

The Analytic Service

**ASO**

# SOLUTIONS FROM A SINGLE SOURCE

Raw Material, Product and Failure Analysis  
for Polymers and Plastics



## The Analytic Service

As an independent company operating on an international scale, the testing laboratory of Analytik Service Obernburg has extensive experience in the fields of plastics, paints, medical devices, fibers and textiles. We cover all areas from raw materials and product analysis to failure analysis.

For the automotive industry, we offer special tests which allow a time-accelerated simulation of the stresses caused by use and environmental exposure in order to guarantee long-term behavior and service life.

Numerous comparative and round robin tests in connection with our accreditation show that our testing laboratory ranks among the

best of the participating laboratories. Regular customer surveys give our testing laboratory high and very high marks in terms of competency, quality, reliability and turnaround times. The testing laboratory is centrally located at the border of the Rhine-Main area in Germany, approx. 50 km south-east of Frankfurt am Main.

The testing laboratory employs approx. 50 qualified chemists, physicists, engineers, technicians and laboratory assistants. Thanks to our highly educated and experienced staff as well as to our high-tech equipment worth millions of euros, we can offer you a complete suite of products, ranging from standard analysis to the solution of difficult problems.

### Areas of Expertise

Automotive Testing  
Raw Material and  
Product Analysis  
Failure Analysis  
Process Measurement  
Technology  
Medical Technology  
Fibers and Textiles  
Seminars







## Analysis of Raw Materials, Auxiliary Materials and Intermediate Products

The chemical and physical properties of raw and auxiliary materials have a significant impact on the further processability and the quality of the final product.

The chemical raw material analysis prevents use of the wrong material and examines the content of active ingredients, pollutants and contamination. To this end, Analytik Service Obernburg uses several spectroscopic and chromatographic procedures.

Glass fibers, fillers, matting agents, plasticizers, flame retardants, pigments, etc. are typical additives in plastics whose content can be measured via X-ray fluorescence analysis or ash analysis. For polymer materials, the residual moisture, which can cause moisture streaks on injection-molded parts or a degradation due to hydrolysis, is also important. End group classifications of polyester allows the damage of polymer materials to be quantified.

Rheological measurements provide information regarding the flow behavior of melts or solutions. This measured variable is important for the continued processability, but also indicates the quality of the raw material. The solution viscosity allows the intermediate molecular weight to be assessed. The Melt Flow Index (MFI) provides information regarding the degree of polymerization. Using comparative measurements, the MFI is able to detect material contamination and processing defects.

Color and gloss measurements allow objective testing under standard conditions so that optical deviations can be safely detected.

For individual routine measurements, we also provide a 24h-service.



### Areas of Expertise

Chemical Analysis  
 Titration  
 Photometry  
 Molecular/Atomic Spectroscopy  
 Chromatography  
 Physical Analysis  
 Density  
 Refractometry  
 Rheology  
 Colorimetry  
 Polymer Characterization  
 Ash Content  
 Melt Flow Index





## Product and Competitive Analysis

Our testing methods are as diverse as the products themselves since every product requires different characteristics. There are specifications for mechanical, chemical, thermal or optical properties.

During mechanical tests, the material strength is tested in tension or compressive loads. Some of these tests can be conducted on the components themselves, other times special test specimens are required. Notch impact tests help to determine the susceptibility to impacts or shocks. The mechanical properties of plastics are temperature dependent. The relevant tests can be conducted across a wide range of temperatures. Furthermore, special thermoanalytical tests (TGA, DSC, DMTA, Vicat) allow assertions regarding melting points or softening temperatures.

In addition to the chemical analysis described under "Raw Material Analysis", the emissions of the final product are often of special interest. During an odor test, a trained test team smells the component and determines the emission perceptibility and type in order to assign grades. Using gas chromatography, undesired or harmful substances can be identified and quantified.

The test team characterizes purchased parts or competitor products via microscopic or spectroscopic procedures in order to derive information regarding the component structure or the manufacturing method.

