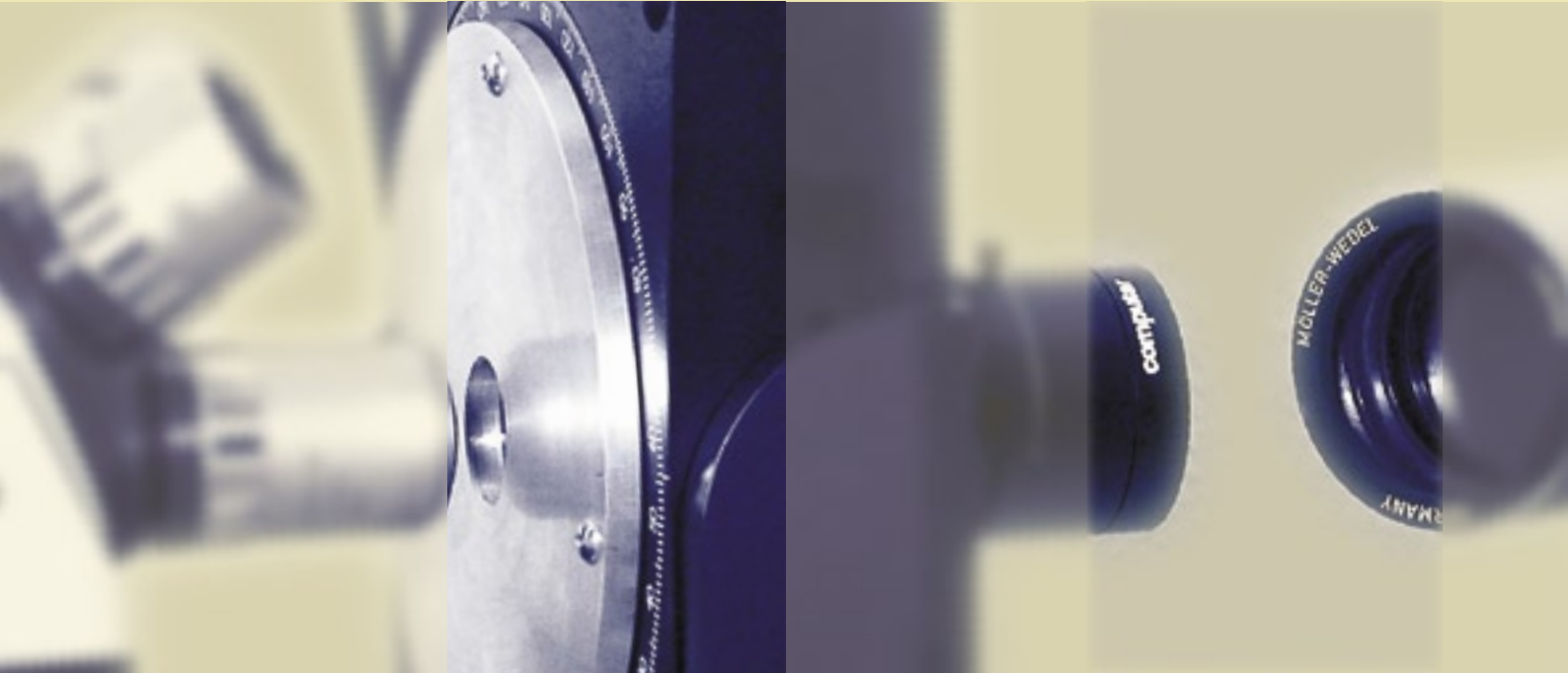




OEG

Optik
Elektronik
Gerätetechnik



OTS 200 | OTS 500
Measuring instruments
for industrial applications



Optics Test Station (OTS) – simply measure

The Optics Test Stations of the OTS series make the computer-based, software controlled measurement possible of optical parameters of single lenses and optical systems.

