

# ***The Nanoworkbench***

Standard Application Packages



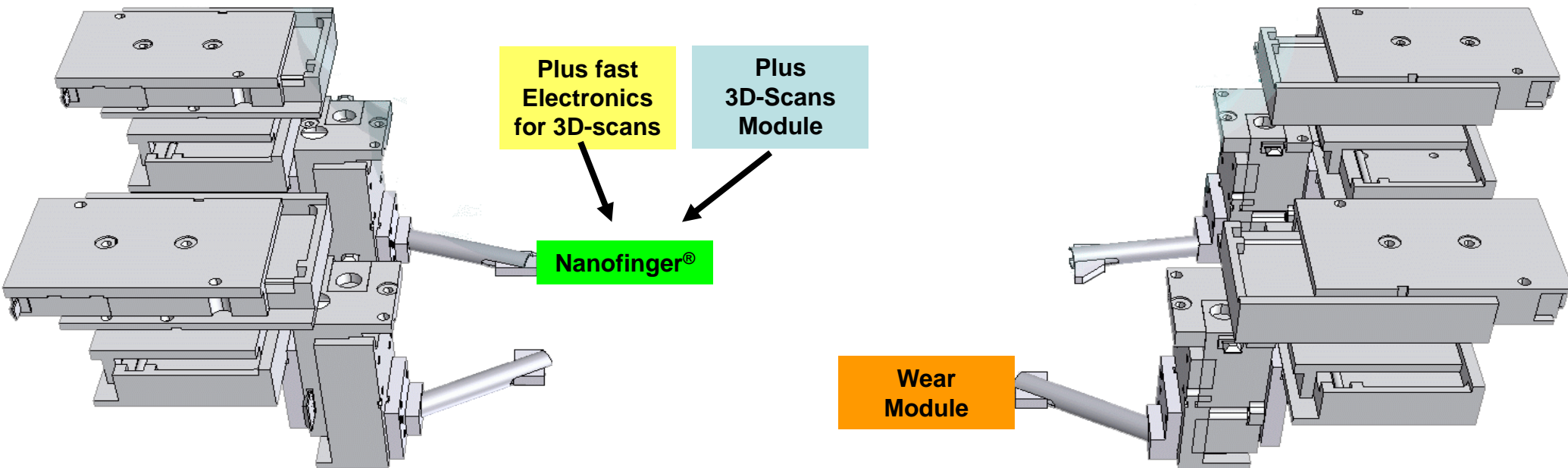
## ***Abrasive Wear Tester:***



***Wearout tester  
with  
3D-Profilometer***

# Abrasive Wear Tester

Nanoworkbench Configuration:



