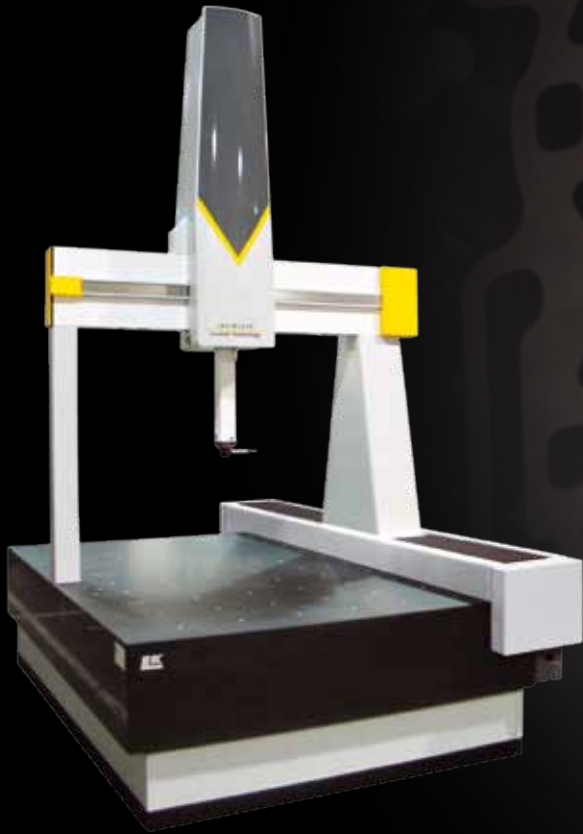




# LK CMM

Coordinate Measuring Machines



# So much more than precision

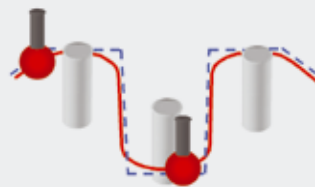
The Nikon Metrology LK range of Coordinate Measuring Machines represent the ultimate in CMM technology. Designed and manufactured using only the highest quality materials, they carry a heritage of over 45 years experience and expertise. LK CMMs deliver the ability to perform dimensional, positional and surface measurement in a single system. Combined with a complete range of contact and non-contact sensors, Nikon Metrology CMMs provide true multi-sensor capability. Sensors can be quickly changed to combine geometric and surface measurement into a single inspection routine.

## Key design features

- Ceramic bridge and spindle provide a thermally stable and ultra-stiff frame for long lasting accuracy.
- Nikon Metrology unique LK air bearings provide a smaller air gap with greater stiffness than standard air bearings to enhance the rigidity of the frame.
- Granite table with integral dovetail guideway (10.10.8 and bigger) provides the smoothest of drives with high velocity and acceleration.
- Steel support legs designed on CAD with Finite Element Analysis provide a stable mounting for the ceramic beam and carriage assembly.
- Friction-driven axes remove the uncertainty of belt drives and gear-boxes and provide a hysteresis-free smooth repeatable motion.
- Bonded Renishaw scales negate the need for separate scale and mechanical frame thermal compensation, providing confidence in repeatability and accuracy.

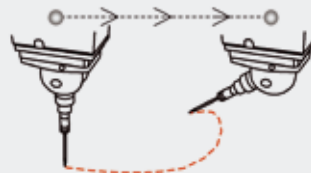


## Key performance features



### Fly Mode

Provides optimized motion control for more efficient machine movement and faster throughput.



### PH Fast

Further optimize the machine throughput by moving the probe head simultaneously with machine motion.



### CMM Hand-box

Multi-function hand-box provides access to programming tools without returning to the computer.

# Multi-sensor support - Measurement for everyone



## Scanning made easy

Regardless whether contact or non-contact scanning is required, Nikon Metrology has a solution designed that provides highly repeatable and accurate scanning results for geometric feature and free-form surface inspection.

Unique and unequalled, digital scanning is delivered as standard on every Nikon Metrology LK CMM equipped with either TP20 or TP200 probes. This cost-effective scanning solution enhances traditional CMM inspection to increase productivity.



When accuracy and high speed are expected, LK CMMs' ultra-stiff ceramic frame guarantees that continuous contact scanning (SP25M) will provide you feature, form and free-form surface data that is equal to any 'fixed-head' probe system.

Non-contact laser scanning, with the world leading Nikon Metrology LC and unique patented XC (Cross-Scanner) technology, allow you to scan virtually any component with unequalled levels of performance. Suitable for geometric inspection, free-form surface inspection or reverse engineering, laser scanning is available for everyone.



