fokus
GmbH Leipzig

MEASUREMENTS IN DIGITAL IMAGES.

metigo® MAP

Laserscanning 3D-Photogrammetry

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fokus GmbH Leipzig has been delivering services in metric building survey, photogrammetry, image procesing and has been producing digital documentation for the conservation of monuments and restoration since 1993:

- totalstation survey, 3D laser scanning and deformation measurements
- digital image plans, developments, ortho-projections and façade drawings
- photogrammetric evaluation of historical photographs for dimensional reconstruction
- large scale photographic plans in high photographic quality for the documentation in conservation of mural paintings, tapestries, floors, furnishing (altars, pews, furniture, paintings)

Beside these services, we develop the software **metigo®*MAP*** for 2D image rectification, mapping, quantity determination and analysis.

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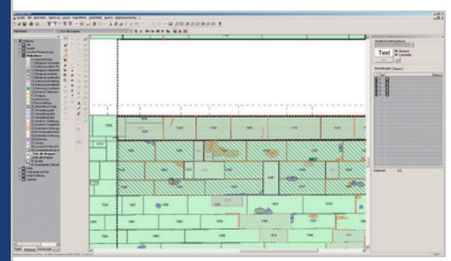
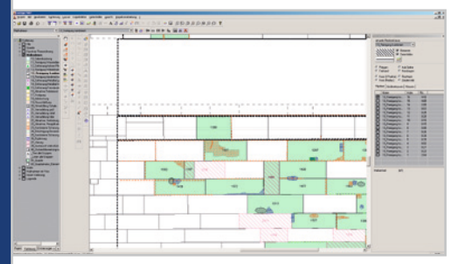


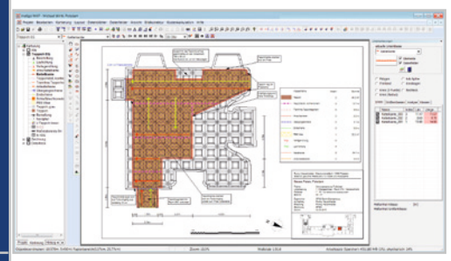


Area-based analysis of mapping data.

2D / 3D mapping

metigo®*MAP* has been developed since 1999 in cooperation with conservators and planners as mapping software.

- 2D image rectification and import of image und CAD files
- automated image rectification
- Import / export of mounted images
- Import of 3D surface models (VRML, OBJ) for 3D mapping
- CAD-based mapping for quantity surveys
- area intersection functions and area analysis
- hatchings, line and colour libraries
- grouping of mapping classes to manage mapping issues (existing and damage mapping, planning, billing)



Potsdam, New Palace.
Object hierarchy of mapping projects of the rooms.
Top: Installation plan of protective floor covers R274, SPSG.
Below: Navigation map with colouring by project data field.

Quantity Determination

- GAEB-import of specifications as mapping classes
- evaluation of manual measurement for charging quantities
- different approaches for area calculation (polygon, bounding box, manual measurement)
- legends with quantity determination
- minimum charging sizes for lengths, areas and volumes
- cross project output of quantity tables (CSV, MS Excel, Open Office)
- object hierarchy for managing all mapping projects on an object
- class analysis via object hierarchy (mapping content, class and group structure)
- true-to-scale output as image, CAD or PDF file
- export a protected mapping project

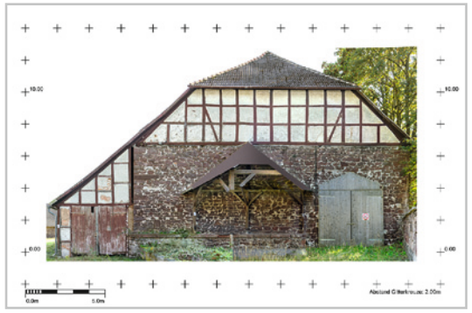
Digital Image Plans

Digitally rectified images as well as developments and ortho-projections of surface models are an inexpensive alternative to CAD plans. The result combines the photographic documentation of the conditon with exact geometry and enables a CAD evaluation as well as a true-to-scale mapping with quantity survey. For freeform or curved surfaces, an orthogonal projection with a digital surface model (laser scan) is calculated on a plane or a cylinder.

