INNOWEP GmbH
MEASURING & TESTING

ABREX®

Fingertip & Hand Abrasion

Soft Chemo Mechanical Abrasion

Delamination

Scratch Resistance

Nailscratch

Fingerprint Cleanability

Shoe Sole Abrasion

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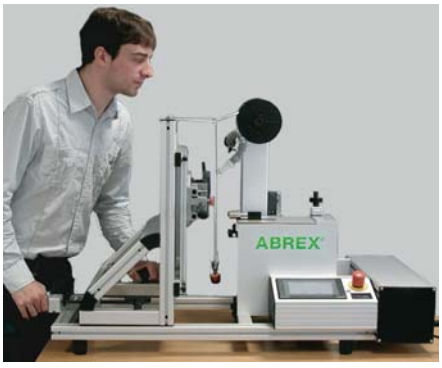
Highlights

- Reproducible results due to standardized test standards
- Real application simulation of chemo-mechanical abrasion
- Universal functionalities due to modular design
- Calibratible testing machine to secure reproducibility



Basic Functions

Abrasion is a common mechanical process on surfaces caused by scuffing, rubbing, or scratching under normal use or environmental exposure. The product with abrasion leads to the undesirable disturbance of its functionality, quality perception and value. Fingertip and hand abrasion is a specific type of abrasion due to the intensive interaction between the products and human fingertips or hands. This special abrasion leads to distinct patterns of damages on the materials and its surfaces.

ABREX®-ABRASION, namely soft-chemo-mechanical fingertip & hand abrasion, is a highly complex abrasion process which involves:

- firstly a dynamic impact with 45° angle by a viscoelastic fingertip under a certain load and the influence of various liquid;
- then a friction rubbing or tumbling motion between the sample and a textile containing dirt, dandruff, oil, sweat or various types of creams.

ABREX® is by far the only testing machine which can simulate this complex abrasion with different standard textiles under different chemical environments.

Furthermore, other tests can be also performed with the standard **ABREX®** and with a high-speed **ABREX®-E**, including:

- finger-nail scratch
- industrial scratch
- shoe sole abrasion
- abrasion with soiling materials
- abrasion with high-abrasive cleaning materials

In additional, all tests can be applied either on a lab sample or on a finished product with the testing temperature ranging from -40°C to +85°C.

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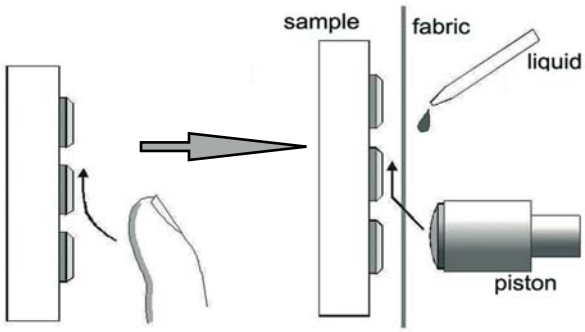
Test Principle of ABREX®-ABRASION



Fingertip Touch ABREX® Abrasion Simulation

Main features of human Fingertip:

- viscoelastic
- curved structure
- rough surface
- Inhomogeneous and nonlinear
- containing dandruff/dirt/swear/fat/lotion/ cream

- Standard silicone piston represents the viscoelasticity of the fingertip;
- Standard fabric/textile represents the rough structure and texture of the fingertip;
- Standard liquid can be artificial sweat, hand cream and many more;
- Dynamic load is applied via the piston onto the sample surface with a fixed 45° angle

Standards & Specifications

- DIN EN 60068-2-70
- IEC 68-2-70
- BMW GS 97034 -1, -2, -3, -4, -5,-6
- BMW GS 97045-2
- BMW PR 506, 510
- BMW AA-0471, AA-P296
- BMW PA-P 315
- BMW TL 9 138681.6
- Daimler DBL 7384
- Ford WSS-M2P188-A1/FLTM BN155-01/ DVM-0055-MA
- GB-T 2423.53
- JIS C 60068-2-70
- PSA D24 5020
- Renault
- EWIMA

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Nail Scratch-Industrial

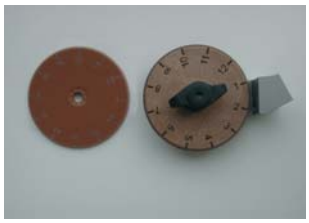
Simulation of typical scratch tests with industrial tips. Supplied with both 45° & 90° sample fixing modules.

Nail Scratch & Mar Test-Automotive

Simulation of typical scratch and mar tests with human fingernail (PMMA) at different speeds. Supplied with 45° sample fixture. Test acc. to BMW GS97034-2.

Shoe Sole Test-Automotive

Simulation of abrasion between shoe sole and the auto trim with high speeds acc. to BMW GS97034-3.

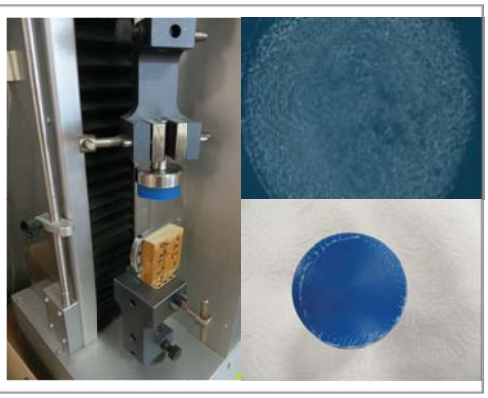


Shoe Sole Abrasion Test-General

Simulation of the general abrasion for floor, carpet, ceramics.

Fingerprint Test

Generation of a standardized fingerprint on the surface (eg. touch screen, glossy piano paint) followed by a cleanability test on ABREX® to test how easily the fingerprint is cleaned by microfiber cloth.