## Areas of Expertise

Mechanical Tests  
Thermoanalysis  
Emissions  
Microscopy  
Spectroscopy







## Failure Analysis

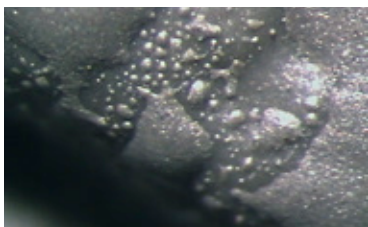
As a long-term vendor in the analysis industry, Analytik Service Obernburg has extensive practical know-how regarding failure analysis. A damage is a change in a component which impairs its intended function. This is not necessarily caused by breakage. Often, the examined damages are changes relating to the optical appearance.

The elemental composition of surface contaminants can be analyzed directly via microscopic methods such as scanning electron microscopy and energy dispersive X-ray analysis. Organic deposits can be characterized using X-ray and/or Raman spectroscopy, both of which are offered as microscopic options at Analytik Service Obernburg.

In case of wetting or adhesion problems with paint, methods such as electron spectroscopy are required which are significantly more surface-sensitive. Often, monolayers of a release agent or a detergent are sufficient to cause a defective area.

If the defect is an inclusion, an appropriate sample preparation using transverse sectioning is required.

A typical failure analysis includes component contamination, injection molding defects, paint defects, galvanic or surface treatment defects, contact problems in switches or connectors, etc. Furthermore, very complex failures such as the analysis of an air bag after a trial deployment can be examined as well.



### Areas of Expertise

Contamination  
Injection Molding Defects  
Paint Defects  
Galvanic Defects  
Contact Problems  
Microscopy  
Spectroscopy/  
Microspectroscopy





## Automotive Test Center/Environmental Simulation

Over their entire service life, technical products are exposed to a variety of environmental influences. This could impact the functionality and/or appearance of a component, thus reducing its service life. The objective of an environmental simulation is to quickly and effectively detect weak points in products in order to avoid future complaints. Environmental simulations include hot or cold temperature resistance testing, temperature cycling tests, hydrolysis resistance testing, condensation resistance testing, as well as tests regarding UV resistance, lightfastness or sunlight simulations.

Since surfaces are not just exposed to climatic impacts, other resistance tests are necessary as well. The surface is exposed to various substances such as fuel, detergents, sweat, cola or sunscreen. The test can be reinforced by simultaneous friction or temperature loads, if appropriate.

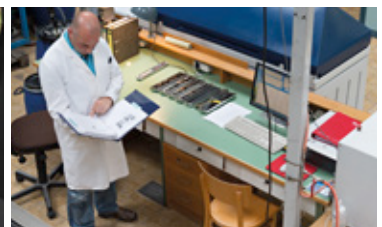
Resistance to corrosion can be examined via salt spray tests. Flammability can be tested using the horizontal burning rate.

Emission tests for interior components are another important part of automotive tests. They allow the measurement of properties such as odor, fogging (condensation on the window pane) and, in connection with a number of specialized analysis, the emission of undesired substances in the vehicle.

