

flo-ir
berührungslos messen

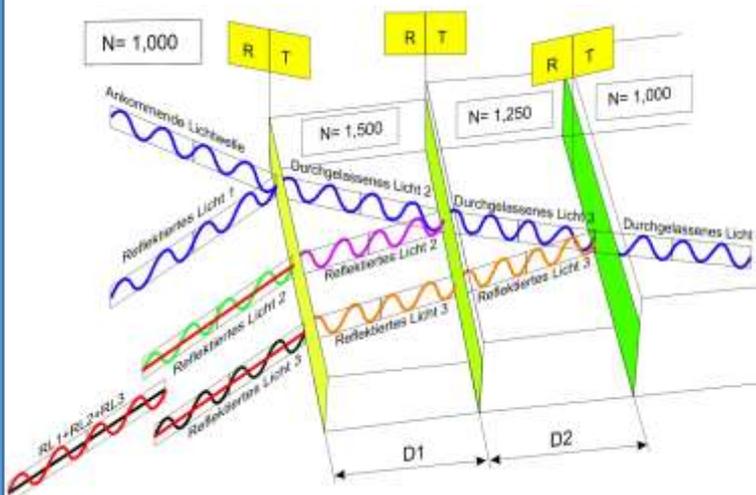
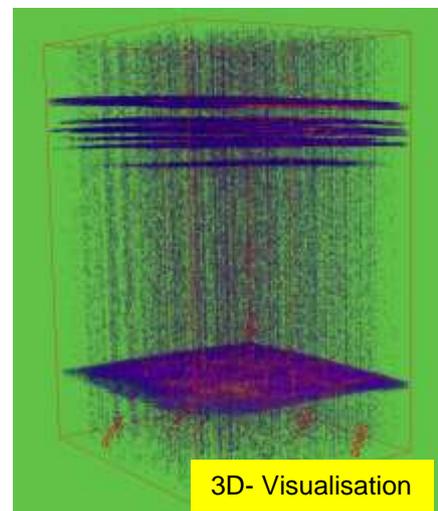
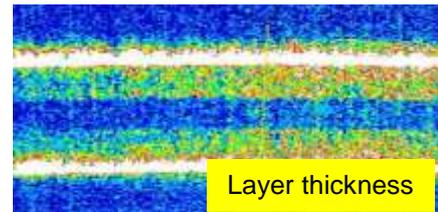
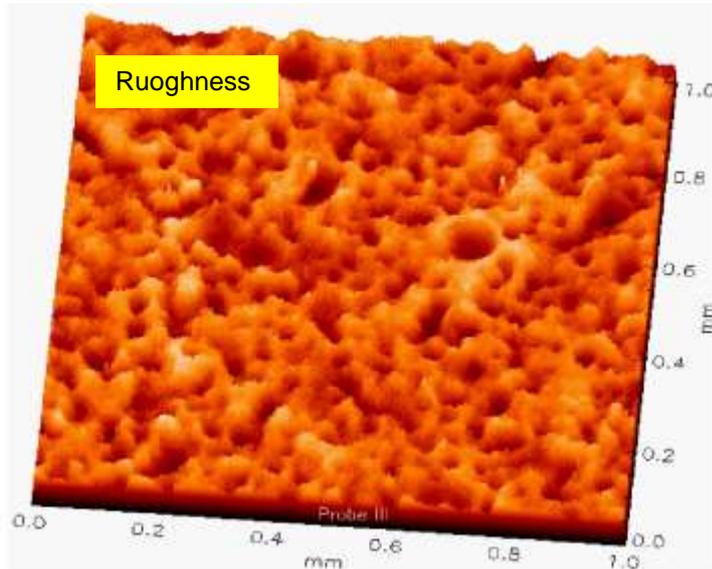
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„Light“

**The new measuring tool
for
today's production**

Swiss quality and conformity with standards

- The innovative ASP technology provides high-resolution 3D data of surfaces and enables new insights into surface structures and machining processes, as well as interfaces between layers.
- By OCT method for surface measurement are the data in true height coordinates (x, y, z) and enable precise, quantitative evaluations.
- Many ISO-compliant profile and surface parameters guarantee an objective comparability and usefulness of the information in the R & D as well as in production.



Dynamics

- The image acquisition of ASP systems with 1 million fps deliver after a few seconds data sets in 3D- high-resolution.
- The sample preparation which is necessary by other technocs (eg alignment, antireflective coating, sputtering) is not requested.
- The user interface of the measurement software provides a simple, straightforward and fast start of the measurement process.
- measurement data are transferred without time-consuming intermediate steps in a complete measurement protocol.

