KONICA MINOLTA

VIVID 910
NON-CONTACT 3-D DIGITIZER

ISO 9001
CERTIFIED
ISO 14001

## 3-D Digitizing - Breakthrough in Process Innovation

Konica Minolta's VIVID 910 the ideal 3D capture device for industrial applications in product design and manufacturing inspection.

VIVID 910

PET: Polygon editing software,
EAT: Easy alignment target-based registration

Compatible with all major 3D software for Modeling and CAD, CAM and CAT

VIVID 910
NON-CONTACT 3D DIGITIZER
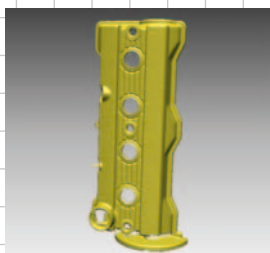
The essentials of imaging

The Konica Minolta VIVID 910, Innovation in 3D Digitizing for both Product Design and Manufacturing.

The VIVID 910 is a non-contact 3-D digitizer, offering fast, precise capture of 3-D shapes. VIVID is ideal for applications in both product design and production. The designers find VIVID invaluable for "reverse engineering" or creating CAD data from physical models and design mock-ups. Production personnel use VIVID for Inspection and computer-aided dimensional testing (CAT). What's more, VIVID improves concurrent engineering by inexpensively making 3D data available throughout the enterprise.

Typical Applications of the VIVID 910

The VIVID 910 is employed in a variety of industries for the following applications :

Reverse Engineering (RE)/Rapid Prototyping (RP)

- Generation of design CAD data from physical modelsand data for detecting interference among mechanical parts from mock-ups.
- Generation of data of parts for which 3-D CAD data is unavailable.
- Verification and comparison of competitor's products with in-house products. Database creation.
- Generation and refinement of designs using actual models created through RP.
- Capture of data for finite element analysis.

Inspection (CAT)/CAE

- Alignment verification and dimensional inspection of components such as:

    metal castings & forgings,
    tooling dies and molds,
    plastic parts (pressure formed, rotational molds, injection),
    sheet metal stampings,
    wood products,
    composites and foam products.

Other Applications

- Food production
- Cultural Antiquities cataloging and publishing
- Dental & orthodontic appliances
- Cosmetic & Maxillofacial surgery
- Machine Vision

The Digitizer with camera like simplicity and refinement, Designed to excel in your Industrial Application VIVID 910

Your assurance of highly reliable data

The VIVID 910 offers the highest level of accuracy and reliability among non-contact digitizers. It excels at accurate and high-speed measurement of a variety of objects. In fact, as evidence of its accuracy, we offer a test report * (by special order) that measures its performance against artifacts traceable to national standards organizations. Konica Minolta is famous for our highly-reliable, measuring instruments that conform to ISO 9000 standards.

> * VIVID 910 Certification of Performance is available by special order. KM offers a certification quantifying the VIVID's accuracy when measuring traceable artifacts. This service is of benefit to those who are implementing the ISO 9000 series of standards for quality assurance systems.

Measures objects of every size.

The VIVID 910 is provided with three interchangeable lenses that can accommodate measurement objects of various sizes and distances from the lens. A single scan is capable of capturing an angular field of view of approximately 10 square centimeters to 1 square meter.

Automatic configuration of detailed settings

The VIVID 910 incorporates the same automatic focus technology used in modern cameras. The optimal measurement distance is automatically detected through both passive and active AF (autofocus). In addition, the optimal laser intensity is obtained automatically through AE technology. The result is highly reliable measurements.

Provides 24-bit color images for outstanding texture mapping.

The CCD and RGB filter acquire rich, 24-bit full-color images. Since the acquired color images are on the same optical axis as the 3-D data, they can be used to create stunning, true-color models.

High-speed scanning capability

VIVID 910 is capable of capturing an object's shape and color in as little as 2.5 seconds. Our proprietary CCD readout technology measures up to 300,000 points at unsurpassed speed. When the subject is a moving object e.g. children, the human body and for other applications requiring higher speeds, an even faster mode is available that can complete a scan in a mere 0.3 seconds.

