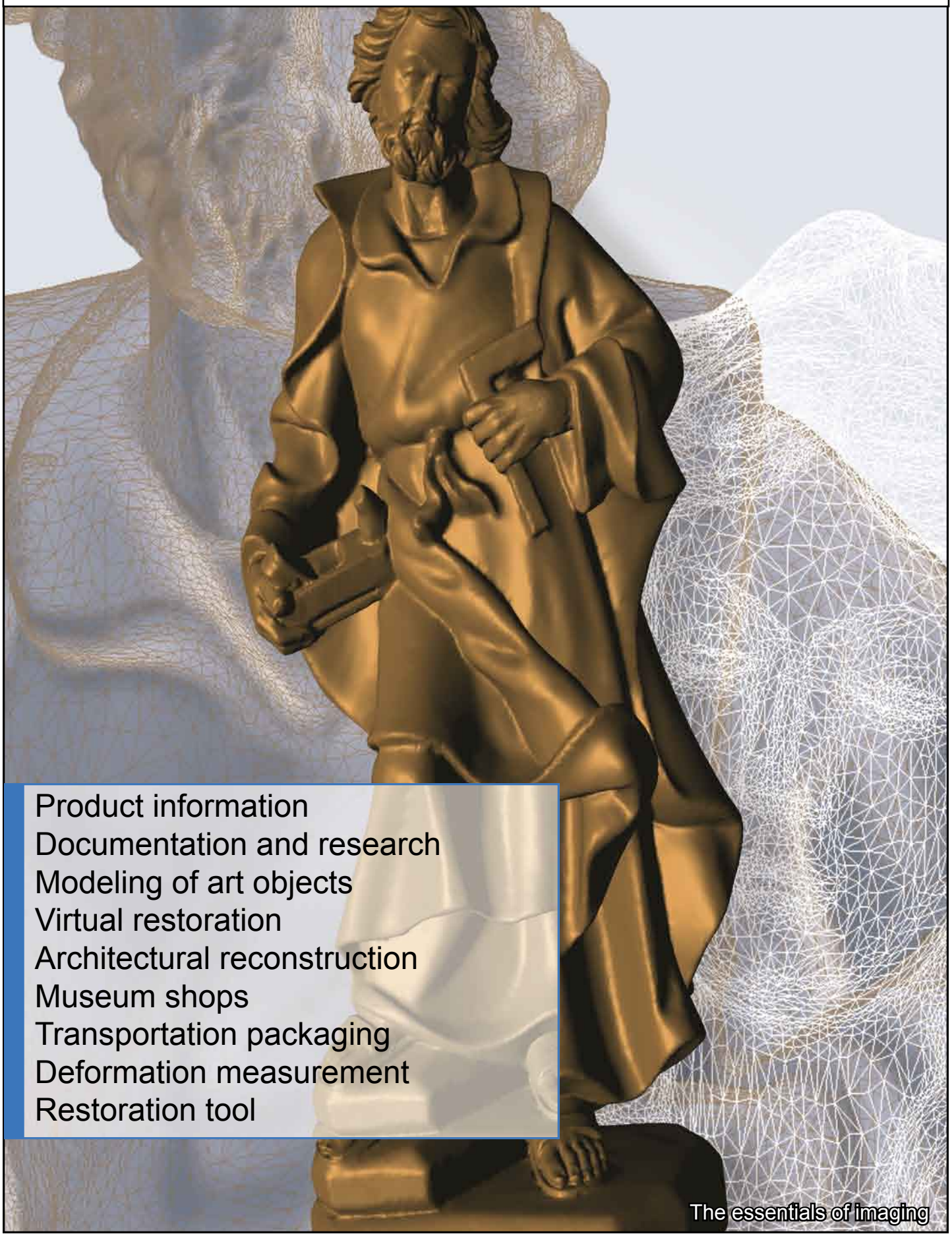
KONICA MINOLTA

3D Digitization

KONICA MINOLTA Non-Contact 3D Digitizer: For art and cultural heritage



- Product information
- Documentation and research
- Modeling of art objects
- Virtual restoration
- Architectural reconstruction
- Museum shops
- Transportation packaging
- Deformation measurement
- Restoration tool

The essentials of imaging

Konica Minolta Non-Contact 3D Digitizer

Applications in Restoration, Conservation and Cultural Heritage

Ladies and Gentlemen,

We are pleased to present this brochure introducing the Konica Minolta Non-Contact 3D Digitizer as the ideal scanning tool for art restoration, conservation, museum services and cultural heritage.