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Steering Wheel Abrasion Test

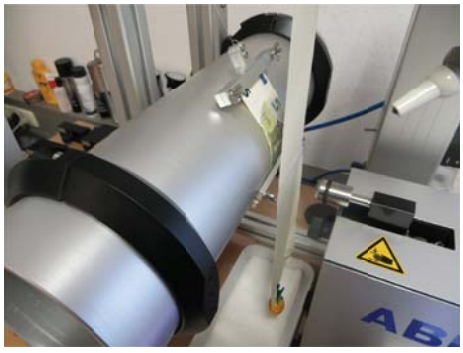
A complete car or truck steering wheel mounting on ABREX® for the simulation of ABREX®-abrasion and other scratch tests without cutting the lab samples. The steering wheel can be any size from automotive, trucks and omnibuses.

Steering Wheel Abrasion Test with Wear Analysis

ABREX®-abrasion tests on steering wheels followed by the measurement of the abrasion rate and surface roughness, topography, structure and visual impression in a mobile fast fashion.

Banknote Durability Test

A specially designed sample mounting adapter with a certain curvature enables the simulation of ABREX®-abrasion and other tests directly on a banknote.



Teeth Abrasion Test

A specially designed adapter to simulate the tooth abrasion for testing the durability of tooth replacement materials. The materials of abrasion counterpart can be customized.

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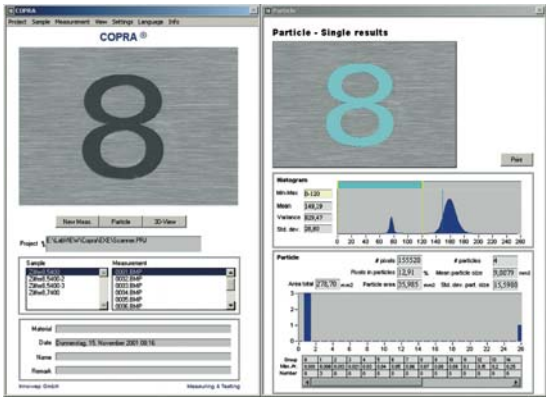
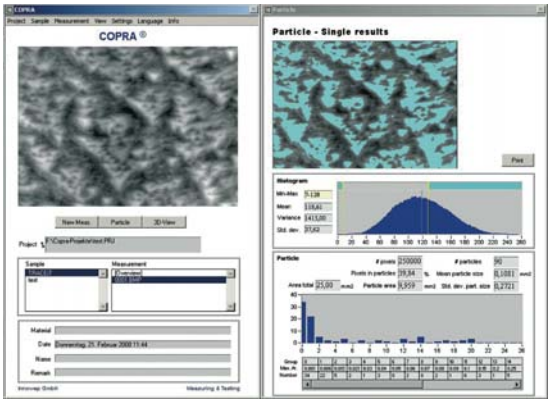
X-Y Sample Mounting Counter

For easy and accurate positioning of the sample

Abrasion & Wear Analysis

Supplied with a high resolution scanner and software for evaluation of abrasion and wear rate, ratio of contact area, particle distribution, porosity distribution, height distribution





Adapters

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Textile Options

Standard Fabric
Simulates ABREX®-abrasion according to DIN EN 60068-2-70 / IEC 68-2-70

Cotton-Batist Fabric (Denim)
Simulates abrasion with clothing materials (e.g. Jeans) according to ISO 105 D01

Cotton-Lawn Fabric
Simulates abrasion with fine-structured clothing materials (e.g. trouser pockets) acc. to ISO 405 F09

Soiling Fabric
Simulates soiliing behaviour with standard materials (by fats, soot) acc. to BMW GS 97034 and various standards. Two versions are available.

Abrasion-Pad S-1000
Simulates mechanical abrasion with high-abrasive rubbing pad

Abrasion-Pad „Scrub-Test“
Simulates mechanical wear by kitchen and cleaning sponges (M44)

Wool Felt H1
Abrasion test according to various standards, hardness H1

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Media Options

Artificial Sweat acc.to:

DIN 53160-2:2001
BMW GS 97045 (two types)
BMW PR506
DBL 7384
VW TL 226 (2 types)
FORD DVM-00870MA
PSA

Additional Fluids

Cleaning paste
Skin lotion
Soil/dirt
Plastic maintainence emulsion
Sun cream/hand cream
Cleaner/Spray
Seasoning
Cooking oil

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Model Options

Model	ABREX® Standard	ABREX® -E	ABREX®-C	ABREX®-CE
Load	1-20 N			
Friction	4-40 mm			
Speed	6 ± 0.5 cm/s	Scratch test acc. to GS 97034-2: 20 ± 2 cm/s; Shoe sole test acc. to GS 97034-3: 70 ± 5 cm/s	6 ± 0.5 cm/s	Scratch test acc. to GS 97034-2: 20 ± 2 cm/s; Shoe sole test acc. to GS 97034-3: 70 ± 5 cm/s
Cycles	1-10,000,000			
Piston	20mm Standard 10mm Standard	20mm Standard 10mm Standard	20mm (-40°C) 10mm (+85°C)	20mm (-40°C) 10mm (+85°C)
Fluid feed	Automatic			
Fabric feed	Automatic			
Power supply	230V / 50 Hz ; 110V / 60 Hz			
Compressed air	4 bar, external, oil free, water free			

Maintenance and Services

ABREX® inspection with maintenance and calibration should be performed at least once a year. Some of the spareparts including piston, textile and artificial sweat are required to be exchanged frequently. Certain test liquids and fabric have limited shelf life. Please consult info@innowep.com for detailed information.