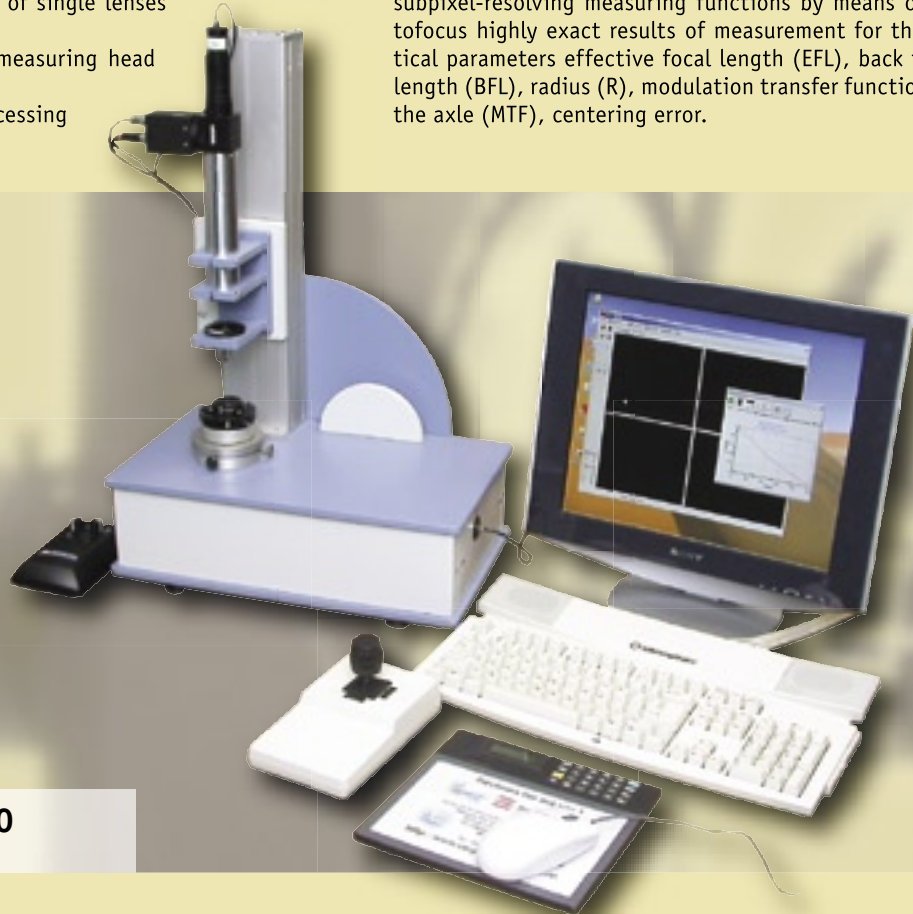
The motor controlling of the measuring head offers high control comfort.

The highly resolving image processing

The measured values are seized with a high resolution CCD camera and evaluated by means of an image processing system in the computer. All measuring functions are software controlled.

Numerous measuring functions

The optics test station OTS is suitable for many of the measuring tasks occurring in practice and supplies by subpixel-resolving measuring functions by means of autofocus highly exact results of measurement for the optical parameters effective focal length (EFL), back focal length (BFL), radius (R), modulation transfer function on the axle (MTF), centering error.



OTS 200

system guaranteed in connection with subpixel software algorithms highest measuring accuracy. Objective, computer-based measurements belong in the quality assurance and in the inspection of incoming goods meanwhile to the standard requirements. With the help of the Optics Test Stations of OEG these demands can be excellently fulfilled. High accuracy, simple operation, automatic measuring expirations and logging possibilities are characteristics of a new generation of optics measuring instruments. The devices of the OTS-series fulfill these requirements and make so the entrance possible into the computer-assisted quality assurance in the optics manufacturing.

Software controlled measurements with highest accuracies

According to standard, two equipment variants of the Optics Test Station are available: OTS 200 and OTS 500. The difference between both variants are the focal length and the opening of the measuring collimator as well as the measuring range. The fundamental structure of both devices is to a large extent identical.

Plan plates and filters can be measured by a software extension and appropriate mechanical adapters regarding deflection angles, wedge angles and tilting with an accuracy of 1 arcsec.

Intelligent software, easy handling

The software works under the current operating systems Windows 2000/XP.

