KONICA MINOLTA

VI-9i

NON - CONTACT 3D DIGITIZER

VI-9i, the most accurate VI yet

Introducing the latest addition to Konica Minolta's VI Series.

Featuring improved accuracy and usability and flexibility. Offering unprecedented value.

It's the most advanced model for industrial applications from reverse engineering to design verification and dimensional inspection.

The essentials of imaging

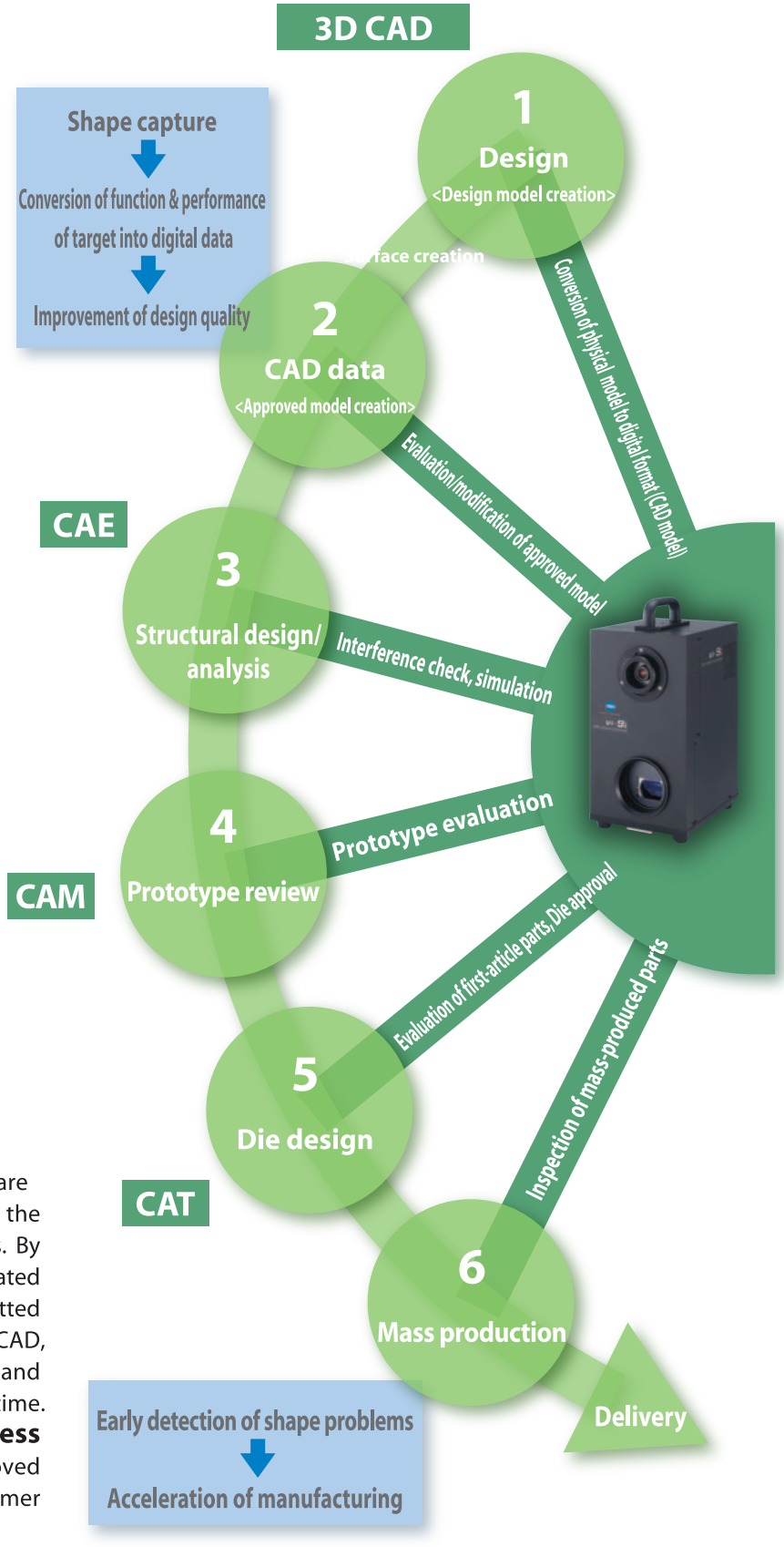
Digital Process Re-engineering

Introducing the VI-9i non-contact 3D digitizer. This innovative device is ideal for reverse engineering, design verification, quality inspection, and other industrial applications.

