High accuracy with high resolution

LC15 Dx

CMM laser scanning
The LC15Dx is a viable alternative to a tactile probe for an increasing number of high precision CMM applications. Manufacturers gain a better appreciation of the dimensional quality of their products without compromising on cycle times. A wider variety of parts, geometry and materials can be measured more effectively, including many parts too small or fragile for a touch probe.

**BENEFITS**

**Closing the accuracy gap**

An LC15Dx is a viable alternative to a tactile probe for high precision CMM applications. The smallest part details can be captured with best-in-class accuracy. Thanks to solid state laser scanner technology and an innovative calibration method, the LC15Dx is closing the gap between laser scanning and tactile probing, achieving accuracies to within microns. Unlike a tactile probe, however, the scanner uses non-contact 3D laser triangulation to measure the surface directly and eliminate probe compensation errors. Full thermal compensation means the maximum accuracy is achieved as soon as the scanner is powered on.

**Versatile scanning without the hassle**

Nikon’s unique ESP3 technology intelligently adapts the laser settings for each measured point in real-time. A wider range and mix of surface materials, finishes, colors and transitions can be measured more efficiently without user interaction, manual tuning and part spraying, including small and fragile parts. Unwanted reflections are neutralised by an advanced software filter while changes in ambient light are absorbed by a high-grade daylight filter.

**Better appreciation of product quality**

The entire part is checked to the CAD model and any areas of concern can immediately be highlighted on a color map, thus providing a complete 3D visualization of dimensional quality. Further investigation and analysis is possible using fly-outs, sections and a library of Geometric Dimensioning and Tolerancing (GD&T). Inspection reports can be as simple or complex as required with follow-on reports fully automated.
SOFTWARE

Intuitive software for every application
A selection of popular software packages for part-to-CAD and feature inspection are available for the LC15Dx, including Nikon Metrology’s own FOCUS software.

Key features include:

- CAD programming
- Best-fit alignment
- Part to CAD comparison
- Feature inspection
- Blade analysis
- Color reporting
- Multi-sensor CMM
- Offline programming
- Point cloud management
- GD&T library
- Teach & Learn programming
- Full simulation

Closing the gap with tactile probe accuracy

AUTOJOINT CONNECTION
Automatic scanner and probe change

ESP3
Automatic laser settings

THERMAL STABILIZER
Zero warm-up

REFLECTION FILTER
Neutralizes unwanted reflections

DAYLIGHT FILTER
Absorbs ambient light

Intuitive programming and offline simulation reduces preparation time

Blade section analysis combined with full 3D comparison

3D visualization of dimensional quality
FULLY INTEGRATED
Laser signal routed via probe interface

STATUS LEDs
Laser diagnostics and status

RANGE FINDER
User guide for manual operation

HIGH QUALITY NIKON LENS
Improves accuracy and data quality

EYE SAFE LASER
Class 2 visible light laser

FEATURE INSPECTION
Feature measurement and GD&T library

SECTIONS AND PROFILES
2D section and profile analysis

CAD COMPARISON
Direct comparison of measured part to CAD

BEST-FIT ALIGNMENT
Best-Fit alignment of measured part to CAD

POINT CLOUD MANAGEMENT
Trim and filter point clouds

CAD EXPORT
Reverse Engineering and data storage
Multi-sensor applications

**COMBINE LASER SCANNING WITH A TACTILE PROBE**

In some cases a single sensor technology is insufficient for measuring all of the features. The LC15Dx can be combined with an optional tactile probe to create a versatile multi-sensor CMM. Depending on the application both technologies can be used independently or together in the same inspection program. Fully automatic sensor changing is possible with the addition of an optional change and storage rack which is mounted on the table of the CMM.

**HIGH PRECISION PARTS AND SMALL GEOMETRY**

The LC15Dx provides significant benefits for a wide variety of high precision parts and geometry, including small details, semi-rigid parts and the more demanding materials:

**PROCESS**  Production - R&D - reverse engineering

**METHOD**  Machined - moulded - stamped - cast - forged

**MATERIAL**  Metal - plastic - rubber - clay - ceramic - composites

**FINISH**  Machine - polished - plated - paint - mixed colors

**STRUCTURE**  Ridged - soft - flexible - fragile

**FEATURE**  Surface - geometric feature - profile - section

- Precision moulding
  Measure small, soft and fragile parts

- Medical implants
  Inspect complex freeform geometry

- Turbine blades
  Eliminate probe tip compensation errors

**ENHANCE THE CAPABILITY OF YOUR CURRENT CMM**

Retrofitting your current CMM with an LC15Dx is a cost-effective solution. The retrofit integrates with the existing CMM controller hardware and compatible probe system to provide a versatile multi-sensor CMM offering both non-contact and touch probe inspection.

LC15Dx retrofit kits are available for the most common CMM controller systems. Contact Nikon for details on exact versions of the controllers.
Specifications

Probing error (MPEP) ¹
1.9 µm (0.000075”)

Ball bar length (MPEE) ²
A+4 µm +L/350 mm
(A+0.00016 +L/13.78”)

Multi-stylus test (MPEAL) ³
3.9 µm (0.00015”)

ISO Probing form error ⁴
7 µm (0.00027”)

ISO Probing size error all ⁵
15 µm (0.000591”)

ISO Probing dispersion value ⁶
7.6 µm (0.000299”)

ISO Cone angle ⁷
100°

Scanning speed (approx.)
70,000 points/sec

Resolution (point spacing)
22 µm (0.00087”)

Points per line (approx.)
900

Measuring temperature range
18-22°C (64.4-71.6° F)

Operating temperature range
10-40°C (50-104° F)

Weight
370 g (0.82 lbs)

Ingress protection
IP30

Laser safety
Class 2

Enhanced Scanner Performance
ESP3

Daylight filter
Yes

Probe head compatibility
PH10M(i)(Q), CW43, PHS

All accuracy specifications valid for a CMM with an accuracy of 2µm + L/350 or better using manufacturer supplied test sphere

1 Nikon Metrology test comparable to EN/ISO 10360-2 MPEP using 1σ sphere fit.
2 Nikon Metrology test comparable to EN/ISO 10360-2 MPEE where A is equal to the CMM MPEE first term value.
3 Nikon Metrology test comparable to EN/ISO 10360-5 MPEAL

Accuracy specifications according ISO 10360-8:2013:

4 PForm.Sph.1x25:Tr:ODS,MPE : “Maximum probing form error” using 25 representative points in translatory scanning mode
5 PSize.Sph.All:Tr:ODS,MPE : “Maximum probing size error using All” measured points in translatory scanning mode
6 PForm.Sph.D95%:Tr:ODS,MPL : “Maximum probing dispersion value” using 95% of the measured points in translatory scanning mode
7 Cone angle : Region of sphere on which the measured points are selected

LC15Dx
Closing the gap with touch probe accuracy