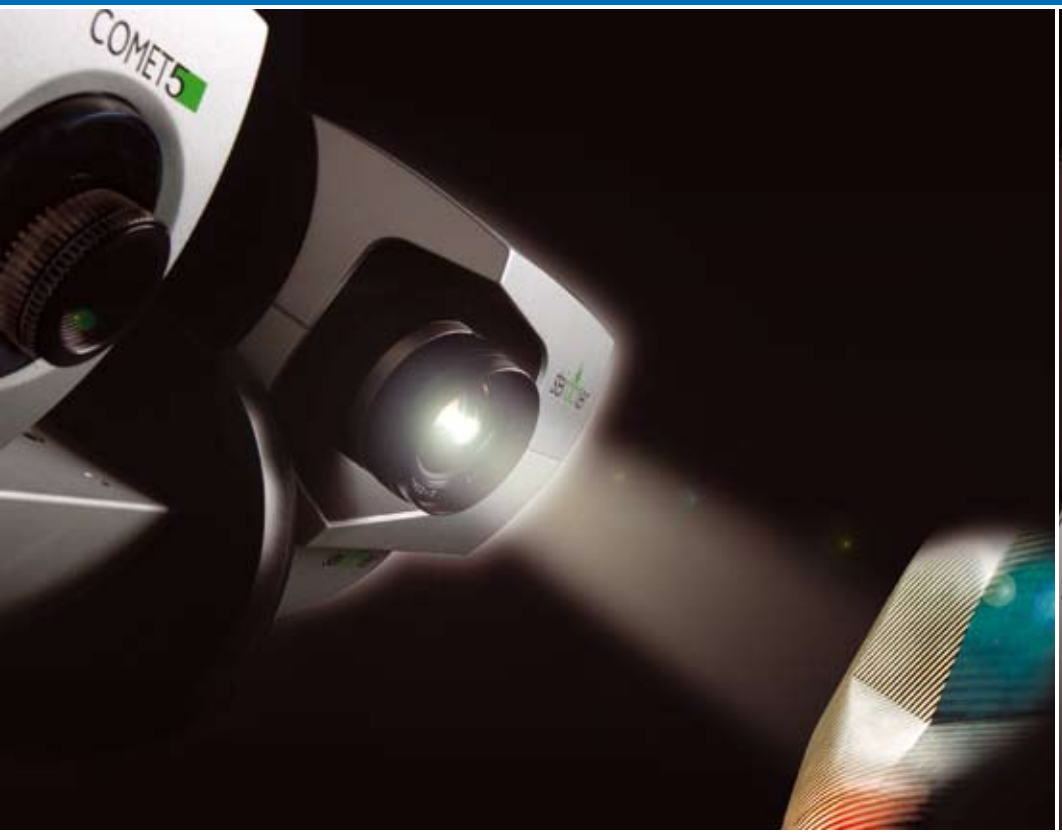
COMET® 5
3D DIGITIZING



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COMET® 5:
THE 3D SENSOR REFERENCE

3D digitizing in revolutionary shape: With the COMET5 sensor, Steinbichler Optotechnik is presenting a system perfectly fitting the steadily growing application requirements from the industry, in particular for product development and quality control. COMET5 combines unique performance and ease of use making it the ideal solution for demanding applications.

Based on industry-proven foundations, the COMET5 with its innovative projection technology reaches new performance levels for high-speed measurements. This is enabling the data acquisition in the digitization process to be completed in 1/6 th. of the time which is a deciding advantage when measuring in rough industrial environments prone to vibration.

The consequent utilization of the latest PC hardware and software technologies (parallel processing, 64 bit operating system and application software) further more enables an extremely fast post-processing of the measured data.

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The combination of the proven one-camera-technique and the newly developed projection technology guarantees high-speed measurements as well as excellent data quality. COMET5 completes all measurements fast and accurately and is therefore ideally suited for efficient use in quality control next to the production line.

The rigid construction of the system is extremely stabile which allows the system to be operated in a wide temperature range and the high-power external light source further improves the system temperature stability.

Owing to its high physical stability, the sensor is perfectly suitable for automated measuring applications. The sensor can be operated on an industrial robot without the risk of acceleration forces influencing the measuring accuracy.

