TRAINING | PRODUCTS | SERVICES

HOFBAUER

OPTIK • MESS- UND PRÜFTECHNIK
VERTRIEB • BERATUNG • TRAINING

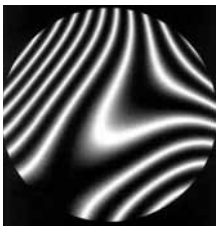
# High-precision optical measuring technology

- Standard and custom solutions
- Contract measurement and calibration
- Practical continuing training

Anything is possible - why not get in touch with us!

Photograph courtesy of:
TC-Teisnach

# Contract inspection Calibration Analysis



## Use our laboratory equipment and our expertise for process control, goods incoming control or as engineering and analysis tools.

Contract measurement on your optical and mechanical machine tools save you an enormous amount of costs and time-consuming orientation of your staff members. Together with the Teisnach Technology Campus of Deggendorf Technical University of Applied Sciences we offer calibration of your optical measuring and testing equipment - on-site too. The calibration equipment that is used has traceability to national standards.

The latest technology - some of it laser-assisted - future-looking software, and many years of specialist expertise guarantee perfect results. These are optionally available in the form of measuring logs (graphics and tables), calibration certificates or wide-ranging test reports.

Of course we support you in interpreting the results and in any questions you may have about further measures.

Photograph courtesy of:
Egbert Reitz Natursteintechnik e.K.

## We measure your production and test equipment:

- Machine beds and stands
- Moving axes, slides
- Special machines and machining centres
- Measuring tables/plates
- Angle standards, straightness standards
- Rotary tables, dividing apparatus

for

- Position uncertainty
- Straightness, flatness
- Alignment
- Parallelism and perpendicularity
- Tilt angle curve and transient response.

## Calibration service for optical measuring & testing equipment

- Absolute calibration on plane surfaces of up to 1200 mm
- Form deviation according to ISO 10110 3/SAG (IRR/RSI)
- Radii standards
- Collimators and telescopes
- Autocollimators
- Goniometer graduated circles
- Focal length calibration
- Angle calibration on prisms/polygons

## Contract measurement on optical components

- Refractive index and dispersion measurement
- Radius determination of spherical surfaces
- Focal and back focal length measurement
- Interferometric measurements on parallel measurement plates, test glasses, mirrors
- Centring errors
- Imaging quality/MTF optical systems

## Precision optics - laser optics

- Design of optical systems
- Tolerance simulation on optical systems
- Reverse Engineering

# Standard solutions and customized product development

Difficult problems are challenges that we love to take on. In a dialogue with you, we develop tailor-made solutions for your individual measurement tasks and customize the software to match.

In close cooperation with Deggendorf Institute of Technology and OEG GmbH, we can also develop customized solutions for your hardware and software. In this connection, we concentrate on the fields of optics and optoelectronics, semi-conductor technology, automotive technology and mechanical and plant engineering.


## Our products ensure your quality - from process monitoring right through to final inspection!

## Optical measuring and testing equipment

- Collimators, telescopes, autocollimators
- Electronic autocollimators
- Radius measuring devices/spherometers
- Focal and back focal length measuring devices
- Flatness and profile measuring devices
- MTF measuring devices and software
- Measuring microscope with automatic evaluation
- Video upgrades, CCD cameras
- Image processing
- Semiconductor and wafer measuring devices

## Production and test equipment monitoring

- Straightness measuring devices
- Flatness measuring devices
- Tilt angle measuring devices
- Measuring devices for rotational position uncertainty
- Testing and reference standards

## Precision optical components

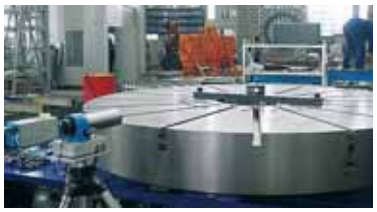
- Parallel measurement plates, test glasses
- Mirror polygons
- Prisms, wedge plates, polygons
- Lenses, objectives

# Practical training on-site in metrology

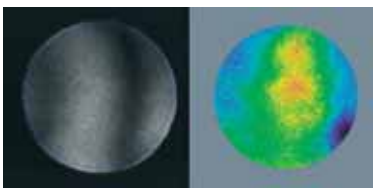
In seminars with workshopcharakter, we give the basic knowledge that you need in the fields of optical testing technology and linear and angular measuring technology. Useroriented in-house staff training courses allow your staff members to familiarise themselves quickly with the fields of optics and optical and mechanical measuring and testing technology.

