Premium portable metrology

ModelMaker MMDx/MMCx
Handheld scanners

MCAx
Articulated arms

ACCURACY, USABILITY AND PORTABILITY

The MCAx Manual Coordinate measuring Arm, is a precise, reliable and easy-to-use portable 7-axis measuring system. It is the perfect partner for the ModelMaker MMDx / MMCx digital handheld laser scanners and Focus 10 Handheld scanning and inspection software. This total solution's accuracy, capability and portability makes it feel perfectly at home in the metrology lab, on the shop floor and in-the-field.

The MCAx arm 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 solution for the widest range of measurement tasks.

Measurement volume
Available in six lengths between 2.0 m and 4.5 m

Advanced construction
Aerospace-grade carbon fiber arm tubes are strong, lightweight, thermally stable and feature a lifetime warranty

Zero-G counterbalance
Reduces operator fatigue delivering effortless control in all positions

Lock
Secures the arm easily and safely when not in use - Enables to fix the arm in any intermediate position

Integrated carry handle
Secure lifting point allows for easy carrying

Feature packs
Can provide additional capability such as Wireless (Wi-Fi) connectivity and Li-Ion battery power

Universal mounting system
Quickly and easily attaches to a variety of stands / tripods and bases including magnetic and vacuum mounts

Rotating grips
Low friction handling positions for better ergonomics while reducing stress and fatigue

Infinite rotation
Infinite rotation of all principle axes for unrestricted use

Absolute encoders
No referencing or warm-up time required

In-the-field verification
MCAx+ arms are supplied with a NIST-traceable length standard for accuracy and repeatability verification

…WITH FLEXIBLE PROBING OPTIONS

Automated probe recognition
Switch between different probe types or between tactile probes and scanners any time - No re-calibration, no probe selection, no tools

Customer choice
Choose between: high-accuracy, no-compromise MMDx scanners with 50 mm, 100 mm or 200 mm stripe widths; or budget-conscious but effective MMCx scanners with 80 mm or 160 mm stripe widths

ModelMaker MMCx

ModelMaker MMDx

Uncompromised portability
No external controller box provides"Plug and play" technology

Zero warm-up time
Isolated hot and cold zones and temperature compensation on MMDx scanner

Enhanced sensor performance
Measurement of unfriendly surfaces is simple due to fully automatic adjustment of laser settings

Optimized scanner geometry
Tilted laser plane and camera gives comfortable ergonomics and best quality image response

Multi-probe capability
Simultaneous mounting of both tactile probe and non-contact laser scanner

Integrated buttons
Control at your fingertips

Ergonomic pistol grip
Increases operator comfort and productivity

Probe options
MCAx supports a wide variety of tactile (straight and hook) and touch-trigger probes in many lengths and stylus configurations

GROUNDBREAKING SCANNING PERFORMANCE

THE DIGITAL HANDHELD SCANNER

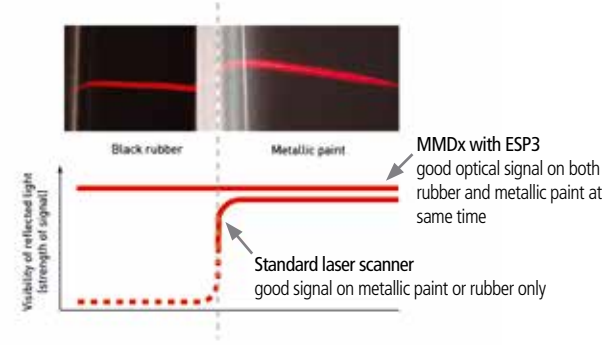
The unmatched accuracy, usability and performance of the digital ModelMaker scanner make it the perfect tool for all inspection or reverse engineering applications.

The ModelMaker MMDx/MMCx scanners are a leap forward in 3D digitizing, as both models feature 3rd generation Enhanced Sensor Performance (ESP3) making them suitable for scanning almost any material.