COMET5 thereby guarantees a high reproducibility of the highly accurate measurement results, in addition to having the advantage of minimizing the need for system recalibration.

COMET5 is through its robust construction made for mobility and a variety of handling systems are available for the positioning of the system.

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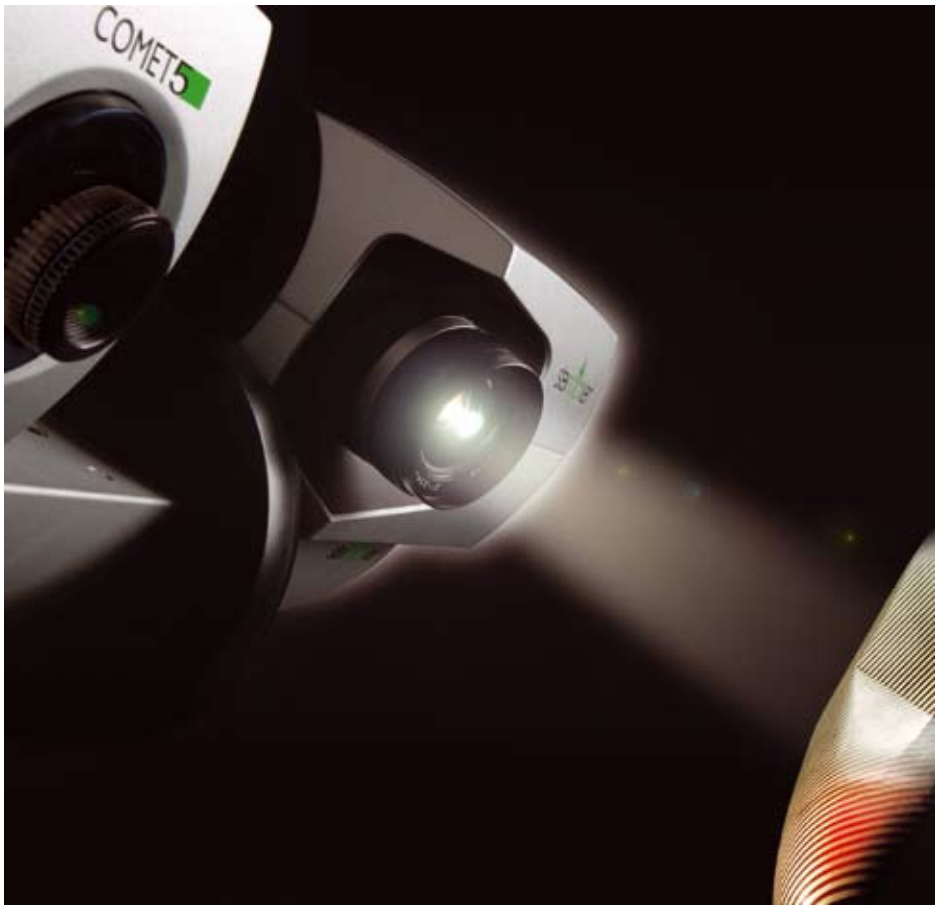

The modular design allows for quick and easy adaptation of the system to the measurement volume required by the application and thereby offers the maximum of configuration flexibility for each individual measurement task.

The unique sensor construction allows the use of a single COMET sensor head for all of the available fields-of-view, from the smallest up to the largest. A custom designed zoom lens in the projection module offers exceptional optical features - thus, the change between different fields of view can conveniently be performed.

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COMET® 5 11M HIGH-END SENSOR

The high-end 11M sensor model of COMET 5 featuring an 11 mega-pixel camera offers the highest resolution available for the digitization of even the smallest and finest details. This model is the ideal choice for digitization applications requiring very high detail and accuracy, such as quality control of aero-engine turbine blades etc. The high flexibility of the system lets the user select the optimal measuring mode for the digitization task at hand, selecting between maximum resolution and maximum scanning speed.

Even for the largest fields of view, the system features a very short working distance (stand-off distance between part and sensor). This is of particular advantage when operating in tight spaces as it simplifies the sensor handling, thereby saving process time. The operational compactness and the high data acquisition speed of the COMET 5 11M ensures a highly efficient measurement process.