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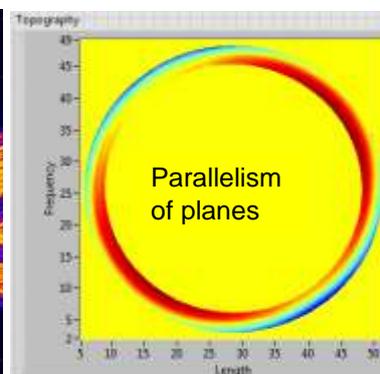
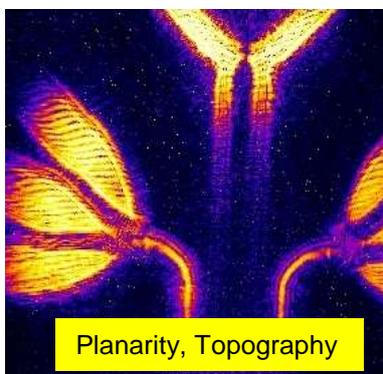
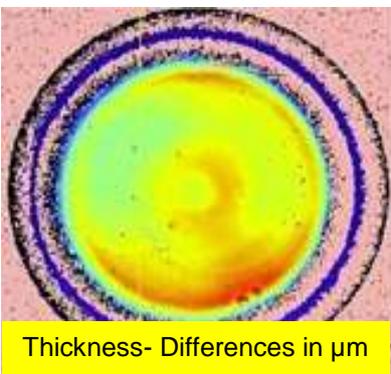
Measurement tasks

Geometry, Diameter, Volume, Height



With two probes, the volume, all dimensions, thickness, weights, profiles, markings, flatness of surfaces or their parallelism and planarity can be measured in one step, accurately and quickly.

The pixel- size is 1 μm to 40 μm .



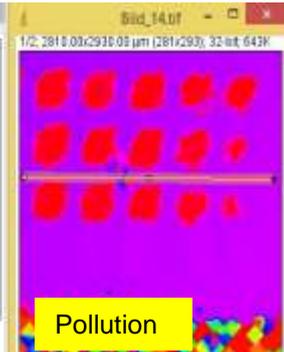
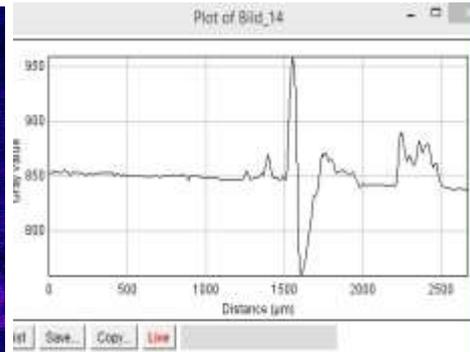
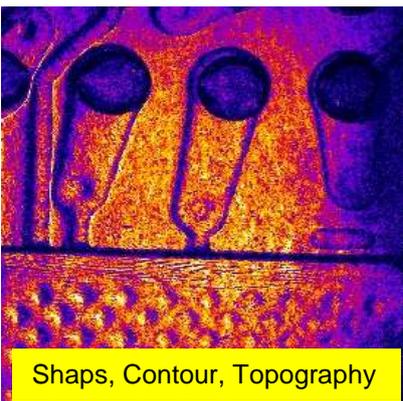
Cross-Section 1		
Wall	Actual	Spec
Average	19.515	
Min	17.560	1.000
Max	23.400	30.000

Cross-Section 2		
Wall	Actual	Spec
Average	22.065	
Min	18.800	1.000
Max	25.700	30.000

Cross-Section 3		
Wall	Actual	Spec
Average	21.924	
Min	17.750	1.000
Max	25.880	30.000

Cross-Section 4		
Wall	Actual	Spec
Average	20.366	
Min	16.430	1.000
Max	24.670	30.000

Shaps, Contour, Parallelism, Koplanarity



Messprotokollblatt				Line	TRE 01	Charge	221	Date	14.05.2015	Rev	06.13.13
Criteria	Measuring tool	Unit	Setpoint	Tolerance min	Tolerance to	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5	Tool 6
Diameter	Pa + MM	mm	28	27,04	28,91	28,095	27,945	28,095	27,945	28,095	28,095
Weight	Pa + MM	g	3,1	2,995	3,005	3,004	3,004	3,003	3,005	3,005	2,994
Thickness D1	Pa + MM	mm	0,50	0,41	0,51	0,50,000	0,46,150	0,47,200	0,48,000	0,49,000	0,49,300
Thickness D2	Pa + MM	mm	0,50	0,41	0,51	0,50,000	0,50,700	0,47,470	0,48,771	0,50,000	0,46,800
Thickness D3	Pa + MM	mm	0,50	0,41	0,51	0,48,000	0,48,642	0,49,200	0,49,000	0,50,140	0,51,200
Planarity	Pa + MM	mm	1	0,99	1,01	1,000	0,995	0,990	0,991	1,000	1,000
Parallelity	Pa + MM	mm	1	0,99	1,01	1,000	0,995	0,990	1,000	1,000	1,000
Depth of the groove	Pa + MM	mm	10	11,9	12,1	12,000	11,940	11,980	12,000	12,000	12,000
Groove width	Pa + MM	mm	2	1,99	2,01	2,000	1,995	1,990	1,992	1,990	1,990
Over all light	Pa + MM	mm	70	71,9	72,1	72,000	71,900	71,900	71,900	71,900	71,900
Diameter inside	Pa + MM	mm	26,7	26,6	26,75	26,700	26,700	26,700	26,680	26,680	26,700
Thickness of the wall	Pa + MM	mm	0,50	0,41	0,51	0,50,000	0,51,700	0,48,460	0,45,220	0,49,000	0,49,000

The automatic surveying of produced parts with electronic equipment allows to create a log and integrate computer analysis for an accurate evaluation of each component and an SPC. (Statistical process control).