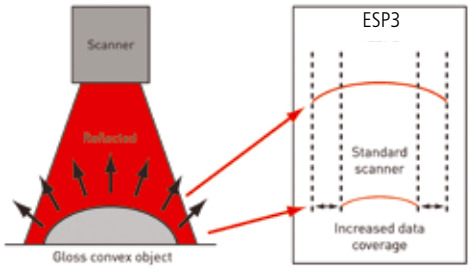
MMDx100 premium digital ModelMaker scanner

SCAN ANY MATERIAL

Through Enhanced Scanning Performance, the ModelMaker scanner adapts its laser power to suit the surface characteristics of the object.
During scanning, it automatically tracks changes in surface conditions – both color and reflectivity – and adapts laser power accordingly in real-time. As a result, ModelMaker is able to accurately and efficiently handle parts with any surface color and texture, without requiring re-scanning or spraying.



ModelMaker scanners also feature an intelligent anti-reflection filter to provide accurate measurements when scanning very shiny or polished materials. The functionality filters out all reflective laser light that is scattered in many directions.



Thanks to ESP3, ModelMaker is able to scan the steep sides of convex surfaces, often a challenge due to poor light reflection.

BEST-IN-CLASS PRODUCTIVITY

Featuring high frame rates and laser stripes up to 200 mm, the digital MMDx/MMCx provides the ultimate in scanning productivity. The scanners' digital cameras benefit from a true (non-interpolated) resolution of over 1000 points per stripe, providing optimum resolution for scanning freeform surfaces and features efficiently.

EASE-OF-USE

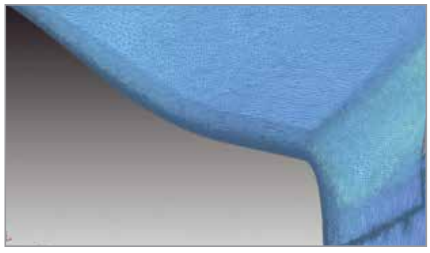
Weighing around 400g and featuring a comfortable stand-off distance, ModelMaker scanners are optimized for ergonomic use. Set-up time and portability is optimized through the use of isolated thermal zones, temperature compensation and on-board processing – which means no external controller or extraneous cabling.

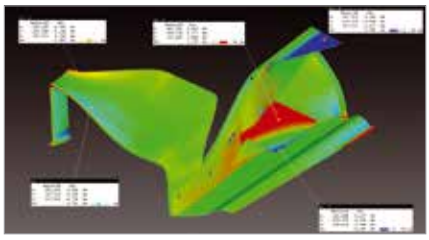
THE RIGHT TOOL FOR THE RIGHT JOB

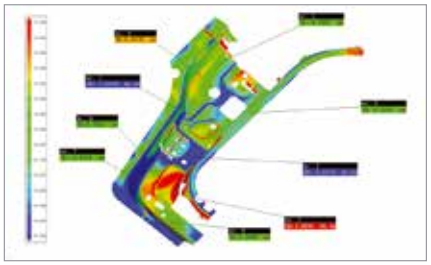
The ModelMaker is available in two performance variants and three stripe widths to match your specific productivity and resolution needs.

	Scan rate	Productivity	Accuracy
MMDx50	• • • •	• •	• • • •
MMDx100	• • • •	• • •	• • •
MMDx200	• • • •	• • • •	• •
MMCx80	• •	• •	• •
MMCx160	• •	• • •	•

INTUITIVE SCANNING AND INSPECTION SOFTWARE







TOTAL SOLUTION

ModelMaker MMDx/MMCx scanners and MCAx arms seamlessly interact with Focus software for scan and tactile probe data acquisition and inspection processing. It is a total solution that tightly integrates hardware and software to guarantee smooth and error-free operation.

SCANNING AND APPLICATION SOFTWARE

Focus supports intuitive inspection using an articulated arm or Optical CMM with tactile and/or scanning probes. The software is specifically designed to easily control data flows with minimum user interaction. For the first time, customers can complete handheld data acquisition and inspection jobs from within Focus without compromising performance.

Alternatively, through the Nikon Metrology API, the MMDx/MMCx handheld scanners and MCAx arms can be used directly in many 3rd party inspection software applications, including PolyWorks® and Geomagic®.