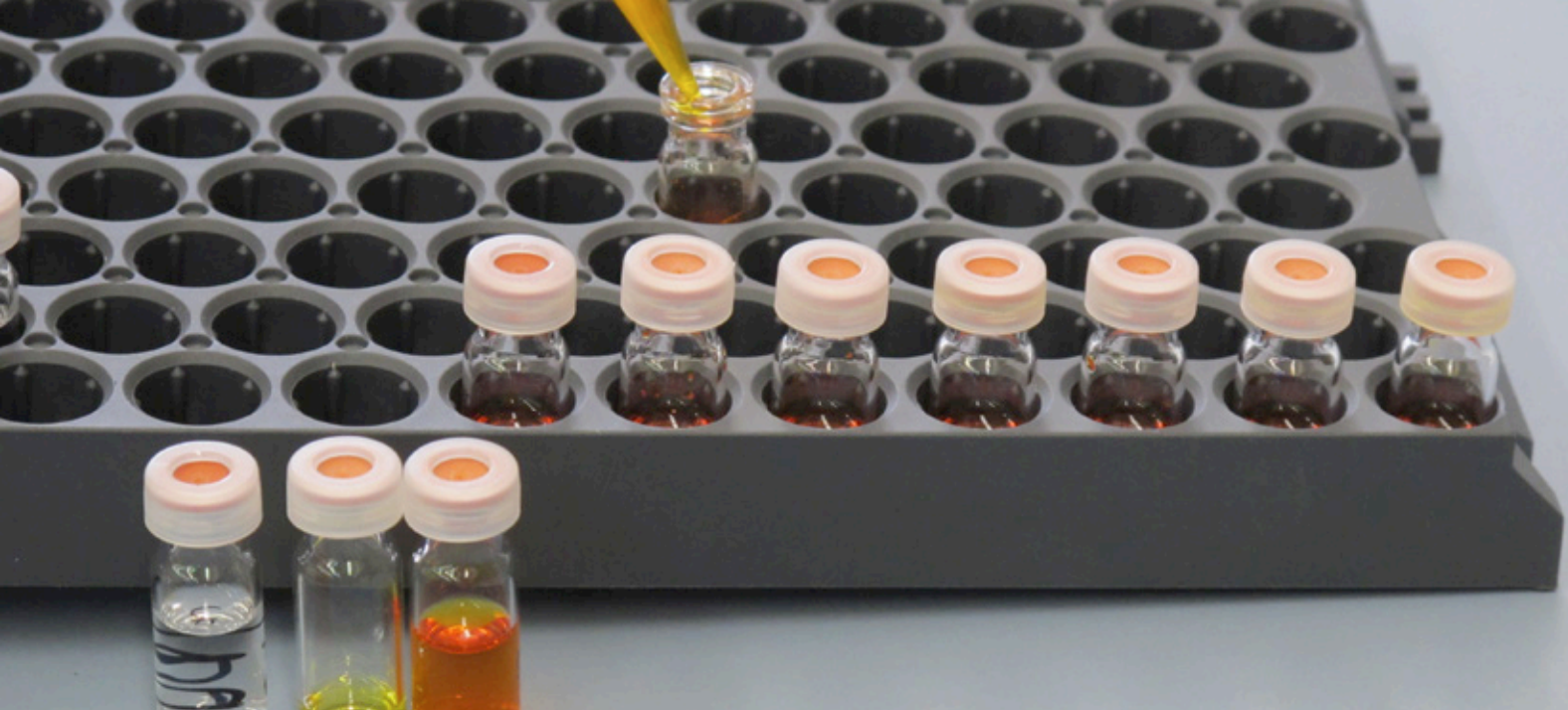
For testing during the final part release process, a special listing or certification by the Original Equipment Manufacturer (OEM) such as those that ASO possesses, is required. Therefore, Analytik Service Obernburg can support you during most automotive tests for the vehicle interior, but also for many exterior components.

### Areas of Expertise

Automotive Testing  
Environmental Simulation  
Resistance Testing  
Abrasion  
Resistance to Soiling  
Flammability Tests  
Emissions







## Medical Devices

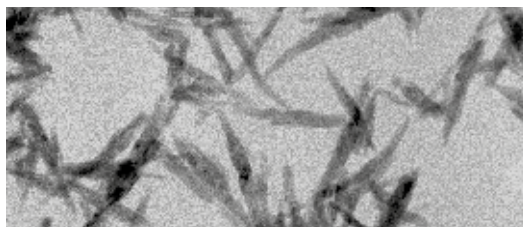
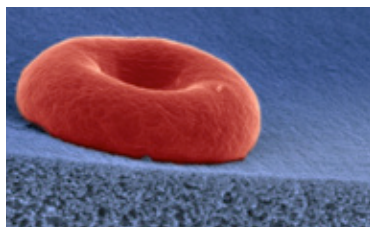
In the area of medical devices, the classical question concerns the purity of substances or the content and distribution of active ingredients. Very often, the analysis has to provide highly accurate quantitative results. Depending on the substance, the problem to be solved, and the matrix, methods such as Nuclear Magnetic Resonance (NMR) or High-Performance Liquid Chromatography (HPLC) can be used. Medical technology often requires a reliable continuous process control instead of single analysis. The advantages of the aforementioned technologies are precision and accuracy. Analytik Service Obernburg has been working with renowned manufacturers of medical devices for years, executing release analysis for their preliminary and intermediate products.