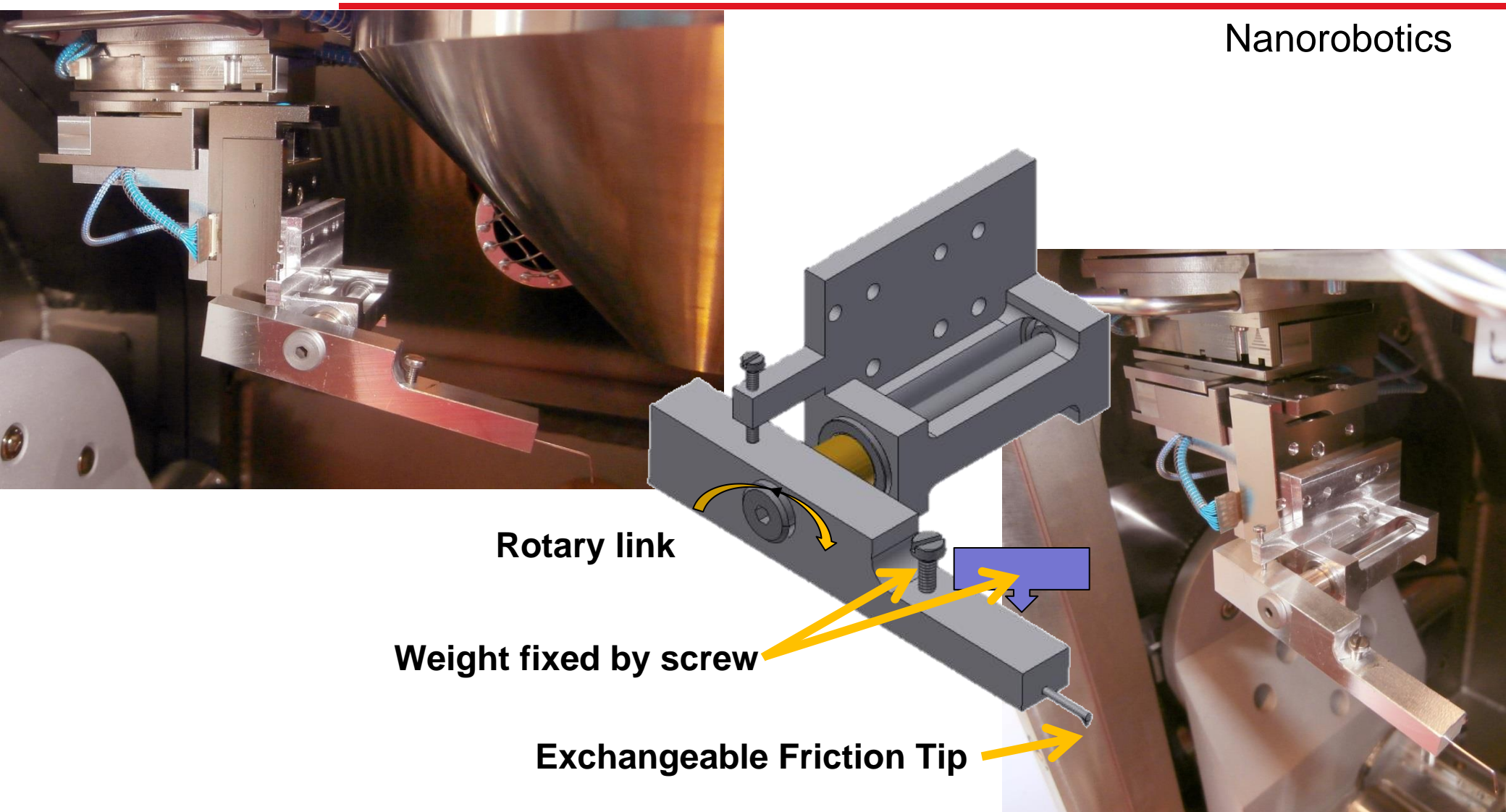
1. **Nanomanipulator equipped with:** 3D-Nanofinger® as Scout and profilometer
  2. **Nanomanipulator equipped with:** Abrasive Wear module with exchangeable friction tip and variable weight
- Standard Software Package: Macro Executor, Live Image Positioning, Assistants, Sequencer

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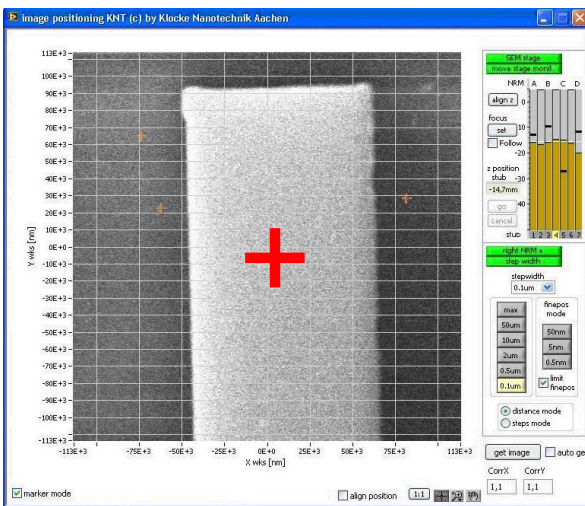
# Abrasive Wear Tester

