Laser Radar MV331/351

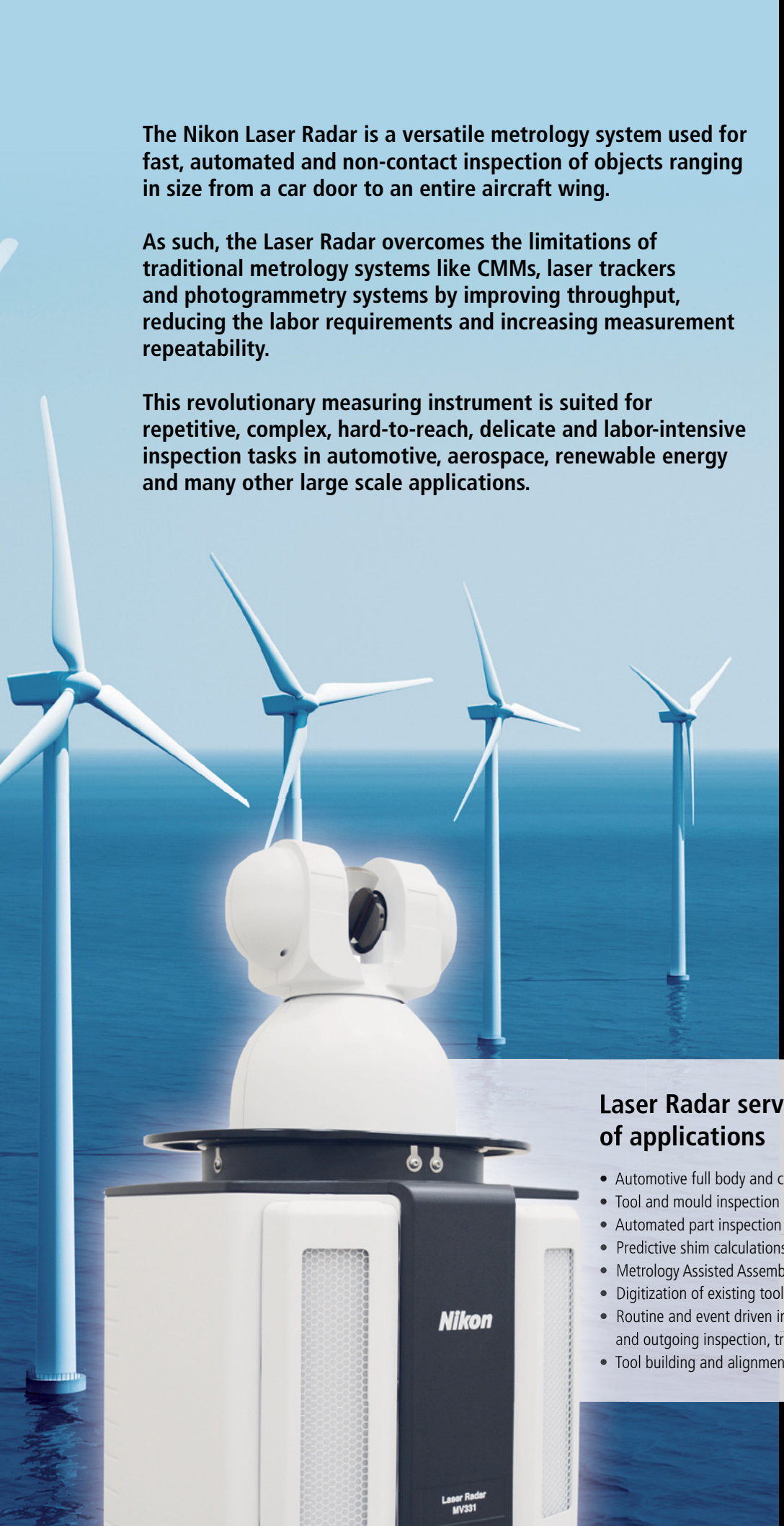
Automated large volume inspection

The Nikon Laser Radar is a versatile metrology system used for fast, automated and non-contact inspection of objects ranging in size from a car door to an entire aircraft wing.

As such, the Laser Radar overcomes the limitations of traditional metrology systems like CMMs, laser trackers and photogrammetry systems by improving throughput, reducing the labor requirements and increasing measurement repeatability.

This revolutionary measuring instrument is suited for repetitive, complex, hard-to-reach, delicate and labor-intensive inspection tasks in automotive, aerospace, renewable energy and many other large scale applications.