COMET5 is designed for applications in the most diverse areas of industry: Variable fields of view and a modular sensor concept allow for digitizing objects of a vast variety of sizes with highest precision.

- Quality Control / Inspection
  - Comparison of actual data with nominal data (part to CAD)
  - Boundary/edge extraction (measurement of sheetmetal parts)
  - Serial inspection in production (manual/automated)
- Mold and Toolmaking
  - Tool reconstruction
  - Scan data for generation of milling tool paths
  - Documentation of actual 3D data at tool release
- Design
  - Scanning of design models for further processing of CAD data, documentation
- Rapid Manufacturing
  - Acquisition of 3D data for Rapid Prototyping
- Reverse Engineering
- 3D Scanning
  - Scanning of art/historical objects, archaeology
  - Medical technical applications, etc.

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COMET® 5 SENSOR SERIES: TECHNICAL DATA

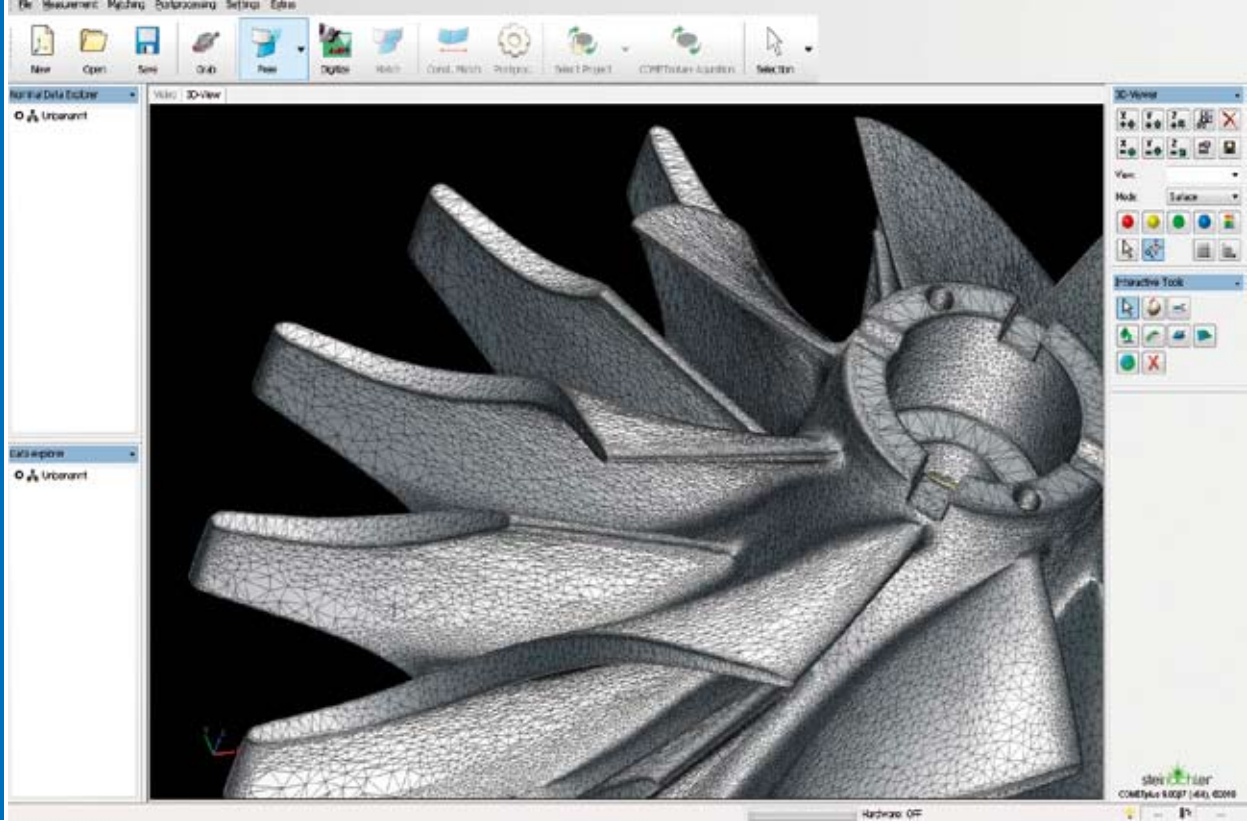
	COMET 5 1.4 M	COMET 5 2 M
Camera Resolution	1360 x 1024	1600 x 1200
Measuring Volume in mm³ 50 100 200 400 800	46 x 34 x 50 110 x 82 x 70 220 x 164 x 140 444 x 330 x 250 890 x 660 x 500	- 85 x 65 x 60 180 x 135 x 140 400 x 300 x 250 800 x 600 x 500
3D Point Distance in µm 50 / 100 / 200 / 400 / 800	33 / 80 / 160 / 320 / 650	- / 55 / 115 / 240 / 500
Fastest Measuring Time in Seconds	0.6	0.6
PC	1 x Intel Xeon Quadcore, 12 GB optional upgrade: up to 24 GB	1 x Intel Xeon Quadcore, 12 GB optional upgrade: up to 24 GB
Sensor Positioning	tripod or sensor stand with manual turn and tilt axis, robot	tripod or sensor stand with manual turn and tilt axis, robot
Automated Object Positioning	rotation table, robot	rotation table, robot