Nanorobotics

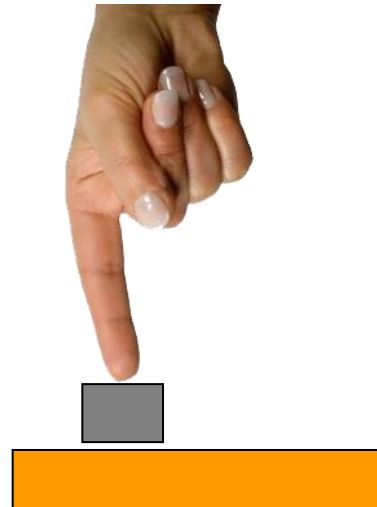


# Abrasive Wear Tester

## Operation Sequence



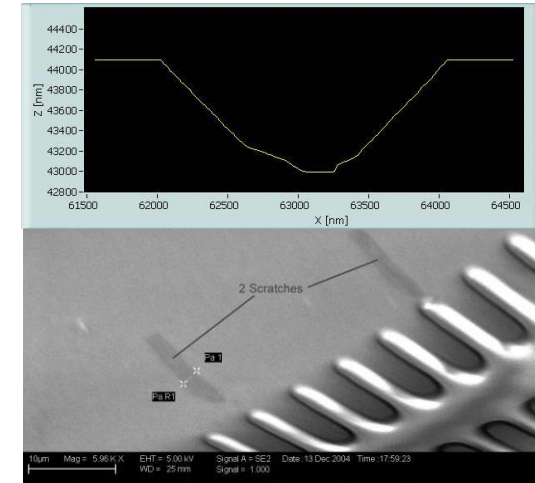
**Live Image Positioning:**  
select target, define linescan



