



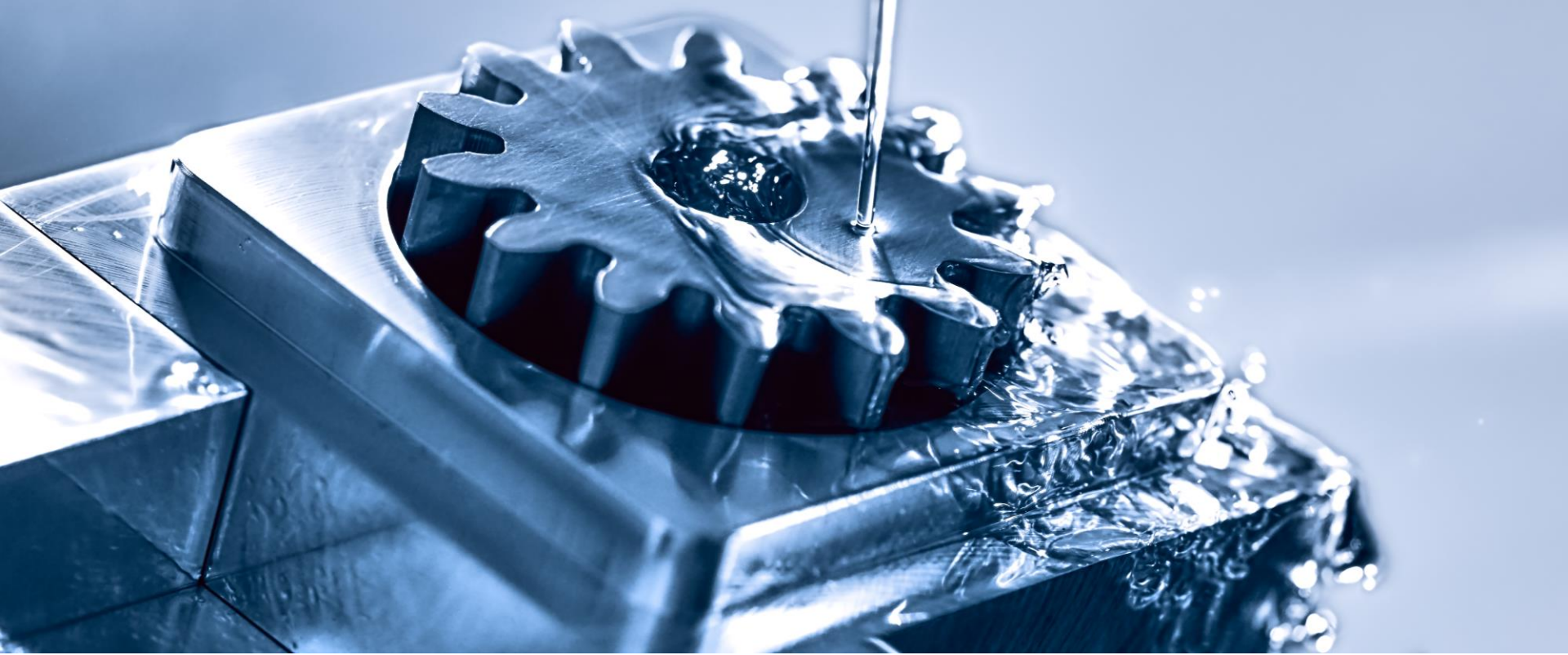
www.qa-group.com

QUALITY ASSURANCE DOWN TO THE SMALLEST DETAIL.

That something special about Quality Analysis: in our organisation you will find the right experts and the right analysis methods for all materials and every requirement.

Our service areas:

- Industrial computed tomography
- Industrial metrology
- Technical cleanliness verification
- Materialography
- Chemical analytics



TECHNICAL CLEANLINESS VERIFICATION

QUALITY ADVANTAGE BY MEANS OF TECHNICAL CLEANLINESS VERIFICATION.

Huge technical advances mean that consistent compliance with cleanliness requirements is no longer just a voluntary exercise, instead it has become mandatory. Our multi-faceted cleanliness analyses help you to guarantee the function, durability and quality, as well as the trouble-free manufacture of your products.

- Accredited test laboratory with more than 400 m²
- Extraction and analysis methods for the residual dirt analysis
- Competitive advantage of correlative particle analysis
- Qualitative and quantitative investigation of contaminating films on surfaces
- Very small and large components in all materials



WHAT'S NEW?

Residual dirt analysis for electrostatic sensitive components (ESDS parts) in ESD protection zone

- Separate ESD protection zone (EPA, electrostatic protected area) in clean room with separate access control
- Device complies with the requirements of the standard DIN EN 61340-5-1 (VDE 0300-5-1), which describes the general requirements for the protection of electronic components
- ESD control elements, such as work surface, LED magnifier light, wristband, floor covering, chair and clothing have been qualified by an external test laboratory
- Regular internal verification with own calibrated measuring instrument
- Trained and instructed personnel
- Continuous environmental monitoring (temperature und relative humidity)
- Personnel access to ESD protection zone only after discharge capability test (PGT, personnel grounding tester)



WHAT'S NEW?