	COMET 5 4 M	COMET 5 11 M
Camera Resolution	2048 x 2048	4016 x 2688
Measuring Volume in mm³ 50 100 200 400 800	55 x 55 x 50 80 x 80 x 60 190 x 190 x 140 380 x 380 x 250 760 x 760 x 500	Measuring Volume 80 in mm³: 75 x 50 x 50 Measuring Volume 150 in mm³: 155 x 105 x 70 Measuring Volume 350 in mm³: 345 x 230 x 200 Measuring Volume 600 in mm³: 560 x 375 x 370 Measuring Volume 1000 in mm³: 900 x 600 x 600
3D Point Distance in µm 50 / 100 / 200 / 400 / 800	25 / 40 / 95 / 190 / 380	80: 18 µm / 150: 38 µm / 350: 85 µm / 600: 140 µm / 1000: 225 µm
Fastest Measuring Time in Seconds	0.8	4.0
PC	HighEnd Workstation; 1 x Intel Xeon Quadcore, 24 GB optional upgrade: 1 x Intel Xeon Quadcore, up to 96 GB	HighEnd Workstation; 1 x Intel Xeon Quadcore, 24 GB optional upgrade: 1 x Intel Xeon Quadcore, up to 96 GB
Sensor Positioning	tripod or sensor stand with motorized turn and tilt axis, robot	tripod or sensor stand with motorized turn and tilt axis, robot
Automated Object Positioning	rotation table, robot	rotation table, robot

COMET5 with its exceptionally innovative sensor concept offers high flexibility and precision for demanding measuring applications.

The modular design allows for quick and easy adaptation of the system to the measurement volume required by the application.

In combination with camera resolutions from 1.4 up to 11 megapixel, COMET5 allows an individual configuration for customer-specific measuring tasks.



DATA ACQUISITION AND PROCESSING WITH COMET®*plus*

The new version of the (Windows based) measurement and processing software COMET*plus* developed by Steinbichler Optotechnik is a strong companion to the new COMET5 sensor. Several measurement strategies which can also be combined for more demanding tasks, offer automatic alignment of single measurements with maximum accuracy and minimal object preparation.

Through the use of the latest available algorithms and parallel processing utilizing high-end hardware technologies (multiple CPUs, dual core/quad core) a perfect data quality - in particular for the generation of high-quality STL meshes - is achieved with minimal processing time and enables the user of the system to take practical advantage of the fully automatic data post-processing capabilities.

For maximum efficiency, COMET*plus* can be integrated into various automated measuring applications.

