- Used to tilt samples around the center axis.
ACCESSORIES

Nikon has a complete lineup of measurement support/data processing systems for specific purposes and applications that support data utilization, as well as a wide variety of accessories.

Data Processing Software E-MAX Series

Introducing general-purpose measurement support systems with a common user interface for PCs

E-MAX is a series of general-purpose measurement support systems for a wide range of manual measuring instruments, including projectors. It has a common user interface for PCs, and allows the selection of two-dimensional data processing, visual measurement using TV images, and image measurement in accordance with the measuring instrument being used. It can also be added on to existing measuring instruments.

Data Processing Software E-MAX Series: Measurement Processing

- Actual measurement + recall measurement
- Coordinate system rotation 1
- Coordinate system rotation 2
- Coordinate system rotation 3
- Coordinate system recall 1
- Coordinate system reset
- Reference axis setting
- 37 angle setting
- Coordinate system recall 1
- Coordinate system recall 2
- Coordinate system rotation 1
- Coordinate system rotation 2

Data Processing Software E-MAX Series: Measurement Processing

1. Point (X, Y, Z, L)
2. Distance between two points (L, Lx, Ly, Lz)
3. Distance between points and a line (X1, Y1, Z1, X2, Y2, Z2)
4. Intersection of two parallel lines (N1, N2, X, Y, Z, A)
5. Intersection of two circles and a line (X1, Y1, Z1, X2, Y2, Z2)
6. Intersection of two circles (X1, Y1, Z1, X2, Y2, Z2)
7. Intersection of a point and a circle (X1, Y1, Z1, X2, Y2, Z2)
8. Intersection of a point and a circle (X1, Y1, Z1, X2, Y2, Z2)
9. Intersection of two circles (X1, Y1, Z1, X2, Y2, Z2)
10. Intersection of two lines (X, Y, Z, A)
11. Key input circle

Data Processing Software E-MAX Series: Measurement Processing

- Actual measurement + recall measurement
- Coordinate system rotation 1
- Coordinate system rotation 2
- Coordinate system rotation 3
- Coordinate system recall 1
- Coordinate system reset
- Reference axis setting
- 37 angle setting
- Coordinate system recall 1
- Coordinate system recall 2
- Coordinate system rotation 1
- Coordinate system rotation 2

E-MAX/D Set

Example combination

V-12B profile projector and a PC running E-MAX

E-MAX/D Set

Example combination

V-12B profile projector and a PC running E-MAX

Data Processing System E-MAX Series: Measurement Processing

- Actual measurement + recall measurement
- Coordinate system rotation 1
- Coordinate system rotation 2
- Coordinate system rotation 3
- Coordinate system recall 1
- Coordinate system reset
- Reference axis setting
- 37 angle setting
- Coordinate system recall 1
- Coordinate system recall 2
- Coordinate system rotation 1
- Coordinate system rotation 2

User-friendly Windows® interface allows a host of measurement and processing functions to be easily controlled using easy-to-understand multi windows and a mouse.

- Graphical window
- List window
- Toolbar (measurement codes)
- Results display window
- Counter window

A built-in navigation function improves measurement efficiency by displaying the current position and the next measurement position during replays.

Number (i) is the current position and number (g) is the next measurement position.

Digital Thermal Printer DPU-414

The DPU-414 connects with a Retrofit Counter/DP Unit or one of the I/O Panels (V-20B, V-12BSC, or V-12BDC) and prints out counter values for X and Y that were read by a photoelectric linear encoder and calculation results by the DP-E1.

2-Axis Counter Display

(V-24B, V-12BD, and V-12BS)

These displays show X and Y-axis coordinates. (Can be switched between 1 m, 0.1 m, and 0.01 m.)

Foot Switch 4

This switch can be used for such purposes as issuing load instructions for the DP-E1 from a Retrofit Counter/DP Unit or for EXRST/EDGE connector (V-20B, V-12BSC, or V-12BDC). However, please use Foot Switch 2 for profile projectors that have manufacturer numbers starting with No. 1 or No. 2. It helps improve measurement efficiency by freeing the user’s hands to perform other tasks.