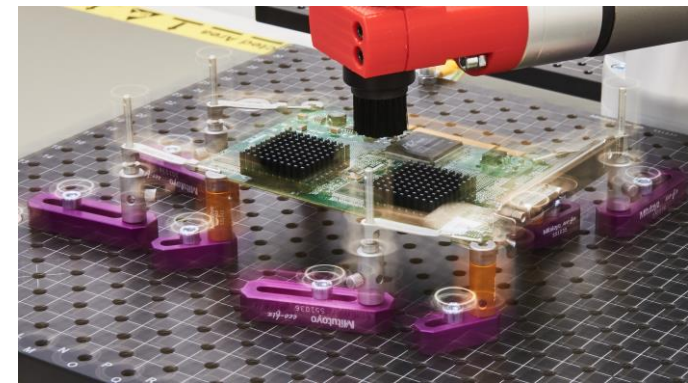
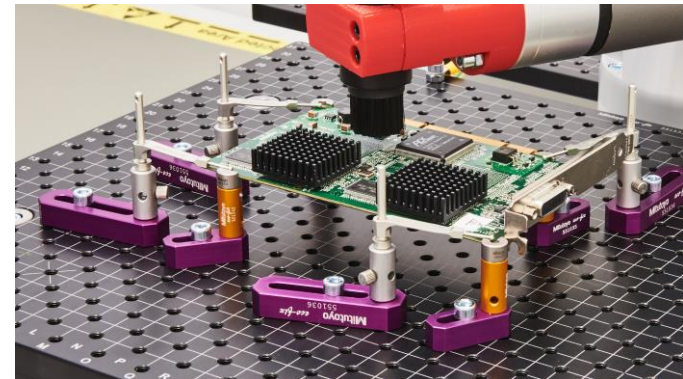
With our new **particle suction extraction system**, we now have the ability to remove dry and loose adhesive particles from large surfaces or specific control areas by suction. The components will not be wetted and can be returned to the application afterwards. The microscopic particle analysis is then performed according to the standards of the QA fluid analysis.

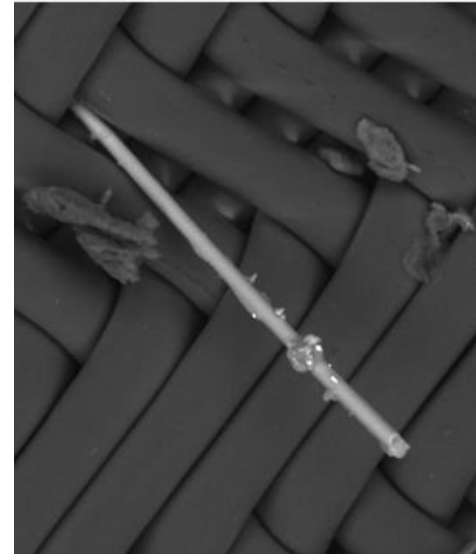
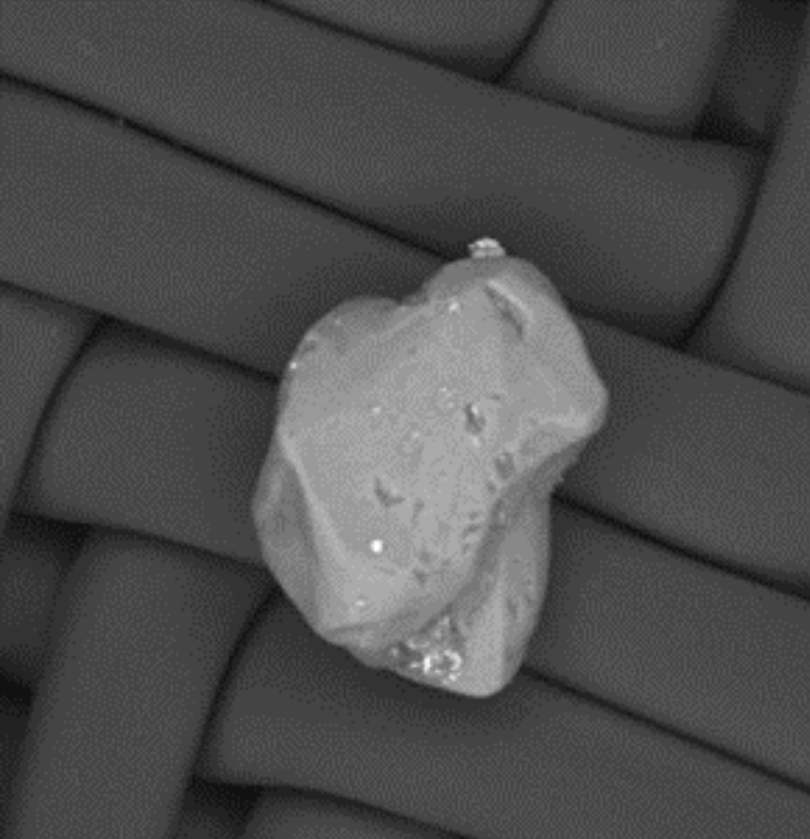
Application examples:

- Large components with dry adhesive particles
- Non-wet extractable components or materials, e.g. micro and process electronics, cable harnesses, battery cell modules and many more
- Inspection of component cleanliness within the production process between the individual assembly steps
- Cleaning before installation and use of modules in e.g. power electronics

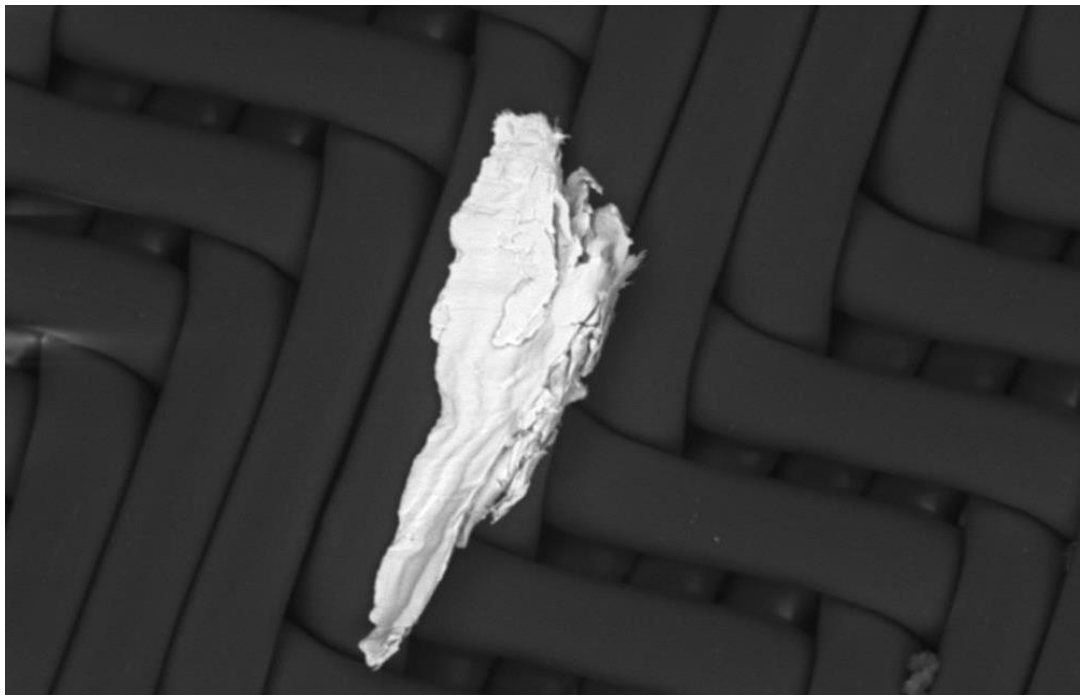
+ TECHNICAL DATA +

- Integration in a separate **ESD room** (clean room class 5 in accordance with ISO 14644)
- Particle suction extraction system with manual/robot-assisted guidance of the particle suction lance
- Components can be clamped reproducibly using a grid clamping system in a modular construction
- Component can be dynamically excited to dissolve the particles before or during extraction
 - Oscillating orbital impact with freely selectable parameters
 - Vibrating impact





CONTAMINATING PARTICLES





EXTRACTION.

Cleanroom class 8 in accordance with DIN 14644

Extraction methods:

- Rinsing, spraying, flooding, ultrasonic
- Air extraction (manual or robot-assisted) with or without dynamic component excitation

Component dimensions:

- Weight: 5 g – 1,000 kg; Size: 1– 2,500 mm

Extraction media:

- Aqueous solution, solvent-based cleaning medium, air

Standards:

- VDA 19/19.1/ISO 16232 as basis, possible to adapt to all other standards

PARTICLE ANALYSIS.

So that you see what we are seeing.

Analysis methods:

- Reflected light microscopy
- Scanning electron microscopy
- RAMAN and FT-IR spectroscopy
- Optical Particle Counter (OPC)

Classification:

- Particle types: metallic / non-metallic / mineral / fibres
- Quantity and size classes
- Defectiveness: hardness, conductivity, magnetism

Standards:

- VDA 19/19.1/ISO 16232 as basis, possible to adapt to all other standards



REFLECTED LIGHT MICROSCOPY.