Problems tested in the context of medical technology comprise the build, composition and structure of membranes for filtration or dialysis. Filtrations are either executed via size exclusion (sieving effect) or chemical absorption. For this analysis, several microscopic and spectroscopic methods are required.

Other areas of interest in the context of medical technology are tests regarding medical textiles, reaction vessels, drain tubes, contact lenses and general medical materials. The relating analyses in connection with biological media are often about contamination and biocompatibility, but also about the analysis of coatings.

During the analysis of bone replacement material, X-ray diffraction can distinguish between different crystalline structures with similar or identical elemental compositions. Therefore, it is well suited for ensuring the purity of inorganic active ingredients. Particle size measurement is an important parameter which correlates to the reaction speed during processing. Particle size measurements with laser diffraction are useful in order to guarantee a consistent quality.

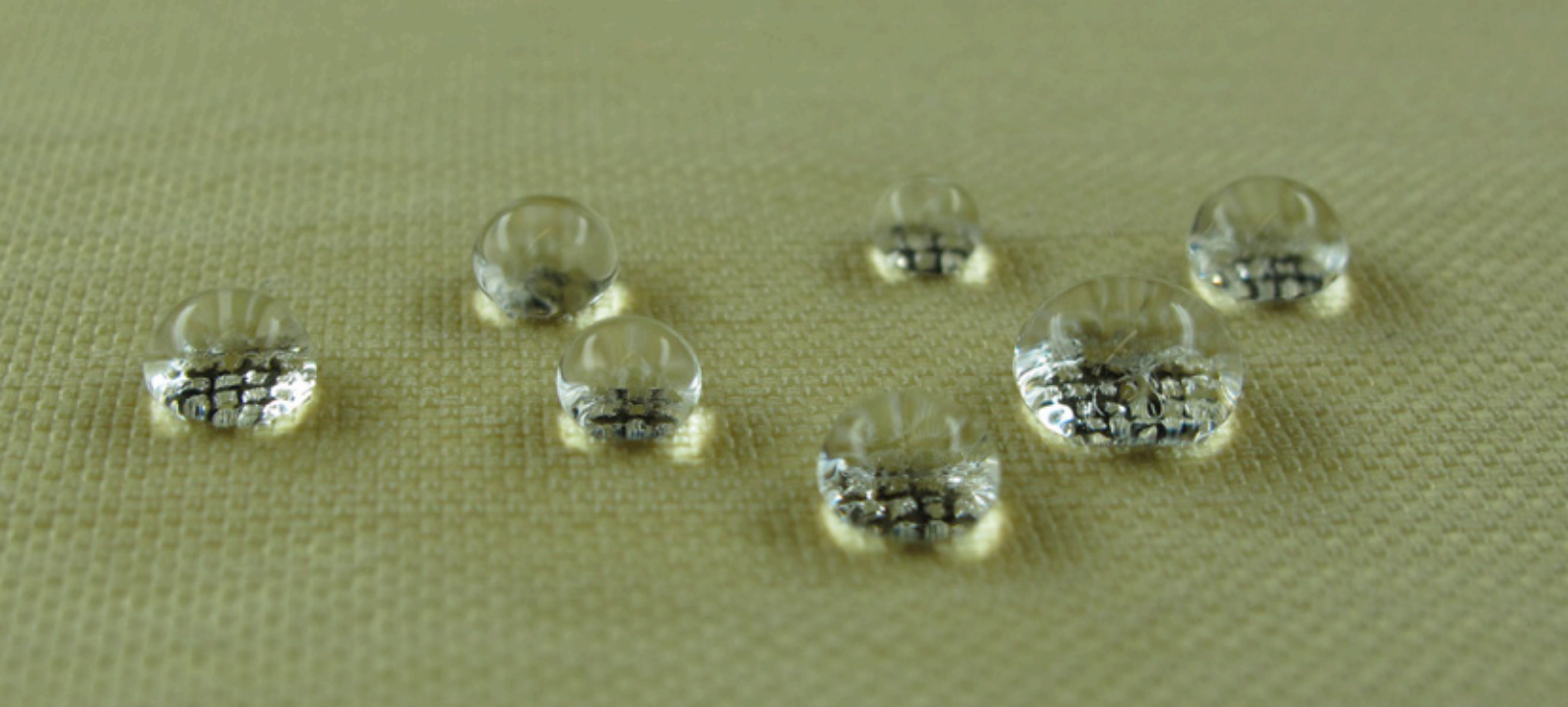
Medical devices are usually individually hygienically packed. To this end, the sealing of the packaging (e.g. blisters) is very important in order to avoid leakage of fluids or to prevent intrusion from the outside. In case of failures, we can determine the cause.