"With faster measurements, better quality data and improved usability, the MV331 / MV351 Laser Radar offers a superior user experience for automated, non-contact large scale metrology"



Laser Radar serves a wide array of applications

- Automotive full body and closure / panel inspections
- Tool and mould inspection & certification
- Automated part inspection & verification
- Predictive shim calculations for composite assemblies
- Metrology Assisted Assembly of large parts
- Digitization of existing tools, parts and assemblies
- Routine and event driven inspections such as first article inspection, incoming and outgoing inspection, troubleshooting, failure investigations
- Tool building and alignment

SLASHING INSPECTION TIME

Automated, non-contact inspection saves on process and labor overhead

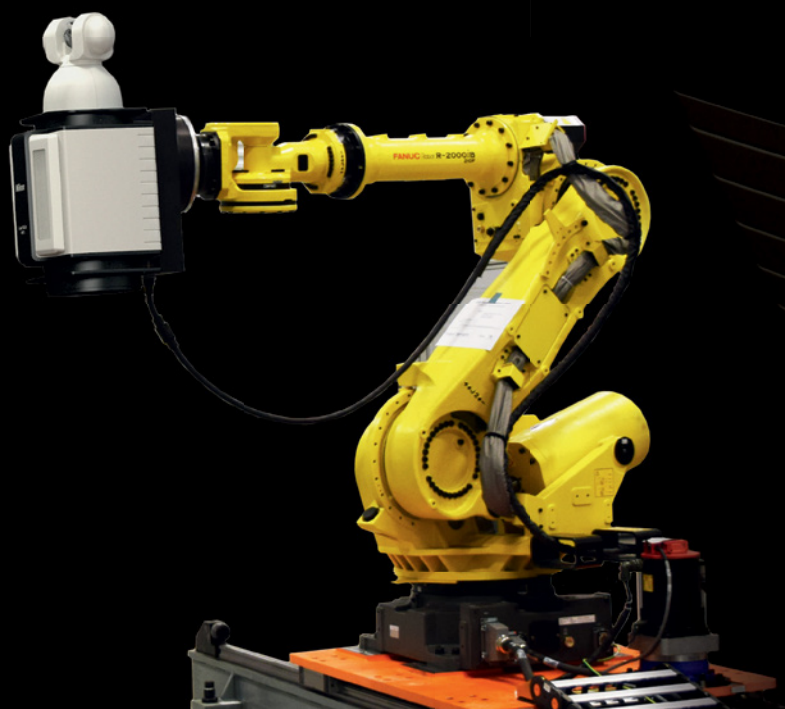
The Laser Radar offers non-contact inspection, true single-person operation, and supports off-line programming for completely automated and unattended operation, reducing operating costs. The Laser Radar's patented technology enables direct surface and feature measurements at high data rates. As a result, the Laser Radar eliminates the need for photogrammetry targets, spherically mounted retro-reflectors (SMRs) and handheld probes.

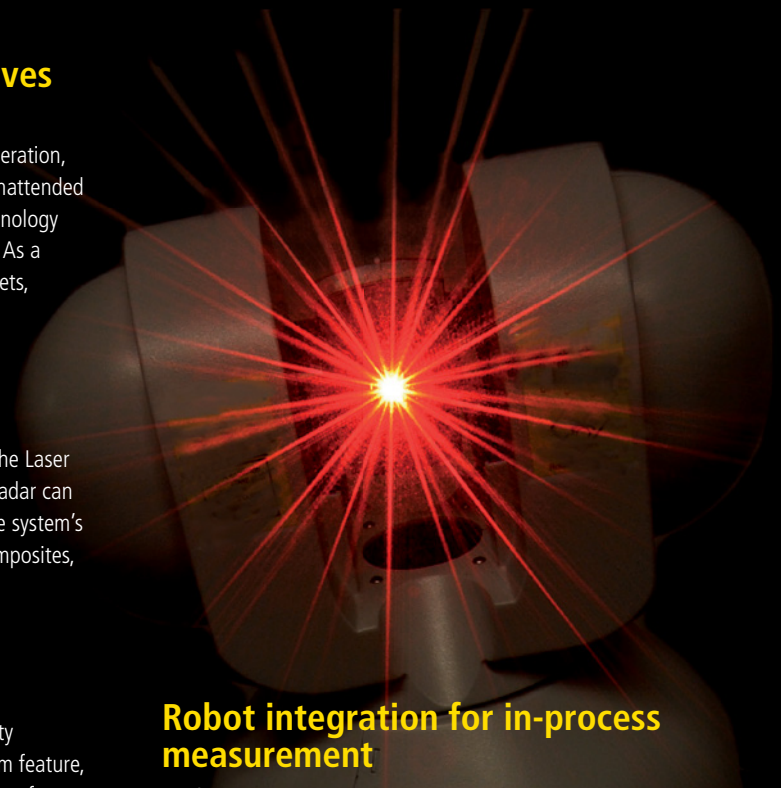
Flexibility in measuring surfaces and finishes

