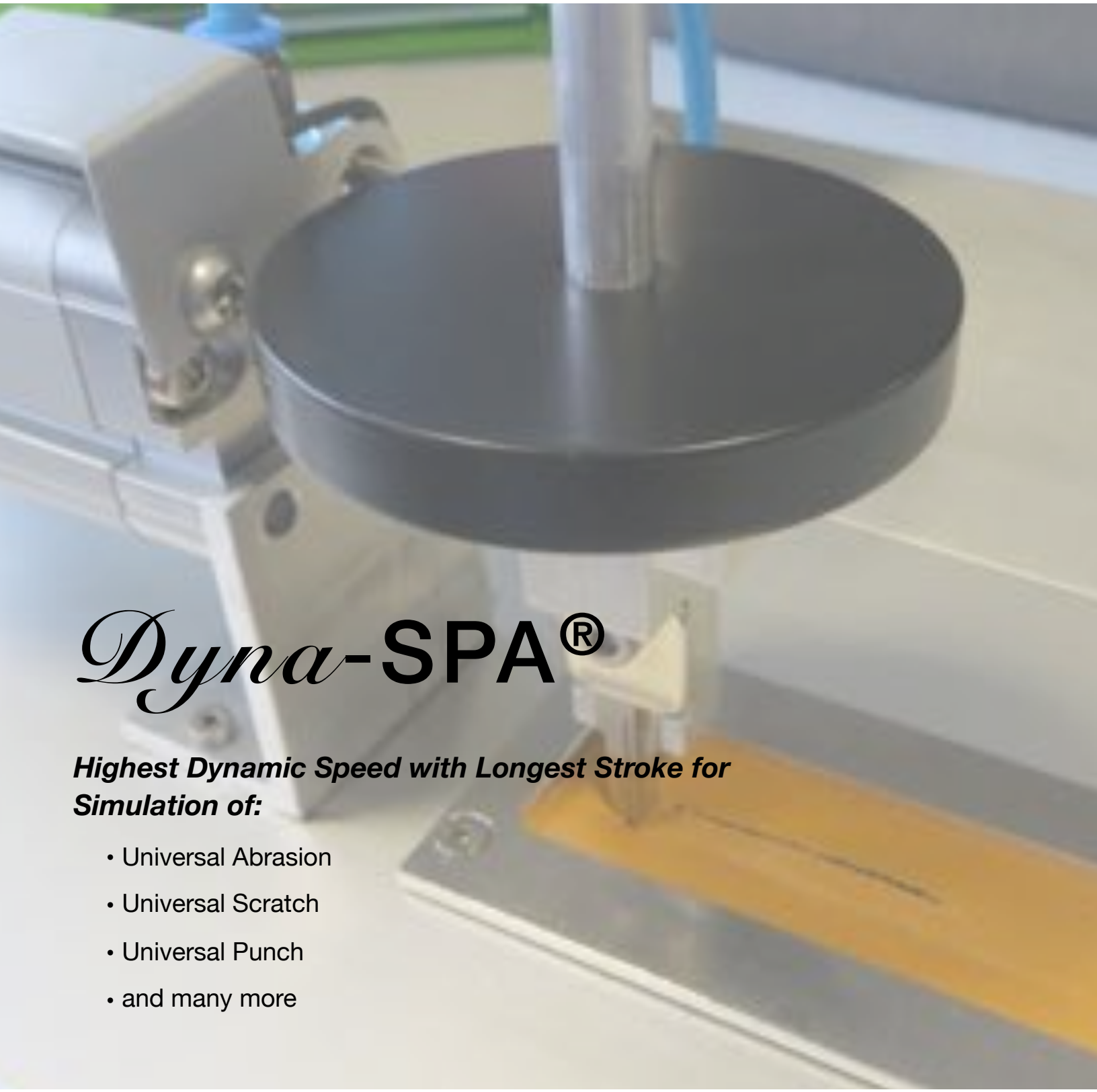
INNOWEP GmbH
MEASURING & TESTING



Dyna-SPA®

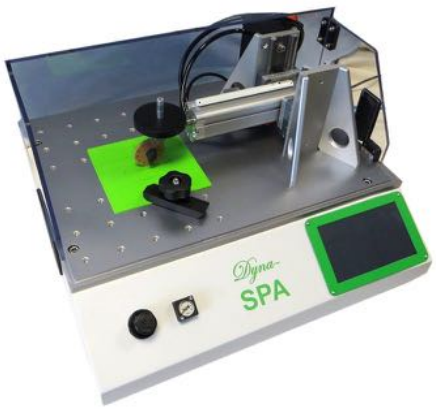
Highest Dynamic Speed with Longest Stroke for Simulation of:

- Universal Abrasion
- Universal Scratch
- Universal Punch
- and many more

Innowep GmbH Haugerring 6, Würzburg, Germany 97070 **T** 0049 931 322 980 **F** 0049 931 322 9812 info@innowep.com www.innowep.com

Highlights

- Fastest system for performing scratch/abrasion/punch tests
- Highest dynamic linear motion up to 100 cm/s driven by pneumatic force
- One machine for all tests
- Perform one-direction test which simulates real application
- Compliance with over 30 standards:ASTM/ISO/DIN/EN
- Universal functionality due to modular design
- Reproducible results due to standardized test standards



Basic Function

Damage to a surface due to abrasion, scratch, mar, scrape and punch is one of the main reasons for the disturbance of a product's quality. In many real applications, deep scratch or severe abrasion occurs during a fast