## When size truly matters

Nikon Metrology recently manufactured one of the largest CMM bridge sizes ever to be ordered with a measuring length and width of 6 meter.

Whether it is a large bridge or a horizontal arm configuration you require, the Nikon Metrology LK range has a standard solution ready for you. Based on the same ceramic and granite construction, the large bridge and horizontal arm CMM range offers market leading accuracy and performance characteristics.



# LK V Bridge and LK V HA High Accuracy CMM

## High-performance ceramic 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.

### Benefits

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

### Features

- Flexible multi-sensor platform: touch probes, analog scanning and laser scanning
- High capacity (loads) table

### Applications

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

### Specifications

- Volumetric accuracy
  - from 1.8 $\mu$ m + L/350 (LK V)
  - from 1.5 $\mu$ m + L/375 (LK V-HA)
- Repeatability
  - from 1.8 $\mu$ m (LK V)
  - from 1.5 $\mu$ m (LK V-HA)
- Velocity
  - up to 42m/min (LK V)
  - up to 50m/min (LK V-HA)
- Acceleration
  - up to 7840m/min<sup>2</sup> (LK V)
  - up to 5400m/min<sup>2</sup> (LK V-HA)



LK V 15.12.10



LK V 8.7.6 (Tripod stand)



LK V 15.10.8

#### LK V (small) - Standard bridge style CMM (high-accuracy versions available)

Sizes <sup>1</sup> (Tripod stand)	Sizes <sup>1</sup>	Probe head	Probes
6.5.4	10.10.8	PH10T	TP20
8.7.6	15.10.8	MH20i	TP200
10.7.6	20.10.8	PH10M	SP25M
	25.10.8		LC15, LC50Cx, LC60Dx, XC65D (-LS)

#### LK V (medium to large) - Standard bridge style CMM

Preferred sizes <sup>1</sup>	Probe head	Probes
15.12.10 20.15.12 25.15.15 20.20.15	PH10MQ	TP20 (LK V only)
20.12.10 25.15.12 30.15.15 30.20.15		TP200
25.12.12 30.15.12 35.15.15 35.20.15		SP25M
30.12.10 35.15.12 40.15.15 40.20.15		LC15, LC50Cx, LC60Dx, XC65D (-LS)

<sup>1</sup> (other sizes available on request)



# LK High-speed scanning bridge CMM

## LK V-SL and LK V-SL HA offering ultimate scanning and inspection performance

The LK V-SL features a revolutionary design that delivers the best scanning and inspection performance currently available in the marketplace. Particularly suited to meet the demands of automotive and aerospace applications, the LK V-SL is a unique and distinctive multi-sensor CMM. With the HA option, such a system becomes a metrology lab reference CMM featuring submicron accuracy for applications requiring highest precision.

### Benefits

- Increased scanning performance delivering high accuracy and throughput
- Increased stiffness and stability of the metrology frame
- Ready for shop floor and metrology lab

### Features

- Granite table with ceramic Y & Z guideways
- Raised X-axis guideway provides ultrafast dynamics
- S-axis 0.1 micron scale
- Multi-sensor capability
- Pneumatic anti-vibration mounts
- Temperature compensation as standard

### Applications

- Analog, digital or laser scanning
- Automotive, engine and transmission components
- Aerospace blade, engine and aircraft components
- General precision engineering
- Medical instruments

### Specifications

- Volumetric accuracy
  - from 1.1 $\mu$ m+L/400 (LK V-SL)
  - from 0.7 $\mu$ m+L/600 (LK V-SL HA)
- Repeatability
  - from 0.7 $\mu$ m (LK V-SL)
  - from 0.5 $\mu$ m (LK V-SL HA)
- Velocity
  - up to 51m/min (LK V-SL)
  - 20m/min (LK V-SL HA)
- Acceleration
  - up to 5065m/min<sup>2</sup> (LK V-SL)
  - 722m/min<sup>2</sup> (LK V-SL HA)



LK V 10.10.8 SL equipped with an LC60Dx laser scanner



LK V-SL (HA) metrology lab reference CMM



### 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.

### LK V-SL and LK V-SL HA - High accuracy bridge style CMM

Preferred sizes <sup>1</sup>	Probe Head	Probes
8.7.6      10.10.8      20.12.10	PH10MQ	TP200
10.7.6      15.10.8		SP25M
15.7.6		LC15, LC50Cx, LC60Dx, XC65D (-LS)

<sup>1</sup> (other sizes available on request)

# LK V Large scale twin-rail mounted and gantry CMMs

## A new breed of large scale CMMs

Nikon Metrology offers large scale gantry and twin-rail mounted bridge style CMMs when size really matters. In addition to high accuracy with maximum volume, these large scale 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 large scale CMMs are constructed using materials with high thermal stability to guarantee optimum accuracy.

