



- 1 ABREX®-scratching device: scratch test of a cover plate with an abrasive medium.
- 2 Image of scratching marks on a hard-coated plastic surface taken by a camera and its conversion into a greyscale diagram.
- 3 Scratching mark on a hard-coating examined by Scanning Electron Microscope.

## EVALUATION OF SCRATCH AND ABRASION RESISTANCE FOR OPTICAL SURFACES

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### Motivation

Current standardized testing procedures for abrasion and scratch resistance of optical coatings often do not reflect the abrasion conditions experienced in practice. In many testing methods the evaluation of the generated damages is made visually or the performance of the method is subjective, e.g. steel-wool-test or pencil hardness. Our objective was to develop a more realistic and reproducible test procedure for comparison and evaluation which can be easily adapted to special applications.

### Our Solution

Well defined homogeneous abrasion materials are chosen depending on the application case and moved over the surfaces with constant load. A microscopic image of the test surface is taken and evaluated by using a special software.

### Advantages of the procedure

- Simulation of conditions similar to the specific applications, e.g. ophthalmic lenses and covers of displays
- Flexible and conformable abrasive rolls with homogeneous and well-defined structure for samples with different resistance, e.g. cloth, wool felt, non-woven containing abrasive grains (SiC, Al<sub>2</sub>O<sub>3</sub>)
- Reproducible testing parameters, e.g. force and friction distance
- Supply of testing liquids (artificial sweat, emulsions)

### Evaluation methods

- Light-microscopic image capturing
- Software-assisted analysis of scratch images
- Haze-measurement according to ISO 14782, 13468 and ASTM D1003