and high dynamic motion, e.g. a deep long scratch by a key on the exterior paint of a car, and this high dynamic scratch occurs at a high speed up to 100 cm/s.

Dyna -**SPA®** , is the only machine which can simulate the fastest and dynamic scratch, punch and abrasion tests within one machine with freely programmable speed (up to 100 cm/s) and stroke (up to 120mm). It complies with over 30 international standards (ASTM/DIN/ISO) for the following applications:

SCRATCH:

- Universal Scratch Test
- Nail Scratch Test
- Pencil Test
- Key Scratch Test
- Cross-cut Test

PUNCH:

- Universal Punch Test
- Fingertip Punch Test

Mar Test & Adhesion Test

ABRASION:

- Universal Abrasion Test
- Shoe Sole Test
- Crockmeter Test
- Wire/Cable Abrasion Test
- Film/Packaging Material Abrasion Test
- Magnetic Stripe Abrasion Test
- Cleaning/Scouring Pad Abrasion Test
- Tooth Abrasion Test
- Scuffing Abrasion Test

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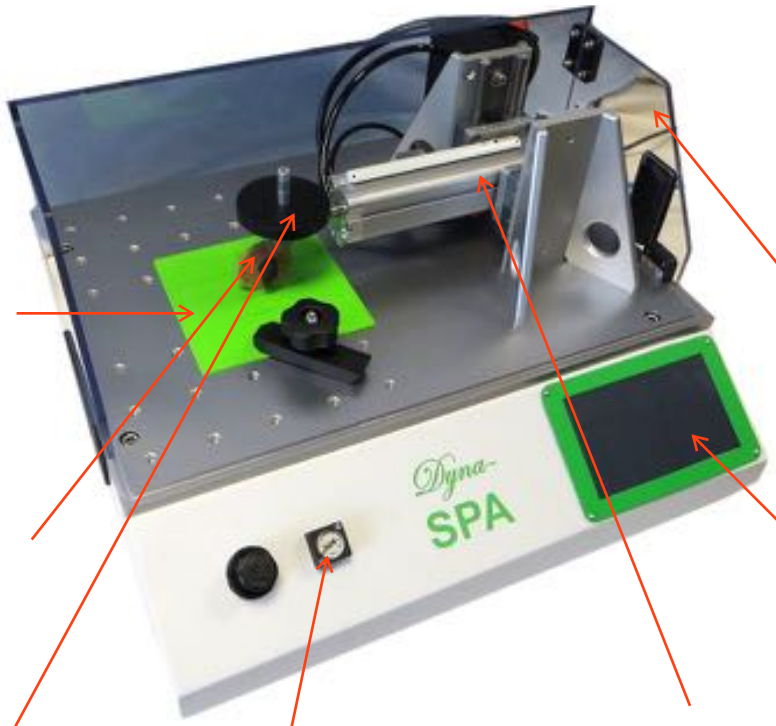
Dyna -SPA® Configuration