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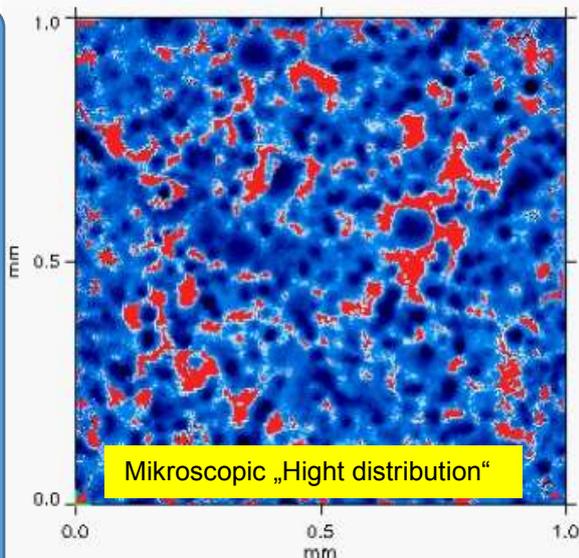
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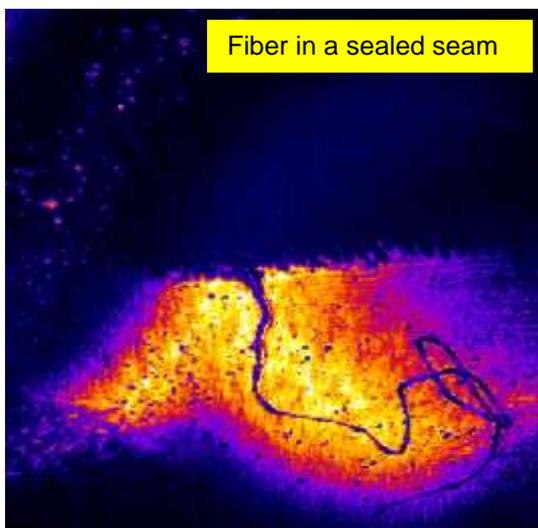
Tragflächenanteile, Rauheit, Schichtdicke

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sRa:	1.109 μm
sRq:	1.412 μm
sRz(DIN):	10.700 μm
sRmax:	13.211 μm
sRp:	4.967 μm
sRv:	8.249 μm
sRt:	13.216 μm
sRsk:	-0.687
sRku:	3.790
sRk:	3.475 μm
sRpk:	0.831 μm
sRvk:	2.006 μm
sRr1:	6.643 %
sRr2:	87.645 %
eVO:	0.124 $\mu\text{m}^3/\mu\text{m}^2$

Sealing seam inspection



Simple, and robust principle:

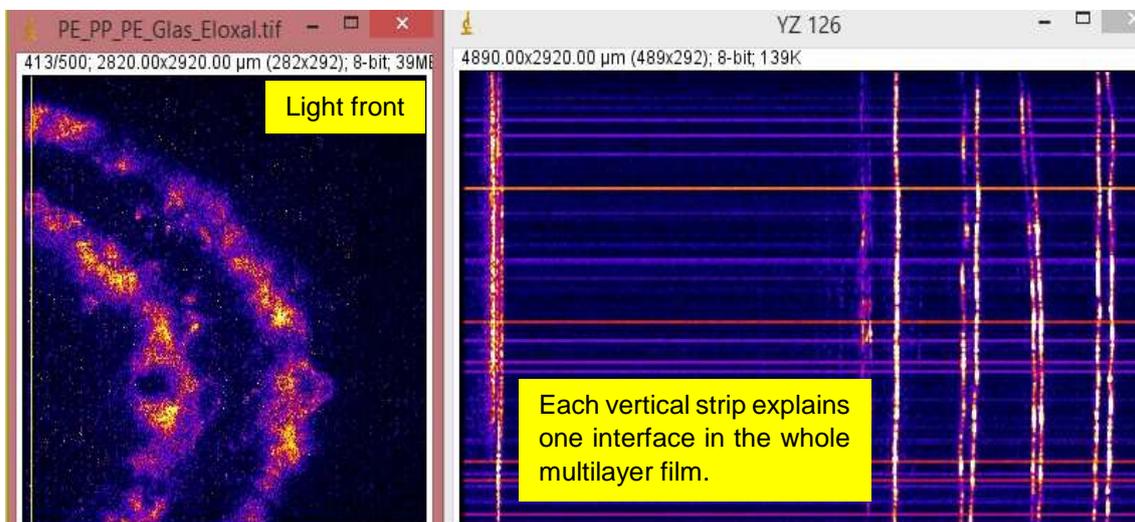
A plane of light is directed via an optical system on the sample and is reflected by the sample as a function of time.