The VI-9i non-contact 3D digitizer provides high-speed and high-accuracy 3D measurement of dies, cast and forged products, and stamped and plastic-molded products. The 9i excels at shape evaluation, tool and die qualification, and quality inspection during prototype creation and the during the production processes. The 9i is an ideal way to capture the shape and dimensional data of design models and prototypes in design drawings for reverse engineering purposes.

When used for reverse engineering or CAE, the VI-9i easily and accurately converts the shape of a product into 3D digital data. Using the VI-9i for inspection or CAT contributes to the early detection of shape problems, provides rapid feedback on design, and eliminates unnecessary work in downstream processes. As a result, it accelerates the entire manufacturing process.

Smooth input and output of 3D digital data are essential to increasing work efficiency during the design, manufacturing, and inspection processes. By introducing the VI-9i, Konica Minolta has accelerated the revolution in manufacturing - a sector committed to the use of digital processing tools such as CAD, CAM, and CAE, to higher-quality shape input and process output, and to reduced throughput time. That's why we're promoting "**Digital Process Re-engineering,**" with the goal of improved effeiciency, and ultimately of enhanced customer satisfaction.



Measurement Flow of VI-9i

(Polygon Editing Tool)

Measure targets of any size.

Konica Minolta employed its expertise in optical engineering to develop interchangeable high-performance, dedicated lenses. As a result, TELE, MIDDLE and WIDE lenses can be selected to accommodate the size of the measurement target.
(Input range in X, Y and Z directions: 93 x 69 x 26 mm to 1495 x 1121 x 1750 mm)

Point & Shoot, Leave detailed settings to the 9i.

Konica Minolta's AF/AE technology, developed through its expertise in camera manufacturing, relieves users from the need to determine the exact measuring distance. Moreover, the system automatically determines the optimum laser power for the surface conditions of the target.
(Scan Range : standard mode 0.6 to 1.0 m, Extended mode 0.5 to 2.5 m)

1 Scanning the target with a laser beam

Take a measurement with the software, Polygon Editing Tool.

High speed and high accuracy

Start the measurement by framing the scan area on the LCD Viewfinder of the VI-9i unit or on the host computer's display . Each scan requires only 2.5 seconds to aquire accurate 3D data.

Standards-Traceable performance

Konica Minolta supports compliance with ISO 9000. Manufacturers using VI-9i for QC applications can receive test report of the accuracy of each 9i, traceable to national standard. Thereby ensuring that our measuring instruments and your process conform to ISO 9000 requirements.

*On request, Konica Minolta can provide a test report for each 9i unit. This test report is created by evaluating the measurement accuracy for all 3 lenses of each 9i using our Reference 3D Chart, an artifact traceable to national standards, and thus can be used as documentation for conformance with ISO requirements.