**1D-Nanofinger®:**  
finds target



**Abrasive Wear module:**  
grinding the surface



**3D-Nanofinger®:**  
abrasion profile

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# Abrasive Wear Tester

## Operation Sequence

### Principle of Operation:

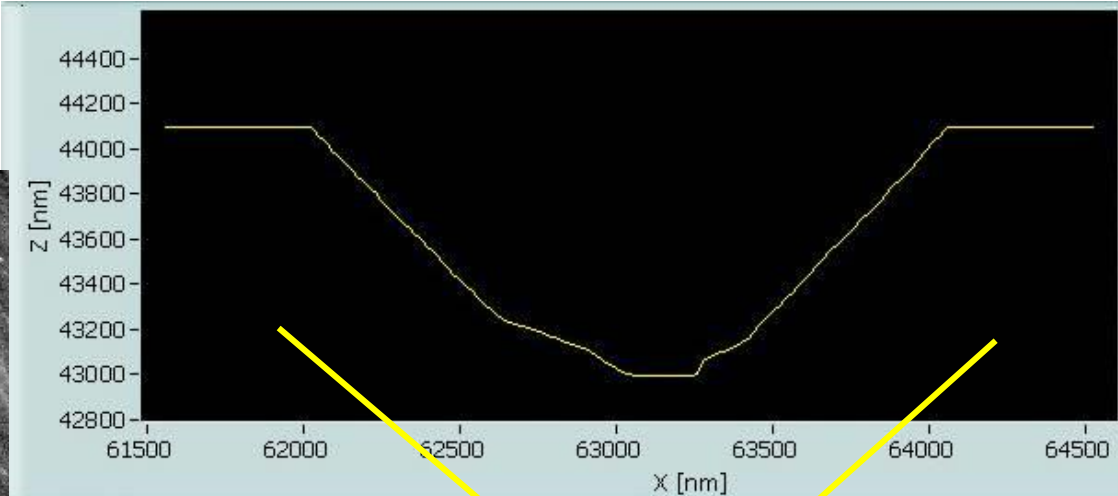
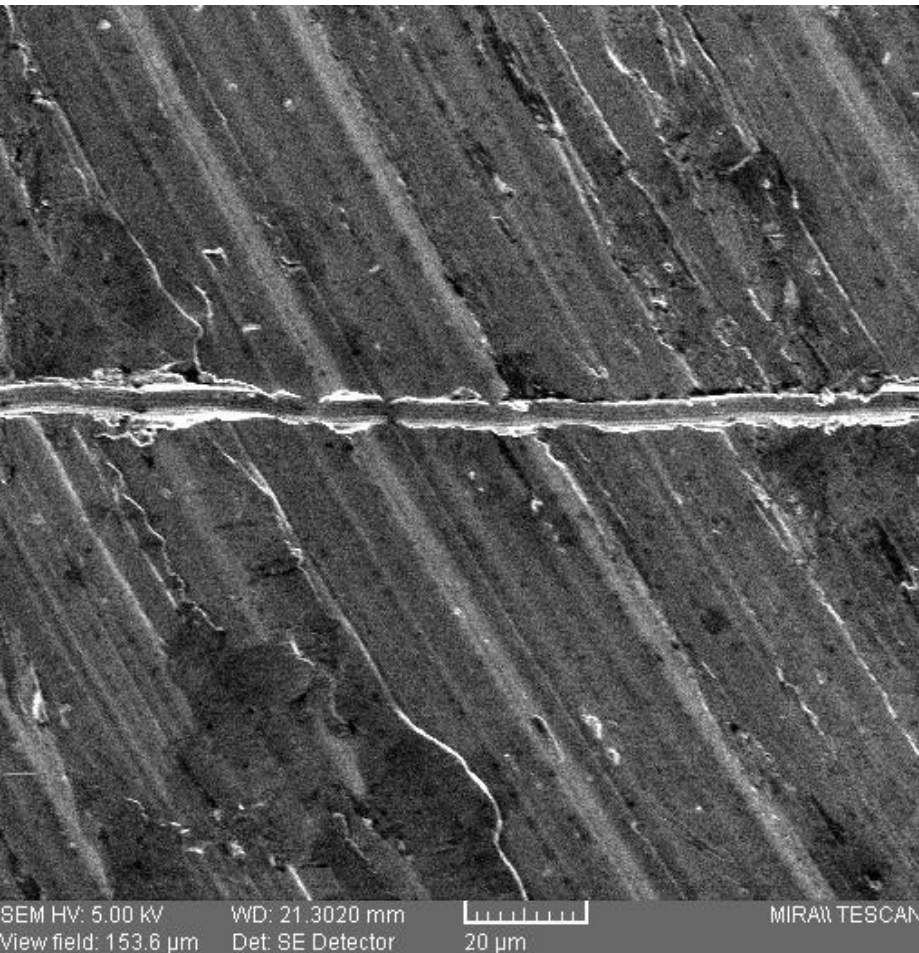
- The Abrasive Wear Tester is equipped with a tool tip selected for the specific measurement task. E.g. a sand grain to measure the wear-out of a snake skin in the desert, a diamond tip with a well defined shape, or a tip out of that material that usually harms the surface to characterize.
- A defined weight pressing the tool tip onto the test surface can be selected.
- Start and endpoint of the line to grind are defined by two clicks with the mouse into the Live Image Positioning module of NanoControl.
- The 1D-Nanofinger® finds the height of these points and tells the grinding tool where to go.
- The Abrasive Wear Tester grinds along the pre-defined line and
- The 3D-Nanofinger® prepares a linescan profile across the abrasion groove, several times alternating with the Wear Tester.



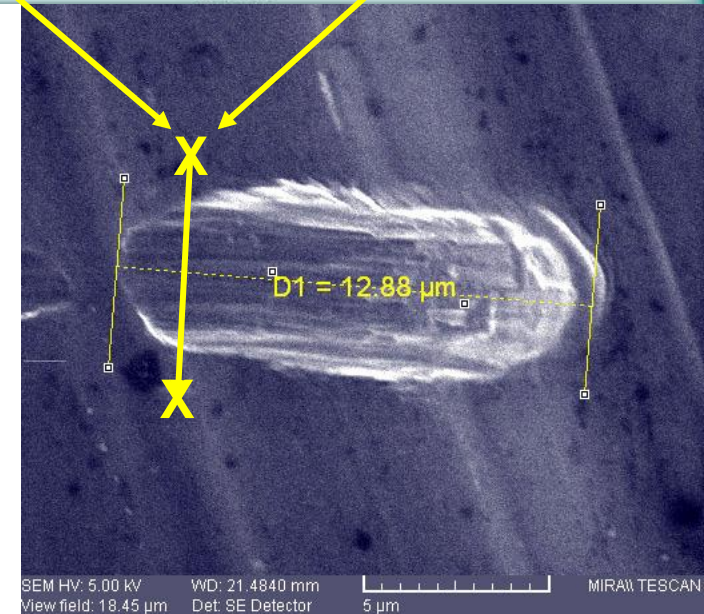


# Abrasive Wear Tester

Repeated abrasion ...