    Fine Mode : 307,200 points/2.5 seconds
   Fast Mode : 76,800 points/0.3 seconds

Designed to be portable and versatile

The VIVID 910 features a lightweight and compact body. It can operate without a host computer by recording data onto Compact Flash memory card. VIVID's integral LCD viewfinder can be used to set camera parameters and as a view-finder to frame the shot or review the data. As a result, the VIVID 910 offers convenience similar to that of a digital camera, so you can operate it wherever your subject may be located.

Dynamic range magnification mode

Objects with very dark to very bright regions are no longer a problem. The dynamic range magnification mode reduces the need for surface processing of objects with high-contrast surfaces (surfaces with both very light and very dark areas). This feature enables you to complete a measurement in only one operation.

Scan sample

Dynamic range magnification mode

Using   Not using
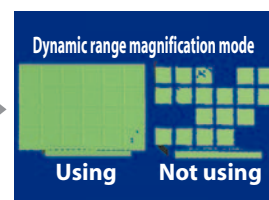
Benefit from the wide-ranging support provided by Konica Minolta, a leading maker of measuring instruments.

The VIVID 910 incorporates the services and expertise developed by Konica Minolta in the field of industrial measuring instruments such as colorimeters and measuring instruments for displays. We ensure your satisfaction by offering a wide range of optional support programs; that includes a periodical calibration service, a training by factory certified trainers and a network of consultants and systems integrators for custom installations.
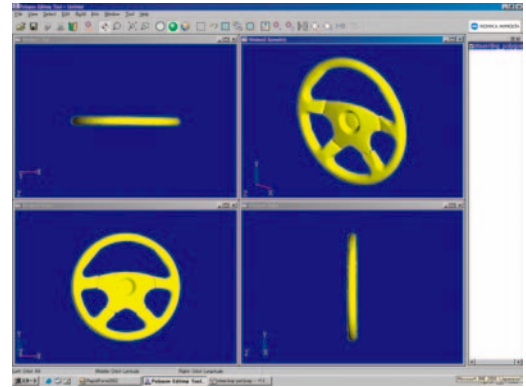
Polygon Editing Tool (standard accessory)

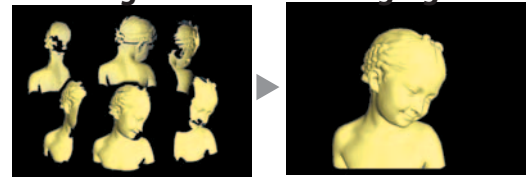## Edit scanned data with complete freedom.

Our proprietary Polygon Editing Tool (PET) comes standard with the VIVID 910. PET enables you to control the VIVID 910 and easily scan, polygonize, edit, and convert the scanned data into any of several common data formats. Multiple scans can be easily registered and merged into a single watertight polygonal model. Editing functions include: fill holes; filter irregular polygons and noise; and perform smoothing. PET exports data in industry-standard formats including: DXF, STL etc. for accurate transfer to a variety of Modeling, Inspection CAD, CAM and CAT 3-D applications. In addition, a SDK (software development kit) is included to enable you to drive the VIVID 910 from your own software application.

Data Registration and Merging

Features

|	
Data read	Proprietary formats: CAM, CDM, VVD, SCN
	General format: STL
Data conversion	Converts from proprietary format to various common formats.
	Polygon: DXF, Wavefront, Softimage, VRML 2.0, STL, MGF
	Point group: ASCII
Functions	Automatic data registration, data merging, smoothing, sub-sampling and curvature-based decimation, polygon checking, texture blending, and other functions
Editing	Rotation, transfer, elimination of point groups, and hole filling with data interpolation
Remote camera operation	Image capture, reference depth of field setting, dynamic range magnification mode, laser power setting, readout of camera data
Display	Wireframe, shading, texture mapping