## Benefits

- Ceramic material offering 300% more stiffness over aluminium allows for ultra large machine sizes with premium accuracy
- Floor-mounted or raised gantry versions to suit all environments and component handling situations
- Twin drive systems valued for smooth motion
- Available with separate measuring plate if required

## Features

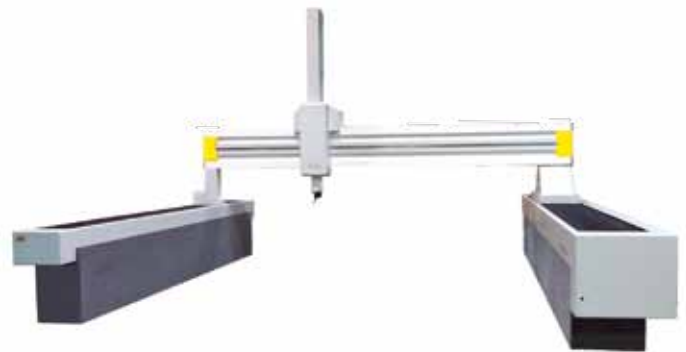
- High-performance air bearings
- LK CMMs feature granite rails with ceramic Y and Z guideways
- Supports tactile styli, analogue scanning and laser scanners

## Applications

- Automotive and commercial vehicles
- Aerospace components and structures
- Marine and locomotive engine components
- Telecommunications and satellite equipment

## Specifications

- Volumetric accuracy
  - from 4.5µm + L/200 (LK V-R)
  - from 3.5µm + L/250 (LK V-G(P))
- Repeatability
  - from 4.5µm (LK V-R)
  - from 3.5µm (LK V-G(P))
- Velocity
  - up to 32m/min (LK V-R)
  - up to 27m/min (LK V-G(P))
- Acceleration
  - up to 2270m/min<sup>2</sup> (LK V-R)
  - up to 2070m/min<sup>2</sup> (LK V-G(P))



LK V 50.40.12 R



LK V-R twin-rail mounted bridge style CMM

### LK V-R and LK V R-SL - Twin-rail mounted bridge style CMM

(short-leg models available)

Sizes <sup>1</sup>	Probe Head	Probes
Rail lengths from 3m to 10m+	PH10MQ	TP20
Bridge sizes from 2m to 4m		TP200
Spindle lengths from 1.2m to 3m		SP25M
<i>(short-leg model with steel legs or concrete riser foundation)</i>		LC15, LC50Cx, LC60Dx, XC65D (-LS)

### LK V-G(P) - High accuracy and ultra high accuracy bridge style CMM

Sizes <sup>1</sup>	Probe Head	Probes
Rail lengths from 2m to 10m+	PH10MQ	TP20
Bridge sizes from 4m to 7m		TP200
Spindle lengths from 3m to 4m		SP25M
<i>(available with steel legs or concrete riser foundation)</i>		LC15, LC50Cx, LC60Dx, XC65D (-LS)

<sup>1</sup> (other sizes available on request)

# LK H 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.

### Benefits

- High velocities/acceleration for low cycle times
- Excellent accuracy and repeatability
- Flexible multi-sensor platform: touch probes, analog scanning, laser scanning

### Features

- Multiple CMM configurations available: table, rail, twin, etc.
- Supports laser scanners and touch sensors
- Can be supplied with cast-iron measuring plate if required

### 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

### Specifications

- Volumetric accuracy
  - from 1.9 $\mu$ m + L/250 (LK H-T)
  - from 10 $\mu$ m + L/200 (LK H-R)
- Repeatability
  - from 1.9 $\mu$ m (LK H-T)
  - 6.0 $\mu$ m (LK H-R)
- Velocity
  - up to 51m/min (LK H-T)
  - up to 40m/min (LK H-R)
- Acceleration
  - up to 10830m/min<sup>2</sup> (LK H-T)
  - up to 7580m/min<sup>2</sup> (LK H-R)