For reverse engineering applications users can select from a broad offering of 3rd party packages which tightly integrate all Nikon Metrology handheld scanners.

FOCUS HANDHELD SCANNING FEATURES

- Real-time point cloud rendering
- Point cloud filtering and polygon meshing tools
- Fuse command for intelligently and automatically processing point cloud data into an accurate, high quality polygon mesh
- Tactile measurements complement laser scanning, both of which can be performed directly in Focus
- Remote software interaction using articulated arm and K-Scan probe
- Automatic sensor intensity adaptation to scan surfaces with varying color or high reflectivity
- Import/export of all standard point, mesh and CAD formats, such as IGES, STL, CATIA, UG, Pro/E, STEP, VDA, etc
- Scripting support for scanning automation

APPLICATIONS

- Fast & accurate 3D scanning
- Part-to-CAD inspection: First article inspection against CAD model
- Inspection of geometric features
- Gap-and-flush inspection
- Reverse engineering: from concept studio clay to class A surfaces
- Input for rapid prototyping

MCAx CONFIGURATIONS AND ACCESSORIES

	MCAx+	MCAx
Scanner compatibility [1]	Handheld scanners: MMDx / MMCx / MMD / MMC Dual-use CMM & handheld scanners: LCDx / LCD	
Feature pack	Scanning pack	
Probes	15 mm diameter steel, 50 mm long 6 mm diameter ruby, 100 mm long 3 mm diameter ruby, 100 mm long	
TESA TKJ connectors	Standard	
Locking counterbalance	Standard	
Hard case	Standard	
Dust cover	Standard	
Probe calibration sphere	Standard	
NIST traceable length standard	Standard	Optional
Rotating grips	Standard	Not available
Base	Magnetic	Bolt-down

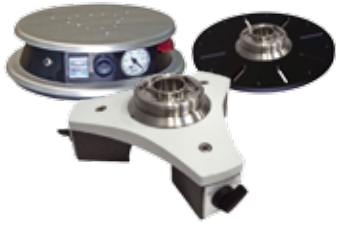
[1] *Scanner not included with MCAx arms as standard*

LC60Dx or LC60D CMM scanner users can extend their measurement capability by also using the scanner on an MCAx arm. Refer to LC60Dx brochure for details.

ACCESSORIES

A modular approach to base and probe connectivity as well as measurement volume extensions and datuming provides a multitude of accessories to enhance usage in the most demanding situations

Lightweight portable or heavy-duty mobile tripods for floor-mounting



Magnetic, vacuum or bolt-down bases for table or tool mounting

Measurement volume extension and probe solutions

SOLUTION BENEFITS

- High accuracy and fast data throughput saves time and money
- Optimized for hard-to-scan surfaces
- Designed for use under all shop floor or field conditions
- Extreme temperature stability and zero warm-up time
- Quick and easy plug-and-play setup
- Short learning curve
- On-board calibration storage
- Scanner compatible with all major brands of portable localizers and point cloud software
- No external controller
- Automatic probe recognition
- Enhanced ergonomics mean stress-free usage
- Seamless transition between scanning and touch-probing

The ModelMaker MMDx /MMDCx digital handheld scanners paired with MCAx portable articulated co-ordinate measuring arms allows you to reduce measurement times by rapidly diagnosing production issues in all areas of manufacture. This enables delivery of your products faster and with greater confidence by meeting the highest quality standards.