The first light return from the peaks of the sample to the ASP array, all the others photon follows later. The ASP array generate an electrical signal.

The instrument- assisted measurement or the assessment of surfaces and coatings of any kind allowed the establishment of well defined criteria and requirements for production processes.

Layer thickness

With one single light pulse, the thickness of each layer in a film is measured in micrometer- accurate without contact. (The following Picture shows 10 layers).



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Branches

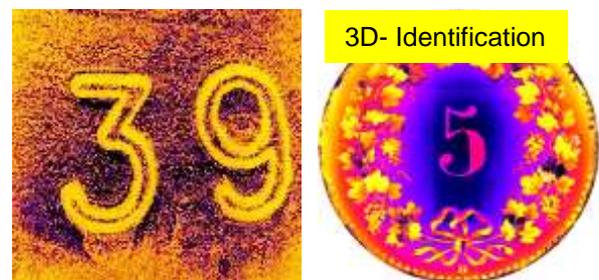
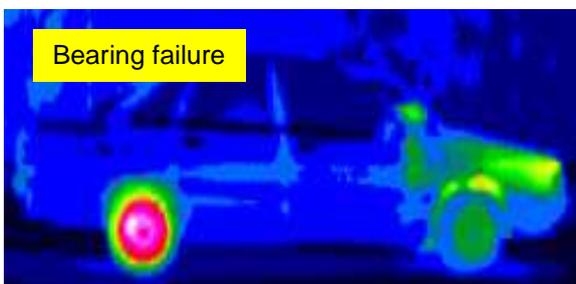
The OCT method with the ASP array meets the highest standards of accuracy, the measurement speed, the robustness and ease of use.

Automobil- Industry

- Body
- Interieur
- Elektronik
- Maintenance
- Layer thickness

Safety Technology

- 3D- Identification
- Product protection
- Forensics
- Failure analysis
- Original proof

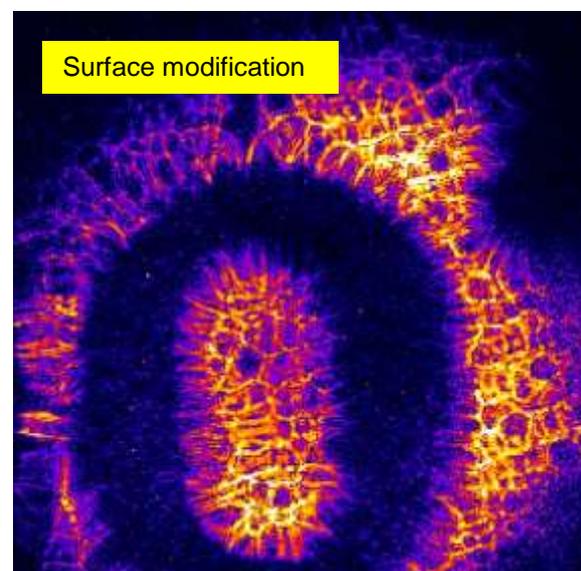
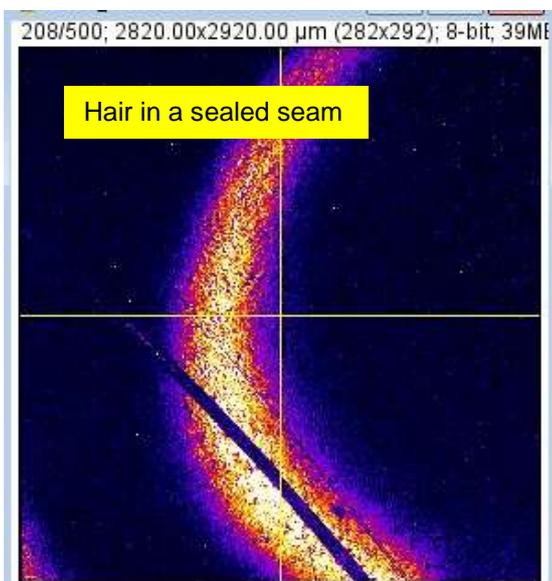


Medicine

- Blister proofing
- Optogenetic
- Kanulus inspektion
- Stents- inspection
- Silicon thickness