Particle analysis with polarised light provides information on:

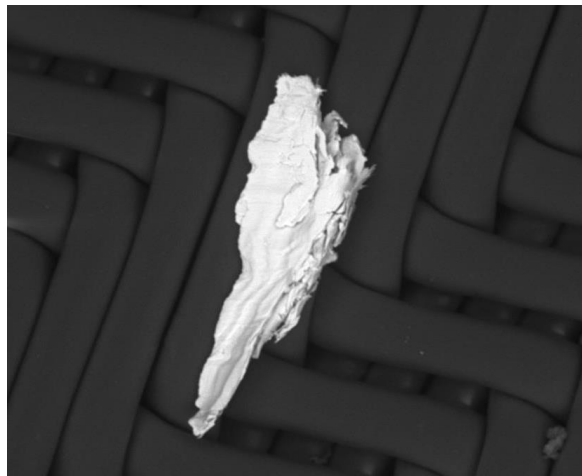
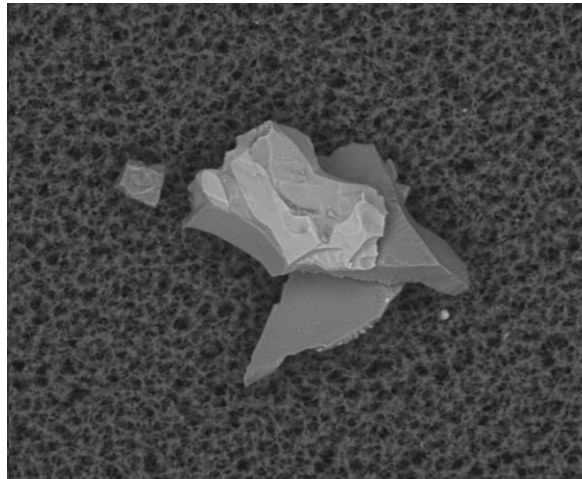
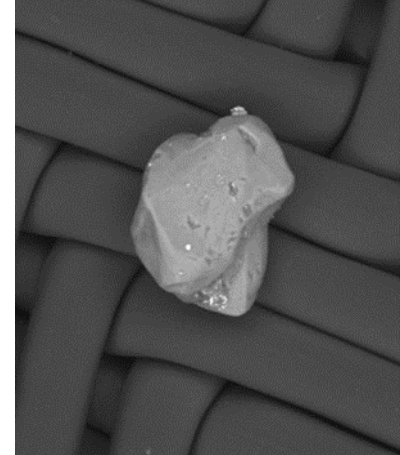
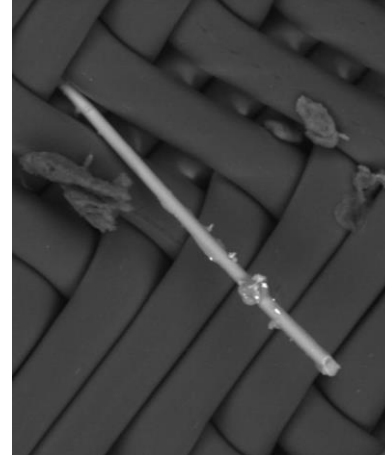
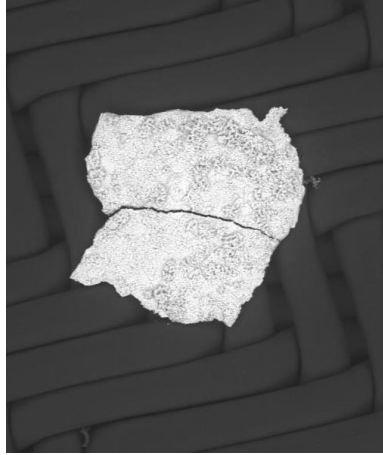
- Type of particle:
 - Metallic shiny
 - Non-metallic shiny
 - Non-fibrous
 - Fibres
- Quantity and size classes of the particles
- No material assignment
- No definition of the defectiveness

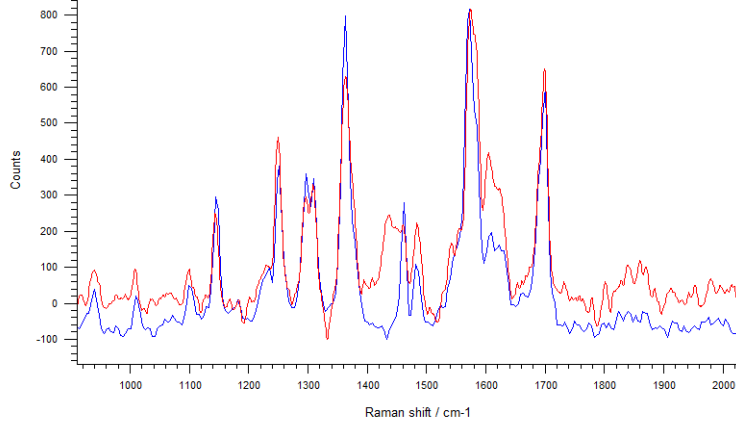


SCANNING ELECTRON MICROSCOPY.