Computer Requirements

PC/AT-compatible workstation capable of running Windows NT®, Windows® 2000 or Windows® XP

Operating system	Windows NT® 4.0 (Service Pack 6 or higher)Windows® 2000 (Service Pack 2 or higher)Windows® XP (Service Pack 1 or higher)
CPU	Pentium III or higher
Memory	512 MB minimum (1024 MB recommended)
Display	1024 x 768 minimum 1280 x 1024 or higher is recommended when using Easy Align Tool for automatic marker registration.
Graphics	OpenGL-compatible video card(Contact us for details.)
SCSI	Adaptec SCSI interface card Note: Contact us for details of tested models.
Drive	CD-ROM drive

Software

Easy Align Tool automatic target-based registration software (optional)
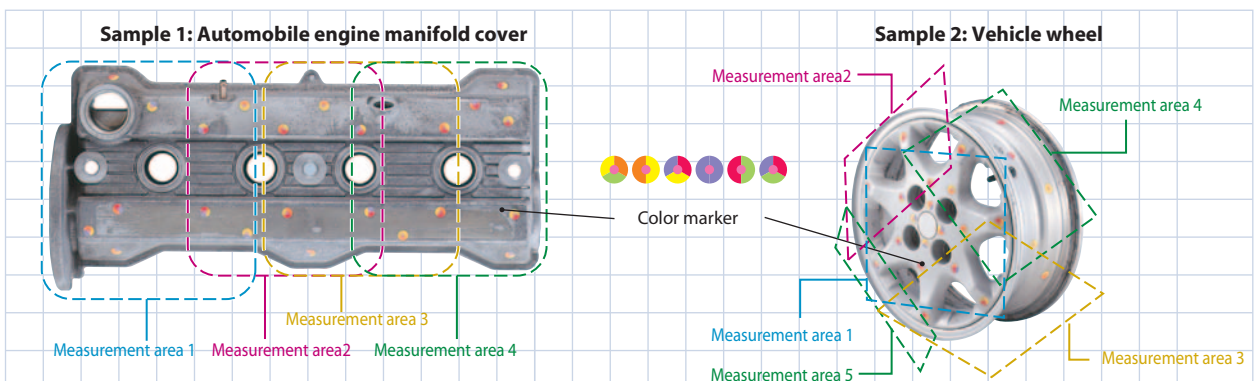
The automatic data registration tool that's simple and user-friendly.
Reduces registration time by 66%!

Automatic Alignment:

Alignment of individual scans has been a challenging task for some. But no longer, Easy Alignment Tool has changed all that. Simply place one of Konica Minolta's proprietary color markers on or near the object to be measured. Now, scan the same object from a different perspective with enough overlap so that at least three of the same markers are included in the second scan.

The new data is automatically registered (with coordinates aligned) with the previously scan. You can see what has been scanned and what has been missed, greatly reducing the time required for capture and post processing. EAT's takes the work out of the measurement of objects (Sample 1) that cannot be placed on a Rotary turn table, or objects (Sample 2) that require multiple measurements from varying points of view.
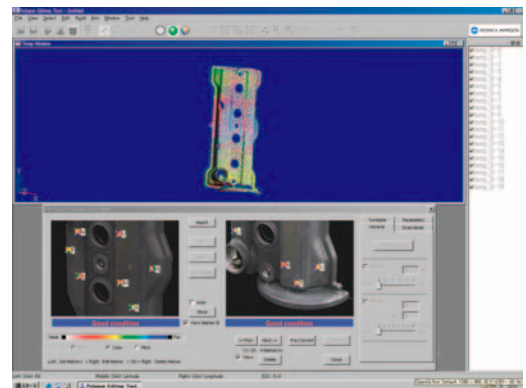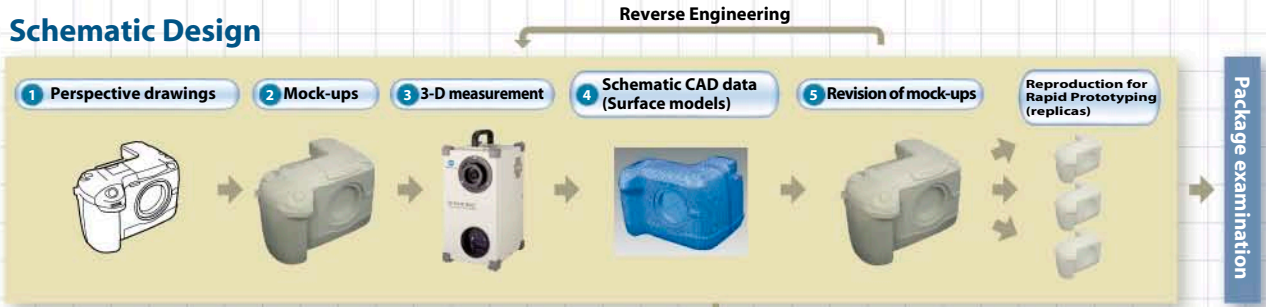