Recapturing one billionth of the reflected laser beam is enough for the Laser Radar to accurately perform a measurement. This means the Laser Radar can scan almost any surface type from dark to light and shiny to dull. The system's high signal/noise ratio yields repeatable range measurements on composites, metals and even highly reflective painted surfaces.

Designed for accurate feature inspection

Correctly manufactured geometric features are critical for high-quality assembly and part mating. The Laser Radar can automatically perform feature, edge and surface measurements. With the Laser Radar, the inspection of features is much faster than traditional methods and can be completely automated - without the need for an operator during runtime. Specific feature scan patterns minimize data sets and maximizes acquisition speed.
Existing inspection stations can be easily converted to measure with the Laser Radar as it can directly measure traditional references like tooling balls, photogrammetry dots, datum holes or even reflective tape. In addition, the Laser Radar's unique ability to precisely measure through mirrors allow it to see around corners and to measure occluded geometry.





Robot integration for in-process measurement

For fully automated inline or line-side inspections, Laser Radars can be easily installed on a standard 6-axis robot arm with the built-in robot mounting interface. The robots are used to automatically position the Laser Radar so it can then inspect areas otherwise hidden from the line of sight. The Laser Radar automatically measures alignment points after every move, guaranteeing all measurements are collected in the absolute coordinate system, independent of the robot and to horizontal arm CMM equivalent accuracy and repeatability.
For operation in manufacturing environments, the Laser Radar is equipped with external air filters that are easy replaceable even when the Laser Radar is connected to the robot mount. In addition to the new filters, positive air pressurization can be used to keep dust and other airborne particles out when working in harsh manufacturing environments.

Seamless integration with common metrology software

Customers can choose from a host of large scale metrology software solutions or use the software SDK to directly control the Laser Radar. Spatial Analyzer, Polyworks and Metrolog software are all commonly used in conjunction with Laser Radar. This flexibility allows customers to use the software of their choice and benefit from the advantages of the Laser Radar without having to re-train on new software. The Laser Radar comes with an easy-to-transport, small-footprint cabinet including a high performance laptop PC and peripherals.

RICH FEATURES, ABSOLUTE BENEFITS

Expanded line of sight around and behind objects using mirrors

Multi-zoom observation camera facilitates manual measurements

Easy replacement of external air filters

Positive air pressurization for use in harsh environments

Built-in robot mounting interface adapts to most common industrial robots

Ultra fast Vision Scan inspection mode captures up to 2000 points per second

Absolute measurements by identifying tooling balls on the measured part

Available in 30 m and 50 m range version (60m and 100m diameter reach)

Supports different stand types and mounting structures to adapt instrument height

Supports a variety of large volume metrology software

KEY BENEFITS

- **Repeatable measurements** – Measuring the exact same points on every part without human interaction enables better process control
- **Automated measurements** - Completely automated inspections dramatically reduce inspection time required to perform measurements of large parts
- **Improved safety** – Parts are measured without an operator standing on the part or ladder to hold a target / probe
- **Inspecting new materials** - Contactless measurements inspect uncured carbon fiber and other delicate surfaces without damaging risk
- **Optimized measuring uptime** – Create and prove out inspection plans completely offline using CAD
- **Seamless integration with today's manufacturing processes** – In-process inspection using Laser Radars on robots and integrated on large machining tools

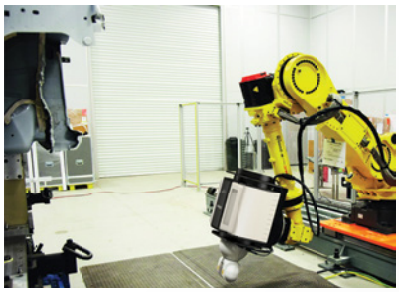
FIT FOR ANY LARGE VOLUME INSPECTION JOB

Fast inspection of aircraft parts

Laser Radar's capability to accurately and efficiently measure very large parts is a key asset for many leading aircraft manufacturers. Aviation metrology applications include major section joins, predictive shimming, engine inlet cowling & thrust reverser inspection and many more.