Retrofit Counter/DP Unit

This unit is for connecting the 2-Axis Counter Display to the V-24B, V-12BD, or V-12BS. It is also required when adding the DP-E1 Data Processor.

Data Processor DP-E1

Data processing system combining both enhanced accuracy and ease of use

The DP-E1 is a new data processor that Nikon developed in response to the demands for enhanced accuracy and improved work efficiency across the entire measurement system. Despite its compact form with a built-in counter, the unit dramatically improves usability thanks to its 320 x 240 pixel LCD. It enables integrated operation with measuring microscopes and profile projectors, speedy measurement calculations, and reliable data processing.

User-friendly, small-footprint system

The compact body includes a measurement counter function. Work can proceed smoothly thanks to the easy-to-view display.

Easy-to-master control keys

The unit is controlled using easy-to-understand measurement code buttons and measurement result lists. This enables users to easily conduct measurement, even the very first time.

Saves measurement results on USB memory

Teaching files and measurement results files can be saved to a USB memory device so that they can be easily taken wherever they are needed.
Designed to meet the automated metrology requirements of mechanical parts, electronic devices, dies & molds and medical devices.

The new iNEXIV VMA-2520 has been expressly designed for three-dimensional workpieces. Though compact and lightweight in design, it provides a long 200mm Z-axis stroke and a 73.5mm working distance, enabling easy Z-axis measurement of mechanical parts, plastic injection molding parts, metal press parts, electronic devices, dies & molds and medical devices. The standard 10x zoom optics meets the industry’s demanding needs for superb resolution at high magnifications while offering a wide field of view at low magnifications. Low distortion optics and high intensity white LED illumination sources improve contrast to enhance throughput. This combination assures reproducible measurements even for colorful parts.

Main features

Easy and accurate measurements optimized for 3D parts
Nikon has drawn on its state-of-the-art digital technologies to produce a highly affordable automated measurement system. The iNEXIV VMA-2520's design is optimized for easy use as well as repeatable and accurate measurement of 3D parts.

Compact and lightweight
The iNEXIV VMA-2520 is a powerful bench top system designed to use minimum factory floor space. The main body has a footprint of only 565mm W x 690mm D x 740mm H (computer and controller separate) and weighs only 72kg (158.7 lb), yet it still has a 250mm x 200mm x 200mm measuring capability.

Long working distance
The newly developed optical system features a super long 73.5mm working distance for all magnifications. This allows sufficient three dimensional clearance for Z-axis measurements even at high magnification.

High-speed, highly-accurate Laser AF (optional)
In addition to the standard Vision AF, an optional high-speed Laser AF with a long 63mm working distance is available. It provides fast focusing and Z-axis measurements regardless of the surface shape of your workpiece.

Touch probing measurement (optional)
The iNEXIV VMA-2520 accepts the Renishaw TP20 system, making 3D parts measurement much easier.

Sophisticated VMA AutoMeasure software
This new versatile software has been developed exclusively for the VMA-2520. It provides various functions to easily conduct tasks ranging from setup, teaching programs and measurements, to evaluations.
Compact, lightweight design offering an extended measurement height

Long 200mm Z-axis stroke plus 250mm x 200mm XY stroke

The VMA-2520 has a unique extendable optical head design that provides a Z-axis stroke of 200mm. Couple this with an X-Y stage travel of 250mm x 200mm and you have a system making measurements of 3D parts such as injection molding parts, metal parts, electronic devices, molds and medical devices easier to manage.

Newly designed optics with an Apochromat LWD objective lens

Nikon has developed a new optical system that covers low magnifications, has a long working distance and is suitable for measuring three-dimensional parts. The Apochromat objective lens features low distortion (0.1% or less) while providing a long 73.5mm working distance throughout all magnification ranges. Moreover, improvements in the LED illumination system also increase image contrast by utilizing an Apochromatic lens to compensate for the blue wavelengths emitted from white LEDs.