### Areas of Expertise

Chemical Analysis  
IR Spectroscopy  
Raman Spectroscopy  
NMR Spectroscopy  
X-ray Fluorescence  
Electron Spectroscopy  
X-ray Diffraction  
Microscopy  
Light Microscopy  
Scanning Electron Microscopy  
Particle Size





## Synthetic Fibers and Technical Textiles

As a testing laboratory at a well-established man-made fiber factory for cellulosic and synthetic threads, Analytik Service Obernburg has extensive knowledge about the related processes. This experience ranges from supporting the development of new fibers and processes, to supporting the production and quality assurance, to failure analysis.

In the area of polymer characterization, we offer photometric/potentiometric titration of carboxyl and amino end groups which can indicate the aging degree or the thermal damage. Another focus is the identification of the viscosity number according to DIN EN ISO 307 and 1628 as well as water determination using the Karl Fischer and vapor pressure method. In addition, we offer quantification tests for catalytic additives via X-ray fluorescence analysis.

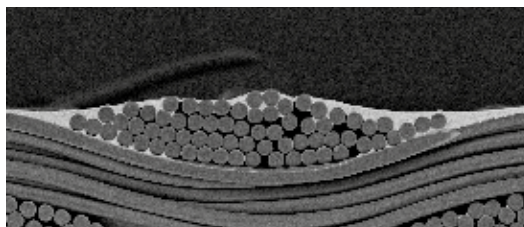
Threads are used to create different woven or knitted fabrics. In order to avoid mechanical damage during this process, these threads are equipped with finishes. We determine the content of these finishes via extraction and Nuclear Magnetic Resonance Spectroscopy (NMR). For woven fabrics with high mechanical stress such as seat covers, the abrasion resistance is verified using the Martindale test.

For other applications, woven or knitted fabrics are coated, using either bonding agents for tire reinforcements or dirt or water repellent coatings for PVC covers used for the fabrication of tents or truck covers. Important analysis tasks in this area comprise the visualization of the intrusion behavior of the coating into the fiber structure. In addition, we examine the moisture transport within the woven fabric covers.

Geotextiles can be used in order to stabilize slopes or for soil drainage. In order to guarantee the long-term stability, end group determination is executed chemically, while the number of antioxidants and stabilizers is determined via NMR measurements.

### Areas of Expertise

- Chemical Analysis
- Gravimetry
- Photometry
- Rheology
- Titration
- IR Spectroscopy
- NMR Spectroscopy
- X-ray Fluorescence
- X-ray Diffraction
- Microscopy
- Light Microscopy
- Scanning Electron Microscopy







## Workplace, Emission, Water and Landfill Monitoring

Under § 7 Sect. 1 Ordinance of Hazardous Substances (GefStoffV), employers are obligated to determine whether or not hazardous substances can be formed or released at the workplace. For instance, annex 5 of the ordinance classifies welding fumes as inhalable dust and alveolar dust as hazardous material. Workplace measurements can be used to evaluate the situation.

