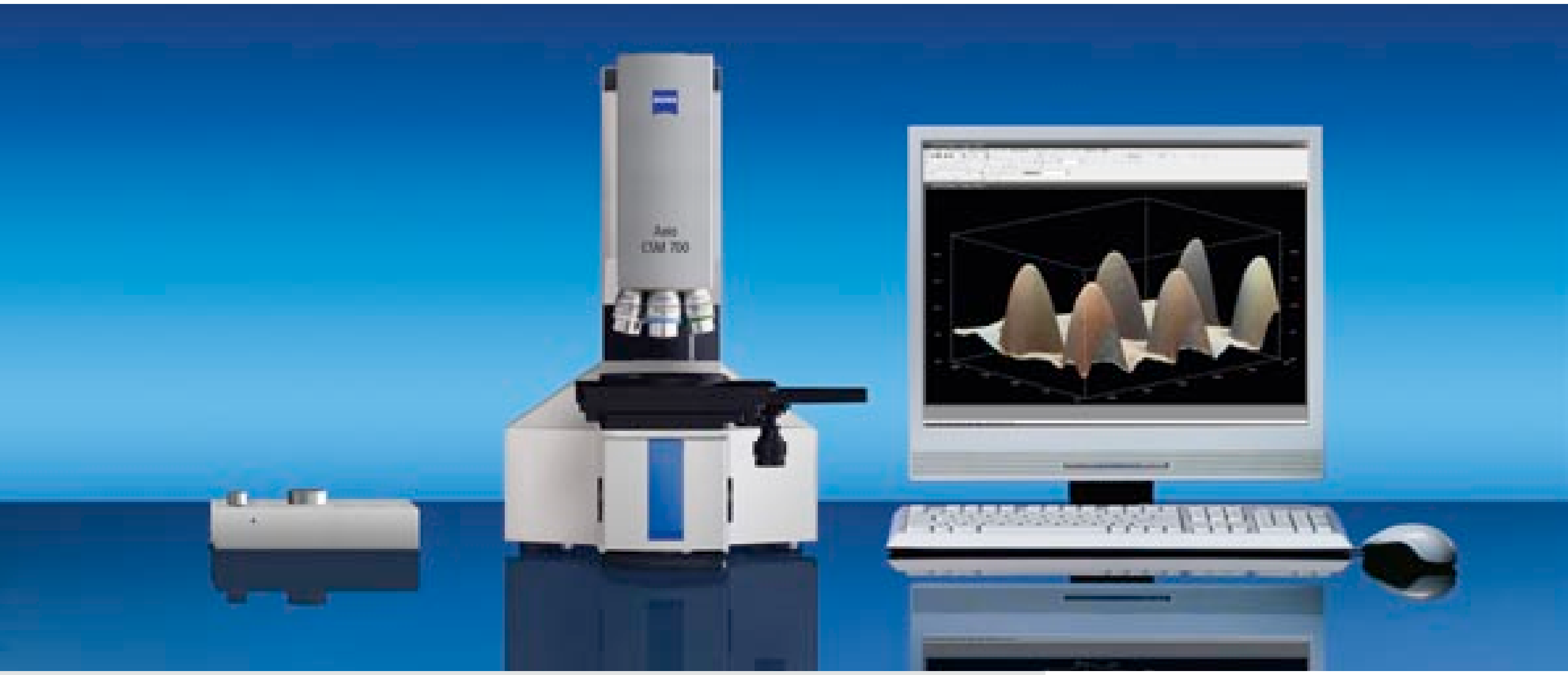
Axio CSM 700

True Color Confocal Microscopy with High Resolution

Experience the impressive functionality of the new Axio CSM 700 from Carl Zeiss, which displays surfaces in three dimensions with high-resolution and true color.

The new Axio CSM 700 (Confocal Scanning Microscope) enables extensive applications in material science research, quality testing and the routine inspection segments. With up to 117 frames per second, the surfaces of your samples remain untouched while topographical measurements are taken. The easy-to-use software offers numerous analysis options including roughness measurement, layer thickness evaluation and particle analysis. In addition, both the images and the results from the measurements can be summarized and saved as a report.

All these outstanding product features enormously improve your working productivity.



3D Topographies
Fast. Precise. Contactless.

ZEISS

We make it visible.

Confocal Microscopy in a New Light

Observe and Measure in New Dimensions

Via the console: Switching between confocal and brightfield mode, along with defining and capturing the Z-Stack and much more are possible.