Automotive inline and next-to-the-line CMM

The Laser Radar can not only measure surface points but also complex features like weld nuts and threaded studs. In combination with a robot, the automation capabilities make the Laser Radar ideal for car body & panel inspections. The ability to program the LR completely offline makes it easy to inspect different vehicle models or sub-assemblies with the same measurement system.

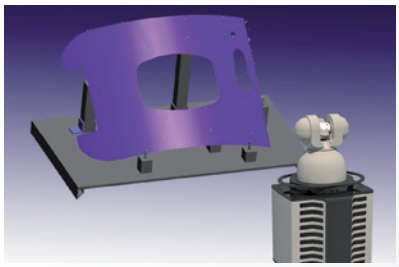


Ideal for composite inspection

Laser Radar serves as an award-winning metrology component in the production of right-first-time composite parts. Laser Radar is integrated into innovative composite manufacturing methods to increase composite part production quality and throughput.

Measuring antennae in a single inspection run

The size and fragility of parabolic communication antennae used in space reduces the number of metrology systems that are fit for the job. The laser radar's automated non-contact measurements provide better accuracy and requires only a fraction of the labor of traditional inspection methods.



Solar mirror inspection to increase output

In the fast-growing concentrated solar energy business, Laser Radar checks the geometric integrity of flat and parabolic mirrors and is then used to align the mirrors for maximum efficacy. Critical in this regard is its capability to directly measure the mirrors without every touching them.

Verifying space telescopes' sensitive hardware

Thanks to its ability to measure both highly reflective and dark material surfaces at large stand-off distances, the Laser Radar makes critical geometric verifications of space telescopes' mirror features and large mechanical structures without the risk of accidental damage to sensitive, high-value components.

Measuring heated surfaces near blast furnaces

The non-contact technology of Laser Radar is perfectly capable of measuring very hot surfaces. The Laser Radar performs geometry quality-related inspection in the various production steps that occur from the blast furnace to base sheet metal and other intermediary products.

Optimizing wind turbine geometry

To speed up geometry verification, Laser Radar accurately characterizes the geometry deviation of giant wind turbine blades in a single production shift without an operator ever having to mark section lines or even touching the part. In this limited time period, the LR is able to acquire many 10's of thousands of individual inspection points on the blade's pressure and suction sides.

SPECIFICATIONS

		MV331	MV331 HS	MV331p HS	MV351 HS
Range		30 m	30 m	30 m	50 m
Measurement speed	**Scanning***	2000 pts/s	2000 pts/s	2000 pts/s	2000 pts/s
	Surface points	0.5 sec	0.2 sec	0.2 sec	0.2 sec
	Tooling ball	7 sec	2 sec	2 sec	2 sec
	Feature (hole)	20 sec	2.2 sec	2.2 sec	2.2 sec
Environmental		Replaceable filters	Replaceable filters	Replaceable filters + attachment for air pressurization	Replaceable filters
Designed for		Cost-efficiency	Performance	Continuous inline operation	Long range

* Measurement speed depends on hole size and settings

Laser

	Measurement laser (infrared)	Pointing laser (red)
Wavelength	1,550 nm	700 nm
Power	<10 mW	<1.0 mW
IEC Class	Class 1	Class 2

Environmental

	Operational	Storage
Temperature	5° to 40°C	-10° to 60°C
Altitude	-400 to 3,000 m	-400 to 11,000 m
Humidity	10 - 90% (non-condensing)	

Distance measurement performance

Measurement accuracy (2σ)	10 µm + 2.5 µm/m
Maximum data rate	4000 pts/sec
Working range	MV331: 2-30 m MV351: 2-50 m

Angle measurement performance

Azimuth uncertainty (2σ)	6.8 µm/m
Elevation uncertainty (2σ)	6.8 µm/m
Azimuth working envelope	±180°
Elevation working envelope	±45°

Combined 3D Uncertainty

Range (m)	2	5	10	15	20	30
2σ Volumetric uncertainty (µm)*	24	53	102	152	201	301

* Tooling ball target grade 25 or less
* Laser Radar must be calibrated and operating in a stable environment

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