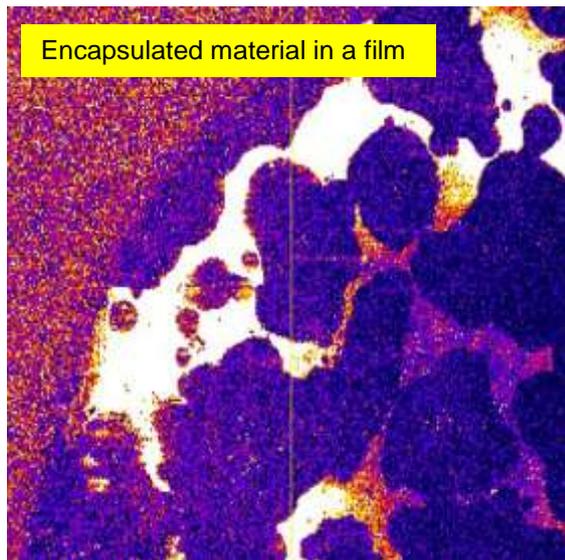
Material Technology

- Surface analysis
- New Materials
- Non destructive testings
- Ceramics
- CFK - GFK components



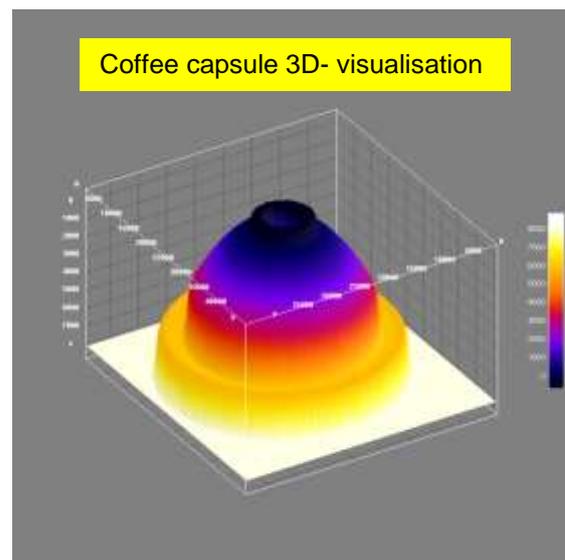
Packaging Industry

- Seam inspection
- Film surveying
- EVOH layer inspection
- Adhesive survey
- Degree of crosslinking



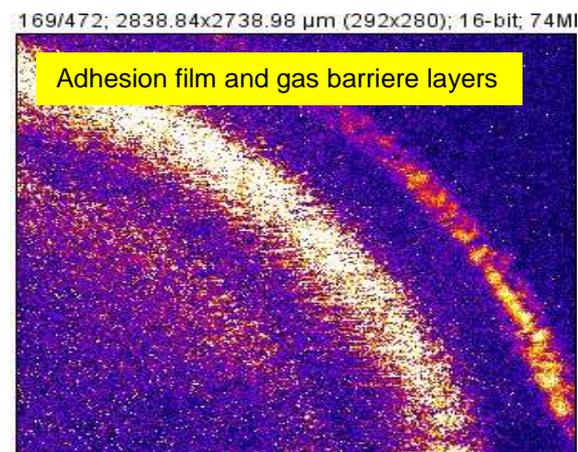
Life Science

- Coffee capsule survey
- Volume determination
- Pad surveying
- Geometry measurement
- Crack determination



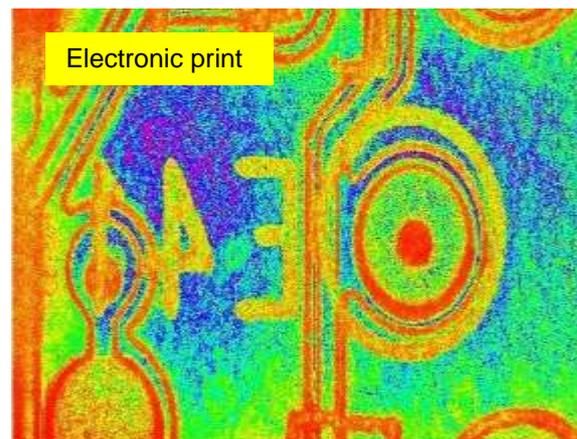
Printing Industry

- Printing cylinder
- Printing plates
- Banknotes
- Safety systems
- Color mixing tool