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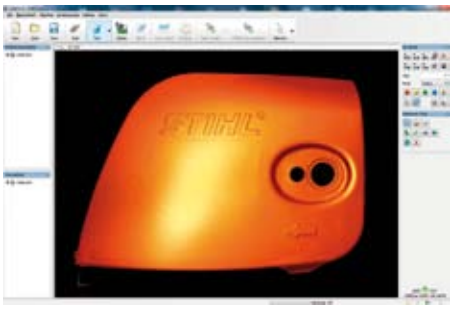
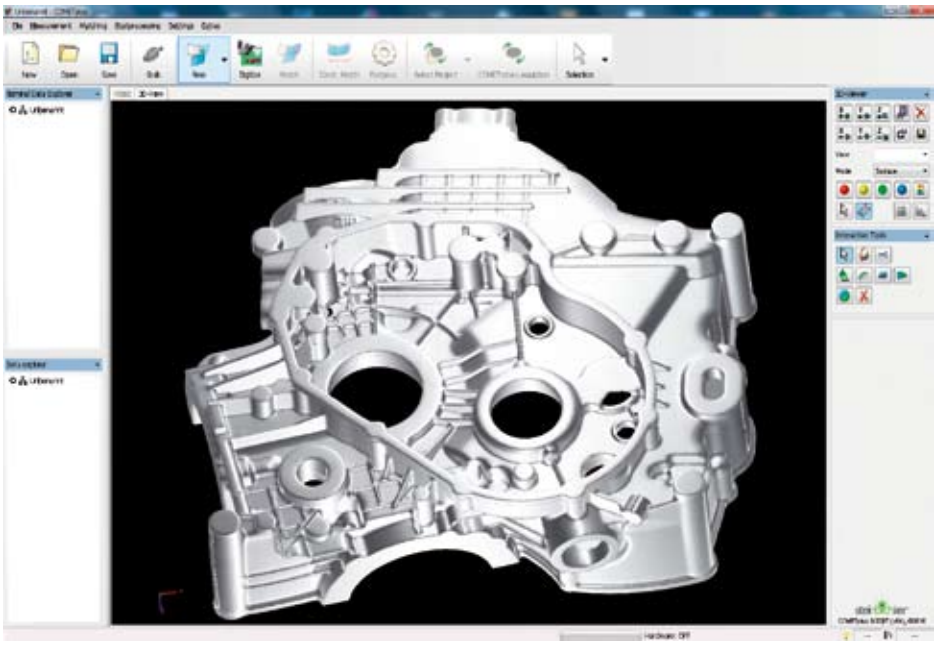
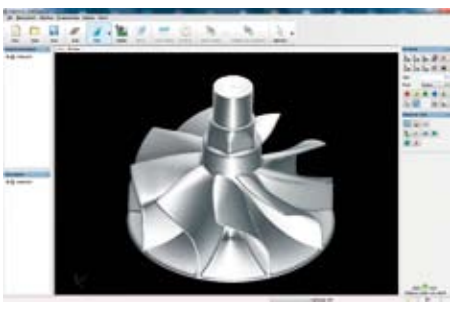




COMET*plus* is highly user-friendly:

The clear, easy-to-use and completely new designed user interface available in the two software variations (modules MATCH and REFERENCE), where the second extents the first, presents an efficient overview of the process steps from the data acquisition through to the final export of the results for the purpose of further processing in e.g. surface reverse engineering or inspection software packages.



COMET®*plus* - FUNCTION OVERVIEW

GENERAL FUNCTIONS:

- COMET*plus* application in 64bit technology, multi processor support, Windows XP 64bit and Windows 7 64bit compatible
- Easy to use graphical user interface with adjustable menu buttons
- Integration of video and 3d view into the main menu for a comfortable analysis and processing of the data
- Interactive and automatic control of the sensor parameters (switching between measurement modes, camera configuration, exposure fusion, non-cooperative surfaces, quality criteria, 3D preview measurement)
- Wide function variety for file management (storage in binary format, data import and export, import of CAD data)
- Easy configuration of system settings and selection of field-of-view
- Data exchange with INSPECT*plus* (optional software package) possible for the simultaneous inspection (on-line) of single views (comparison with CAD data by false-color display)

MATCHING AND TRANSFORMATION FUNCTIONS:

- Free matching of data sets based on surface structure with automated pre-alignment
- Automatic tie point matching (using a minimum of only 2 markers)
- Matching with scale bar information (for free matching and matching using tie points)
- Automatic determination of coded and uncoded photogrammetry markers *
- Automatic data matching using pre-measured reference points *
- Matching with modular reference setups
- Combination of different matching strategies within one measuring project
- Matching with tolerance settings „constraint matching“
- Group matching (interactive grouping and selection of defined areas for global matching)
- Display of matching quality using false-color-index
- Matching of data sets with different resolution and point density
- 3-2-1 alignment of coordinate system
- Bestfit alignment of measurement object to reference data (CAD)

DATA EDITING FUNCTIONS:

- Automatic post processing (conversion of point-clouds into triangle meshes, decimation and optimization in one automatic tolerance-based process)
- Automatic editing and optimization of triangle meshes (removing outliers, tolerance-based smoothing, curvature-based decimation, scaling, mirroring)
- Interactive editing of triangle meshes (hole filling, cutting, smoothing, decimating)
- Interactive and automatic calculation of cross sections
- Automatic measurement of adapters
- Interactive definition of features on CAD data (e.g., circles, long holes, fold points)
- Combined 2D/3D feature measurement

FUNCTIONS TO ENSURE SENSOR ACCURACY:

- Fast, simple and highly accurate sensor calibration on-the-spot by the user
- Service functions for control of sensor accuracy and sensor calibration
- Integrated hardware diagnosis function

EXTRAS:

- Complete range of functions can be automated using macros (VB scripts)
- COM interface for integration into automated solutions
- Automatic data acquisition using optional rotary table (data acquisition and control of hardware)