Fully automated particle analysis
with EDX provides information on:

- Type of particle
 - Hard metallic particles
 - Hard mineral particles
 - Soft particles
 - Electrically conductive/non-electrically conductive particles
 - Magnetic/non-magnetic particles
- Quantity and size classes of the particles
- Material assignment
- Definition of the defectiveness via hardness classes, conductivity and magnetism





RAMAN & FT-IR SPECTROSCOPY.

Fully automatic analysis of the particles via spectral comparison provides information on:

- Type of particle:
 - Fibres
 - Plastics/elastomers
 - Salts
- Quantity and size classes of the particles
- Material assignment
- Definition of the defectiveness



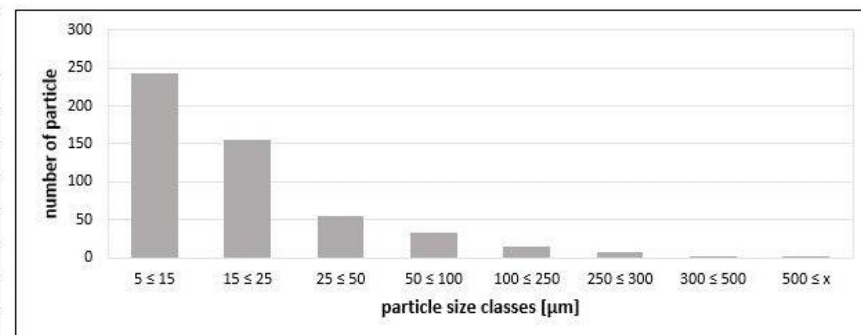
OPTICAL PARTICLE COUNTER (OPC).

Optical particle counter for liquids provides information on:

- Quantity and size classes of the particles
- No information about type of particle
- No material assignment
- No definition of the defectiveness



particle size classes [μm]	number of particles
$5 \leq 15$	243,0
$15 \leq 25$	156,0
$25 \leq 50$	56,0
$50 \leq 100$	33,0
$100 \leq 250$	15,0
$250 \leq 300$	7,0
$300 \leq 500$	3,0
$500 \leq x$	2,0

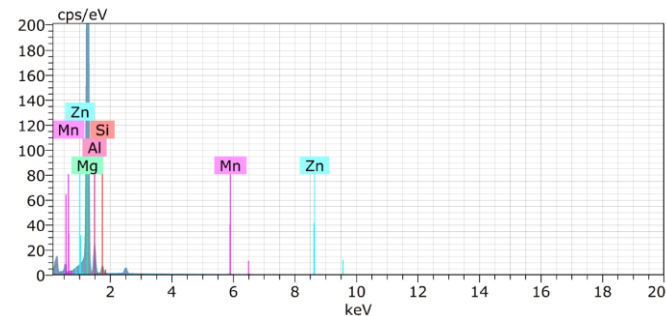
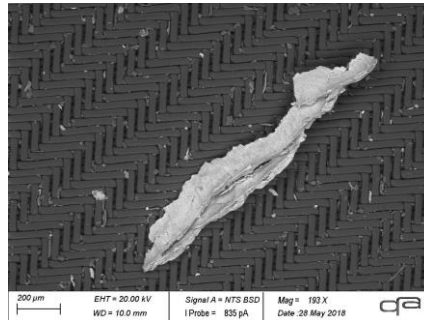


INFORMATION ADVANTAGE DUE TO CORRELATIVE PARTICLE ANALYSIS.

We combine our **microscopy and spectroscopy methods** to acquire harmful particles reliably. As such, along with reflected light microscopy we use also SEM-EDX analysis and RAMAN & FT-IR spectroscopy for comprehensive particle analysis. In this way we can clearly identify organic and inorganic particles in relation to material and defectiveness.

Your advantage: You receive detailed, comprehensive results for organic and inorganic particles. In your test report you receive detailed information on:

- Quantity and size class: from 5 μm
- Material classes & composition: metals, minerals, salts, organics
- Damage behaviour: hardness class, conductivity, magnetism



Light microscopic image; scanning electron microscope image; EDX analysis to identify the material

A close-up photograph of a dark asphalt surface. Several diagonal streaks of rainbow-colored oil are visible, reflecting light in vibrant bands of red, orange, yellow, green, blue, and purple. The oil appears to be a contaminant on the road. The text 'CONTAMINATING FILMS' is overlaid in white at the bottom.