Best-ever picture quality

Capturing the maximum image information is a standard that Carl Zeiss applies to its objectives used in confocal microscopy. The new EC Epiplan-Apochromat objectives have extremely high numerical aperture which enable one to resolve the finest structures in the submicrometer range. This helps one to reliably detect tiny defects and impurities in the samples. In combination with the new Axio CSM 700 confocal microscope, the previous resolution limits of visible light microscopy are significantly reduced. More than 40 reflected-light objectives with magnifications ranging from 1.25 x to 100 x fill almost every need.

Confocal imaging in true color

Innovative technology enables the Axio CSM 700 to perform confocal imaging in true color. As a result, no additional brightfield images with large, unsharp areas are required to display the true color. The simultaneous capture of color information enormously enriches the three-dimensional topography. Specific surface points can be found quickly and reliably.

Efficient workflow

The Axio CSM 700's user friendly software is impressive, not only because of its extensive measuring functionality, but also its intuitive arrangement of the control and image-editing elements.

Measurements with a blink of an eye

Through the use of the so-called Wire-Frame mode, height measurements can be executed at outstanding speeds of 117 frames per second. In addition, 16-bit resolution enables precise detection of topographies.

Working-comfortable

The successful ergonomics of the new Axio CSM 700 are again reflected not only in the software, but also in the microscope components. Acquisition speed, focus variation, switching between brightfield and confocal mode, defining the Z-Stack range and brightness settings can all be controlled comfortably from the specially designed console.

Integrated vibration absorption

The damping elements integrated within the stand keep the microscope vibration-free and enable clear imaging and precise test readings. This functionality is supported by the Axio CSM 700's low center of gravity.

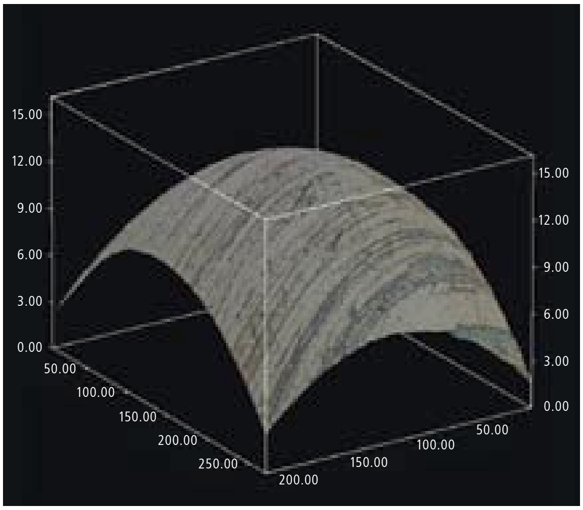
Enhanced Productivity

Thanks to the unique combination of these exceptional product features, the common workflows (e.g. routine inspection) are considerably simplified leading to increased productivity.

Precise Measurement

High Resolution and Reliable Detection

Graphic text: 3D topography of an antifriction ball-bearing for the evaluation of wear, axis length unit: µm.



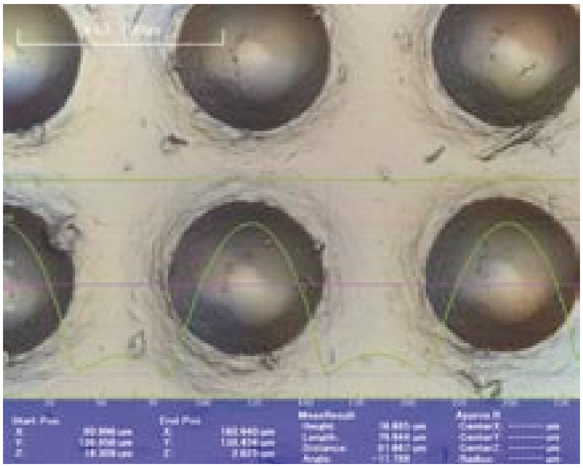
Smaller than small: measurements in nanometers
The Axio CSM 700 shows particular strength in the identification and measurement of variations in height: it guarantees reliable detection of height information from approximately 20 nm, up to several millimeters. This is enabled by highly sensitive light intensity detection, optimal confocal imaging, very precise continuous measurement of the height position of the table (with the help of a laser linear scale), and innovative software algorithms.

Height variations in the millimeter range
The Axio CSM 700 performs just as reliably when it comes to analyzing deeply textured surfaces with heights of up to several millimeters.