Actively engaged in 3D imaging technology internationally since 1997, Konica Minolta works in close partnership with leading universities, research institutes and software partners. This global activity puts the company in an ideal position to offer successful product solutions for a wide range of 3D applications. The design and manufacture of 3D imaging systems is a logical next step in the development of Konica Minolta's core strengths based on its expertise in color- and light-measurement technology.

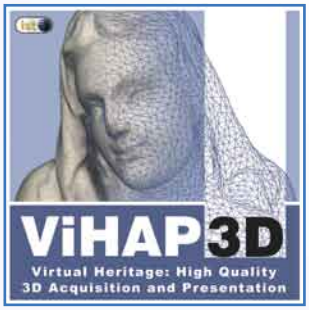
Konica Minolta non-contact 3D digitizers are used in medical science (prosthesis fitting, mouth/jaw/cosmetic surgery), industry (reverse engineering, rapid prototyping), restoration and conservation of art objects and cultural heritage materials (three-dimensional documentation and archiving, virtual museums, virtual restoration, non-contact molding for replication), and in web design and animation (films and cartoons).

Konica Minolta non-contact 3D digitizers work without touching the object and without damaging it in any way. The object data obtained can be stored digitally or output in analog form so it can be processed and utilized for a wide variety of purposes. Optical measurement systems are thus ideally suited for multi-dimensional imaging and digitization of art objects and cultural heritage materials.
The object data collected may be used to conserve art and cultural treasures, for study and research purposes, and as a powerful marketing tool.

To highlight the use of 3D imaging technology for the conservation, restoration, and promotion of cultural heritage, Konica Minolta is participating with five other organizations in the European VIHAP 3D project.

The aim of the project is to produce high-quality 3D images of European art treasures, to ensure conservation of the originals and give the wider public easier access to them.

This project is of immense significance for the conservation of cultural heritage throughout the world.



EU Project IST-2001-32641
www.vihap3d.org

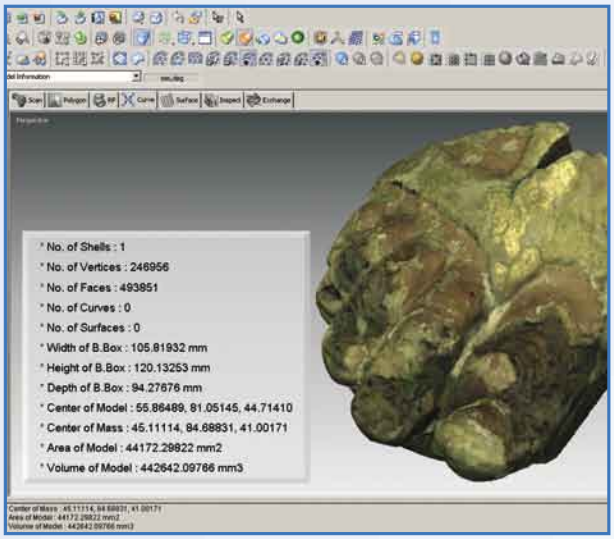
Konica Minolta's innovative 3D laser technology could be the perfect solution for you too.