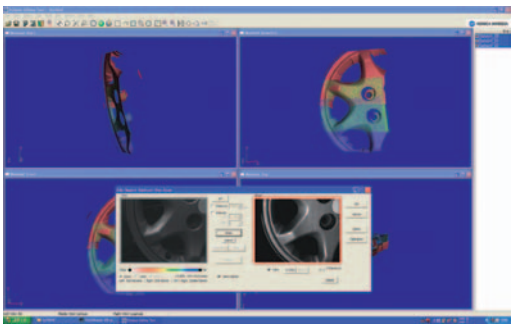
Measurement with VI-9i

2 Merging and editing of 3D data

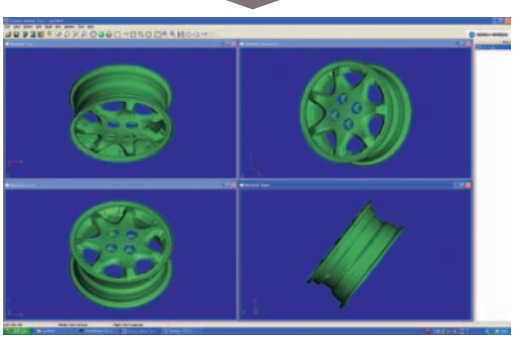
Quick, easy editing

Missed a spot? You'll see it immediately and be able to scan any voids. You can check the measured 3D data in real time on the preview screen. This allows for sequential framing, measurement, and alignment of the data. Thanks to the improved processing speed and the new graphical user interface specifically developed for the VI-9i, even large amounts of measurement data can be merged, edited and converted into general 3D data format with greater speed and ease. Merging of data can be accomplished by just clicking on a single pair of points. There is no need to attach markers, etc. before measurements.

■Aluminum Wheel

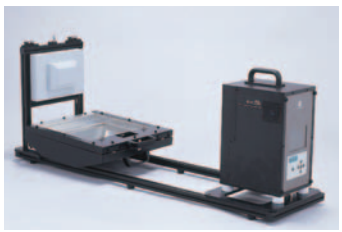


Measurement and data position alignment



Merging of 3D data (polygons)

What's more, our new field calibration system maintains the high reliability of the factory settings by canceling the degraded accuracy caused by lens exchange or a change in environment.

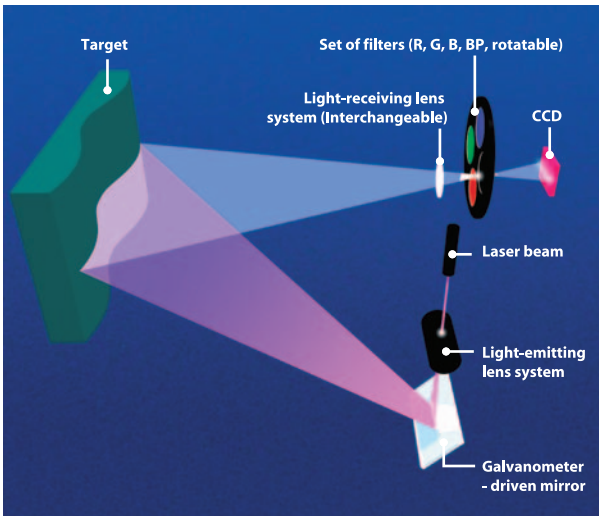


The non-contact 3D digitizer VI-9i offers improved accuracy and ease of use.

High speed, high precision, and Measurement accuracy of ±50mm

The VI-9i requires only 2.5 seconds per scan to acquire accurate 3D data.
Consequently, the VI-9i is ideal for accuracy verification and shape inspection of cast, forged, and pressed automotive parts and plastic-molded automotive parts. Give us your part, and we'll prove it to you.

The new Field Calibration system, negates inaccuracies caused by lens exchange or environmental changes. A simple calibration procedure before use assures the optimal performance from the 9i.



<Measurement principle>

The VI-9i is based on the principal of laser triangulation. A target is scanned with laser stripes . The CCD camera receives the light reflected from the surface of the subject. Surface shape measurements of the subject are obtained through triangulation, and converted into a 3D polygon mesh. The VI-9i measures 640 x 480 points with one scan, simultaneously acquiring surface shape data and color image data.

VI-9i System configuration

(Polygon Editing Tool)

＊ Photo shows example setup of VI-9i and laptop computer (commercial product).

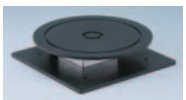
< VI-9i Main standard accessories>

① Interchangeable Lenses (TELE, MIDDLE, WIDE)
② Field Calibration System
- Polygon editing software "Polygon Editing Tool"
- SCSI Cable

<Optional accessories>

③ Measurement Stand Set
- Tripod Set

④ Rotating Stage Set



＊ Shape varies with sales region.