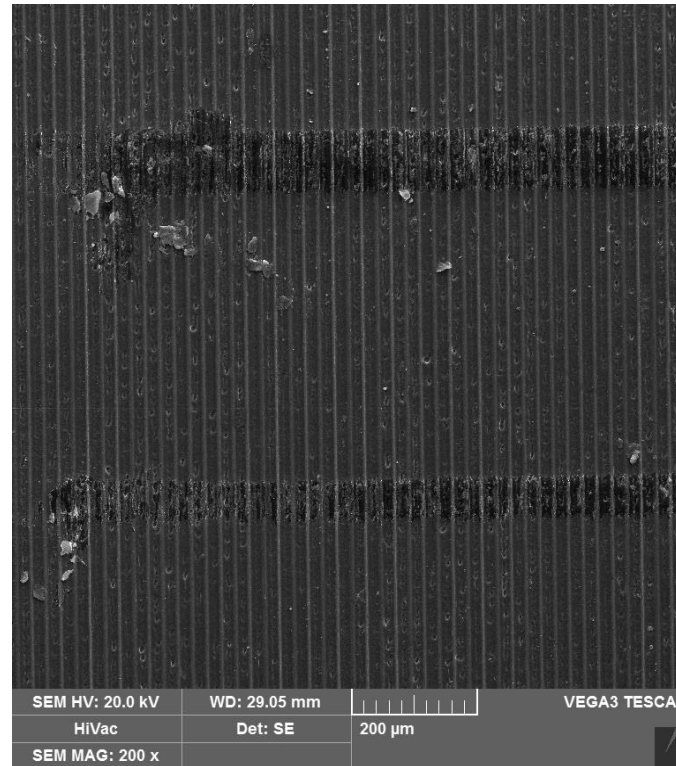
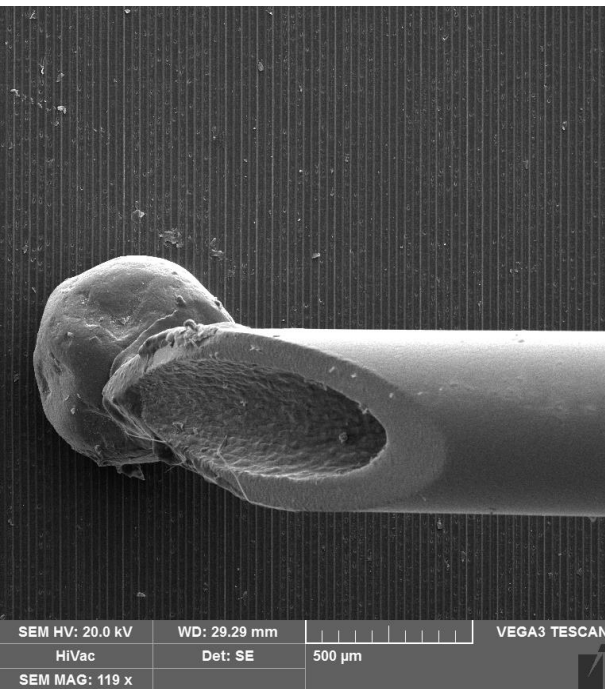
... plus  
line profiles