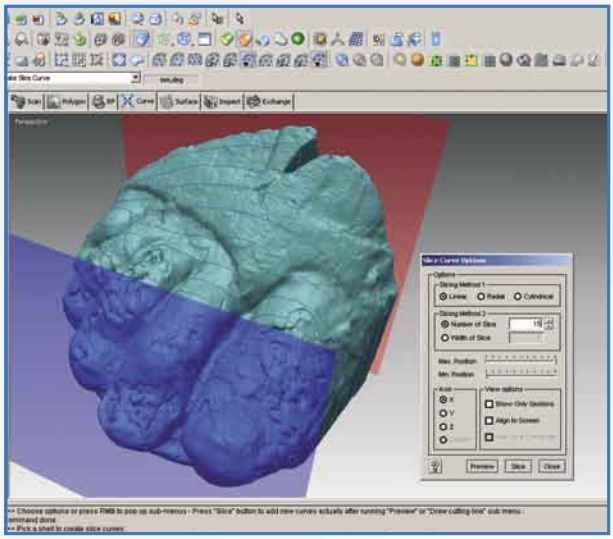
Product information

For use in cultural conservation and museum services, Konica Minolta non-contact 3D digitizers combine all the advantages of non-contact optical measurement in a single system.
They are portable and compact, giving maximum mobility in the exceptionally sensitive environment of art and cultural conservation. No calibration is necessary so they are easy to operate.
Konica Minolta non-contact 3D digitizers are based on the principle of laser triangulation. Objects are scanned using a laser light stripe, producing non-contact three-dimensional measurements of objects, freeform surfaces, models and other shapes. And by using RGB filters you can measure not only the shape of the object but its texture as well.
With dimensions of some 20 x 40 x 30cm and a weight of around 11kg, the digitizers are handy to use and may be operated from a tripod.
The VI-910 (called the VIVID 910 outside of Europe) has three interchangeable lenses, giving it an exceptionally flexible scanning area and it has received ISO 9001 and ISO 14001 certification.
Each scan can cover a section from 11 x 8cm at a subject distance of 60cm up to a 120 x 90cm at a subject distance of 2.5m. Measuring time in fine mode (307,000 points) is 2.5 seconds and in fast mode (76,800 points) 0.3 seconds. The system achieves a resolution of up to 0.008mm in the z coordinate. The VI-910 can be also be operated in stand-alone mode with no computer connection using an LCD and compact flash memory card.
With the Konica Minolta standard software it is then a simple matter to merge several individual scans and edit and export the data. The digitizer can also be operated with a turntable allowing rapid 360° acquisition of models. The object data can then be processed thereafter with the RapidForm software,a highly functional and flexible tool.

In addition to geometric measurements,the digitizer can also document the color texture of objects.

Documentation and research





Used in conjunction with the right software such as RapidForm, Konica Minolta non-contact 3D digitizers make ideal tools for documentation and research purposes.
For more detailed object analysis, virtual slices can be cut through objects as required.
A few mouse clicks will give you measurements of volumes or areas.

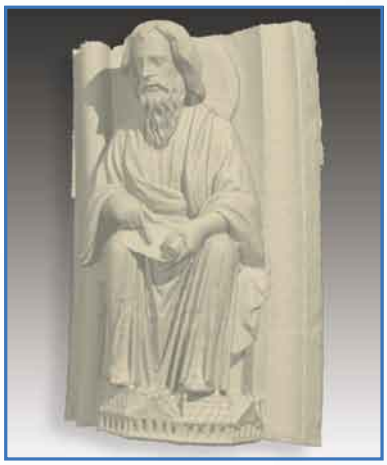
Web presentations

Thanks to their exceptional mobility, Konica Minolta non-contact 3D digitizers are widely used for on-site measurement of art treasures. Archaeologists making a virtual reconstruction of the Colosseum in Rome documented architectural details such as ornaments, friezes and capitals for three-dimensional presentation on the Internet.

Modeling of art objects

It has long been normal procedure in the industrial sector to create models from three-dimensional object data, either strictly 1:1 or scaled as required, using techniques such as 3D wax modeling or stereolithography.

Compared with conventional methods of direct modeling with materials like silicon, optical systems for measuring object forms have important advantages for museum exhibits or art and cultural treasures.