Micro system Industry

- MEMS
- LED- SLD
- Elektronik
- Mikrooptics
- Fiber technology

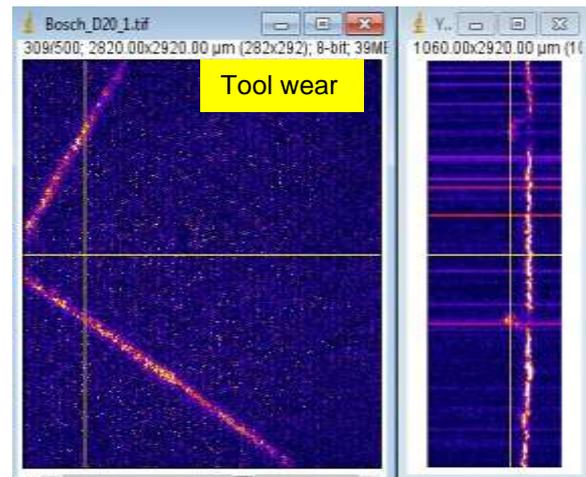
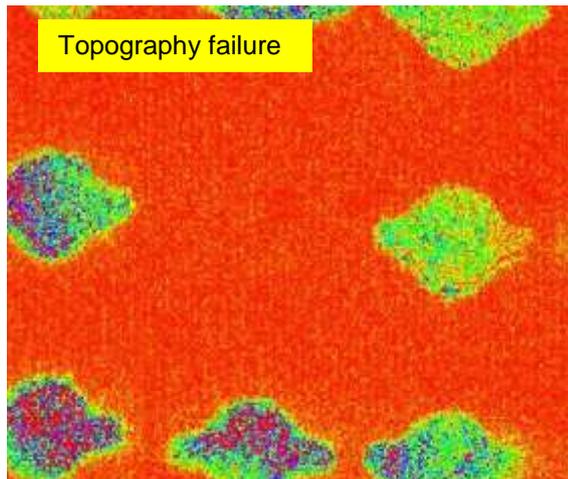


Energy technology

- Solar cells
- Fuel cells
- Batteries
- Turbines
- Efficiency

Tool engineering

- Cutting tools
- Grinding tools
- Coatings
- Micro tools
- wear



Flo-ir OCT – Technology

The robust technology is based on patented technology (Active Pixel Sensor Array). The light from a SLD- light source is directed via an optical system and the lens onto the sample surface. Light rays are reflected from the sample and return to the Instrument. At the prism, the reflected light is focused onto the sensor. The light beams are deflected by a mirror and picked up by the OCT camera with the integrated ASP array.

ASP Array-OCT-Technology – An exclusive tool for the industry

(ASP = Aktiver Sensor Pixel-Array, OCT = Optical coherence Tomography)

The OCT technology has long been well established for medical applications, but hardly known for industrial applications. Developments in recent years have however made the OCT technology today to a very robust and reliable method for industrial quality and process control.

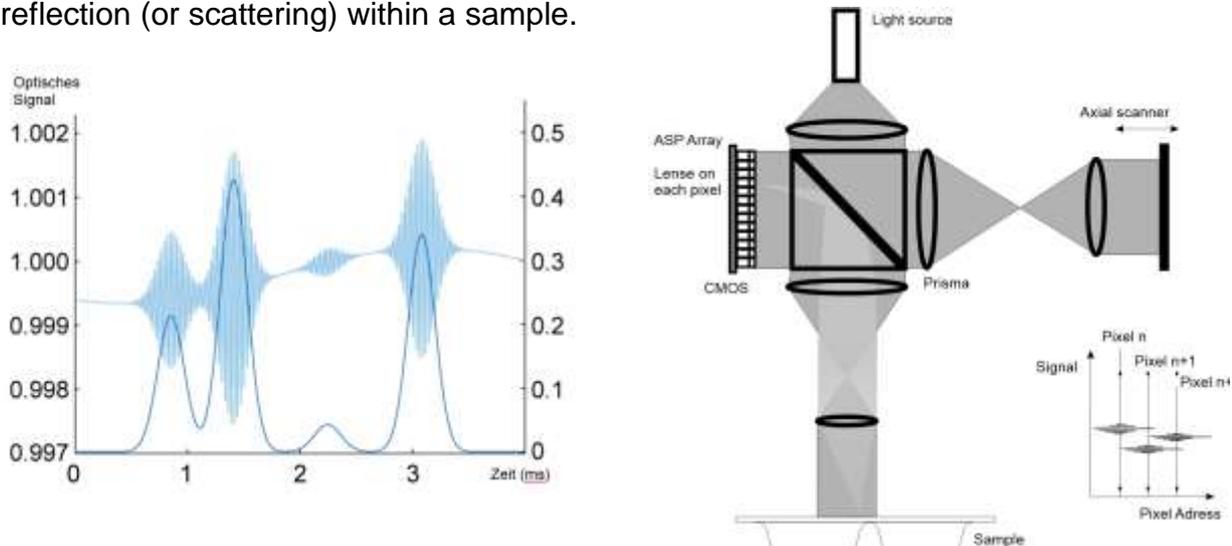
The OCT technology works in "real time" with highest accuracy. In the ASP array systems functionalities of the data acquisition and signal processing are even integrated onto the "pixel level". For the extraction of interferometric features, the time-of-flight principle (TOF) is used. The ASP architecture offers the demodulation of the optical signal within a pixel with up to 100 kHz and the reconstruction of the amplitude and its phase.

The dynamics of image capture with the ASP array is higher by two orders of magnitude in comparison with conventional image sensors!!!

This property allows a topographic imaging in real time with an extremely high geometric spatial resolution and at high speed.