SPECIFICATIONS

MODELMAKER MMDx/MMCx LASER SCANNER

	MMDx50	MMDx100	MMDx200	MMCx80	MMCx160
Stripe width (Y)	50 mm (2.0″)	100 mm (3.9″)	200 mm (7.9″)	80 mm (3.1″)	160 mm (6.3″)
Stand-off (to near FOV)	95 mm (3.7″)	100 mm (3.9″)	110 mm (4.3″)	100 mm (3.9″)	110 mm (4.3″)
Measuring range (Z)	50 mm (2.0″)	100 mm (3.9″)	150 mm (5.9″)	100 mm (3.9″)	150 mm (5.9″)
Accuracy (1σ) [1]	7 µm (0.00028″)	10 µm (0.00039″)	16 µm (0.00063″)	16 µm (0.00063″)	24 µm (0.00094″)
Data rate at full FOV	50 Hz		60 Hz	30 Hz	
Max. data rate	150 Hz			30 Hz	
Points per stripe	1000			800	
Temperature compensation	Yes			No	
Laser power control	Fully automatic - per point (Enhanced sensor performance - ESP3)				
Sensor weight	Approx. 400 g (14.1 oz.)				
Laser power	Class 2				
Localiser compatibility	Nikon Metrology MCAx / MCA II 7-axis / MCA 7-axis (v2.2 & 2.5) Nikon Metrology K-Series K600 / K610 Romer/CimCore Infinite 1.0SC 7-axis / Infinite 2.0SC 7-axis				

[1] Typical values are 30% better than published accuracy.

LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT

Max output: 5 mW & 1 mW
Emitted wavelength: 660 nm & 635 nm
IEC 60825-1 Edition 2.0 2007-03
CLASS 2 laser product
Read manual before use

Complies with 21 CFR 1040.10 and 1040.11, Laser notice no. 50, dated June 24, 2007
Due to the diverging beam, viewing the laser output with optical instruments (for example, eye loupes, magnifiers and microscopes) within a distance of 100 mm may pose an eye hazard.

MCAx ARTICULATED ARM

	Measuring range	Point repeatability [2]	Volumetric accuracy [3]	Weight
MCAx20+	2.0 m (6.6ft.)	0.023 mm (0.0009″)	±0.033 mm (±0.0013″)	8.2 kg (18.1 lbs)
MCAx25+	2.5 m (8.2ft.)	0.027 mm (0.0011″)	±0.038 mm (±0.0015″)	8.5 kg (18.7 lbs)
MCAx30+	3.0 m (9.8ft.)	0.042 mm (0.0017″)	±0.058 mm (±0.0023″)	8.8 kg (19.4 lbs)
MCAx35+	3.5 m (11.5ft.)	0.055 mm (0.0022″)	±0.081 mm (±0.0032″)	9.1 kg (20.1 lbs)
MCAx40+	4.0 m (13.1ft.)	0.067 mm (0.0026″)	±0.098 mm (±0.0039″)	9.4 kg (20.7 lbs)
MCAx45+	4.5 m (14.8ft.)	0.084 mm (0.0033″)	±0.119 mm (±0.0047″)	9.7 kg (21.4 lbs)
MCAx20	2.0 m (6.6ft.)	0.044 mm (0.0017″)	±0.061 mm (±0.0024″)	7.9 kg (17.4 lbs)
MCAx25	2.5 m (8.2ft.)	0.049 mm (0.0019″)	±0.069 mm (±0.0027″)	8.2 kg (18.1 lbs)
MCAx30	3.0 m (9.8ft.)	0.079 mm (0.0031″)	±0.100 mm (±0.0039″)	8.5 kg (18.7 lbs)
MCAx35	3.5 m (11.5ft.)	0.099 mm (0.0039″)	±0.125 mm (±0.0049″)	8.8 kg (19.4 lbs)
MCAx40	4.0 m (13.1ft.)	0.115 mm (0.0045″)	±0.151 mm (±0.0059″)	9.1 kg (20.1 lbs)
MCAx45	4.5 m (14.8ft.)	0.141 mm (0.0056″)	±0.179 mm (±0.0070″)	9.4 kg (20.7 lbs)

Working temperature: 0 – 50° C (32 – 122° F)
Storage temperature: -30 – 70° C (-22 – 158° F)
Relative humidity: 10 – 90% non-condensing

Operational elevation: 0 – 2000 m (0 – 6600 ft.)
CE Compliance: Yes
Universal worldwide voltage: 100 – 240 V AC (50 – 60 Hz)