Major applications

○ Automotive/motorcycle manufacturers and parts maker
- Dimensional inspection of cast/forged parts. Checking of the margin remaining for secondary processing
- Accuracy inspection, parts inspection, interference check with mechanical parts, die verification of press- or plastic-molded products
  Inspection/analysis of car seats, tires, and cushioning materials
- Reverse engineering using actual objects, mock-ups, and scale models of car
- seats, headrests or wheels

○ Companies in heavy industry, iron/steel or heavy equipment manufacturers
- Inspection of turbine blades, steel pipes and steel plates. Design of heavy equipment

○ Other manufacturers
- Inspection or reverse engineering of interior/exterior wall materials and modular bath units
- Inspection of train rail wear, tanks at hydroelectric power plants, and turbine blades

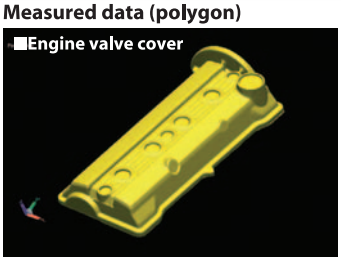
For other applications, visit our website below

Reverse engineering

Example of procedure for CAD data creation — Creation of a CAD Model of an automotive aluminum casting —

Measured data (polygon)

■Engine valve cover

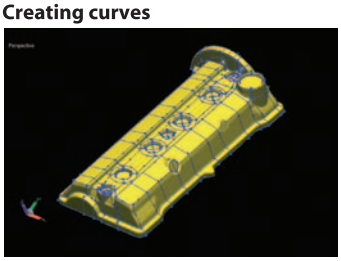


Measurement, alignment, merging, hole filling, and cleaning

STL

Various analysis software/Rapid prototyping

Creating curves



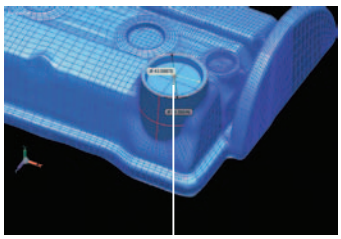
Manual curve creation

Unnecessary when the automatic surface creation function is used

Creating NURBS

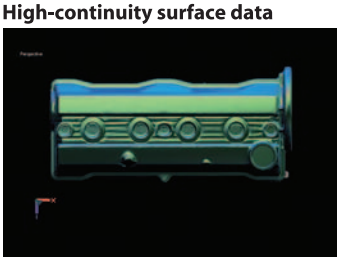
Creates a NURBS patch matching the curve boundaries

Trimmed NURBS surfaces



Create geometrically shaped surfaces such as cones and planes. Trim the data with these surfaces.

High-continuity surface data



Example of continuous surface evaluation using environment mapping

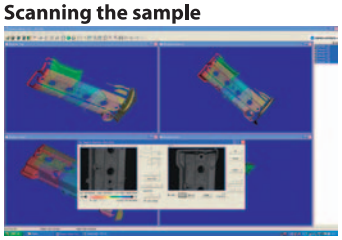
3D CAD

IGES

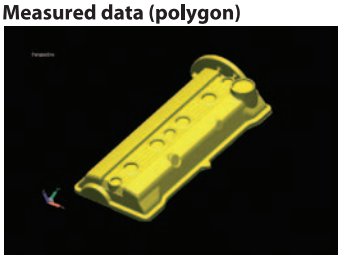
Inspection

Example of CAT work procedure — Comparison inspection between measured data and CAD data —

Scanning the sample

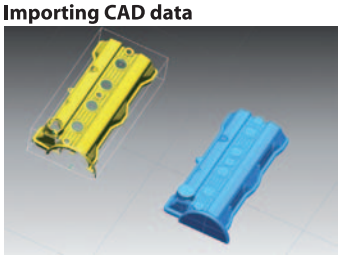


Measured data (polygon)