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This creates time-dependent interferograms in the beam path a light source. The optical path length is generated by an axial movement of the reference mirror. The amplitude-modulated optical signal and the carrier frequency are proportional to the scan rate and contains the depth information. Each maximum of the signal envelope corresponds to a reflection (or scattering) within a sample.



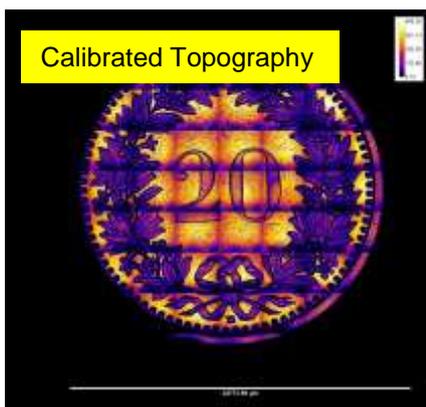
The ASP array produces at same time 300 * 300 axial Interferogramme which touch each other on all sides. The scanning speed is higher by several factors because the signal demodulation for detecting the envelope is not limited by the frame rate of the ASP array in comparison to standard OCT systems.

If an optical signal arrives to a pixel of the the ASP an electrical signal is generated. The background is faded to saturation of pixels by high light intensity to avoid. The sampled signal is integrated continuously multiplied by a signal of the same frequency and two paths whose phase is shifted by 90 degrees from each other are averaged.

The outputs of the two paths are routed to the PC, where the envelope amplitude and the phase calculate a three-dimensional tomographic image. More information about the OCT technology based on the ASP array are available on request.

By the light plane, a component surface is completely scanned. The optical system on each pixel of the array prevent that scattered light from adjacent measurement points affects the signal.

Due to the Z-axis with a resolution of 100 nm, the system can be moved to any height, thereby reducing the intake of images carried stacks at different heights. Each OCT image corresponds to a horizontal section through the sample.



The light intensity for each individual image point is changed due to the reflection or scattering. At maximum intensity the measuring point is in focus. Taken all together, the individual values gives all the OCT signals. From the time of flight of the light the precise height of each pixel is calculated.

The picture shows color coded elevation values on a 20 cents coin. From the signals amplitude or phase images can be visualised.

Highest signal quality with the patented ASP sensor array

ASP array that was developed in Switzerland and patented. The unique process enables ultra-fast image recording with up to 1 million fps. In addition, the system is characterized by an extremely sensitive and robust signaling in high light output. So height resolutions down to the nanometer range achieved. Unlike conventional measuring method stray light effects, measurement artifacts and preferential directions are prevented in the OCT method.



The measured levels of each pixel yield the exact three-dimensional reconstruction of the surface. Due to the intensity information to obtain a high-resolution deep sharp image. With optional use of a color camera, a color image of the surface can be produced in addition.

Recording module

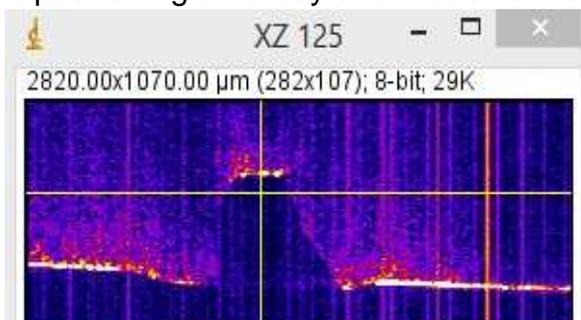
The selectable binning mode adjacent pixels are combined in one pixel block. The signal-to-noise ratio is improved and accelerated image acquisition. The ASP array reaches maximum image dynamics of 1 million fps. Depending on the measurement task is the optimal balance between resolution and frame rate selected.

Layer thickness measurement

In the measurement of transparent samples, the intensity peaks of the reflected light of each layer can be detected. The OCT system which has a whole layer sequence detected in the Z-direction of a focal plane with a single pulse and its thickness or cross-linking measures.

Exact positioning

Integrated glass scales with a resolution in the range of 100 nm to ensure a high positioning accuracy and thus an artifact-free composition of the images.



The picture shows a groove of about 300 microns wide and 150 microns deep. The side wall of the groove and the groove depth are measured accurately with the OCT method. The resolution in the z direction is decoupled from the lateral spatial resolution and is much better than 2 microns.

HD Stitching

Using the HD Stitching mode (automatic image stitching) multiple frames can be assembled into a large-scale picture. Up to more than 100 images at full resolution combined. The field can be flexibly chosen. The stitching measurement is fully automated by motorized x, y, z axes.

Technological advantages

The profile faithful reproduction of the finest, roughness is a central quality criterion of our measurement technique. In industrial use, including the comparison with measured according to standards tactile roughness values of the utmost importance. Numerous scientific and industrial studies clearly show that our system meets the highest standards and consistently can be used in addition to tactile systems. The calibration of the device is based certified standards as those used in the tactile roughness. The evaluation of profile and surface data is also compliant with international standards, such as based on the international standard ISO 25178.

Measure intuitively!