Our trainers have many years of experience in the fields of optical metrology and quality assurance. They have gained their methodological, personal and social skills in intensive further training courses and on a self-taught basis over the years.

We can also offer special seminars for your individual training courses on the basis of detailed consultation.



Photograph courtesy of:
Demmeler Maschinenbau GmbH & Co. KG



## Metrology

- Basics of metrology
- Mechanical linear measuring technology
- Basics of optical metrology

## Optical metrology

- Measurement and inspection using collimators, telescopes and autocollimators
- Interferometric surface metrology I
- Interferometric surface metrology II
- Goniometer - Basics
- Goniometer Part I: High-precision angular measurement
- Goniometer Part II: Refractive index measurement/dispersion
- Goniometer - Overall module
- Optical linear measuring technology - Basics
- Theory and practice of measurement of the modulation transfer function (MTF)
- Calibration of autocollimator

## Production and test equipment monitoring

- Straightness measurement using an electronic autocollimator
- Parallelism and perpendicularity measurement
- Flatness measurement using an electronic autocollimator
- Tilt angle measurement using an electronic autocollimator
- Position uncertainty - rotary axes
- Position uncertainty - laser interferometer
- Determination of tolerances

## Optics

- Basics of technical optics
- Properties of optical materials and components
- Image errors and aberrations in optical imaging
- Tolerances of individual optical parts
- Applying ISO 10110 in practice

## Software training course

- ELCOLEVEL software - Straightness software for electronic autocollimators
- ELWIMAT software and its use in three-dimensional space with six degrees of freedom

# Synergies that you can benefit from

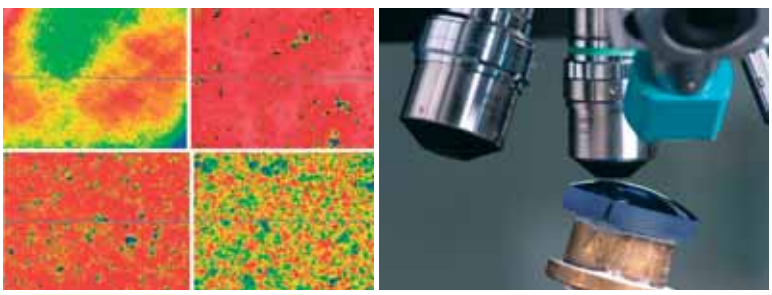
You can get everything from us as your single source: regardless of whether it's standard products, newly developed products, modified products, contract measurement and calibration or training courses and workshops for your staff members.

We will work out a bespoke solution just for you. Above all, this includes our customer-specific proprietary developments and product customisations to meet our customers' individual requirements.

Our software packages and customisations makes sure that you can work with them conveniently and have future-proof documentation.

We cooperate on an intensive basis with Deggendorf Technical University of Applied Sciences' Technology Campus, their research group and use a large equipment pool.

If you would like to test the efficiency of our products first or make an investment at a later time, we can carry out contract measurement and calibration using our equipment pool on your premises too. We take competent advice and equipment presentations for granted.



Photograph courtesy of: TC Teisnach

## Contract measurement and calibration on-site too

Are you looking for a favourably priced alternative to continuous quality assurance of your products? Using our partially laser-aided measuring and testing equipment, we can offer contract measurement and calibration measurement of your

- machine tools
- production facilities
- measuring and testing equipment

as well as your

- optical components and
- optical test media.

## Marketing of branded products

We market products manufactured by OEG GmbH, Frankfurt/Oder as well as by other famous manufacturers. These high-quality products are used in a wide range of applications in the fields of

- Optics and optoelectronics
- Video, film and photographic technology
- Semiconductor technology as well as
- Automotive technology, mechanical & plant engineering.