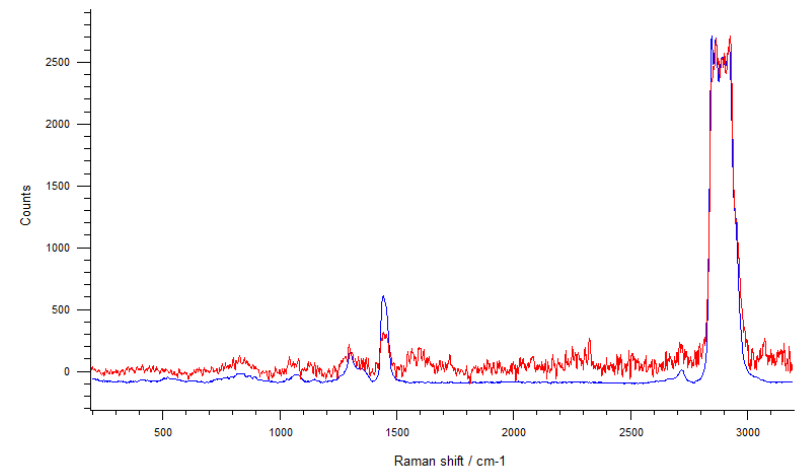
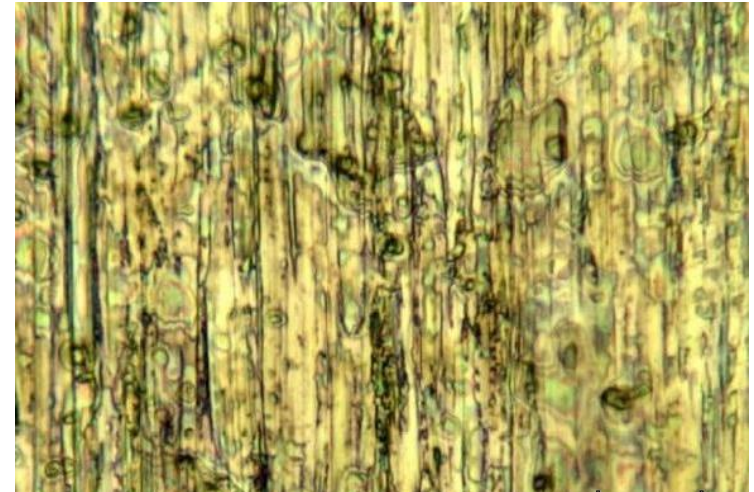
CONTAMINATING FILMS

CONTAMINATING FILMS.

Chemical-filmic contaminations on surfaces can interfere with or hinder subsequent manufacturing steps such as bonding, welding, printing or assembly. Using chemical analytics, we identify manufacturing and cleaning residues such as grease, oil, coolants, cleaning media, etc. –both quantitatively and qualitatively.

Analysis methods:

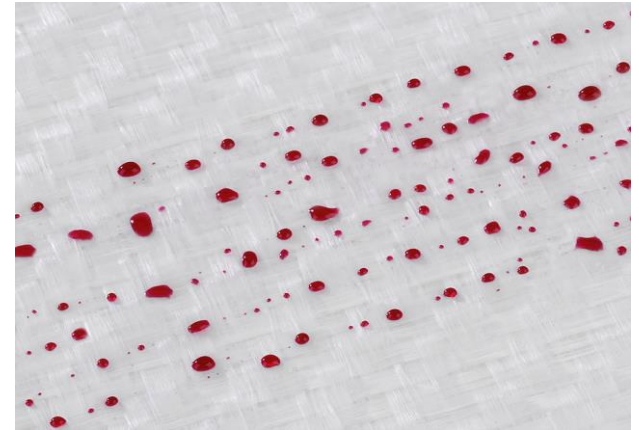
- Determination of the surface tension by means of test ink
- Gravimetric determination
- Detection of filmic contamination by fluorescence measurement
- Quantification by gas chromatography (GC) with flame ionization detector (FID)
- Identification and quantification by gas chromatography (GC) coupled with mass spectrometry (MS)
- Detection and material identification by RAMAN and FT-IR spectroscopy



CONTAMINATING FILMS.

Test ink

- Surface tension determines the wettability
- Measurement of the surface tension on various materials using test ink
- The higher the surface tension value, the cleaner the surface
- Surface tension/energy in mN/m



