

QTSculptor is a complete system for the 3D digitization and reconstruction of real world objects. It consists of a 3D sensor built according to the stripe projection method and a high-performance software package, which allows the 3D data to be processed into a water-tight triangular mesh.

The complete system for the 3D digitization strikes with its flexibility in fulfilling various demands and its high usability. The 3D scanner can be scaled to fit the size of the object. The complete equipment fits into a handy suit-case and can be operated with a laptop.



### QTSculptor - System Components

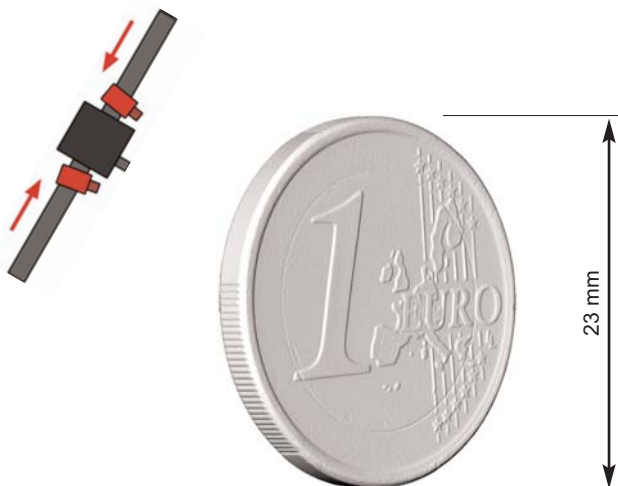
- 3D Scanner  
1280 x 960 pixel in standard configuration
- QTSculptor Software  
base module and 3D sensor module
- Calibration accessories

### Optional Components

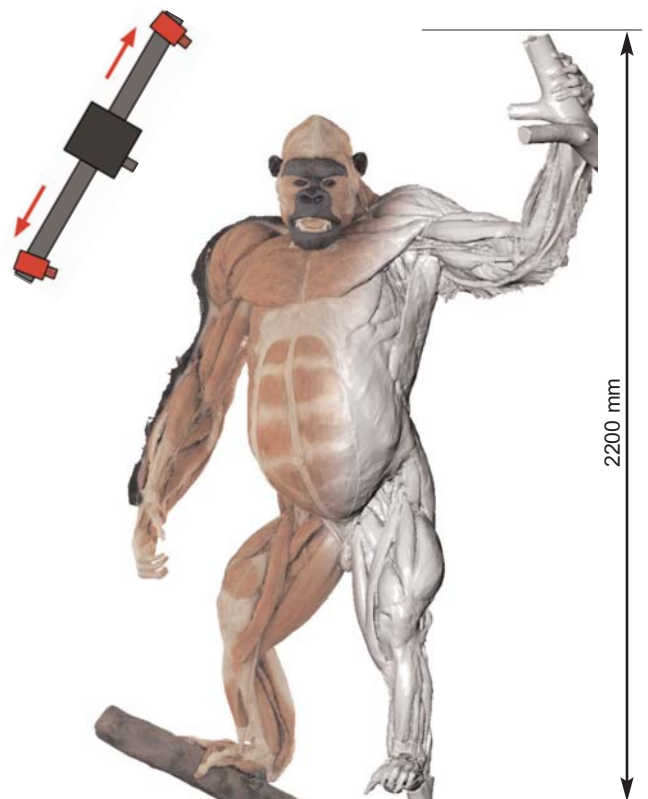
- Higher Resolution scanning devices
- Higher Speed scanning devices
- QTSculptor Texturing Module
- Color Camera Extension
- Program controlled Rotary Device
- Macro Extension

### One device - multiple ranges

The 3D scanning devices from Polygon Technology GmbH are easily adjustable for measuring ranges from 25 mm to 1500 mm. Objects with a size of few millimeters up to several meters can be measured with the same equipment by combining scans from different visual angles.



Easily adjustable for small measuring ranges



Easily adjustable for large measuring ranges

### 3D Scanning Devices

The 3D scanners are based on a specialized method of stripe projection. The geometry of the object is measured through mathematical combinations of the stripe patterns.

The PT-M scanner type series consists of a stereo scanner head with two CCD cameras and a projector which performs a moving stripe-projection.

In the standard version (PT-M1280) this scanner reaches a depth resolution of 0,01 mm at a measurement extent of 100 x 75 mm. For higher requirements special scanner heads or the macro extension are available.

With its compact dimensions and the low weight the 3D scanner PT-M1024 shows its qualities in both, the stationary and mobile use.



