



OptoCat

Texture Mapping for three-dimensional scan data

Capturing and mapping the texture of a scanned object to its digital 3D representation – this is an add-on module of the high-performance measuring and evaluation software OptoCat. The texture mapping feature is particularly interesting for three-dimensional scanning projects in the field of arts and cultural heritage – or indeed for any user who requires a high resolution texture for the generated 3D data.

How it works:

This algorithm maps high-resolution bitmap information to each triangle of the scanned object with sub pixel accuracy, assigning several pixels per triangle instead of only a single color information per vertex. The texture resolution is independent from the resolution of the object's 3D data, allowing the creation of a reduced point cloud while maintaining a high-resolution texture.

What kind of pictures would you like to use?

The texture mapping can be carried out both by using the internal imagery of the scanning sensor as well as using images taken with any kind of external camera. Working with external digital data not only



—> The texture's resolution is independent of the 3D object data's resolution



—> The internal color imagery of the SmartScan and other digital photos can be used for texture mapping

allows for a variety of possibilities of texture capturing but also provides a large degree of freedom with regard to pixel resolution, professional illumination and raw data processing with color management. Furthermore, it is possible to complement the 3D data generated by a monochrome scanning sensor with color imagery, or even to work with multispectral data (UV, IR, etc.).

Flexible transfer of texture

Thanks to the automatic texture mapping process in the OptoCat software, the internal images taken with the 3D scanner are directly transferred onto the 3D scanning object. The sensor data of previous OptoCat projects can be also used for texturing with the Texture Mapping module.

For texture mapping, you do not need a complete measuring project, just use the mesh with color or grey value information and the textures of the scanner camera. To capture external digital images in true color, a geometrically calibrated color camera with table of colors is additionally available.



—> Camera kit for true-color texture mapping



Easy workflow

When using external imagery, the user first manually specifies the tie marks in the 3D data and in the digital image, before he starts the automatic optimization and alignment process. The texture resolution is independent from the resolution of the object's 3D data, allowing to create a reduced point cloud while maintaining a high-resolution texture.



—• Texture Mapping in OptoCat: The user specifies tie marks in the 3D data (left) and in the digital image (right) for the automatic alignment.

To get an optimally smoothed result, the merging process adjusts the overlapping textures of the individual pictures by taking into account different weights affecting the texture quality.



—• Texture Mapping with external images: The individual textures before merging (left) and after merging (right)

The automatic optimization process optionally reduces the spotlights in the textures; this is ideally suited for very shiny measuring objects. Besides the commonly used data export formats STL (data without color) and PLY (data with vertex color), the export format Wavefront OBJ (data with textures) can also be opened and processed with various third-party software packages.

The direct comparison in the image below reveals: With the OptoCat texture mapping, the 3D model gets an improved color reproduction, a clearer contrast and a higher texture resolution — and therefore reaches a much more realistic representation of the original object than the scanner cameras' mere vertex colors.



—• From top to bottom:

- 3D model without color information
- Standard color information per vertex of the mesh on a reduced 3D model
- 3D model with high-resolution textures: Improved color reproduction, clearer contrast, higher texture resolution