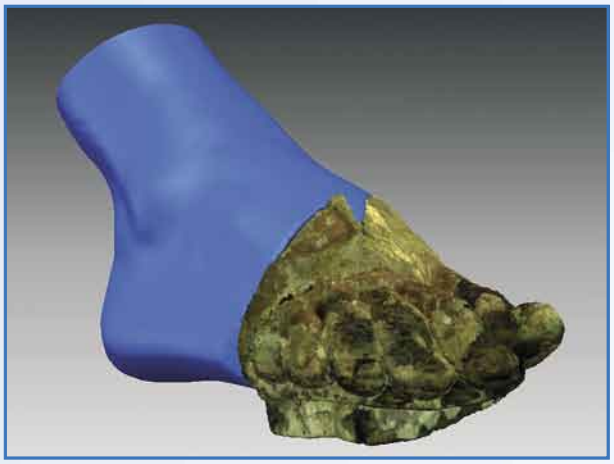
> The shape is measured without touching the object so absolutely no damage is caused.

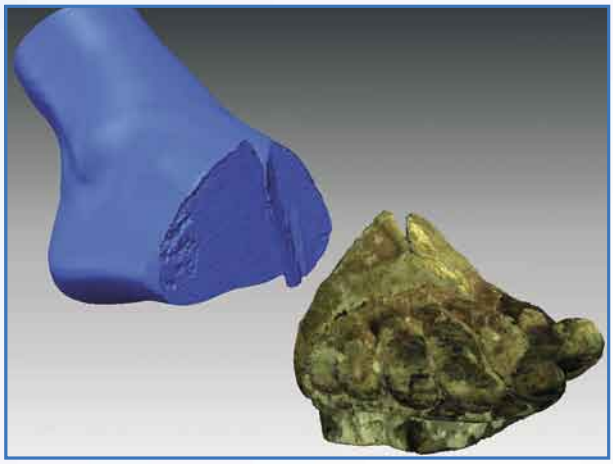
> Scale models from three-dimensional object data are more accurate and truer to reality than manual copies.

> Three-dimensional object data can be read straight into cutting or stamping machines (for positive models) or used to manufacture a mold (for negative models).

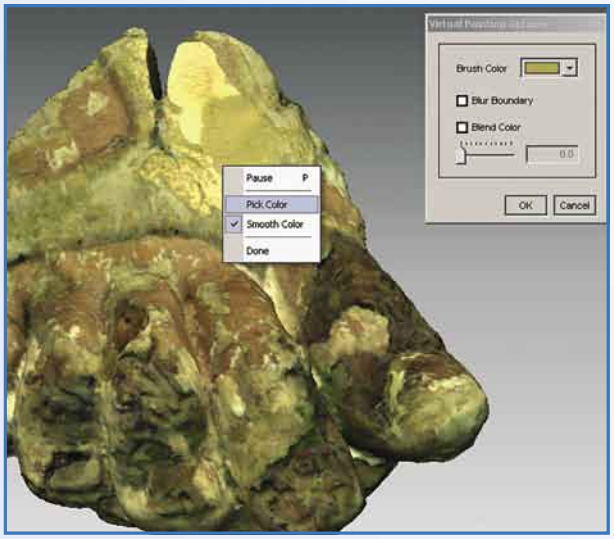
Virtual restoration

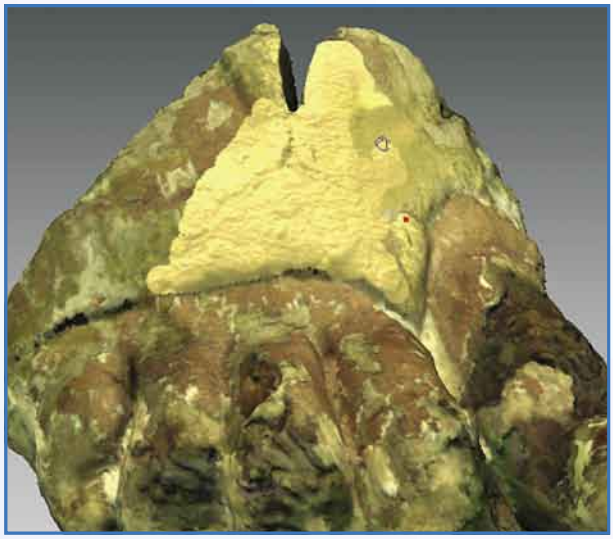
3D object data is supremely suited for virtual restoration, both for producing three-dimensional models and for reproducing the color of objects.