The high-contrast, high-resolution images captured by the Axio CSM 700 boast a depth of field previously only achievable with scanning electron microscopes. In addition, the true color information is provided with confocal precision. In semitransparent materials and multilayer systems, the Axio CSM 700 is able to identify inclusions, interfaces, shrink cavities, and inhomogeneities, as well as layer thickness measurements.

Reliably assess surface properties
The Axio CSM 700 is the ideal tool for inspecting the quality of engineering surfaces, whether of precision-machined metal tools or machine components, or the tribological analysis of high-performance ceramic parts used in the automotive industry. The Axio CSM 700 also records 2D height profiles in a reliable controlled way. On the basis of a high-resolution microscopic image, you can decide online where and how you want to record your height profile.

The information-rich 3D visualization techniques of the Axio CSM 700 software enable rapid quantitative assessment of friction and wear tests made on such innovative surfaces. Comprehensive geometric measurement functions and functional parameters such as bearing ratio, area and volume properties guarantee that the surface texture is thoroughly characterized.



Light guide plate with height profile measurement, extended depth of field.

Multiple Material Surfaces

Successful, Efficient Analysis

From crystalline to amorphous, from natural to culinary

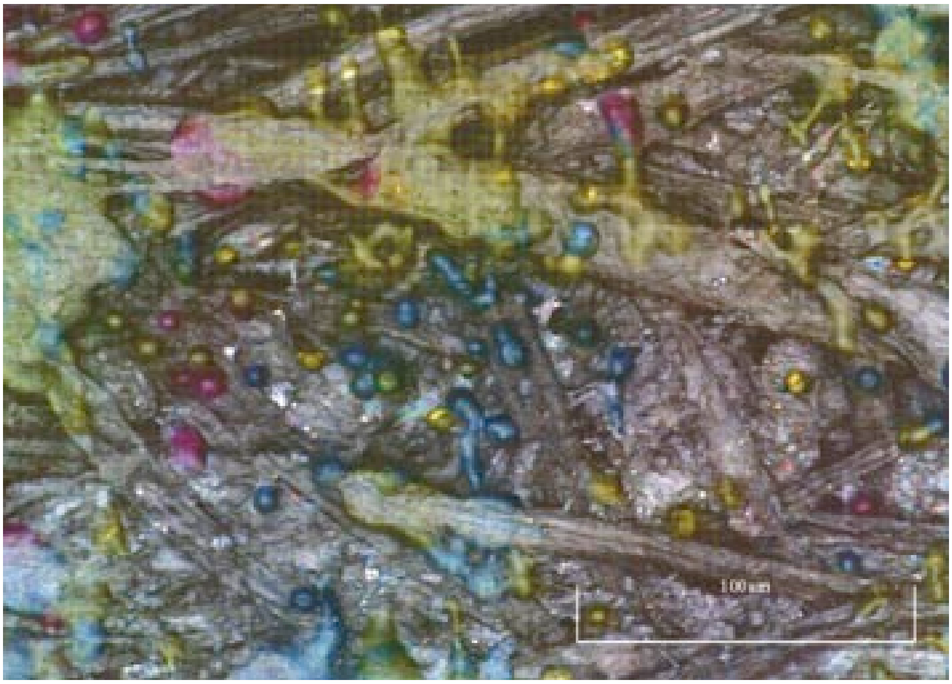
Modern material surfaces demand modern examination technologies like the Axio CSM 700. Innovative glass materials can be found in LCD panels or microfluidic channels. Ceramic materials that form the basis of innovative substrates and electronic components must also meet high quality requirements that demand the use of extremely precise surface analysis. Use the Axio CSM 700 to check your materials for wear-resistance, slip-resistance, thermal stability, and water resistance.

The use of natural fibers such as cotton, jute, flax, hemp, and sisal in automotive manufacturing, especially for vehicle interiors, is well established. In the paper and packaging industries, renewable raw materials also provide cost-effective, stable and environmentally friendly alternatives to non-renewables. The Axio CSM 700 also shows its strength, for example, in the inspection of powdered milk, or in testing the porosity of pastas or confectionaries.