3D Scanner PT-M1280

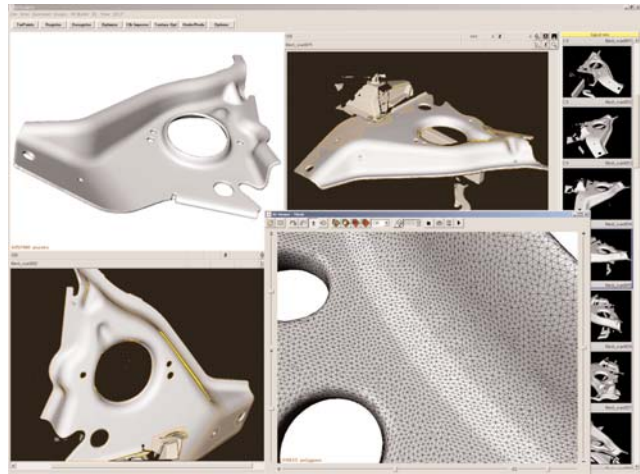
### QTSculptor Software

The Software consists of a base module and optional program components for the control of the 3D sensor and the texturing of the 3D model.

All software modules of the QTSculptor system captivate by the high quality of the resulting data while they are very easy to use.

#### Key features - Base Module:

- Interactive view planning
- Segmentation of range images
- Registration in world coordinates
- Simultaneous registration of multiple images
- Orientation by 321-method or markers
- Comfortable handling of large data records
- Exploitation of data redundancies
- Generation of watertight triangular meshes
- Selective editing of meshes
- Preprocessing and filtering
- 3D visualization



Handling the scan data in QTSculptor



Program controlled Rotary Device for automated data acquisition

#### Key features - Sensor Module:

- Control of the 3D scanner and data acquisition
- Carrying out the initial calibration of the system

#### Key features - Texturing Module:

- Processing the data of our 3D color scanners
- Processing of digital photos
- Aligning photos to the object coordinate system
- Calculation of the textured 3D model

### QTSculptor - Texturing Module

Digitizing real world objects obviously includes the color of an object as well as its geometry. This additional information can be used for documentation, presentation and even quality assurance.

#### Simply photo realistic

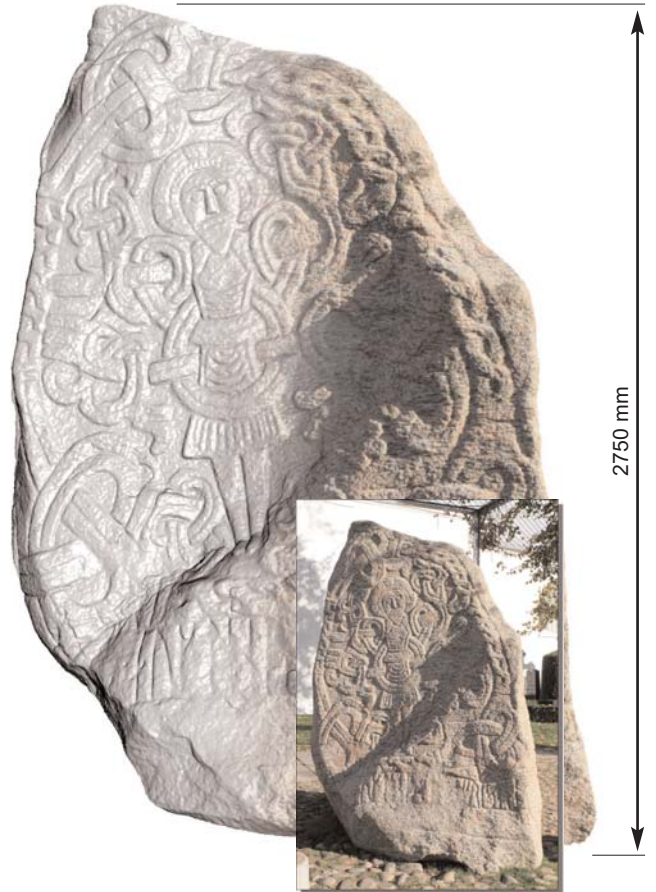
The QTSculptor Texturing Module is a powerful tool to compute photo-realistic skins for digitized objects. Based on digital photographs as well as the data of our 3D color scanning devices, it processes a realistic object texture whose maximum level of detail only depends on the resolution of the used photographs.

The Texturing Module is available as an integrated module of the QTSculptor System but also as an independent application for texturing present 3D models.