Three-dimensional data can also be used to aid in fitting fragments of broken artifacts together again using the Best-fit function of the RapidForm software.





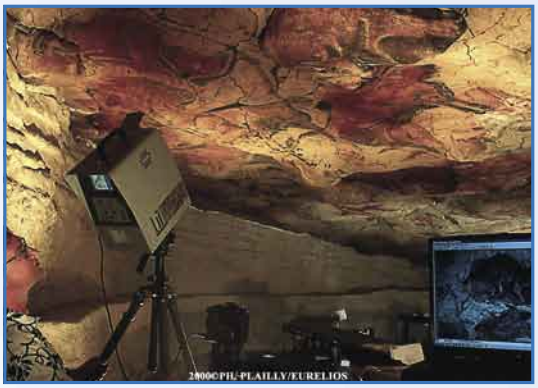
With the RapidForm software Virtual Painting tool you can select a color from the original surface of the object and paint over the original with an adjustable-size virtual paintbrush, so you can make a virtual color reconstruction of various different stages of its composition.

Architectural reconstruction

Konica Minolta non-contact 3D digitizers play a valuable role with larger architectural structures where high resolution is required.

The famous Altamira limestone cave in Spain was closed in 1970 because of the enormous numbers of visitors it attracted. The resulting increases in temperature and humidity threatened to cause the prehistoric cave paintings to flake off the cave walls.

It was decided to reconstruct the whole cave true-to-size so that the public could view the prehistoric paintings without risking damage to the original. The Konica Minolta VI-700 (called the VIVID 700 outside of Europe) was used to take three-dimensional images of 2600m² of painted walls, negative forms were cut in foam and silicon molds were made. The fact that the VI-700 could measure the color at the same time was of enormous value in the reconstruction of the paintings.



The silicon molds were arranged according to the original cave shape and painted by hand with natural pigments. The completed model cave is cooled to 12°C to give visitors a genuine cave experience.

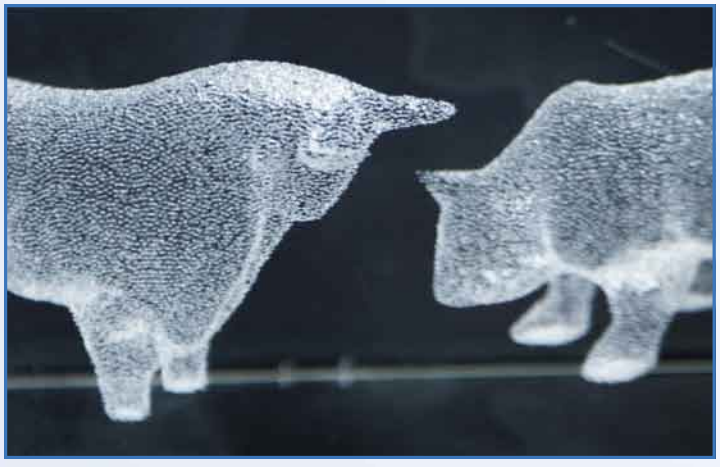
Museum shops

3D object data can be used not only for modeling of artifacts at risk but for commercial and marketing purposes.
At the Canadian Museum of Civilisation, for example, a model of the Sphinx has been selling extremely well as a tie-in with their exhibition “Mysteries of Egypt”.
The original was 2m long, while the models were 28 x 11cm.