White LED illumination for fast, high-accuracy measurement

The VMA-2520 employs a white LED light source for episcopic illumination, diascopic illumination and 8-segment LED ring illumination. The high-intensity white LED features constant color temperature and less flicker, thus it provides stable measurement accuracy, particularly when observing color images. With the LED’s quick response to lighting controls, increased measurement throughputs can be achieved.

10x zoom with wide field of view

The VMA-2520 comes standard with a five-step, 10x zoom optical system that provides both superb resolution at high magnification and a wide field of view at low magnification. Greater position accuracy, achieved by eliminating backlash in the zooming mechanism when using the five-step zoom range, makes it ideal for measurement applications.

Table for the main body and PC rack are optional

Table the main body and PC rack are optional
Multiple sensors for high speed and accurate height detection—Vision, Laser and Touch Probe

High-speed, high-precision Vision AF
Thanks to the adoption of a new algorithm and a progressive scan CCD camera, Vision AF now provides greater speeds and accuracy. Vision AF is convenient for applications such as focusing surface and edges of a workpiece.

Optically independent Laser AF (option)
As well as the standard Vision AF, fast Laser AF that features a long 63mm working distance can be used as an option. The Laser AF for the VMA-2520 employs a non-contact sensor that uses a red semiconductor laser light as a fill light, and enables height detection with sub-micrometer resolution. The Laser AF provides fast and precise focusing on workpiece surfaces regardless of optical magnification, making measuring the height of workpieces easier.

Touch probe for height and side measurements (option)*
The INEXIV VMA-2520 accepts the Renishaw® TP20 or TP200 touch-trigger probing system, making contact-probing measurements possible. It detects surface and side coordinates for complicated 3D parts, where vision sensing can not be used.

* Touch probe option will be available in summer 2007. Renishaw® is a registered trademark of Renishaw plc.

Nikon’s advanced image processing algorithm
In combination with Nikon’s new image processing technology, the VMA-2520 provides state-of-the-art image processing technology. The digital video image outputs are transferred to a PC’s IEEE 1394 port via the controller and processed for sub-pixel level edge detection. This eliminates the need for a frame grabber in the host computer and enables high-speed, highly-accurate observations and measurements. The 3CCD progressive scan color camera also achieves FOV measurement repeatability equivalent to that of a monochrome camera.

Easy selection of desired edges by eliminating dust and burrs
Some workpieces contain multiple edges within a given caliper, or their contrast is too low, making edge detection extremely difficult. This function graphically profiles the contrasts of the image within the caliper using a multi-gray-level scale, enabling the operator to select any one of a number of edges. Selection of the desired edge is simple; click the appropriate buttons in the edge selection menu and adjust the threshold level using the mouse.

Video edge probes with auto “best-fit” function
When the operator clicks the point to be measured, the system automatically rotates the probes, sets them at the optimum position, and sets the probe size, all automatically.

Advanced intelligent search
Skew alignment and deviations between the edge probing points within a workpiece are automatically corrected by a pattern-matching feature, eliminating possible measurement errors.

APS (Auto Position Search)
Thanks to this function, the operator no longer needs to manually place multiple workpieces in proper alignment; the INEXIV automatically searches workpiece position for skew alignment.

MPS (Multi-Pattern Search)
Automatically corrects deviations between the edge probing points programmed in a teaching file as well as irregular feature positions without edge probing error.
User-friendly standard software iNEXIV VMA AutoMeasure

Main program layout

The VMA AutoMeasure software provides enhanced ease of use and versatility because it is based on years of extensive experience with the NEXIV VMR series. An intuitive wizard menu and operation window with large icons can be customized by selecting engineering mode or operator mode. A specified GUI environment can be stored with an individual ID using the ID registration function. User teach files (parts measurement programs) can now be stored with notes and images for easy recognition and recall. Even the number of mouse clicks required for each operation has been reduced to simplify and speed up the measurement process. Also, iNEXIV VMA AutoMeasure supports a multiple-language environment. The software can switch languages without having to restart the program.

iNEXIV mode switcher to select proper operation procedures

Selection of a teaching file with interactive guides

Interactive measurement wizards

The measurement wizards guide operators, step by step, through what is required to achieve their tasks. In addition to the default wizards, operators can create customized wizards by registering frequently used procedures to streamline future operation.