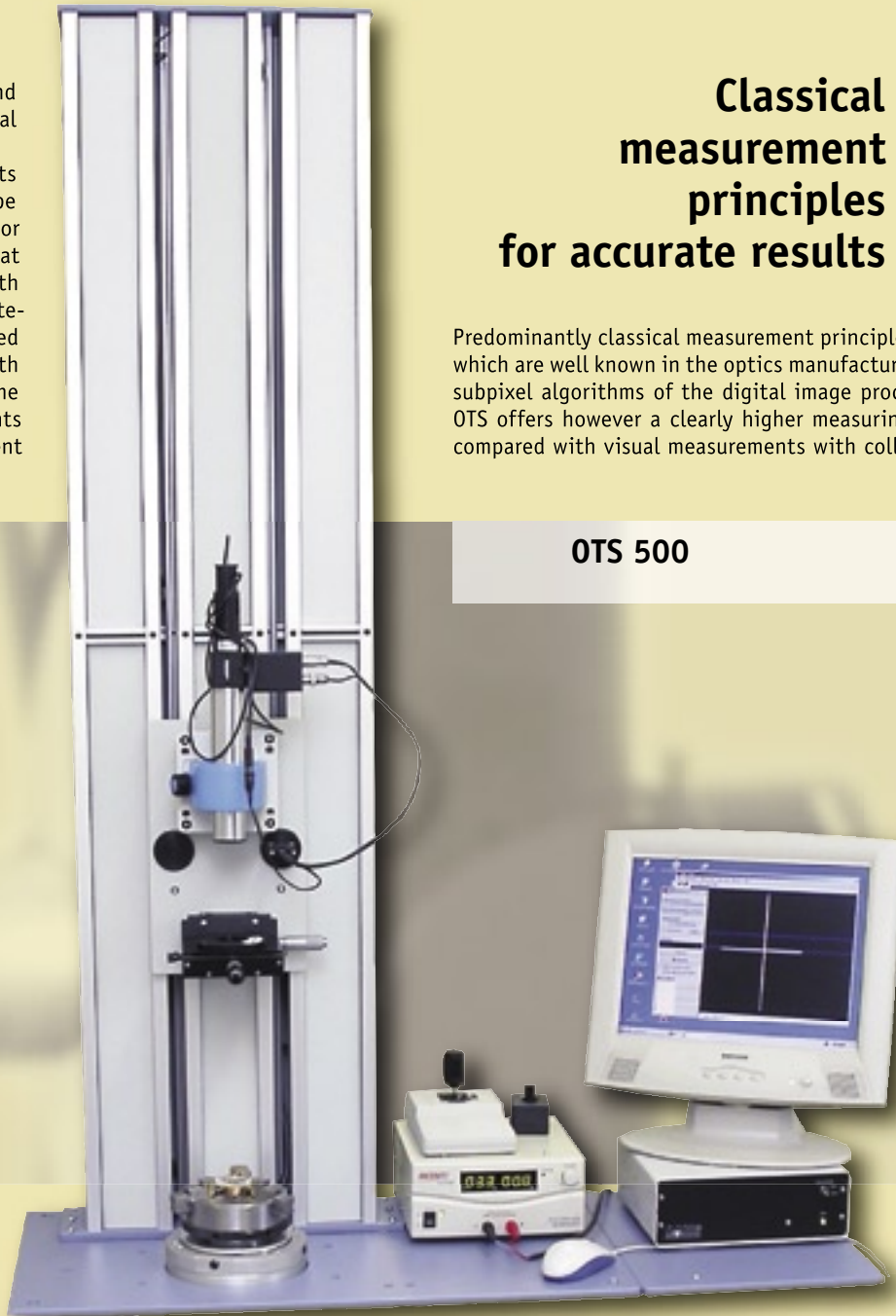
Principal item of the software are the image processing system and the integrated 3-axle stepping motor controller. The image processing system serves both for the representation of the live-video image of the CCD camera on the PC monitor and for the highly exact recording of measurement.

The integrated stepping motor controller makes the software controlled movement possible of 3 axles of the measuring instrument and forms the basis for the progressive measuring concept upon automatic and/or part-automatic measuring expirations.

Great importance was attached to a simple and logical software surface. Measuring expirations and procedural instructions for the operator are given by the software. The software supports both the employment in the

quantity production and sampling of individual samples.

For series measurements the positions can be stored of reference or image planes, so that test specimens with same imaging characteristics can be measured extremely fast, also with normally something time consuming measurements e.g. radius measurement



Classical measurement principles for accurate results



Predominantly classical measurement principles are used, which are well known in the optics manufacturing. By the subpixel algorithms of the digital image processing the OTS offers however a clearly higher measuring accuracy compared with visual measurements with collimator and

OTS 500

or the measurement of FFL and BFL.

For single measurements the measuring head is positioned comfortably and sensitively by means of joystick. Particularly for these measurements the live-video image of the collimator and/or autocollimator video image is very helpful.

Documentation possibilities for all requirements

The results of measurement can be stored as ASCII file or as complete metrology record in the txt format. Txt-protocols are to a large extent freely configurable. Free texts can be combined with all information, which are within the program available. These are e.g. date/time, results of measurement and statistic functions (mean value, standard deviation). Protocols permit also an inserting of simple, freely programmable formulas. If necessary the data can be sent directly over the network to a central server.

telescope.

A detailed description of all measuring functions and -principles and of the software is provided with the equipment.

Optical-mechanical basic setup

The optical-mechanical main components of the OTS are the basic frame with integrated measuring collimator, the measuring head and the motorized z-axis for measuring head positioning. The measuring head consists of an autocollimator with illumination unit and CCD camera. It can be used depending upon measuring function in autocollimation or as telescope (then in connection with the measuring collimator). The illumination units are equipped with an electronic brightness control, in order to make an adjustment possible to the reflection characteristics of the test specimen (by use in autocollimation) or the free aperture of the test specimen. The CCD camera replaces the visual eye piece of the autocollimator. The live-video image of the camera is digitized over an image

processing system and represented in real time on the PC monitor.