LK H-R premium series twin-rail mounted horizontal arm CMM with walk-on covers

### LK H-R - high accuracy rail mounted horizontal arm style CMM (single or twin column)

Sizes <sup>1</sup>	Probe Head	Probes
Rail lengths from 4m to 10m+	PH10MQ	TP7M
Spindle lengths from 0.4m to 1.6m		TP20
Column heights from 2m to 3m		TP200B
<i>(available with walk-on or bellow covers for rails)</i>		SP25M
		LC15, LC50Cx, LC60Dx, XC65D (-LS)

### LK H-T - high accuracy table mounted horizontal arm style CMM

Sizes <sup>1</sup>	Probe Head	Probes
Rail lengths from 1m to 5m	PH10MQ	TP20
Spindle lengths from 0.4m to 1.6m		TP200B
Column heights from 0.6m to 2m		SP25M
		LC15, LC50Cx, LC60Dx, XC65D (-LS)

<sup>1</sup> (other sizes available on request)



LK H-R dual column horizontal arm CMM




























LK H-T high accuracy table mounted horizontal arm CMM

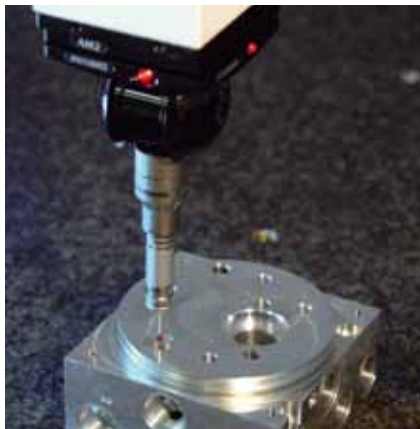


LK H-T featuring rotating table

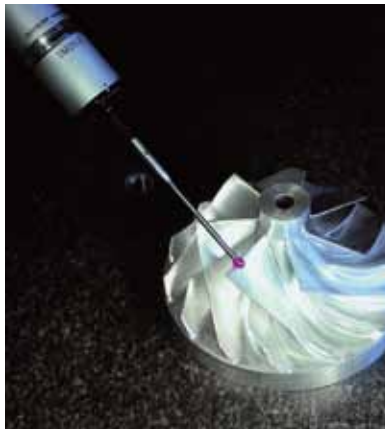
# Supported probe systems

From traditional single point data collection to state-of-the-art 5 axis measurement incorporating probe head touches, Nikon Metrology supports many different configurations of probe system.

Contact measuring systems										
Manually indexing			Motorized			Dynamic				
Manual probe heads with integral TP20 probe systems		Manual probe head with autojoint connection	Fixed position with autojoint		Motorized probe heads with 720 positions available			Infinite positioning probe head for 5 axis point collection	Infinite positioning probe head for 5 axis multi-point measurement	Fixed probe head with long stylus capability
MH20i	MH20	MIH	PH6M		PH10T	PH10M	PH10MQ	PH20	REVO	SP80
										
PH6M	PH6M	TP20	TP200	TP20	TP200	TP20	TP200	SP25M	RSP2	
										
		SP25M			TP200	TP200	TP7M		RSP3	
										
MCR20		MCR20/SCR200/FCR25		MCR20/SCR200/FCR25/ MRS-ACR3			MCR20			



TP200



SM25-2



REVO

Contact Nikon Metrology to check availability of the probe system to each machine model



**Non-contact measuring systems**

**Single and multi-stripe laser**

Laser data collection for inspection of features, comparison to nominal CAD data or reverse engineering

PH10M PH10MQ



LC15Dx



LC50Cx



LC60Dx



XC65Dx / XC65Dx-LS



**MCR20**



Scanning of medical implant



Scanning of casting



Feature inspection

# Digital CMM scanners



## Digital scanning boosts inspection performance

The all-digital Nikon LC15Dx scanner brings 3D digitizing in the accuracy range of tactile measurement, while offering the advantage of capturing a multitude of inspection points. With its smaller field of view, it perfectly suits digitizing small or detailed objects with higher point density and tighter tolerances

The LC60Dx is an all-purpose scanner that can be used both on CMM and portable arms. The LC50Cx laser scanner offers an adequate productivity with its 50mm stripe width and scanning rate of 45 stripes per second.

Incorporating 3 lasers in a cross pattern, the XC65Dx captures all full 3D details of features, edges, pockets, ribs and freeform surfaces in a single scan. The XC65Dx-LS version with a longer stand-off distance (170mm) facilitates scanning of complex forms.