Gravimetric determination

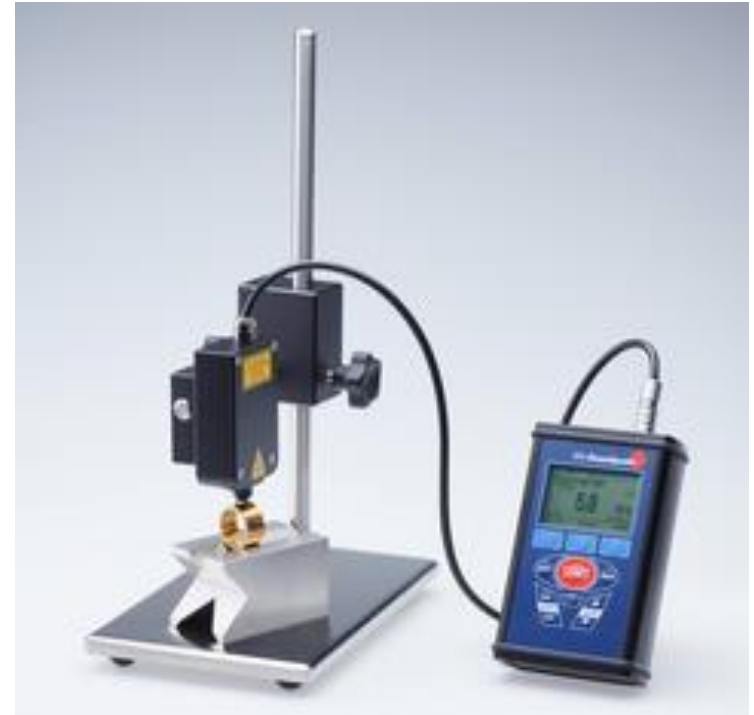
- Extraction using suitable solvents and separation of the solid residues by filtration
- Gravimetric determination of the mass of the soluble residues after evaporation of the solvent using a highly accurate analysis scale
- Indication in mg/component or mg/m²



CONTAMINATING FILMS.

Fluorescence measurement

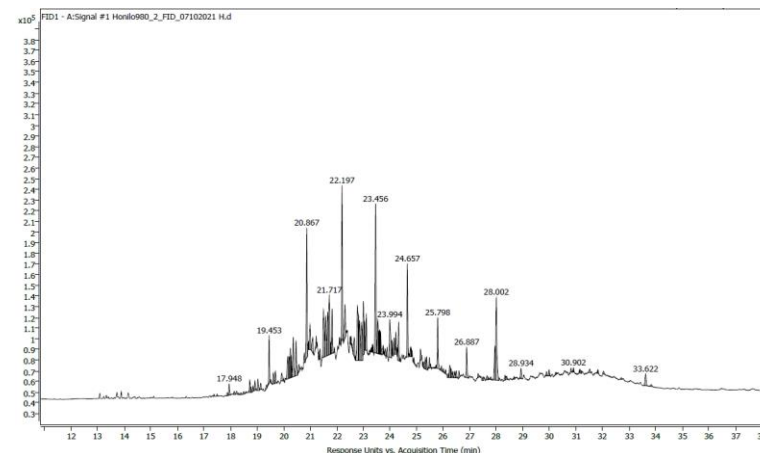
- Detection of fluorescent substances such as fats, oils and waxes by means of UV light
- Detection of non-fluorescent substances, such as silicone oils, using added fluorescent dyes
- Contactless detection of organic substances on metallic surfaces
- Reference value: clean surface
- The higher the measured fluorescence value, the stronger the filmic contamination
- Indicated measured value: RFU (relative fluorescence units)



CONTAMINATING FILMS.

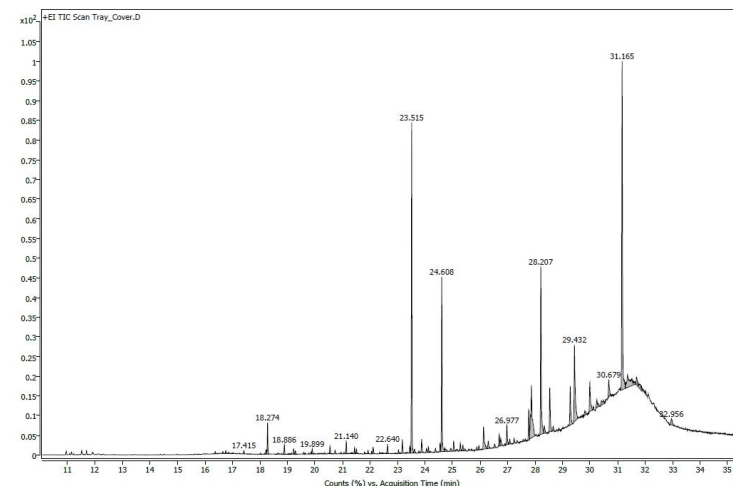
Detection and quantification by gas chromatography coupled with a flame ionization detector (GC-FID)

- Extraction using suitable solvents
- Analysis of dissolved organic residues
- Result: Sum of soluble organic contaminations in mg/component or mg/m²



Identification and quantification by gas chromatography coupled with a mass spectrometer (GC-MS)