Sample Mounting Fixture
dry test or under wet environment

Abradant Fixture
A selection of all types of abrasion/ scratch tips, adapters and clamps

Security Cover

Computer Control

Loading Unit

Pressure Gauge

Pneumatic Cylinder
- Provide dynamic speed: up to 100cm/s
- Provide motion: one direction or reciprocating

Dyna -**SPA®** tester is used to test the resistance property of material and surface against scratch, abrasion and punch. The samples can be lab samples or finished products either flat or with curvature. *Dyna* -**SPA®** is widely used as a standard for many industries:

- automotive components
- painted/coated parts
- printed graphics/images
- optical products
- leather
- textile
- medical products
- packaging materials
- flexible films
- wires and cables
- magnetic stripes
- electronics
- rubber
- home appliance
- floor
- ceramics
- furniture
- coating and color

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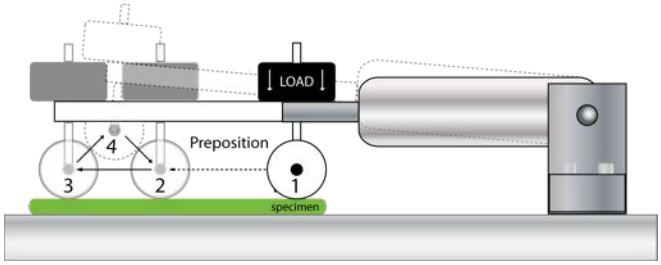
Test Principle

Dyna -**SPA®** tester is designed to test either flat surfaces or curved products, making it versatile to evaluate finished products of all sizes and all materials. A variety of optional test tips, test textiles, test media and sample clamps is provided to perform different types of abrasion, scratch, mar and punch tests. And it is also suitable for both wet and dry tests.

Dyna -**SPA®** tester is built with a horizontal piston rod driven by a pneumatic cylinder that moves in a linear motion, either one-direction or reciprocating. At the end of the cylinder is a movable assembly which allows the cylinder and the arm to move freely in the Z-direction. Therefore, the tip follows the shape and surface structural. The tip is mounted to the end of the piston rod and a dead weight is mounted on the top to generate a load in Z-direction onto the test sample. As the horizontal rod moves, the test tip raises or lowers vertically to follow the curvature of the test sample. In addition, the pillow block can be moved up and down, therefore the samples with a wide range of thicknesses can be tested.

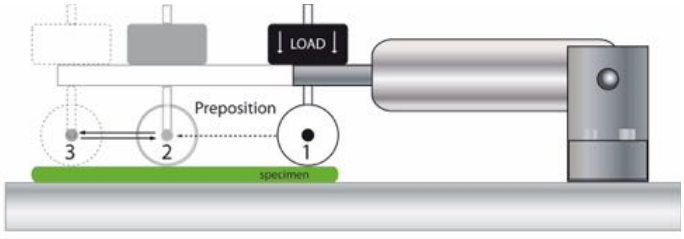
Mode 1



One-Direction Mode

- Pneumatic system drives the tip wheel to the prepositioning point “2” to ensure the right velocity for the test;
- Then the tip is moving from point “2” with a certain stroke to point “3” at pre-defined speed;
- A pushup rod will lift the pneumatic cylinder to position “4” and reside back at the position “2” for the next cyclic linear motion;
- An opposite cycle from position “2” to “4” to “3” can also be achieved.