To effectively scan surfaces with varying color or high reflectivity, LC/XC scanners provide automatic real-time adjustment (ESP3) of sensor settings for each individual point of the laser stripe.

### Features

- 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.

### Specifications

	LC15Dx	LC60Dx	LC50Cx	XC65Dx	XC65Dx-LS
Field of View	18x15mm	60x60mm	50x60mm	65x65mm (3x)	65x65mm (3x)
Probing error (MPE <sub>v</sub> ) <sup>1</sup>	2.5µm	9µm	20µm	12µm	15µm
Data acquisition (approx. pts/sec)	70,000	77,000	37,500	3x 25.000	3x 25.000
Enhanced Scanner Performance (ESP3)	√	√	√	√	√

<sup>1</sup> Nikon Metrology test comparable to EN/ISO 10360-2



XC65Dx

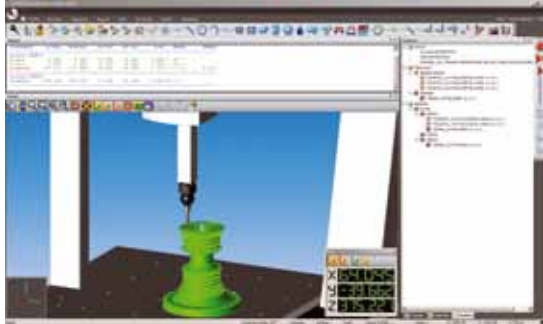


LC60Dx

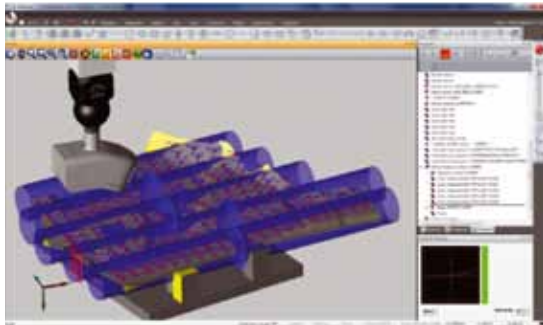
# CAMIO7 multi-sensor CMM metrology software

## The standard for DMIS co-ordinate measuring machine programming

CAMIO7 is the world's leading multi-sensor CMM programming software supporting traditional touch-trigger probes, continuous contact scanning probes and the full range of Nikon laser scanning probes. Regardless of whether inspecting stamped, moulded, fabricated or machined parts CAMIO7 drives accurate and efficient inspection programs for geometric features or full surface analysis with CAD compare.



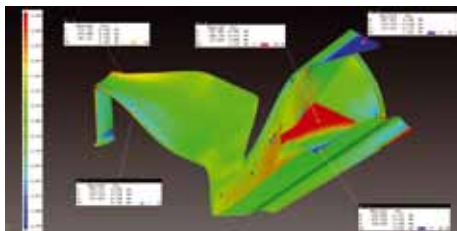
Straightforward scanner path definition based on CAD data



Laser scanner paths can be programmed based on CAD data or taught from the hand-box



Comprehensive graphical reporting



Graphical reporting can combine GD&T tolerances and full part to CAD comparison

## Features

- An interface reflecting the latest Microsoft® Windows® standard with ribbon style toolbars providing instant access to all programming functions.
- A NEW simplified programming environment with fewer mouse-clicks.
- A NEW faster workflow to program multiple features of multiple types (ie points, circles etc.) in a single operation.
- Simplified probe management.
- Probe check function to verify the probe path before committing to the program or CMM operation.
- Flexible reporting options with multiple outputs including full colour graphics, ASCII text, excel or internet browser compatible formats.
- Support for the latest versions of CAD data: IGES, VDA-FS, STEP, ACIS®, CATIA® v4 and v5, Pro/ENGINEER®, Unigraphics®, Solidworks® and Parasolids®.
- Fully I++ compliant.

## Benefits

- The ability to create CMM programs using multiple probe types to achieve the best CMM inspection routine for your application.
- Easy to use programming functions to suit all levels of user.
- Reduced programming time.

## Comprehensive off-line programming capability

- CAMIO7 planning provides the capability create new or open existing inspection plans direct from CAD data including the import of part axis and GD&T tolerance data.
- Full machine simulation and collision avoidance.
- Creates CMM programs in true DMIS output without translation.
- CAMIO7 can be used as a stand-alone solution to create programs to run in compatible 3rd party DMIS software\* including PC-DMIS® and Metrolog XG®.

\* compatibility check to the DMIS standard is advised

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