Topography of textured material surfaces

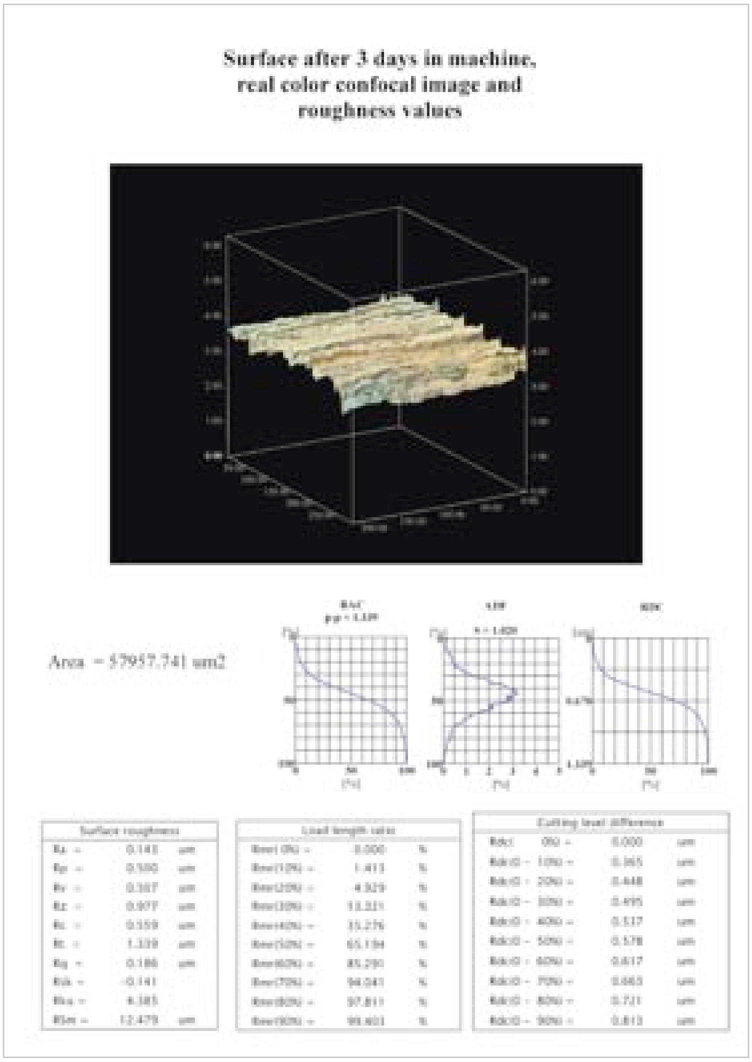
The image stack provides a basis for calculating the 3D topography of micro-structured surfaces. Objects with low reflectivity are reconstructed as reliably as metallic surfaces with high specular reflectivity. Near-transparent polymer structures can be analyzed just as successfully as diffusely-reflecting ceramic surfaces. In fact, the Axio CSM 700 performs particularly well with diffusely-reflecting materials in comparison to other optical techniques: it can reliably detect sloping edges much steeper than half the objective's numerical aperture.

Printed color paper with extended depth of field.



Powerful Software

Extensive Functionality



Surface after 3 days in machine, real color confocal image and roughness values

Area = 57957.741 um2

Surface roughness		
Ra =	0.141	um
Rp =	0.500	um
Rv =	0.357	um
Rz =	0.977	um
Rc =	0.559	um
Rt =	1.339	um
Rq =	0.186	um
Rsk =	-0.141	
Rku =	4.385	
RSm =	12.479	um

Load length ratio		
Rmr(0%) =	0.000	%
Rmr(10%) =	1.413	%
Rmr(20%) =	4.929	%
Rmr(30%) =	13.321	%
Rmr(40%) =	35.276	%
Rmr(50%) =	65.194	%
Rmr(60%) =	85.290	%
Rmr(70%) =	94.041	%
Rmr(80%) =	97.811	%
Rmr(90%) =	99.403	%

Cutting level difference		
Rdc(0%) =	0.000	um
Rdc(0 - 10%) =	0.365	um
Rdc(0 - 20%) =	0.448	um
Rdc(0 - 30%) =	0.495	um
Rdc(0 - 40%) =	0.537	um
Rdc(0 - 50%) =	0.578	um
Rdc(0 - 60%) =	0.617	um
Rdc(0 - 70%) =	0.663	um
Rdc(0 - 80%) =	0.721	um
Rdc(0 - 90%) =	0.813	um

A summary of the measurement results as a report.

Varied Picture Analysis

The Axio CSM 700 software presents you with a surprisingly wide variety of image analysis methods. The spectrum ranges from simple distance assessment to two and three-dimensional roughness measurements, even particle analysis.

Efficient, easy operation

The capture of three-dimensional image stacks is supported and accelerated via the following functions:

- Autofocus: The automatic focusing of the Axio CSM 700 on the surface under examination – in one click
- Autogain: Automatic brightness adjustment to optimal values defined by the illumination intensity and surface reflectivity of the object under examination – in one click
- Very high-speed height measurements: Using the innovative Wire-Frame mode, height measurements can be executed at speeds of up to 117 frames per second.