## Practical training courses and workshops

### Do you want to

- increase efficiency in development, production, control and quality assurance?
- improve quality according to DIN EN ISO 9000 ff?
- choose new measuring procedures and suitable measuring and testing equipment for production and control?
- bespoke further training for your company on an individual basis?

### Then we can recommend

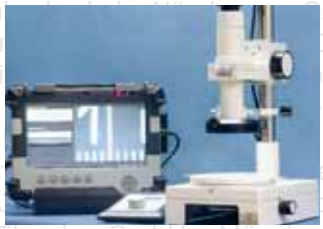
- in-house seminars and workshops for measuring and testing technology (on a participant- and task-oriented basis)
- including your specific internal production and measurement equipment
- consulting and coordination of the content and scheduling
- professional, personal customer care after the seminar.

# A few practical examples:

Our continuously increasing clientele includes some of the most famous manufacturers in the fields of precision optical engineering, toolbuilding, as well as automotive technology and mechanical engineering. Customer satisfaction confirms that we are doing the right thing and at the same time motivates us to do even better.

Dr. Engelbert Hofbauer studied precision engineering before completing his doctorate in the field of mechanical engineering at Ilmenau. Since 1995, Dr. Hofbauer has worked in Sales and Consulting for the optical and mechanical engineering industry. As a research assistant, his focus - in addition to research - was on further training and applicationrelated developments for industry (DaimlerChrysler AG, Conti-Temic microelectronic GmbH, MAN SE, KLA-Tencor Corporation, Karl Storz GmbH & Co. KG, Bayer Maschinenbau GmbH & Co. KG, Friedrich Richter Messwerkzeuge GmbH & Co. KG, Egbert Reitz Natursteintechnik e.G., Photon Laser Optik GmbH, ...)

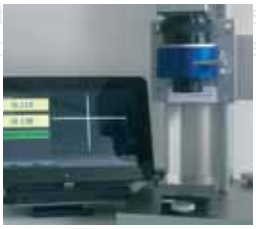
www.continental-corporation.com



www.richter-messzeuge.de

www.reitz-natursteintechnik.de

www.photon-laseroptik.de



www.th-deg.de/de/tc-teisnach

## Conti Temic microelectronic GmbH

To set cameras for the automotive field, it is necessary to check assembly boxes for angularity/parallelism/roll angle < 0.01°, X, Y position < 0.005 mm and distance < 0.5 mm. ELWIMAT is just the solution for this.

## Friedrich Richter Messwerkzeuge GmbH & Co. KG

To carry out precise measurement of the measuring channels on measuring tapes of up to 30 m, a mobile measuring microscope is used that has a camera and computer-supported image processing on the Touch PC, which can also be wireless with battery operation.

## Egbert Reitz Natursteintechnik e.G.

To measure the side cheeks of a new 32 m machine, a special autocollimator was developed. In this connection, the straightness measurement uncertainty is < 0.025 mm; this is also dependent on the ambient conditions.

## Photon LaserOptik GmbH

Laser crystals with a length of about 20 mm and a diameter of 1 mm are produced to a tolerance of < 1 arcmin to the cylinder surface. Measurement to < 0.05 arcmin is carried out using an AKF Special Low Light; centring of the highly anti-reflective endoscopy optics and cemented elements is done in the same way.

## Newly developed AKFV variable drawtube

Using the new AKFV, you measure spherical and aspherical lenses and (convex and concave) mirrors on a non-contact way. Electronic evaluation by means of contrast function and with coloured go/no-go display on the modern touch display.

## TC-Teisnach/Deggendorf Institute of Technology

Together with Deggendorf university, we develop measuring concepts and measuring equipment for precision optics. The left-hand picture shows the measuring portal from the "OPTASENS" EU project together with the sensor from the "WiPoVi". In the new "DoSuRe" ZIM project, it is intended to use this to carry out absolute measurements of large spheres, including convex ones, in situ.


HOFBAUER

OPTIK • MESS- UND PRÜFTECHNIK

Dr. Engelbert Hofbauer
Petzetstraße 8
81245 München

Tel: 0 89 - 89 66 90 88
Fax: 0 89 - 89 66 90 89

info@hofbauer-optik.de
www.hofbauer-optik.de