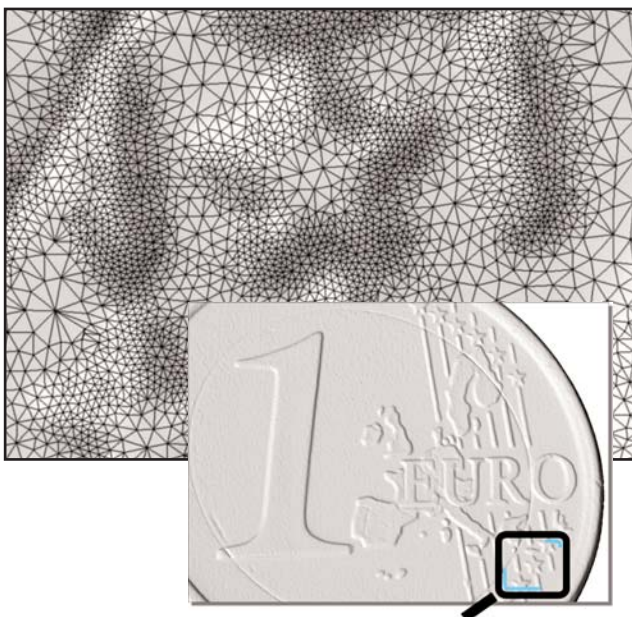
### QTSculptor - Color Camera Extension

Our scanning devices can be extended to full 3D color scanning functionality. An additional color camera is integrated and calibrated to the system.

The color camera extension gives the advantage of processing a naturally colored, photo realistic 3D model by the push of a button.



Ancient stone of Jelling. Scanned and textured with QTSculptor



Euro coin (23 mm) scanned with the QTSculptor Macro Extension

### QTSculptor - Macro Extension

High precision calibration equipment and adapted optics provide maximum accuracy in short scanning ranges. The Macro Extension expands QTSculptor's scanning devices to digitizing the macro range.

The scanning ranges can be adjusted to measuring fields from 25 x 18 mm to 200 x 150 mm. Our standard scanning device PT-M1280 for example reaches a depth resolution of 0,0032 mm at a measuring field of 25 x 18 mm with this optional equipment.

For even more details Polygon Technology provides devices with higher resolutions, for example the PT-M1600 with a resolution of 1600 x 1280 pixel.

The Makro Extension is available as an add-on to all scanning devices of the PT-M series.

## QTSculptor - Technical Specifications

### Hardware requirements (recommended)

- Standard PC or Laptop
- 1GB RAM or more
- 8GB free disc space
- 3D Graphics Accelerator
- Free PCI / PCI-Express or PCMCIA slot

### Supported Operating Systems

- Windows 2000, Windows XP

### Data Exchange

Import: Ordered point clouds (range images)

Export: STL (binary or ascii), DXF, VRML2.0, OFF, IV

### Measurement Extent

The measurement extent of the system essentially depends on the used lens. In the standard configuration the smallest measurement extent is approximately 100 x 75 mm. The measurement extent's upper limit is constrained only by the obtainable contrast of the projector on the object surface. In the standard configuration measurement extents of 1500 x 1125 mm are attainable under favorable lighting conditions. For larger measurement extents it is recommended that the ambient light in the environment is reduced. For measurement extents smaller than 100 mm the Macro Extension with an alternate lens set and calibration equipment is available.

Standard Lens	
Measurement extent [mm]	Measurement distance [mm]
100 x 75	285
300 x 225	825
500 x 375	1360
750 x 563	2030
1000 x 750	2705
1500 x 1125	4050

Macro Extension	
Measurement extent [mm]	Measurement distance [mm]
25 x 18	400
50 x 37	710
75 x 56	1030
100 x 75	1340
150 x 112	1970
200 x 150	2600

### Measurement Precision

The measurement precision of the 3D sensor scales in correspondence with the measurement extent. The lateral resolution is a direct result of the camera resolution and affects the spacing of the measured points along the object surface. The depth resolution is a result of the measuring method and is approximately 8 times the lateral resolution.

For the smallest measurement extent without Macro Extension (100 x 75 mm) a lateral point spacing of 0,078 mm with a precision of 0,01 mm in depth results. The measurement extent of 1000 x 750 mm results in a precision of 0,1 mm in depth and a lateral point spacing of 0,78 mm. The connection between camera resolution, measurement extent and point spacing is shown in the following table.

Characteristics of the sensor head			Resolution for 25* / 100 / 500 / 1000 mm picture field	
sensor head	resolution	shot speed [s]	lateral resolution [mm]	depth resolution [mm]
PT-M1600	1600 x 1200	8	0,016* / 0,063 / 0,313 / 0,63	0,0027* / 0,008 / 0,039 / 0,08
PT-M1280	1280 x 960	2	0,019* / <b>0,078 / 0,391 / 0,78</b>	0,0032* / <b>0,01 / 0,049 / 0,1</b>

\* available with the Macro Extension

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