• This software is an optional add-on to the Polygon Editing Tool. Requires Polygon Editing Tool ver. 1.2 or higher.
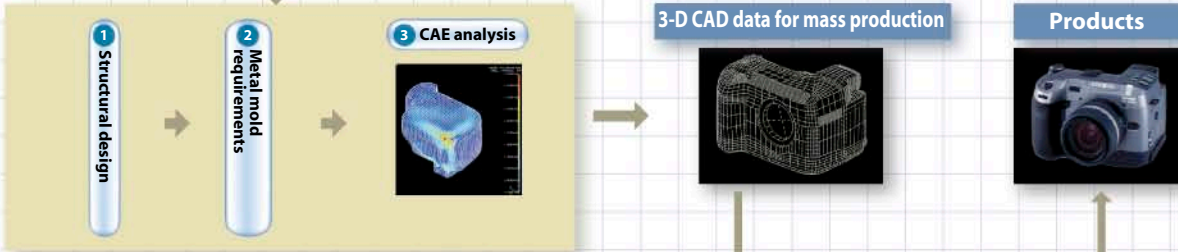

Sample 1: Automobile engine manifold cover

Measurement area 1 Measurement area2 Measurement area 4
Measurement area 3

Color marker

Sample 2: Vehicle wheel

Measurement area2
Measurement area 4
Measurement area 1
Measurement area 5
Measurement area 3

Process Innovation with the VIVID 910

Schematic Design

Reverse Engineering

1 Perspective drawings → 2 Mock-ups → 3 3-D measurement → 4 Schematic CAD data (Surface models) → 5 Revision of mock-ups → Reproduction for Rapid Prototyping (replicas)

Package examination

Structural Design

1 Structural design → 2 Metal mold requirements → 3 CAE analysis → 3-D CAD data for mass production → Products

Approval of Metal Molds

1 Design of metal molds → 2 Test shots → 3 3-D measurement → 4 Comparison with CAD data and inspections (CAT) → 5 Approval of metal molds

Inspection of Mass-produced Parts

1 3-D measurement (Sampling or 100%) → 2 Comparison with CAD data and inspections (CAT)
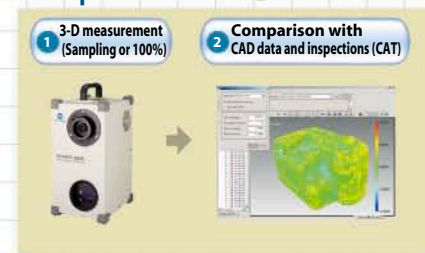
Applications and Data Flow for the VIVID 910

Anthropometrical measurement

Measuring with the VIVID 910
Further simplify operations with optional accessories – the Rotary Stage Set, Benchtop Frame Set, and Easy Align Tool (automatic registration software).