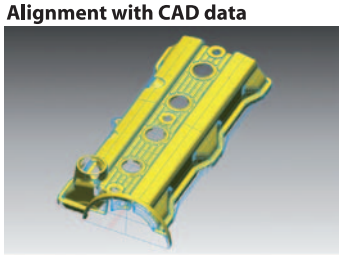


Measurement, alignment, merging, and cleaning

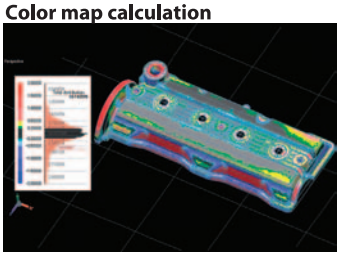
Importing CAD data



Alignment with CAD data



Color map calculation



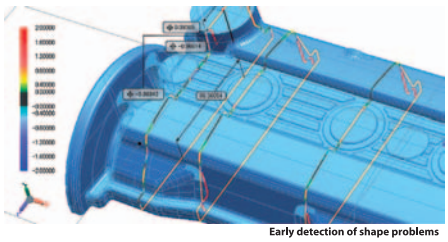
Inspection evaluation report

Comparison between CAD data and measured data

Color map display providing at-a-glance indication of sections within/outside the tolerance range (contour display)

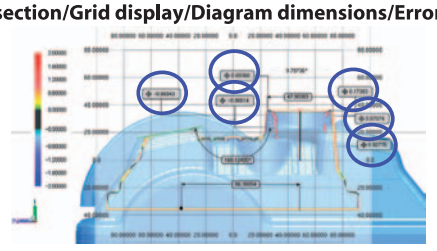
Example of inspection evaluation report —Comparison between reference CAD (NURBS) data and measured data—

