

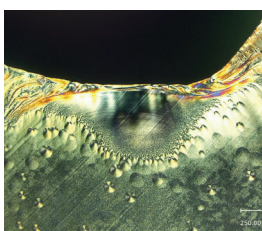
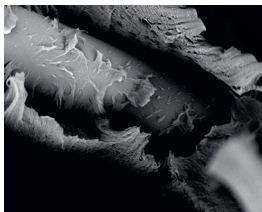


Service Overview

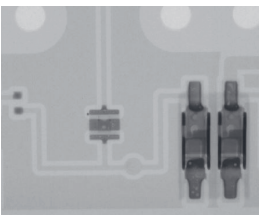
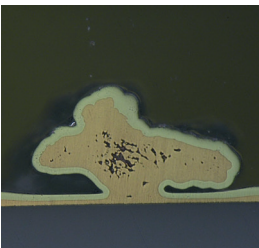
Analytical Testing: Material and Failure Analysis

in an accredited testing laboratory

Typical defects (Excerpt from portfolio)	Methods Procedures
Material-testing Development Quality assurance	
➤ Substance purity ➤ Particle analysis ➤ Technical cleanliness ➤ Emission behaviour ➤ Fracture analysis ➤ Material fatigue ➤ Media resistance testing	➤ Infrared spectroscopy (FT-IR) ➤ Dynamic Differential Scanning Calorimetry (DSC) ➤ Thermogravimetric analysis (TGA) ➤ Gas chromatography (GC) ➤ Element analysis (SEM/EDX) ➤ Microscopy Thin sections Cross-sections ➤ Melt flow rate determination (MVR/MFR) ➤ Size exclusion chromatography (SEC)

FAILURE ANALYSIS OF PLASTIC PRODUCTS


Typical defects	Methods Procedures
Material defects	
➤ Material contamination ➤ Mix-up of materials ➤ Chemical composition/ Batch variations ➤ Filler/Carbon black content ➤ Inclusions/particles ➤ Odour ➤ Outgassing ➤ Glass fiber orientation	➤ Infrared spectroscopy (FT-IR) ➤ IR microscopy ➤ Dynamic differential scanning calorimetry (DSC) ➤ Thermogravimetric analysis (TGA) ➤ TOF-SIMS analysis ➤ Gas chromatography (GC-MS, TDS, headspace, pyrolysis) ➤ Ash residue determination ➤ Elemental analysis (SEM/EDX) ➤ Dynamic mechanical analysis (DMA)
Defects related to manufacturing	
➤ Material degradation ➤ Process defects/crystallinity/cavities ➤ Microstructure/filler distribution ➤ Weld line strength ➤ Delamination ➤ Shrinkage and warping ➤ Stresses/orientations ➤ Weld line position ➤ Design ➤ Weld seam problems ➤ Laser marking problems	➤ Size exclusion chromatography (SEC) ➤ Viscosity number determination (VN) ➤ Melt flow rate determination (MVR/MFR) ➤ Dynamic Differential Scanning Calorimetry (DSC) ➤ Reflected and transmitted light microscopy ➤ Computed tomography (CT) ➤ Scanning electron microscopy (SEM) ➤ Thermomechanical analysis (TMA) ➤ Crack Knacker ➤ Fiber lengths analysis
Service-related failures	
➤ Abrasion ➤ Breaks, cracks ➤ Discolouration/efflorescence/material changes ➤ Media resistance ➤ Assembly	➤ Infrared spectroscopy (FT-IR) ➤ Dynamic Diff. Scanning Calorimetry (DSC) ➤ Reflected and transmitted light microscopy ➤ TOF-SIMS analysis ➤ Computed tomography (CT) ➤ UV/Vis Spectroscopy ➤ Scanning electron microscopy (SEM)



Typical Problem	Methods Procedures
Material defects	
➤ Chemical composition ➤ Inclusions/Particles in Coatings	➤ Reflected and transmitted light microscopy ➤ IR microscopy ➤ TOF-SIMS analysis ➤ Elemental analysis (SEM/EDX) ➤ X-ray fluorescence (XRF)
Process defects	
➤ Delamination ➤ Shrinkage/warping ➤ Stresses ➤ Pimples, blisters, pinholes ➤ Layer structure/layer thicknesses ➤ Curing/cross-linking ➤ Pre-treatment	➤ Microscopy (reflected and transmitted) ➤ SEM ➤ Chemical stripping ➤ Glacial acetic acid test ➤ TOF-SIMS analysis ➤ Infrared spectroscopy (FT-IR) ➤ Dynamic Differential Scanning Calorimetry (DSC)
Failures arising from use	
➤ Discolouration/efflorescence/material changes ➤ Chemical resistance ➤ Breaks, cracks ➤ Surface contamination	➤ Infrared spectroscopy (FT-IR) ➤ TOF-SIMS analysis ➤ Reflected and transmitted light microscopy ➤ Elemental analysis (SEM / EDX) ➤ Media resistance testing

MATERIAL IDENTIFIKATION

Typical defects (Excerpt from portfolio)	Methods Procedures
Competitive analysis Development Quality assurance	
➤ Identification of the base polymer ➤ Determination and characterisation of fillers and reinforcing materials ➤ Additive analysis	➤ Infrared spectroscopy (FT-IR) ➤ Dynamic Differential Scanning Calorimetry ➤ Thermogravimetric analysis (TGA) ➤ TOF-SIMS analysis ➤ Ash content ➤ Gas chromatography ➤ Elemental analysis (SEM/EDX)

When a plastic component fails, there can be a variety of reasons. It is important for you not only to identify the failure, but also to obtain detailed information so that you can rectify it and – last but not least – prevent it from happening again in future. Our services therefore go beyond traditional root cause analysis in the event of a failure; you also benefit from our more than 30 years' experience in plastics and failure analysis to help improve your process to a state of safety, efficiency and profitability. With over 1,000 assignments per year, we specialise in:

- Failure analysis of moulded parts, coatings assemblies
- Visualisation of defects, layer sequences and geometries (including non-destructive methods)

We utilise state-of-the-art equipment, which is available to you in our accredited laboratory. A wide range of testing methods from traditional materials testing and surface analysis round off our portfolio. Our consultancy services also include expert advice on selecting the optimal methods for your specific requirements, ensuring the best value for money. A large network of partner laboratories ensures that we can offer you any technology required to solve your problem. Throughout the process, order handling remains discreet and entirely under our control.

Challenge us!

We are happy to take the time for a non-binding, personal discussion.

INFORMATION AND ENQUIRIES

Those interested can find further information on our website – or contact us directly:

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