The images are taken with a digital medium format camera and focal lengths between 28 to 500 mm. For Structure-from-Motion (SfM) applications, we use full-frame SLRs with focal lengths of 12-800mm or, as required, a 24MPx drone. For all lenses, correction parameters of distortion and chromatic aberration are calculated.

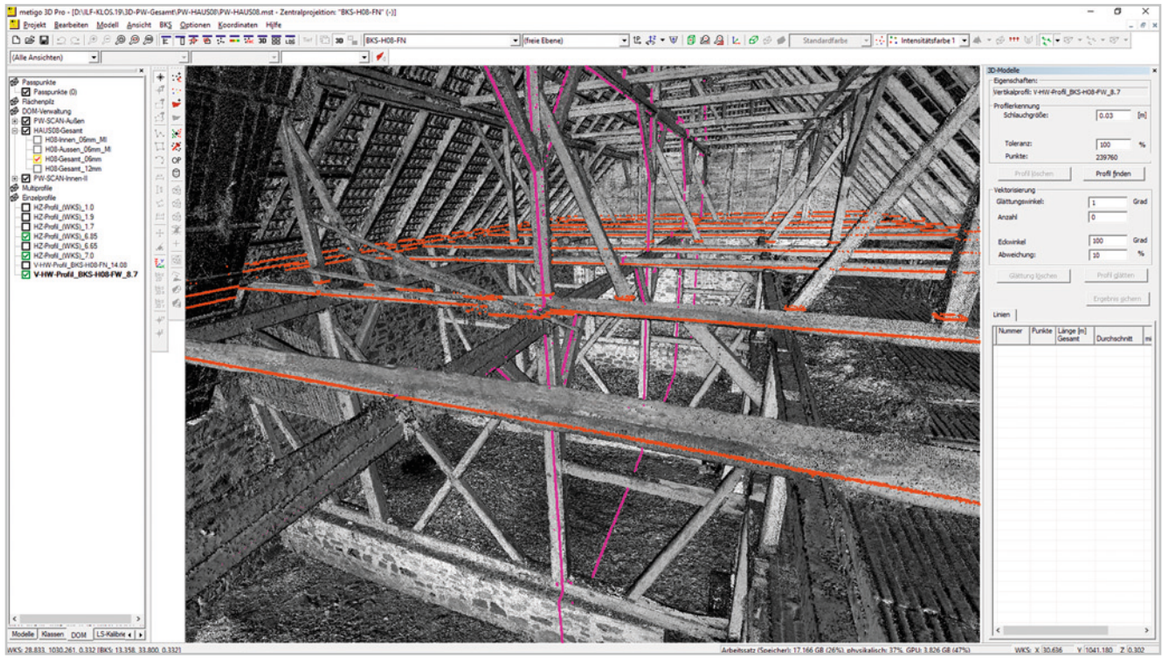
For a professional illumination of different tasks in the interior, we have a flash unit, halogen, daylight, LED UV and infrared lamps.

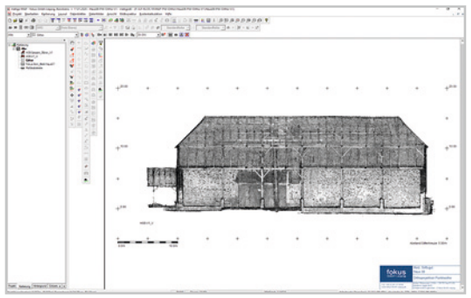
Weißenau,
Abbey Church St. Peter and Paul.
Digitally developed surface with ortho-projected choir vaulting. (Original at a scale of 1:10 with 400 dpi resolution)