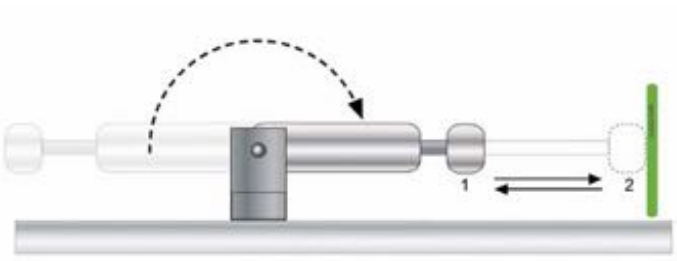
Mode 2



Reciprocating Mode

- Pneumatic system drives the tip wheel to the prepositioning point “2” to ensure the right velocity for the test;
- Then the tip is moving back and forth between point “2” and “3” at pre-defined speed, the inward and outward speeds can be different.

Mode 3

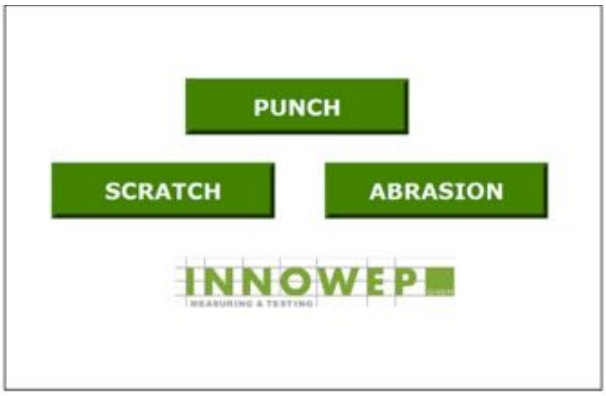


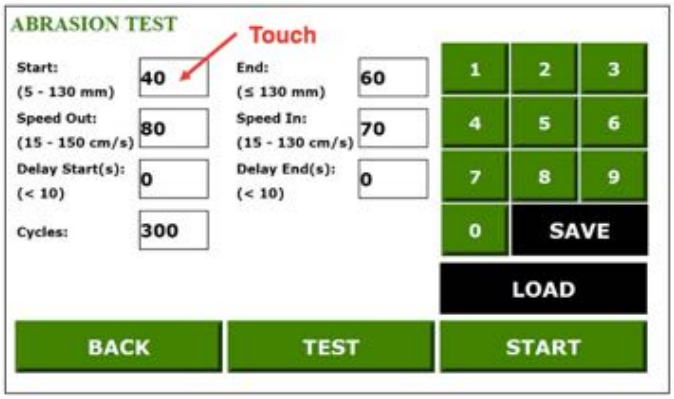
Punch Test Mode

- Pneumatic cylinder is flipped 180º;
- Then the punch tip is hitting the sample back and forth between point “1” and “2” at pre-defined speed.

Software

Dyna -**SPA®** tester has an adjustable program which enables the user to select the test mode, test speed, struck length, test load and others. According to the test method, the test condition can be set up freely ni the software.





Test Methods

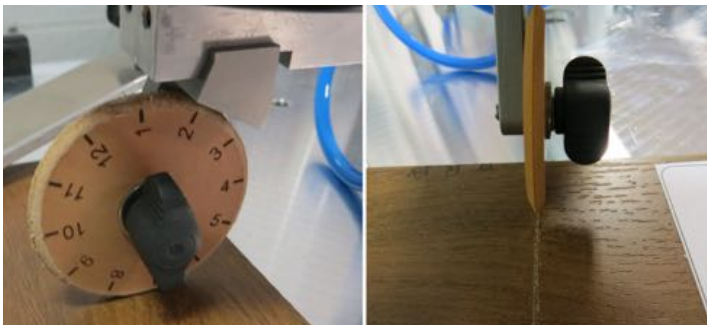
Dyna -**SPA®** tester can perform various tests which comply with many ISO, ASTM, BS, GB/T standards. Please contact us for information on the test standards that can be performed by *Dyna* -**SPA®** to evaluate the resistance of a material surface to scratch, abrasion, mar, scrape and punch.