* function only available in COMET*plus* Reference module

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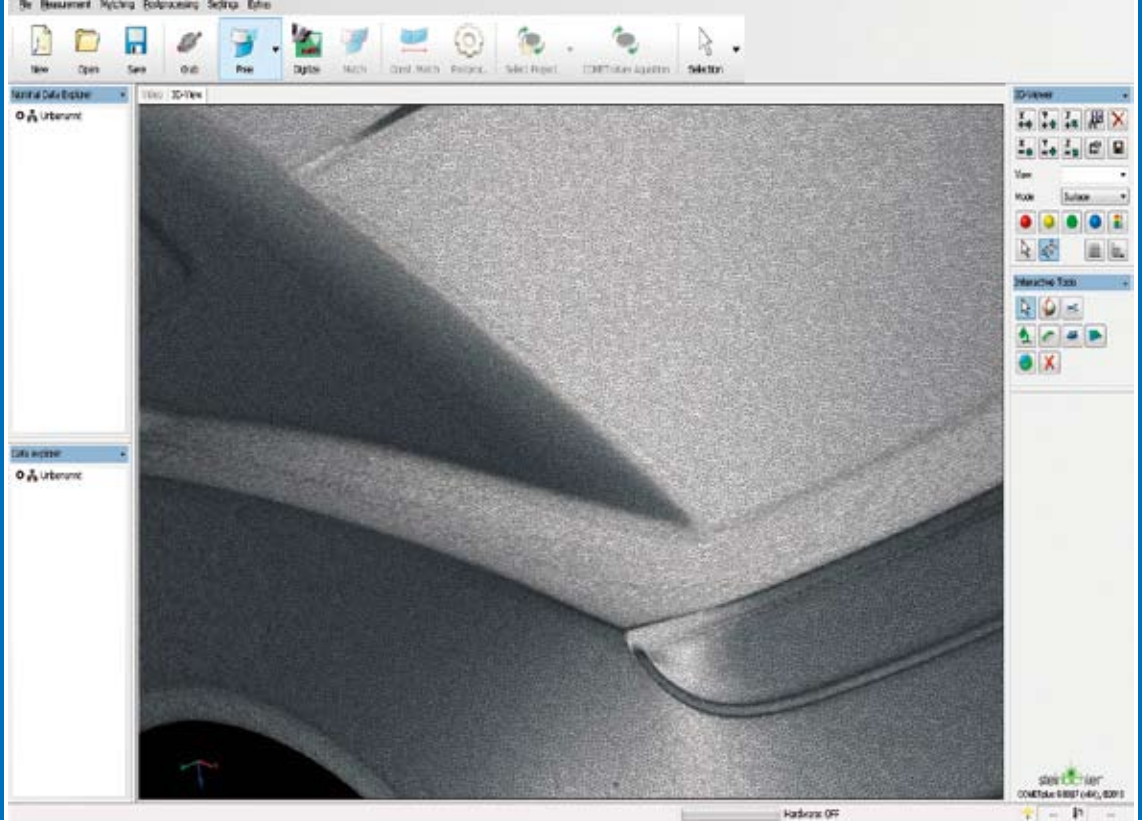
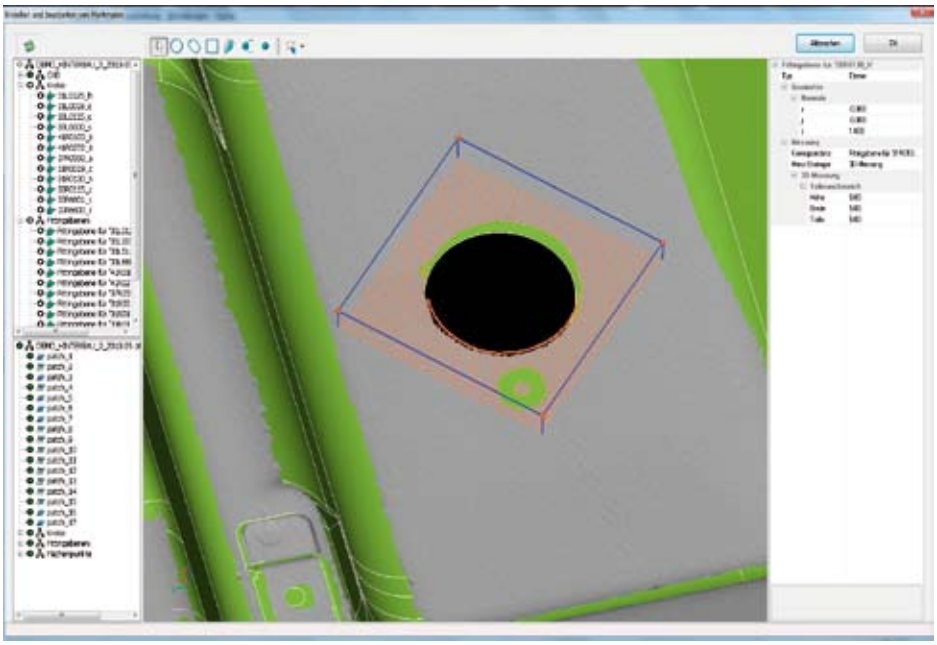
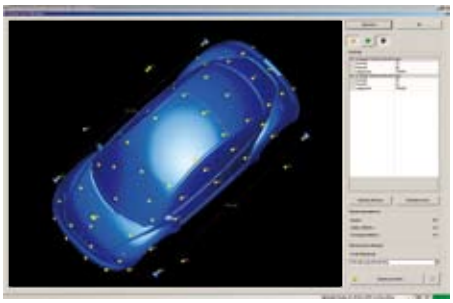
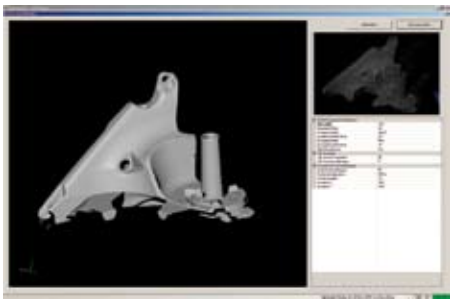


COMET®*plus*
FEATURES - HIGHLIGHTS







Feature Measurement

Interactive definition of features on CAD data (e.g., circles, long holes, fold points).

Matching with Scale Bar Information

Achieves enhanced accuracy for matching methods using tie points and free matching.

Service Functions for Control of Sensor Accuracy and Sensor Calibration

Ensures a continuous monitoring of the system accuracy for every single measurement.

Automated, Free Matching

Automatic definition of corresponding object features for free matching without manual user interaction.

Measuring Dialog

Simultaneous display of measured data and live image. Intuitive setting of parameters for the measurement.

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