

## What does it measure?

For the first time, objective, **highly accurate measurements on the nail** are possible in vivo.

In collaboration with Prof. Paola Perugini from the University of Pavia in Italy, we have developed a patented device to analyze mechanical properties of nails, such as firmness, elasticity and thickness.

## The Measuring Principle

The nail is placed on a support in the unit. A high precision load cell measures constantly the pressure required to step down the special applicator. The **force needed for the deflection of the nail** is displayed in real time. As soon as the head touches the surface of the nail the pressure increases. The result is a curve of force and distance (force deflection diagram). Its **slope** is depending on the mechanical properties of the nail. There are three different applicator sets for the measurement of:

- Transversal deformation: the nail is deflected vertically.

The slope of the curve indicates the **elastic property of the complete nail**. The result is the flattening index for the nail.

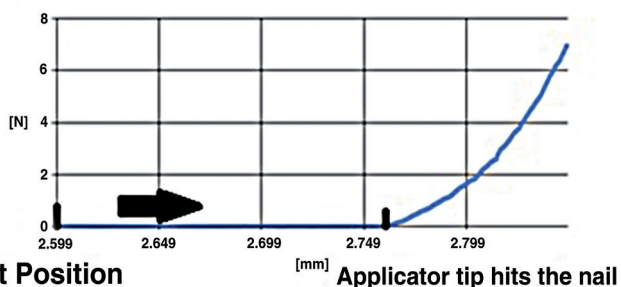
- Resistance to compression force: the nail is deflected punctually. The slope of the curve indicates the **structural strength/ firmness** of the nail. Also the **thickness** of the nail can be assessed.
- Longitudinal deformation: the nail is deflected horizontally. The slope of the curve indicates the **elasticity of the distal edge** (border) of the nail. The result is the bending index for the nail.

## Fields of Application

- **Efficacy tests** for all kind of nail care products and formulations.
- Create innovative **product & marketing ideas**.
- Clinical research of **nail disorders** as well as other skin diseases presenting nail changes and the quantification of therapies.

## Advantages

- Very **easy handling** and convenient software.
- Measurement is absolutely **pain-free**.
- Several **safety** and comfort features.
- A variety of settings (pressure force, down step size of the applicator, measurement time, etc.) to meet **individual applications**.
- Positioning the nail is very easy, as it is constantly **monitored by a built-in camera** from the side.
- Ghost image of T0 as an overlay to aid **perfect positioning** for optimal reproducibility.
- The applicator heads can be moved down in very **small adjustable steps** (precision of 0.1  $\mu\text{m}$ ).
- Highly accurate values with **good reproducibility**.
- **Quality measures** of the curves ( $R^2$  and deviation) to check the measurement immediately.
- Study based simple and quick evaluation of the results in **statistical programmes** possible.



|             | Structural Strength | Deviation from Average in % | R <sup>2</sup> |
|-------------|---------------------|-----------------------------|----------------|
| Curve 1     | 34.9044             | 1.7                         | 0.976          |
| Curve 2     | 35.7159             | 0.6                         | 0.986          |
| Curve 3     | 37.3422             | 5.2                         | 0.992          |
| Curve 4     | 34.0294             | 4.1                         | 0.985          |
| Average (Ø) | 35.4980             |                             |                |

|         |                  |
|---------|------------------|
| SD      | Thickness Ø [mm] |
| 1.22043 | 0.48742          |

## Technical Data

Dimensions: 51.0 (H) x 20.5 (W) x 19.2 (D) cm, Weight: 10.4 kg, Power supply: external 100-240 VAC, 47-63 Hz, DC 12V/9A, Port: USB 2.0, type B connector, Consumption: during measurement approx. 0.3 A, Internal illumination by 18 white LEDs  
 Distance measurement: max. 10 mm  $\pm$  0.02 mm, steps from 1 to 10  $\mu\text{m}$ , measurement uncertainty: 30-70  $\mu\text{m}$  for load of 10 N  
 Load measurement: high precision load measurement cell, measurement range 0 – 10 N, measurement uncertainty:  $\pm$  0.02 N  $\pm$  2% of the respective load value, camera to monitor nail position: built-in, 5 MPixel  
 USB color camera, resolution: 2592 x 1994 Pixel, Computer: Windows®10, USB 2.0 or 3.0  
 Technical changes may be made without prior notice.

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