The environment group of Analytik Service Obernburg has the necessary equipment for taking air samples at the workplace and analyzing them in order to determine the inhalation exposure of solid and gaseous hazardous substances such as formaldehyde, solvents and dust.

In addition, emission measurements are executed in order to optimize production facilities. If for instance regulatory thresholds in relation to the total organic carbon are exceeded, selective measurements of the exhaust gas can localize the cause. In addition to parameters such as total organic carbon, dust/aerosols and methane, carbon disulphide and hydrogen sulphide measurements are of special interest as well.

Our investigative body for ground water, surface water and waste water has a DIN EN ISO/IEC 17025 accreditation and AQS notarization. We employ accredited samplers, also for taking samples of cooling systems according to VDI 2047.

Processes in our daily operations involve sampling and examining water samples regarding various parameters as well as maintaining and calibrating online waste water analyzers. Short response times and competent consulting in case of customer problems are among our key strengths.

### Areas of Expertise

Workplace Measurements  
Emission Measurements  
AQS Water Analysis  
Maintenance of Online TOC Systems  
in the Waste Water System  
Landfill Monitoring





## Methods

**Surface Analysis and Microscopy:** Electron Spectroscopy (SEM-EDX/ESEM), Surface Analysis (ESCA/XPS), Atomic Force Microscopy (AFM), Light Microscopy, Image Analysis, Molecular Spectroscopy (FTIR/Raman), Roughness Measurement, etc.

**Spectroscopy:** Molecular Spectroscopy (NMR/FTIR/Raman/UV-Vis), Atomic Spectroscopy (AAS/ICP-MS), X-ray Spectroscopy (XRF/SEM-EDX), Electron Spectroscopy (ESCA/XPS), etc.

**Chromatography:** Gas Chromatography (GC), Gas Chromatography Mass Spectrometry (GC-MS), Gel Permeation Chromatography (GPC), High Performance Liquid Chromatography (HPLC), inverse GC, etc.

**Rheology:** Melt viscosity (MFR/MVR), solution viscosity

**X-ray Structure Analysis:** X-ray Diffraction

**Thermal Tests:** Thermogravimetric Analysis (TGA), Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC), Heat Resistance and Vicat Softening Temperature, Burning Behavior, etc.

**Mechanical Physical Tests:** Tensile Tests, Bending Tests, Impact Bending Tests, Roughness Measurement, Hardness Measurement, Density

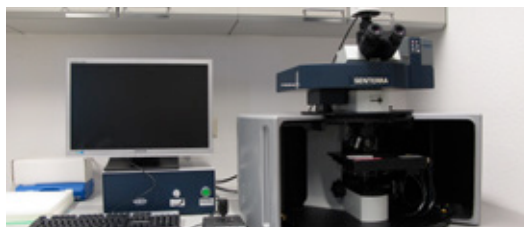
**Optical Tests:** Colorimetry, Gloss Measurement, Light Microscopy, Birefringence, Laser Particle Measurement, UV/Vis Spectroscopy

**Classical Chemical Analysis:** Chemical Digestion, Extraction, Chemical Characteristics, Titrimetry, Photometry, Gravimetry

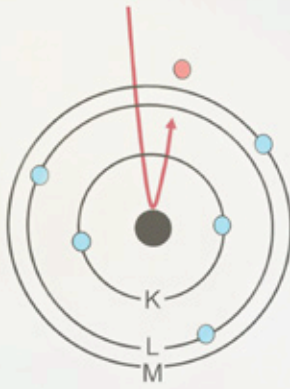
**Polymer Characterization:** Humidity, Particle Size, solution viscosity

## Areas of Expertise

Microscopy  
Spectroscopy  
Chromatography  
Rheology  
Thermal Tests  
Mechanical Tests  
Optical Tests  
Chemical Analysis  
X-ray Structure Analysis







**Streuung am Atomkern**  
(Rückstreuelektroden)

Aufgrund der extrem unterschiedlichen Masse von Elektron und Atomkern werden die Primärelektronen an den Kernen reflektiert. Diese verlieren dabei nur wenig Energie und können auch aus größeren Tiefen die Probe wieder verlassen. Die Wahrscheinlichkeit für eine Wechselwirkung ist um so höher, je größer der Kern ist.