(NRC/VIT Reverse Engineering Project)

By kind permission of the National Research Council Canada

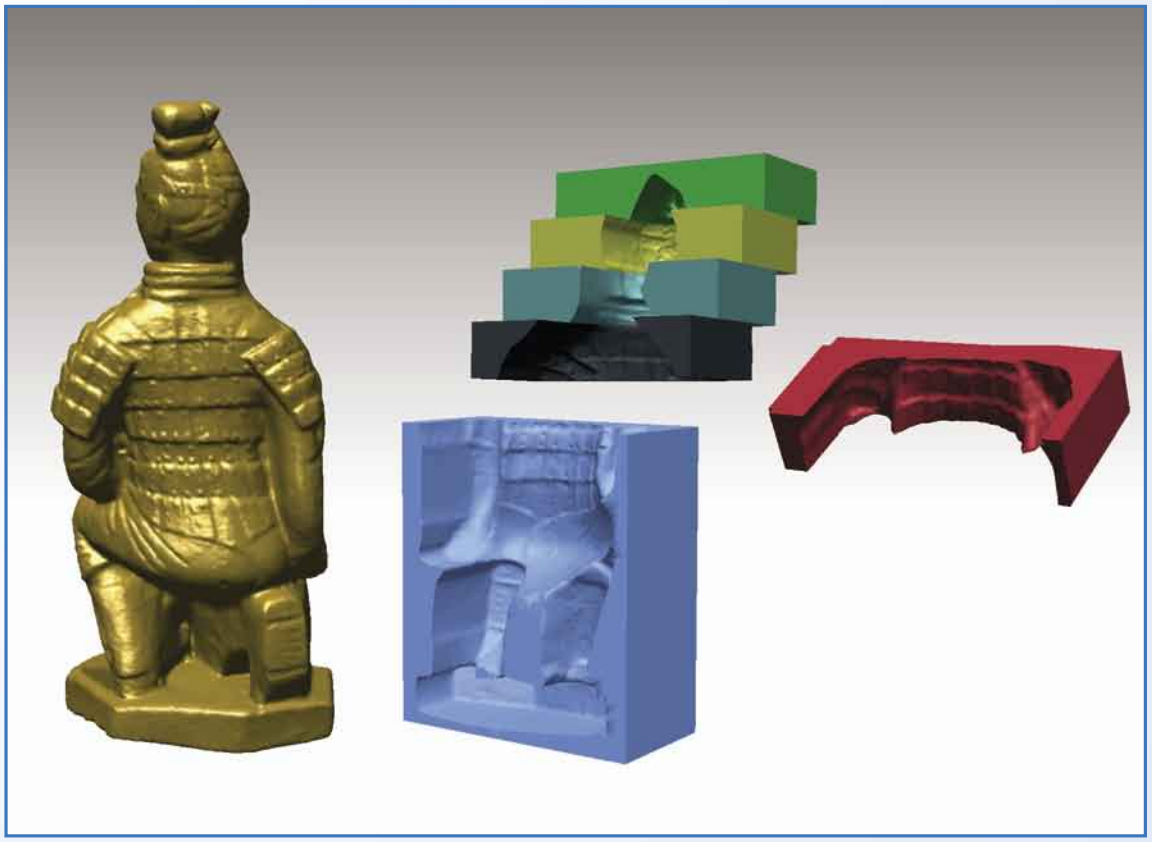
There are numerous other possible applications such as candle molding or laser etching of 3D models in crystal cubes. Please visit: http://www.crystalix.de/



Transportation packaging

Three-dimensional geometrical models can be embedded in any geometrical shape required.
The negative form obtained can then be cut into urethane foam blocks of various sizes.

If it is necessary to keep the object from coming into direct contact with the foam, the negative form can be enlarged as required so an insulating material can be inserted between them. Precision machined supports for objects on exhibit or in storage can be manufactured in the same way.