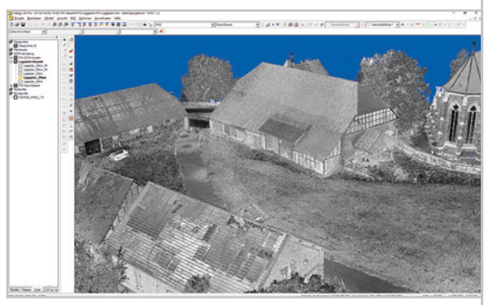


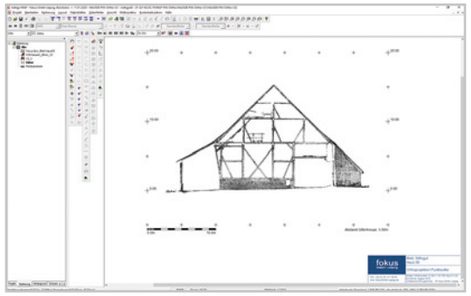
Laser scanning

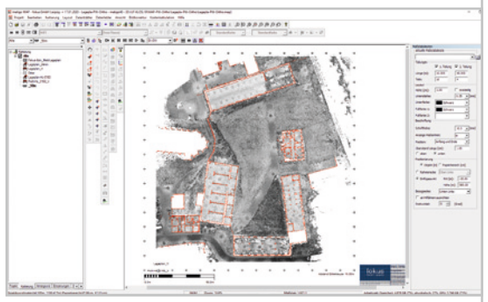
is the line-scanning of object surfaces with a laser beam in order to measure them three-dimensionally. The result is a three-dimensional point cloud coloured B&W depending on reflection intensity. With additional camera shots, the dots can also be coloured with real object colour.
With a suitable orientation software, the individual point clouds are automatically oriented in a uniform coordinate system. The so-oriented point clouds can be used as base for CAD-evaluation of floor plans, sections and elevations.











Ilfeld, Priory Manor.
3D laser scanning, detailed survey of plans and sections.

Top:
2D rectification
(Original at a scale of 1:50 with 400 dpi resolution)

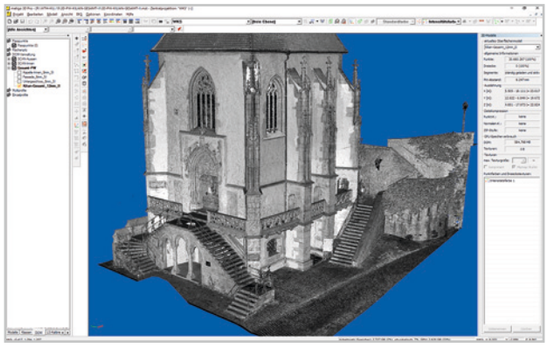
Centre:
3D view of the complete point cloud with coloured section planes (longitudinal and horizontal section)

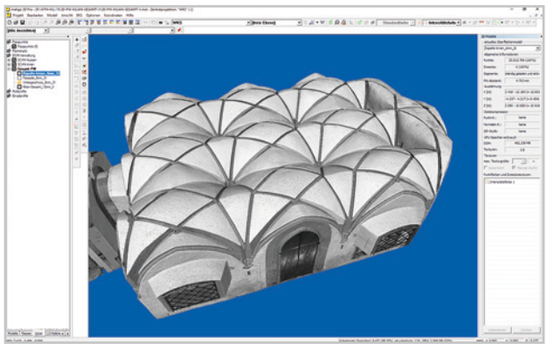
Bottom left:
Ortho-projected longitudinal and cross section

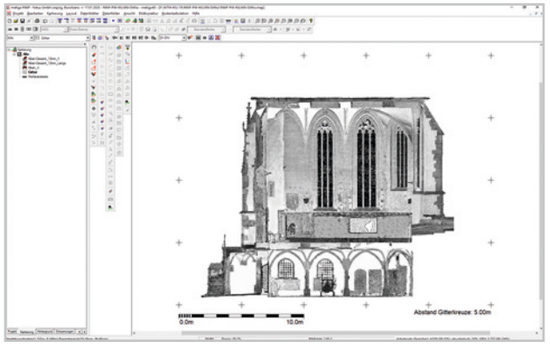
Bottom right:
3D view of the the complete point cloud of the priory manor and ortho-projected plan of the ground floor

3D data evaluation

In metigo 3D software, the oriented point clouds of the individual scanner positions can be merged to an object point cloud / complete point cloud with a defined point distance. This can then be used to create horizontal and vertical sections for CAD analysis, orthogonal projections of elevations and deformation analysis.







Wertheim upon Main, St. Killian's Chapel.
Digitally developed image plans, 3D laser scanning
(Original at a scale of 1:25 with 400 dpi resolution).

Top: 3D view of the complete point cloud
Centre: 3D view of the basement
Bottom: Ortho-projected longitudinal section of the point cloud
Left: 2D rectification for mapping