CG

Cataloging of cultural artifacts

CT data → Various Reverse Modeler

Various CG software (optional)

Editing of Measurement Data

Polygon Editing Tool (standard accessory)

Rapid Prototyping

Reverse Engineering

Various Reverse Modeler

Various Reverse Modeler

• CAT
• Inspection

IGES

Importing of CAD data

Various 3-D CAD/CAE → Various rapid prototyping systems
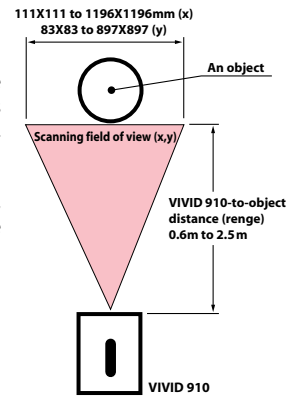
Report output

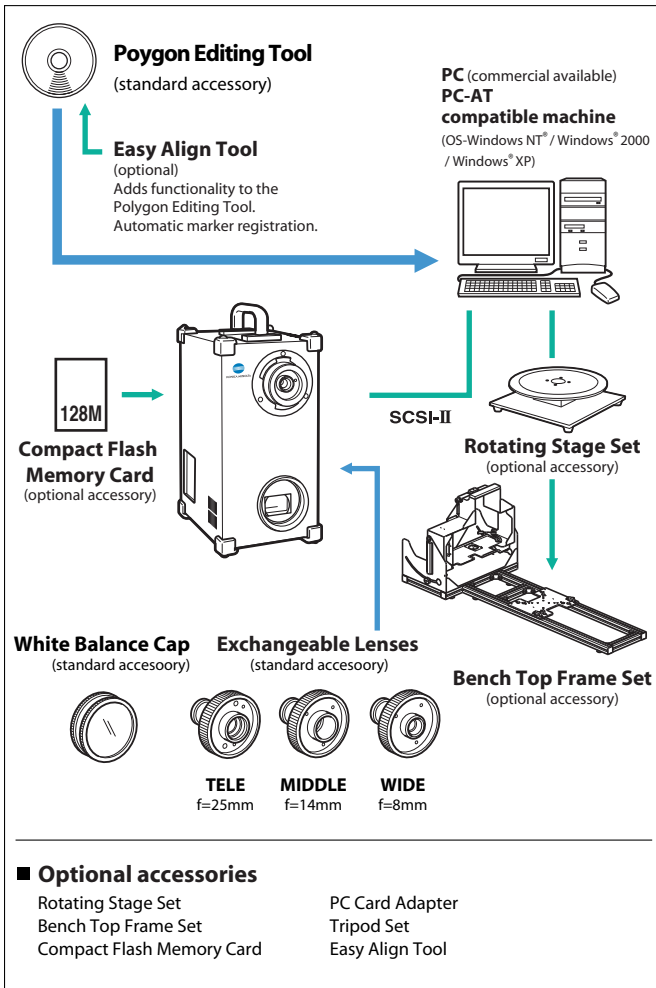Various 3-D CAD

Theory of Operation

Basic Principle

The VIVID 910 uses LASER triangulation. The object is scanned by a plane of laser light coming from the VIVID's source aperture. The plane of light is swept across the field of view by a mirror, rotated by a precise galvanometer. This LASER light is reflected from the surface of the scanned object. Each scan line is observed by a single frame, captured by the CCD camera. The contour of the surface is derived from the shape of the image of each reflected scan line. The entire area is captured in 2.5 seconds (0.3 seconds in FAST mode), and the surface shape is converted to a lattice of over 300,000 vertices (connected points). VIVID gives you more than a point cloud; a polygonal-mesh is created with all connectivity information retained, thereby eliminating geometric ambiguities and improving detail capture. A brilliant (24-bit) color image is captured at the same time by the same CCD. Unlike other scanners, the VIVID has no parallax error, its "spot - on"!

High Accuracy Measurement

A high-accuracy scanner and a high-accuracy Calibration facility unit to be used for calculation of 3-D data have been developed for the VIVID 910.
The 3-D reference chart traceable to the national standards has also been established to utilize the technology and algorithm that enable higher accuracy measurement.