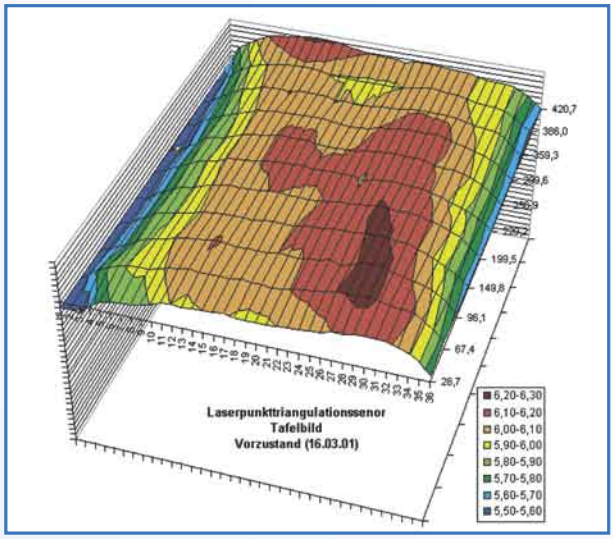
Deformation measurement

Konica Minolta non-contact 3D digitizers have proved an excellent tool for shape and deformation measurement on panel paintings.

There are three questions of interest in the conservation of panel paintings:

> Firstly, conservators may wish to ascertain the effectiveness of existing stabilization measures such as rear reinforcement, struts and so on, to establish whether stresses are being generated.
> Secondly, it is important to determine the extent of deformation of a wooden panel to ensure that the necessary freedom of movement is allowed when reframing or hanging it.
> Thirdly it allows conservators to fix maximum air-conditioning tolerances in subsequent storage locations.

Panel painting “Madonna and Child with the Young St. John” (Italy, 15th century)
Above: Front with sketches of rear reinforcement
Below: The three-dimensional data output in MS Excel. A convex deformation of the panel is clearly visible.



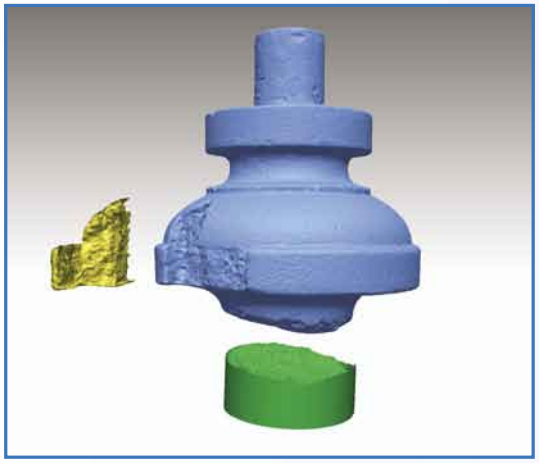
Optical measuring techniques can be used to assess the extent of damage and for damage prevention by planning restoration measures and storage conditions based on observations.

Text and illustrations from:
Stephanie Adolf, Optische Verfahren zur mehrdimensionalen Erfassung von Kunstobjekten – Verformungsmessung und digitale Auswertung an Tafelgemälden (Optical techniques for multidimensional measurement of art objects – Deformation measurement and digital evaluation of panel paintings), dissertation, FH Cologne, 2001

Restoration tool

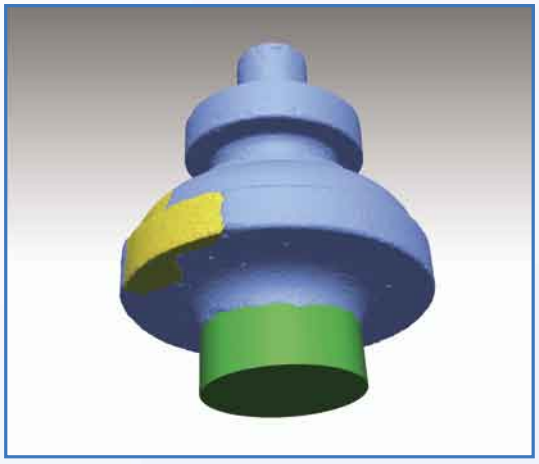
Optical techniques have frequently been used as restoration tools.

