Chemical Resistance of Plastics and Coated Surfaces

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The Problem:

Surfaces may change their appearance if they come in contact with cleaning agents, service fluids, sweat, sun cream or other substances (see Fig. 1). An additional friction load may lead to streaks or friction marks. However, especially for visible parts in the automotive field, a good optics is of utmost importance. In this case, a proof of resistance to the essential contact substances is therefore nearly always required as part of the initial samples approval tests.

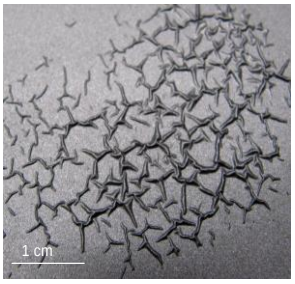

Fig. 1: "Wrinkles" after treatment with insect repellent.

The Solution:

Our scope of automotive an initial samples approval tests today contains 1813 individual tests (close to all accredited according DIN EN ISO 17025) for 16 OEM's. Numerous of these tests are aimed at the clarification of chemical resistance of uncoated, coated, or painted surfaces.

Here, there are four typical tasks:

1. Test of the base material by storage in e.g. oils or fuels, also at elevated temperature. Tensile, compression, bending or hardness tests prior and after storage indicate changes of the mechanical properties.
2. Test of painted or coated surfaces by exposition to chemicals. Optical changes are detected via visual assessment, colour or gloss measurement. Scratch or cross-hatch tests provide information on the coating or paint adhesion.
3. Test under combined load, e.g. rubbing of surfaces under the influence of chemicals. Apart of optical changes, changes in roughness or haptics may be additional assessment criteria here.
4. Influence of chemicals on surfaces under mechanical stress, e.g. to determine the resistance to stress-corrosion cracking. The surface loaded this way is visually and microscopically checked for stress-corrosion cracks (see Fig. 2, overleaf). In certain cases (transparent birefringent materials), the stress condition and the stress-corrosion cracking may be visualized polarization microscopy (see Fig. 3, overleaf).

Industries (A-Z)
Automotive
Medical Technology
Paints and Coatings
Plastics Processing
Textile

Objectives
Proof of Chemical Resistance

Materials (A-Z)
Coated or Painted Parts
Finished Parts made of Plastics
Textiles

Analytical Methods (A-Z)
Adhesion Tests (Cross-Hatch, Scratch)
Haptics Test
Mechanical Tests (Bending, Compression, Hardness, Tensile)
Microscopy
Optical Tests (Colour, Gloss)
Rubbing Tests (Crockmeter)

Related Topics
Basic Investigations
Initial Samples Approval Tests
Quality Assurance

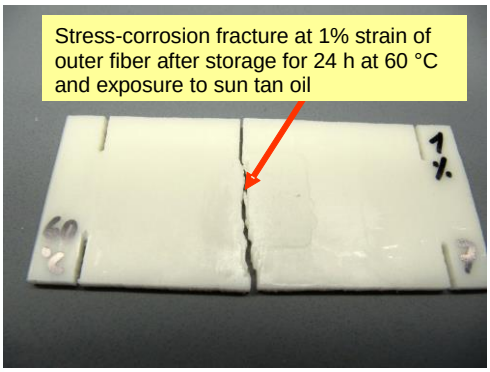

Fig. 2: Stress-corrosion fracture after treatment with suntan lotion.

Fig. 3: Incipient stress-corrosion cracking by alcohol.

The Advantages:

The Analytik Service Obernburg has a multitude of chemical resistance tests in its scope. Especially for suppliers to the automotive industry, the necessary proof of sufficient chemical resistance of parts can be provided - both in the development stage and in the initial samples approval tests.

For basic investigations or in case of failed initial samples approval tests, a team of qualified academic co-workers is available for a thorough analysis of the causes. For this purpose, high-tech methods such as electron microscopy, surface analytics, FTIR and Raman spectroscopy, NMR spectroscopy or chromatography are available.

Interested?
The Automotive Test Center of the Analytical Services Obernburg is ready to answer your questions and to help you.

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