Online CAD interface program

By importing a workpiece’s CAD data in, for example, DXF format, the operator can display graphics in the CAD graphic window on iNEXIV VMA AutoMeasure. This facilitates efficiency in teaching and shortens working time. The operator can move the stage to the desired position by double-clicking the appropriate position within the input workpiece. Also, it is possible to create a teaching file automatically from CAD feature data on iNEXIV VMA AutoMeasure.

Handy optional hardware & software

Time and labor reduction throughout the work process

Imaging Documentation Program: NEXIV EDF/Stitching Express

This optional software makes EDF—Extended Depth of Field—images by extracting focused pixel information from multiple captured images in 2-axis direction. Also, it generates 2D stitching images from different FOV images captured with CNC XY stage motion, making a wide FOV observation possible. Both functions contribute to image documentation.

Two-dimensional profile shape analysis program:
INEXIV VMA Profiler/CAD Reader

INEXIV VMA Profiler makes it possible to measure and judge 2-dimensional profile shapes in a workpiece that cannot be measured in the normal geometric mode. More accurate quantitative measurements can be taken than with the chart comparison method using profile projectors and/or conventional measuring microscopes. With the INEXIV VMA CAD Reader, nominal shape data can be created from CAD data in the DXF/IGES file format.

CAD interface off-line teaching support program:
INEXIV VMA Virtual AutoMeasure

This program enables CAD data to be read into the Virtual Video Window on a separate computer, allowing the operator to use INEXIV’s teaching program with the same operational procedures as on the online computer. This eliminates the necessity of using an actual workpiece during teaching sessions and lets the INEXIV VMR system concentrate on automatic measurement for increased productivity. The software imports IGES, DWF, DMIS, NC files, Gerber, and so on.

Gear evaluation software

This software provides evaluations on various parameters of a measured workpiece, including pitch deviations, tooth space runout, base tangent length, and dimension overpin, based on industrial standards.
Report and chart generating program: Custom Fit QC

Suitable for lot control of inspection data such as maximum value, minimum value, range, standard deviation and process capability index.
• In addition to 10 standard inspection result sheet forms, it is possible to customize original forms.
• BMP and JPEG files can be pasted onto the inspection result sheet.
• Automatic generation of graph and changeable degree/minute/second display.
• Easy to generate histograms, X-R control charts and scatter diagrams.

Operating environment: Windows® 2000/XP
Microsoft Excel® 2000 or later
Required memory: 128MB (min)
Codevelopment: Aria Co., Ltd.

Real-time SPC via DDE (Dynamic Data Exchange)

Using a DDE Link function, measured data can be immediately transferred to spreadsheets such as Microsoft Excel®, SPC-PC IV, SPC-PC IV Excel, and others, making real-time SPC analysis possible.

Note: SPC-PC IV and SPC-PC IV Excel are products of Quality America Inc.

Nikon rotary indexer RI-3600L

The RI-3600L can rotate the image of a workpiece and display it with a 0.01° resolution. Because it can be controlled externally, it enables automatic measurements while controlling the posture of the workpiece.

Minimum readout: 1°
Control resolution: 0.01°
Max. workpiece diameter: 75mm
Operation mode: Auto or Manual
Pre-set points: Point of origin and 3 others

Report generating program: VMR Report Generator

This software enables quick generation of inspection result sheets in various report forms including user-designed forms. Users can even customize the program by creating macro scripts to meet any special requirements.

Operating environment: Windows® 2000/XP
Microsoft Excel® 2000 or later
Required memory: 128MB (min)
Codevelopment: Pronics Co., Ltd.
Laser AF is a Class 1 Laser Product

CLASS 1 LASER PRODUCT