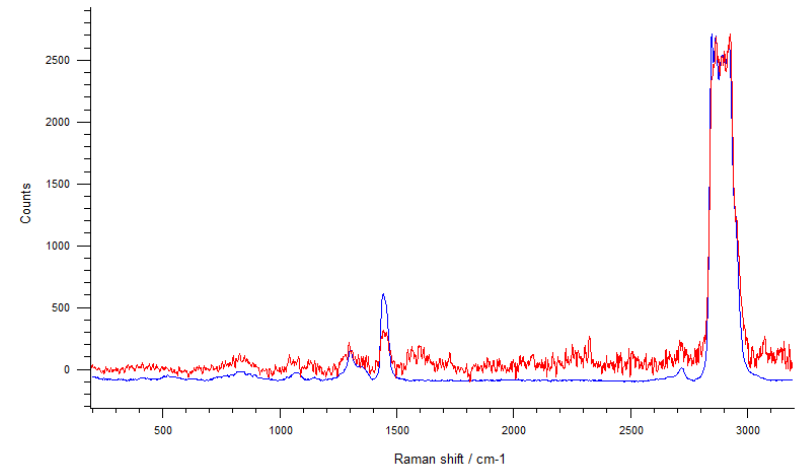
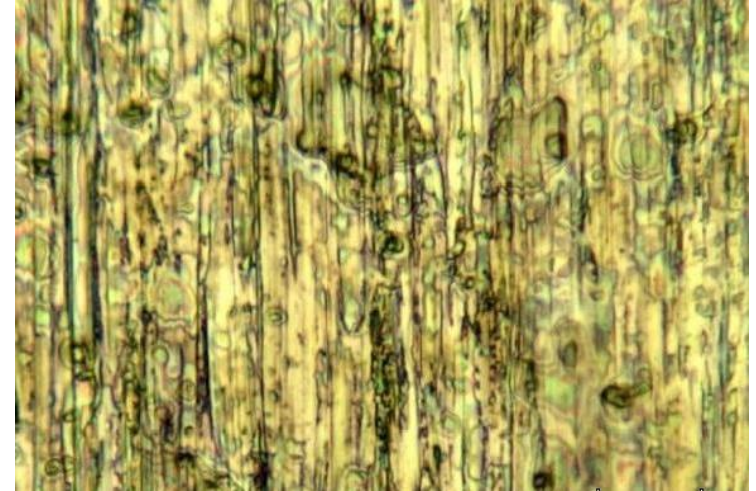
- Extraction using suitable solvents
- Analysis of dissolved organic residues
- Result: Sum of soluble organic contaminations in mg/component or mg/m²
- Identification of individual components

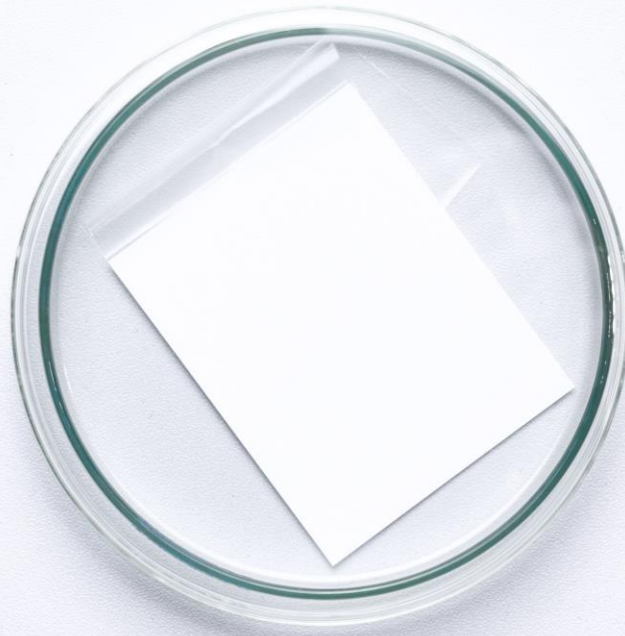


RAMAN AND FT-IR SPECTROSCOPY.

Detection and identification by RAMAN and FT-IR spectroscopy

- Analysis of oils, fats, cooling lubricants, cleaners, preservatives, solvents and many more
- Analysis directly on the component surface
- Clear detection and identification of the contamination
- Identification of the contamination by means of reference databases





PARTICLE MONITORING

PARTICLE MONITORING.

Particle trap analysis for monitoring environmental effects

- Evaluation with/without Illig value calculation = particulate precipitation per hour per 1,000 cm²
 - Sum of all particles with weighted size classes referred to a unit of time
- Acquisition of influencing factors:
 - Production or logistics environment
 - Building services
 - Organisation
 - Complete logistics and added value chain
- Important for conclusions about component cleanliness
- Systematic short-term or long-term analysis



STANDARDISED TEST METHODS. ACCLAIMED QUALITY ASSURANCE.

Accredited test laboratory in accordance with DIN EN ISO/IEC 17025:2018

Our accreditation means for you one thing above all else: certainty. You can rely on high standards, excellent services and guaranteed quality standards. As your partner, we accompany you during product development, innovations and safeguard product quality together with you.

Advantages of our accreditation:

- Impartiality and confidentiality
- International validity (ILAC)
- Dependability due to conformity assessment
- Reproducibility and comparability
- Standardised measurement and analysis methods
- Highest requirements on the technical standard
- Monitoring of the management system and the competence of the specialist personnel



QUALITY ASSURANCE IN NUERTINGEN AND SWITZERLAND.

It is possible to implement your projects worldwide from our sites.



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