The effective stroke of the motor z-axis can be adapted to the demanded measuring range. The stepping motor controller makes a positioning accuracy possible within the sub- μm range. Thus in connection with the autofocus function the highly exact detection of the image plane position is ensured. The subjective influence of the measurement results is avoided by the autofocus function. Except of the centring error measurement, the specimen holder consists of a self centring holder with a diameter range up to 100 mm, usual in optical industry.

Measuring functions and measuring accuracies of OTS 200

Function	Measuring range	Reproducibility	Accuracy
Focal length (EFL)	0.5 ... 500 mm -500 ... -0.5 mm	$\pm 0.04 \dots \pm 0.3 \%$	$\pm 0.04 \dots \pm 0.3 \%$
Back focal length (BFL)	0.5 ... 500 mm -500 ... -0.5 mm	$\pm 0.04 \dots \pm 0.3 \%$	$\pm 0.04 \dots \pm 0.3 \%$
Flange focal length (FFL)	0.5 ... 500 mm -500 ... -0.5 mm	$\pm 0.04 \dots \pm 0.3 \%$	$\pm 0.04 \dots \pm 0.3 \%$
Radius konkav / konvex	$\pm 500 \text{ mm}$	$\pm 0.03 \dots \pm 0.3 \%$	$\pm 0.03 \dots \pm 0.3 \%$
MTF (on axis, only for positive BFL)	0 ... 1,000 lp/mm	3%	3%
Deflection angle	1.5°	1 arcsec	1 arcsec
Wedge angle	1°	1 arcsec	1 arcsec
Tilt (autocollimation)	0.75°	1 arcsec	1 arcsec

Measuring functions and measuring accuracies of OTS 500

Function	Measuring range	Reproducibility	Accuracy
Focal length (EFL)	0.5 ... 1,200 mm -1,200 ... -0.5 mm	$\pm 0.04 \dots \pm 0.3 \%$	$\pm 0.04 \dots \pm 0.3 \%$
Back focal length (BFL)	0.5 ... 1,200 mm -1,200 ... -0.5 mm	$\pm 0.04 \dots \pm 0.3 \%$	$\pm 0.04 \dots \pm 0.3 \%$
Flange focal length (FFL)	0.5 ... 1,200 mm -1,200 ... -0.5 mm	$\pm 0.04 \dots \pm 0.3 \%$	$\pm 0.04 \dots \pm 0.3 \%$
Radius konkav / konvex	$\pm 500 \text{ mm}$	$\pm 0.03 \dots \pm 0.3 \%$	$\pm 0.03 \dots \pm 0.3 \%$
MTF (on axis, only for positive BFL)	0 ... 1,000 lp/mm	3%	3%
Centring error		Repr. of sensor: 1 μm	Accuracy of the sensor: 1 μm
Deflection angle	1.5°	1 arcsec	1 arcsec
Wedge angle	1°	1 arcsec	1 arcsec
Tilt (autocollimation)	0.75°	1 arcsec	1 arcsec

Special optical measuring instruments

OEG GmbH is specialized since foundation in the development of customized measuring instruments. If the OTS standard devices should not fulfill the existing requirements fully, take up please with us contact, in order to discuss your special requirements. Please you consider also our offer at MTF measuring instruments, if you must evaluate the resolution of optical systems not only on axis but also in field points objectively.

General technical data of OTS 200 and OTS 500

	OTS 200	OTS 500
Free aperture of measuring collimator	28 mm	65 mm
Focal length measuring collimator	200 mm	500 mm
Maximum specimen diameter	100 mm	200 mm
Brennweite Autokollimator	200 mm	
Free aperture autocollimator	28 mm	
Illumination AC / collimator	LED / LED	LED / 50W Halogen
Resolution CCD-Camera	440,000 Pixel (higher res. on inquiry)	
Motorized axles	2	3
Autofocus	Yes For MTF-Measurement: Autofocus for freely choosable spatial frequencies	
Automatische Messabläufe	Ja	
Manual measurements	Yes, by joystick	
Stepper motor controller	3 axles, 40,000 steps per revolution	
Operating system	Windows 2000/XP	
Software	32 Bit	
PC	Equipment according to respective state of the art technique	
PC-Monitor	17" flat screen	

Ordering informations

Ordering number	OTS 200					OTS 500				
	524.11.1	525.11.1	526.11.1	527.11.1	528.11.1	524.10.1	524.20.1	524.25.1	524.30.1	524.35.1
Focal length	•	•	•	•	•	•	•	•	•	•
Back focal length	•	•	•	•		•	•	•	•	•
Flange focal length	•	•	•	•		•	•	•	•	•
Radius	•	•	•	•		•	•	•	•	•
Angle			•	•				•	•	•
MTF	•	•				•	•	•		•
Centring error						•				•



OEG

Measuring instruments for optical parameters
MTF-measuring instruments
Autocollimation-applications
Special optical measuring instruments

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