*[2] The **Point Repeatability Test** (or SPAT) is the reference test to determine measurement arm repeatability with ball probe. The cone is in front of the machine. Points are measured from multiple approach directions. The average point and the deviation of each point to the average center are calculated. The result is the maximum range divided by two. The published value is the pass-off specification for: ASME B89.4.22 SPAT and VDI/VDE 2617-9 Sphere form (MPE_{Pf}) & Sphere position (MPE_{Pl})*
*[3] The **Volumetric Accuracy Test** most accurately represents the reasonable expectations for machine performance in practical measuring applications since it involves measuring a certified length standard many times in several locations and orientations and compares the resultant measurements to the actual length. The Volumetric Length Accuracy Test is the most appropriate test for determining machine accuracy and repeatability. The result is the maximum deviation of the measuring distance less the theoretical length. The published value is the pass-off specification for ASME B89.4.22 Volumetric Performance and VDI/VDE 2617-9 Sphere size (MPE_{Ps}) & Indication for size (MPE_{Pi}) Probing specifications are relevant to both the center and offset probe ports of the MCAx arm. The specifications are achieved under stable environmental conditions with the MCAx arm mounted on a base plate or magnetic base and using a 15 mm diameter, 50 mm long, steel ball probe connected to both probe ports.*

SPECIFICATIONS

SYSTEM ACCURACIES FOR MCAx WITH SCANNER COMBINATIONS

Arm type	Laser scanning system accuracy (2σ)					
	MMDx50	**MMDx100**	**MMDx200**	**MMCx80**	**MMCx160**	**LC60Dx**
MCAx20+	42 µm (0.0017")	48 µm (0.0019")	66 µm (0.0026")	56 µm (0.0022")	70 µm (0.0028")	50 µm (0.002")
MCAx25+	48 µm (0.0019")	54 µm (0.0021")	70 µm (0.0028")	62 µm (0.0024")	74 µm (0.0029")	58 µm (0.0023")
MCAx30+	54 µm (0.0021")	60 µm (0.0024")	78 µm (0.0031")	72 µm (0.0028")	84 µm (0.0033")	64 µm (0.0025")
MCAx35+	72 µm (0.0028")	76 µm (0.003")	98 µm (0.0039")	90 µm (0.0035")	102 µm (0.004")	82 µm (0.0032")
MCAx40+	94 µm (0.0037")	96 µm (0.0038")	114 µm (0.0045")	108 µm (0.0043")	118 µm (0.0046")	100 µm (0.0039")
MCAx45+	116 µm (0.0046")	120 µm (0.0047")	136 µm (0.0054")	130 µm (0.0051")	138 µm (0.0054")	124 µm (0.0049")
MCAx20	50 µm (0.002")	56 µm (0.0022")	74 µm (0.0029")	64 µm (0.0025")	80 µm (0.0031")	58 µm (0.0023")
MCAx25	56 µm (0.0022")	62 µm (0.0024")	78 µm (0.0031")	70 µm (0.0028")	84 µm (0.0033")	66 µm (0.0026")
MCAx30	78 µm (0.0031")	82 µm (0.0032")	100 µm (0.0039")	92 µm (0.0036")	106 µm (0.0042")	86 µm (0.0034")
MCAx35	102 µm (0.004")	106 µm (0.0042")	128 µm (0.005")	122 µm (0.0048")	134 µm (0.0053")	114 µm (0.0045")
MCAx40	128 µm (0.005")	136 µm (0.0054")	154 µm (0.0061")	148 µm (0.0058")	158 µm (0.0062")	142 µm (0.0056")
MCAx45	162 µm (0.0064")	168 µm (0.0066")	190 µm (0.0075")	180 µm (0.0071")	194 µm (0.0076")	174 µm (0.0069")

Laser scanning system accuracy: *the laser scanning system accuracy indicates the performance of the laser scanner combined with a handheld localizer. The test is performed by scanning a highly accurate reference plate in 5 different orientations of the articulated arm and laser scanner. The 5 resulting point clouds are merged together in one point cloud and a best-fit plane is constructed through this point cloud. For each of the points, the distance is calculated to the best-fit plane. The result of the test is the 2σ value on all of the calculated deviations.*

MMDx/MMCx with MCAx

Premium portable metrology

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