111X111 to 1196X1196mm (x)
83X83 to 897X897 (y)

An object

Scanning field of view (x,y)

VIVID 910-to-object distance (renge) 0.6m to 2.5 m

VIVID 910

System Block Diagram

Poygon Editing Tool
(standard accessory)

PC (commercial available)
PC-AT compatible machine
(OS-Windows NT® / Windows® 2000 / Windows® XP)

Easy Align Tool
(optional)
Adds functionality to the Polygon Editing Tool.
Automatic marker registration.

128M

Compact Flash Memory Card
(optional accessory)

SCSI-Ⅱ

Rotating Stage Set
(optional accessory)

White Balance Cap
(standard acceesory)

Exchangeable Lenses
(standard acceoory)

Bench Top Frame Set
(optional accessory)

TELE
f=25mm

MIDDLE
f=14mm

WIDE
f=8mm

■ Optional accessories

Rotating Stage Set	PC Card Adapter
Bench Top Frame Set	Tripod Set
Compact Flash Memory Card	Easy Align Tool

Specifications

Type	Non-contact 3D digitizer VIVID 910
Measuring method	Triangulation light block method
Auto Focus method	Image surface AF (contrast method), active AF
Light-Receiving Lens (Exchangeable)	TELE: Focal distance f=25mm
	MIDDLE: Focal distance f=14mm
	WIDE: Focal distance f=8mm
Scan Range (Depth of field)	0.6 to 2.5m (2m for WIDE)
Optimal 3D measurement Range	0.6 to 1.2m
Laser class	Class 2 (IEC 60825-1), "Eye safe", Class 1 (FDA)
Laser Scan Method	Galvanometer-driven rotating mirror
X Direction Input Range (Varies with the distance)	111 to 463mm (TELE), 198 to 823mm (MIDDLE), 359 to 1196mm (WIDE)
Y Direction Input Range (Varies with the distance)	83 to 347mm (TELE), 148 to 618mm (MIDDLE), 269 to 897mm (WIDE)
Z Direction Input Range (Varies with the distance)	40 to 500mm (TELE), 70 to 800mm (MIDDLE), 110 to 750mm (WIDE/FINE mode)
Accuracy	TELE X:±0.22mm, Y:±0.16mm, Z:±0.10mm to the Z reference plane (Conditions:TELE/FINEmode,Konica Minolta's standard)
Input Time	0.3 sec (FAST mode), 2.5 sec (FINE mode), 0.5 sec (COLOR)
Transfer Time to Host Computer	Approx. 1 sec (FAST mode), 1.5 sec (FINE mode)
Ambient Lighting Condition	Office Environment, 500 lx or less
Imaging Element	3-D data:1/3-inch frame transfer CCD (340,000 pixels) Color data:3-D data is shared (color separation by rotary filter).
Number of Output Pixels	3-D data : 307,000 (for FINE mode), 76,800 (for FAST mode) Color data : 640 x 480 x 24 bits color depth
Output Format	3-D data : Konica Minolta format, & (STL, DXF, OBJ, ASCII points, VRML) (Converted to 3-D data by the Polygon Editing Software/ standard accessory) Color data : RGB 24-bit raster scan data
Recording Medium	Compact Flash memory card (128MB)
Data File Size	Total 3-D and color data capacity: 1.6MB per data (for FAST mode), 3.6MB per data (for FINE mode)
Viewfinder	5.7-inch LCD (320 x 240 pixels)
Output Interface	SCSI II (DMA synchronous transfer)
Power	Commercial AC power 100 to 240V (50 to 60Hz), rated current 0.6A (when 100Vac is input)
Dimensions (WxHxD)	213 x 413 x 271 mm (8-3/8 x 16-1/4 x 10-11/16 in.)
Weight	Approx.11kg (25 lbs)
Operating temperature/ humidity range	10 to 40℃, relative humidity 65% or less with no condensation
Storage temperature/ humidity range	-10 to 50℃, relative humidity 85% or less (at 35℃) with no condensation

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