Evaluation at cross section



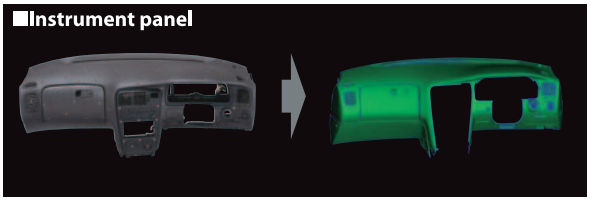
Early detection of shape problems

Cross section/Grid display/Diagram dimensions/Errors at specific points

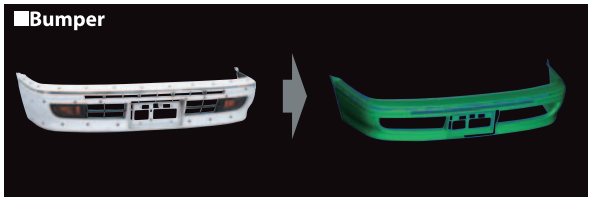


Example of measuring data

■Instrument panel



■Bumper



Specifications of VI-9i

Type	Non-contact 3D digitizer	
Measuring Method	Triangulation light block method	
Light-Receiving Lenses (Interchangeable)	**TELE**	Focal distance f=25 mm
	MIDDLE	Focal distance f=14 mm
	WIDE	Focal distance f=8 mm
Scan Range	0.6 to 1.0 m (In Standard mode)	
	0.5 to 2.5 m (In Extended mode)	
Laser Scan Method	Galvanometer-driven rotating mirror	
Laser Class	Class 2 (IEC60825-1), Class 1 (FDA)	
X Direction Input Range(In Extended mode)	**TELE**	93 to 463 mm
	MIDDLE	165 to 823 mm
	WIDE	299 to 1495 mm
Y Direction Input Range(In Extended mode)	**TELE**	69 to 347 mm
	MIDDLE	124 to 618 mm
	WIDE	224 to 1121 mm
Z Direction Input Range(In Extended mode)	**TELE**	26 to 680 mm
	MIDDLE	42 to 1100 mm
	WIDE	66 to 1750 mm
Accuracy (X, Y, Z)	±0.05 mm (Using TELE lens at distance of 0.6 m, with Field Calibration System, Konica Minolta's standard, at 20°C)	
Precision (Z, σ)	0.008 mm (Using TELE lens at distance of 0.6 m, Konica Minolta's standard, at 20°C)	
Input Time (per scan)	2.5 sec	
Transfer Time to Host Computer	Approx. 1.5 sec	
Ambient Lighting Condition	Office environment, 500 lx or less	
Imaging Element	3D data: 1/3-inch frame transfer CCD (340,000 pixels)	
	Color data: Common with 3D data (color separation by rotary filter)	
Number of Output Pixels	3D data: 640 x 480 (640 x 460 in the HIGH QUALITY mode)	
	Color data: 640 x 480	
Output Format	3D data: Konica Minolta format, & (STL, DXF, OBJ, ASCII points, VRML)	
	(Converted to 3D data by the Polygon Editing Software/ standard accessory)	
	Color data: RGB 24-bit raster scan data	
Data File Size	Total 3D and color data capacity: 3.6MB per data	
Viewfinder	5.7-inch LCD (320 x 240 pixels)*1	
Output Interface	SCSI II (DMA synchronous transfer)	
Power	Commercial AC power, 100 to 240 V (50/60Hz), rated current 0.6 A (at 100 VAC)	
Dimensions	221 (W) x 412 (H) x 282 (D) mm	
Weight	Approx. 15 kg (with lens attached)	
Operating temperature/humidity range*2	10°C to 40°C, relative humidity 65% or less with no condensation	
Storage temperature/humidity range	0°C to 40°C, relative humidity 85% or less (at 35°C) with no condensation	
Regulatory approvals	UL 61010A-1, CSA-C22.2 No.1010-1, etc.	

*1 Contains Mercury in the backlighting of LCD used for display, Dispose According to Local, State or Federal Laws.

*2 Operating temperature/humidity range of products for North America : 10 to 40°C, relative humidity 50% or less (at 40°C) with no condensation

Specifications of Polygon Editing Tool

<Main Features>

Readable Formats	Konica Minolta proprietary formats: CAM, VVD, SCN, CDM, CDK General format: STL
Data Conversion	Conversion from Konica Minolta proprietary formats into general format Polygonal data: DXF, Wavefront, Softimage, VRML 2.0, STL, MGF Point group data: ASCII
Functions	Data alignment, data merging, smoothing, uniform data reduction, adaptive data reduction, polygon check, texture blending
Point Group Editing	Rotation, movement, deletion, hole filling with data interpolation
Camera Remote Operation	Measurement, measurement reference distance setting, number of scans setting, laser power setting, high-quality setting, filter setting, etc.
Display Modes	Wireframe, shading, texture mapping

<Operating Environment>

PC-AT compatible	Computer running Windows® XP/Windows® Vista
OS	Windows® XP Professional SP2, x 64 Edition Windows® Vista Business SP1 (32-bit, 64-bit)
CPU	Pentium 4 or better
RAM	1024 MB (2048 MB recommended)
Display	Graphic display ability at 1024 x 768 or more
Graphics Board	OpenGL-ready board (verified-compatible board recommended.)
SCSI Interface	Adaptec SCSI card (Please use a verified compatible board.)
Others	CD-ROM drive, USB port

For further information regarding graphics board and SCSI interface, please contact the VI Salesperson in your area.

- Specifications are subject to change without notice.
- Product names in this brochure are trademarks of their respective companies.

SAFETY PRECAUTIONS

Read all safety and operating instructions before operating the VI-9i.

- Use only a power source of the specified rating. Improper connection may cause a fire or electric shock.
- Do not stare into the laser beam. (MAX. 30mW 690nm / CLASS 1 (FDA), CLASS 2 (IEC) LASER PRODUCT)

Certificate No : YKA 0937154
Registration Date : March 3, 1995

Certificate No : JQA-E-80027
Registration Date : March 12, 1997

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