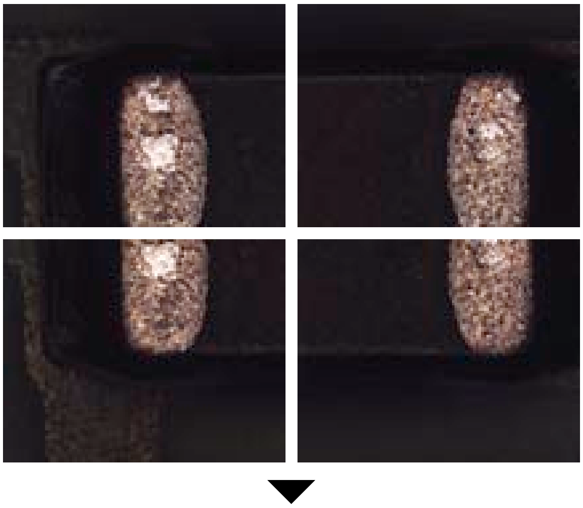
For the completion of the measurement, only the highest and lowest points of the surface need to be set. This simplicity enables problem-free usage even by users with little microscopy experience.

Measurement functionality

On the basis of individual and/or several profiles, distances, line widths, middle line widths, angles, radii, surfaces, volumes and much more can be measured without contact. The available profilometry also offers roughness and waviness measurement functionality along lines or acrossed surfaces. The calculation of the appropriate characteristic values is based on the DIN EN ISO 4287 standard.

Layout function

Finally, the results of the respective measurements can be interactively entered into different formats and saved as measurement reports.



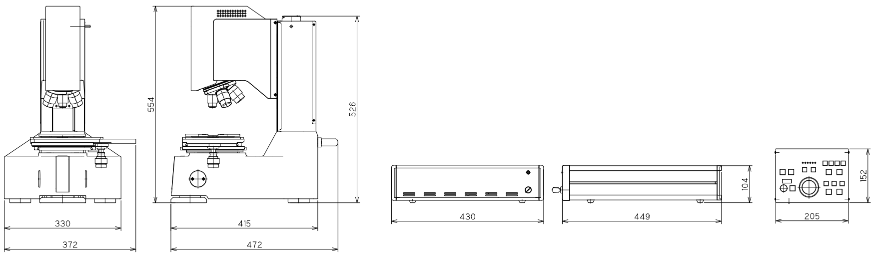
Stitching

For the capture of larger object fields, image stack arrays can also be recorded. This can be done either manually or automatically when using a motorized scanning stage. Overlaying the image fields of individual stacks enables a precise correlation using modern software algorithms within the stack array. This produces a clear, error-free picture of the extended object field. The aforementioned measurement functions are of course also available for such enlarged stacks.

Electrical resistance: An extended measuring field through the correlation of four image stacks.

Technical data

Axio CSM 700: Dimensions in mm



Microscope stand *Controller* *Console*

Image field according to objective magnification	Objective magnification	Image field (µm x µm)
	10x	1168 x 938
	20x	584 x 469
	50x	234 x 188
	100x	117 x 94
Image pixel resolution	1280 x 1024 Pixels	
Lateral resolution (line-space-pattern) Repeatability of lateral measurements (3 σ) Repeatability of height measurements (1 σ)	160 nm 20 nm 30 nm	
Illumination	Xenon lamp (wave length range: 400 to 700 nm)	
Acquisition speed	7.5 fps (High-speed color mode); 117 fps (Wire-frame mode)	
Color depth	3 x 8 bit (RGB)	
Height measurement	15 mm maximum measurement range; 10 nm increments; 16-bit resolution	
Maximum sample height	63 mm	
Image data processing and measurements	2D: Distances, area, area ratio, center of gravity, Feret Max, Feret X, Feret Y, diameter of the circle with equivalent area, perimeter, segmentation, binary morphology, smoothing, median, sorting, gamma correction, sharpening, etc. 3D: Height, roughness (line/area, calculation according to DIN EN ISO 4287), volume, surface area, particle analysis etc. Additional: Overlay, patchwork (stitching), reporting functionality	
Monitor	20.1"-LCD-TFT-screen	

Carl Zeiss MicroImaging GmbH
07740 Jena, Germany

Industrial | Location Jena
Phone: + 49 3641 64 3400
Telefax: + 49 3641 64 3144
E-Mail: micro@zeiss.de

www.zeiss.com/topo

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