Adapters

There is a variety of adapters within the *Dyna* -**SPA®**, for example, key scratch, cross cut scratch, crockmeter abrasion, and many more.

Key Scratch Adapter

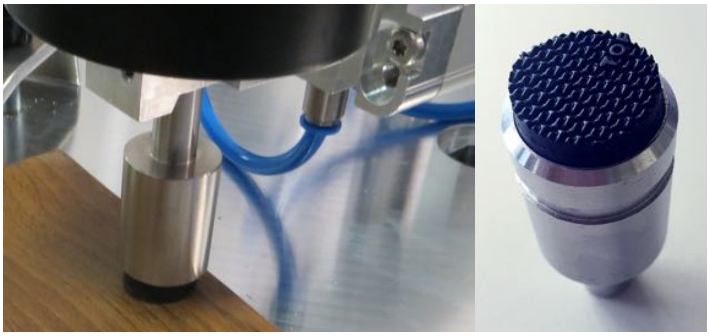
- Standardised key scratch tip;
- Can be used for simulation of scratch/abrasion resistance of the magnetic stripe of the credit card.



Shoe Sole Scratch Adapter

- Standardised shoe sole tip;
- Leather or SBR material:

I. Shore-hardness (95 ± 3) Shore A
II. Spec. weight (1.23 ± 0.20) g/cm^3
III. Tensile strength ≥ 10 N/mm^2
IV. Elongation ≥ 250 %
V. Abrasion ≤ 250 mm^3 acc. to DIN ISO 4649



Shoe Sole Abrasion Adapter

- Standardised shoe sole tip;
- Specified shore hardness
- 20mm diameter
- for testing the floor abrasion resistance, car interior carpet abrasion resistance and many more

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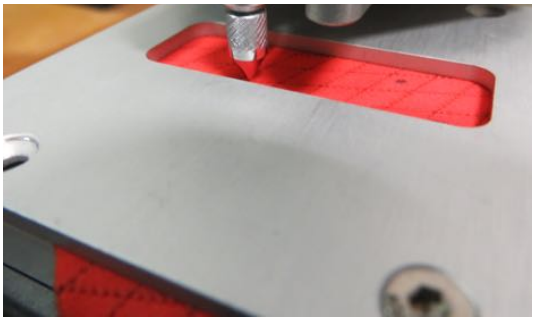
Tip Options

A great choice of tips is supplied with each *Dyna* -**SPA®** tester along with necessary abradands and liquid media. Each tip is standardised in many parameters including the size, shape and materials which permits the equivalent result. A detailed tip choice of *Dyna* -**SPA®** is described in details upon request.

Sample Clamp Options

Universal Sample Clamp for flat and curved samples with various height



Clamp for testing specific area

Other clamp choice is available upon request.

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Technical Specification

Model	*Dyna* -**SPA®**		
Static Load	1-30 N		
Stroke Length	max. 120 mm (programmable)		
Linear speed	up to 100 cm/s (higher speed upon request)		
Cycles	1-10,000,000		
Features	Scratch	Abrasion	Punch
Measurement delay (s)	programmable		
Speed in & out	programmable		
Power supply	230V / 50 Hz ; 110V / 60 Hz		
Compressed air	6 bar, external, oil free, water free		
Accessories included with the base unit	3 different loads; 2 scratch tips; 1 punch tip (metal) 1 universal clamp for abrasion test 1 set of sample holding plate * All the above accessories will be packed in one box; the base unit will be packed in a wooden box acc. to international shipment.		
It is up to the user to determine a suitable adapter, tip or sample clamp appropriate to their products.			

Maintenance and Services

Dyna -**SPA®** should be inspected, maintained and calibrated minimum once a year. Some of the spare parts such as abradants are required to be replaced frequently.