- Sophisticated user interface
- prescan function (Navigator)
- With a few clicks of measurement (snapshot technology)
- Automatic adjustment of brightness (Auto Intensity)
- Automatic range setting (Auto-Range)
- Save all parameters as resubmission (Template function)

Technological advantages

The profile faithful reproduction of the finest roughness structures is a central quality criterion of our measurement technique. In industrial use, including the comparison with measured according to standards tactile roughness values of the utmost importance. Numerous scientific and industrial studies clearly show that our system meets the highest standards and consistently can be used in addition to tactile systems. The calibration of the device is based certified standards as those used in the tactile roughness. The evaluation of profile and surface data is also compliant with international standards, such as based on the international standard ISO 25178th

The OCT method is the ideal complement or alternative to SEM and provides for the characterization of surfaces in the micro and nanometer many advantages. In contrast to the REM are in the OCT measurement, the surface height data as a true co-ordinates (x, y, z) before. Only with these quantitative information is possible an exact evaluation of 3D parameters. Furthermore, no sample preparation is necessary. Even compared to an AFM has the OCT system with the ASP array has advantages. The higher lateral spatial resolution of the SEM and AFM compared to optical systems, while in practice often required.

10 advantages over for optical measurement methods

1. High resolution and size sturdiness.
2. Ultrafast measurements with very high measuring point density.
3. High-quality and available raw data directly.
4. Scattered light method arm thanks to the patented multi-pinhole disc.
5. Reliable measurement on all surfaces.
6. High Cross acceptance.
7. Ready to use, no preparation is necessary.
8. Measuring procedure without sample preparation or inclination correction.
9. Low-maintenance measuring systems.
10. ASP - array technology "Made in Switzerland".

The ASP - OCT platform - a powerful software and many new solutions to current problems.

ASP - OCT - Metrology

The intuitive measurement and control software ensures the efficient execution of measurements. With the Navigator feature a quick overview image is created, in which the desired measuring range selected. Then, the measurement process can be thanks to the snapshot technology started directly. Meaningful 3D representations of measured intensity and color overlay are available after a few seconds. Semi-automated measurements can be easily realized with the template function.

Color - Dice

Our software provides OCT measurement data as a differential interference contrast image is compared to a DIC microscope. The software provides many advantages. Minimum height changes that are not visible to other microscopy techniques, can be detected. Structures are presented with infinite depth of field, and this regardless of color and reflectivity of the sample.

Powerfull representation!

- 3D display, fast high-quality representation
- 3D measurement data overlay with intensity and color measurement
- Profile representation
- Presentation of results

OCT - ASP - Analysis

The surface analysis software provides everything that is needed for the presentation and analysis of the structure, roughness, waviness, step height, contour and other surface features. In the intuitive multilingual user interface allows you to create complex analytical reports of a button. A variety of display options such as profile view, 3D reconstruction image or reflection generate meaningful measurement protocols.

OCT - ASP - flo-ir Automation

With custom software allows individual measurements easily automated. All specified measurement parameters are stored in a measuring template.

Individual automatisation!

- User-Dependent serial measurements
- Time Efficient work
- Various measurement tasks and analyzes in a measurement recipe
- Report generation and SPC control
- Database Based

The software has a powerful analysis library. Measurements and Analysis are saved permanently and thus available for statistical process control available. The strict

separation between the operator and administrator mode ensures easy operation and reliable results.

Custom designed - meter to measure

Flo-ir represents the OCT system together exactly according to customer requirements. There is a wide variety of hardware and software components. The measuring system can be adjusted thanks to its modular structure at different measuring tasks and individual requirements of automation, measuring comfort and accuracy. On our test systems, various sensor technologies can be integrated. For maximum ease of use, the sensors can be controlled via software.

Flexible all-round measurement solution

The compact and easy-to-OCT system explorer is a complete package for precise measurement and analysis of surfaces. The flexible instrument is suitable for commercial use in the laboratory and for automated quality assurance in production environment. It provides reliable 3D measurement data quickly and easily in just a few steps function.

Effektively analysing and documentation!

- Depends on user
- Powerfull automatisisation
- Customizing adaption of analysing and integration
- 3D-Analysis, ISO 25178, ISO 13565, ISO 12781
- 2D-Analysis ISO 4287
- Geometry, Contour, Volume and so on....

Confidence through cooperation

Well-known companies from the watch industry as well as the auto components industry already have the process of light propagation time measurement for quality control in industrial applications.

The engineers from flo-ir work as a development partner for manufacturers to develop a business and technology to help him solve demanding measurement tasks. The production areas and projects where flo-ir systems are used, are characterized by complex conditions and continuous development processes.

The flo-ir GmbH relies on specialized fields, in-depth application knowledge and trustful cooperation with strong partners and competent customer.

We build complete machines according to the principle of OCT for industry or for the laboratory and perform as required, measurements in the sales order.

Our plants are given to customers turnkey and managed by our professional staff.