KÖHLER 2000 and STIETENCRON et al. 1997 tested the use of non-contact 3D digitizers as an aid in restoration as part of their dissertation.
(Sebastian Köhler, Möglichkeiten zur Herstellung aufsteckbarer Ergänzungen für Holzskulpturen (Methods of manufacturing attachable parts for wooden sculptures, dissertation, FH Cologne, 2000)
(Stietencron et. al., Phenolharzgetränkte Papierwaben als Aufdopplungsmaterial für statisch geschwächte Holztafelbilder (Phenolic resin impregnated paper honeycomb as backing material for structurally weakened panel paintings), dissertation, FH Hildesheim, 1997)



KÖHLER describes various ways of manufacturing an attachable piece for a Gothic Pietá whose base was damaged by anobia rot. The work involved scanning part of the severely eroded area with a laser slice digitizer and cutting a new wooden part for the area based on the data obtained.

STIETENCRON et al. 1997 scanned the back of a panel painting severely weakened by anobia rot and used the relief obtained to cut a backing piece of phenol resin impregnated paper honeycomb.



Using Boolean operators, three-dimensional objects can be merged with other 3D objects or any other shapes such as cylinders.
This is an ideal way of measuring weak areas and adding new parts by cutting them out from various materials.

KONICA MINOLTA
Non-Contact 3D Digitizer

- Compact
- Portable
- No calibration

Specifications

Type
Non-contact 3D digitizer

Method
Triangulation light block method

Autofocus
Image surface AF (contrast method); active AF

Optical system
Three interchangeable lenses, telephoto (f =25mm), medium (f =14mm), wide-angle (f = 8mm)

Object distance
0.6m to 2.5m

Scannable range (XY) / depending on distance
Min. 111mm x 83mm
Max 1196mm x 897mm

Geometrical precision (typical for Z)
+/- 0.008mm (FINE)

Measured data per scan
307,000 points (FINE)
76,800 points (FAST)

Scanning time
0.3s (FAST) / 2.5s (FINE) / 0.5s (color)

Ambient light
< 500lux

Memory card
Compact Flash Memory Card (128MB)

Interface
Fast SCSI

Laser
Class 1 (FDA)
Class 2 (IEC 60825-1)

Color LCD
5.7 inch color TFT LCD (320 x 240 pixels)

File sizes
1.6MB (FAST) to 3.6MB (FINE)

Output formats
3D: Konica Minolta Format & STL, DXF, OBJ, ASCII, VRML (export formats for 3D polygon editing software (standard accessory)
Texture: RGB, 24-bit color depth

Dimensions
213mm x 413mm x 271mm (WxHxD)

Weight
Approx. 11kg

Operating environment
10° to 40°C, RH < 65% (no condensation)

Storage environment
-10° to +50°C, RH < 85% (no condensation)

Konica Minolta's innovative 3D laser digitizing technology could be the perfect solution for you too.
We would be pleased to supply further information and look forward to hearing from you.

Konica Minolta Sensing, Inc.
3-91, Daisennishimachi, Sakai, Osaka 590-8551, Japan
EMail: 3dinfo@minolta.co.jp
Web: http://konicaminolta.jp/pr/se_3d

Konica Minolta Photo Imaging U.S.A., Inc.
725 Darlington Ave., Mahwah, NJ 07430
Phone: 888-473-2656 (in USA), 201-574-4000 (outside USA), FAX: 201-574-4201
EMail: vivid3d@ph.konicaminolta.us
Web: www.minolta3d.com

Konica Minolta Photo Imaging Europe GmbH
Europaallee 17, 30855 Langenhagen, Germany
Phone: +49 (0)5 11/74 04-845 FAX: +49 (0)5 11/74 04-807
EMail: 3d@phe.konicaminoltaeurope.com
Web: www.konicaminolta-3d.com

Konica Minolta Photo Imaging (HK) Ltd.
Room 1818, Sun Hung Kai Centre, 30 Harbour Road, Wanchai, Hong Kong
Phone: 852-34137508, FAX: 852-34137509

Konica Minolta Photo Imaging Asia HQ Pte Ltd.
10, Teban Gardens Crescent, Singapore 608923
Phone: +65 6563-5533 FAX: +65 6560-9721