Die Rückstreuelektroden erzeugen somit einen **Materialkontrast**.

Seminar Problemlösungsorientierte Oberflächenanalytik 2017, 2/77

Der Analytik-Service

ASO

## Seminars and Training

### Surface and Failure Analysis

As a long-term vendor in the analysis industry, Analytik Service Obernburg has extensive practical know-how. Based on this knowledge, we offer intensive seminars for further training on selected analysis topics.

Our experts teach practical concepts in relation to failure analysis and product optimization via surface analysis procedures. They present both established and innovative analytical methods and explain their principles, applications and applicability for various materials, using numerous practical examples. These examples mostly come from areas such as development and quality assurance, while detecting and clarifying the causes of failure in failure analysis are discussed specifically.

Using numerous application examples, we determine the opportunities and limits as well as the advantages and disadvantages of the different methods with the participants. Furthermore, strategies in relation to systematic failure analysis will be explained.

Additionally, we offer customized in-house seminars at your company in the subject areas of failure analysis or surface analysis.

### Seminar Automotive Testing – Testing according to Automotive Standards

Every automotive manufacturer demands first-class quality when it comes to the vendor parts which are installed in their vehicles. This creates increasingly higher challenges for vendor companies who have to ensure that their products fulfill these requirements. Components in the vehicle interior require intensive physical and chemical testing. The required laboratory tests not only vary from one manufacturer to the next, but also depend on the material, the component size and sometimes the installation point in the vehicle. This seminar navigates the participants through the jungle of different OEM requirements and explains which analytical methods are used by a testing laboratory and how forward planning can avoid difficulties in practice.

We are looking forward to welcoming you to one of these events at our SKZ seminar facility in Obernburg which also includes a tour of our laboratories.

### Areas of Expertise

Surface Analysis  
Microscopy  
Spectroscopy  
Failure Analysis  
Product Analysis  
Automotive Release Testing





## The enabler in the plastics industry

As the largest plastics institute in Germany we offer practical solutions – tailored exactly to your requirements. For more than the past 60 years now we have seen ourselves as a partner to the plastics industry providing extensive system expertise:

By means of **Testing and Quality Assurance** we support your product policy, supplying you with valuable arguments for your key markets. With more than 10,000 participants each year, we are the market leader for **Training and the Transfer of Knowledge** in the field of plastics. Our **Research** division bets on the development and improvement of production technologies in line the market requirements. With the **Certification of Management Systems** we offer you the best prerequisite for efficiency and economic success.

### SKZ – Das Kunststoff-Zentrum

Friedrich-Bergius-Ring 22 • 97076 Wuerzburg/Germany  
Tel.: +49 931 4104-0 • [info@skz.de](mailto:info@skz.de)

**Reliable partners at SKZ!** The managing directors from left to right: Dr. Benjamin Baudrit (Deputy Managing Director Training & Research), Robert Schmitt (Managing Director Certification), Prof. Dr.-Ing. Martin Bastian (Chief Executive Officer), Dr. Thomas Hochrein (Managing Director Testing and Managing Director Training & Research).

## Become part of a strong community!

With more than 390 members, the association for the promotion of the SKZ currently constitutes the most important and dynamic network in the field of plastics. Benefit from the numerous opportunities for cooperation achieved through the networking of experts from all areas of the plastics industry. Our network reflects the wide spectrum of the industry and offers excellent opportunities for the cooperation of economy, science and politics.

For further information, please visit [www.skz.de](http://www.skz.de) or contact us at [fskz@skz.de](mailto:fskz@skz.de)

**Analytik Service Obernburg GmbH** | A Company of the SKZ-Group  
Industrie Center Obernburg • D-63784 Obernburg/Germany  
Tel.: +49 6022 81-2668 • Fax +49 6022 81-2896 • [info@aso-skz.de](mailto:info@aso-skz.de)