# Abrasive Wear Tester

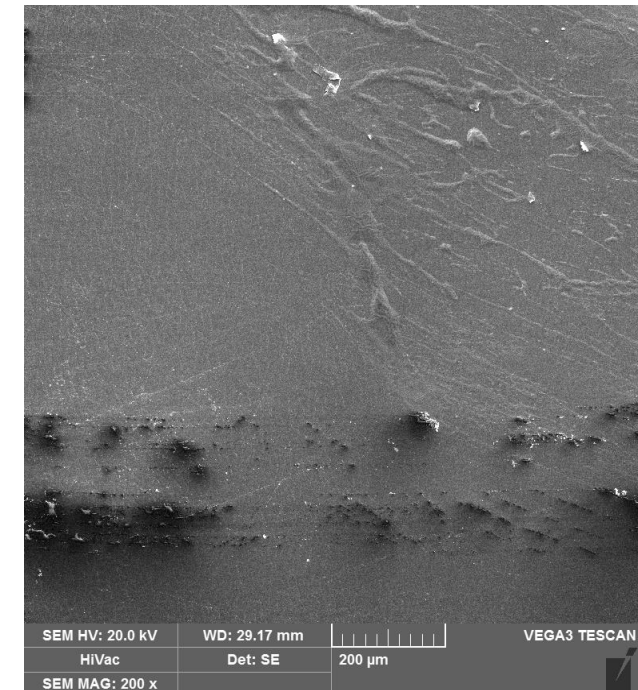
Examples

Sand grain as friction tip

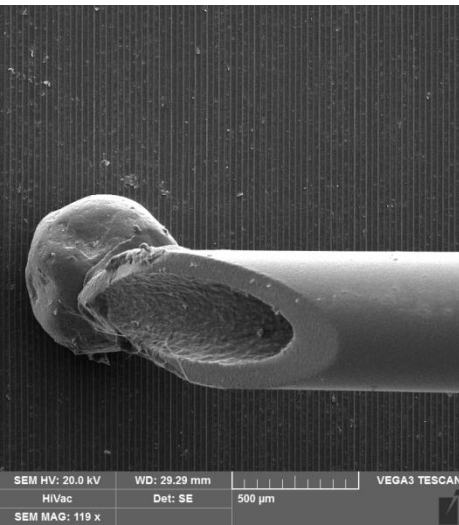


Artificial snake skin

Low wearout on  
sandfish skin

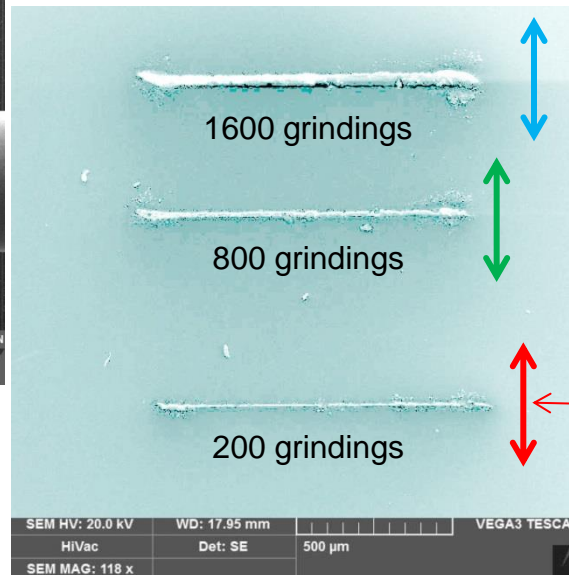




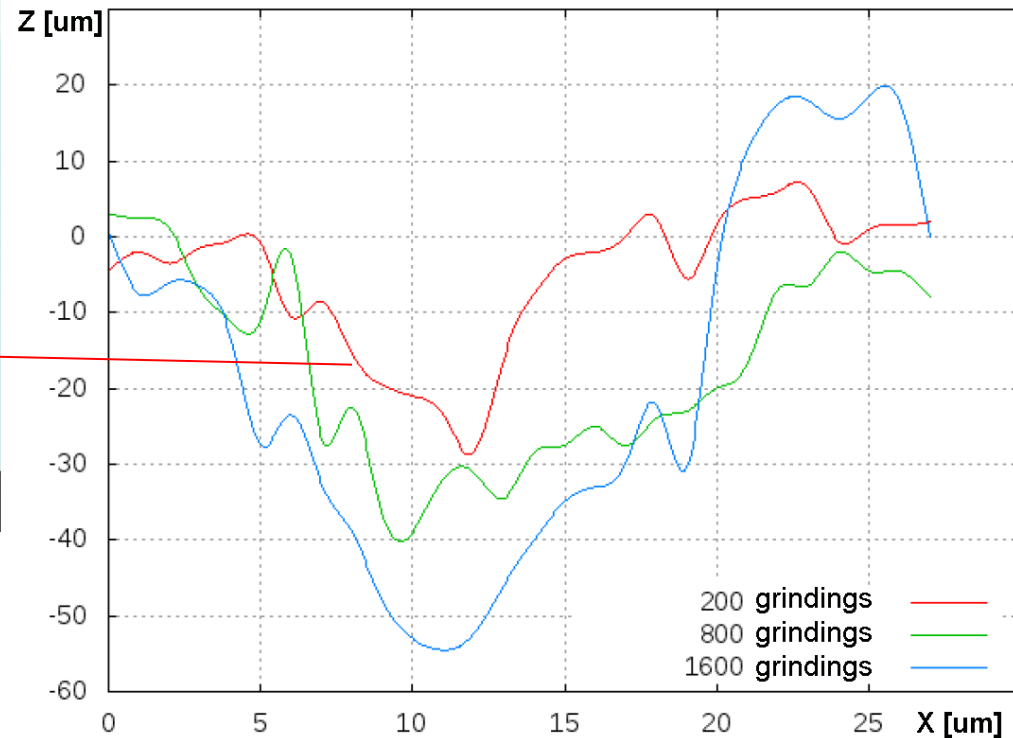


**Sand grain as  
friction tip**

**Abrasive lines  
in PMMA**



**3D-Nanofinger linescans**



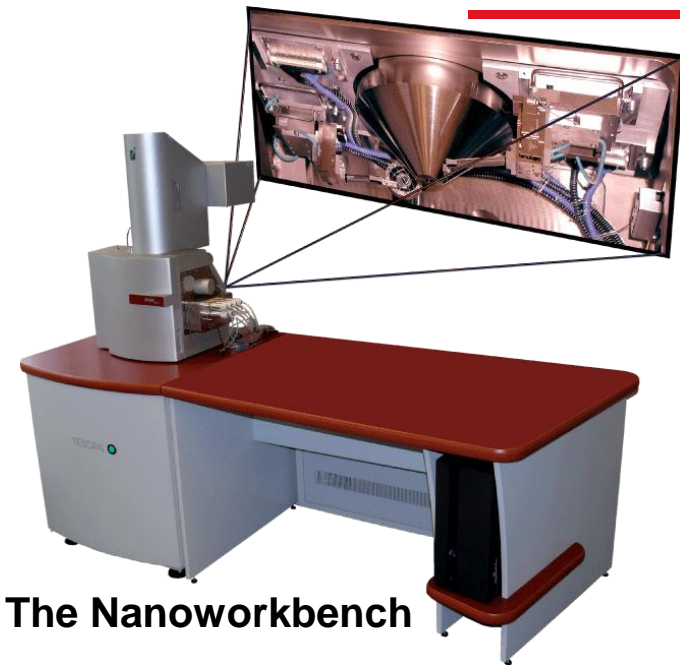


### Summary

- With the Nanoworkbench from Klocke Nanotechnik wearout testings on fine and coarse scale are very fast and easy.
- The Live Image Positioning module allows to define the wear testing area in XY just by mouse-clicks into the SEM image.
- The Nanofinger<sup>®</sup> operating as Scout guides the wear tester tool automatically to the sample, also to isolators.
- Automatic macros and absolute positioning in superior precision allow abrading line by line with automatic in-between profile measurements by the 3D-Nanofinger<sup>®</sup>.

# The Nanoworkbench

and its Application Packages



The Nanoworkbench

**The Abrasive Wear Tester ...**

**is one out of several “Standard Application Packages” of our [Nanoworkbench](#).**

The Nanoworkbench enables the hand-eye coordination as used at Light Microscopes now in any SEM/FIB, together with automation of the SEM/FIB (@ZEISS, FEI, TESCAN)



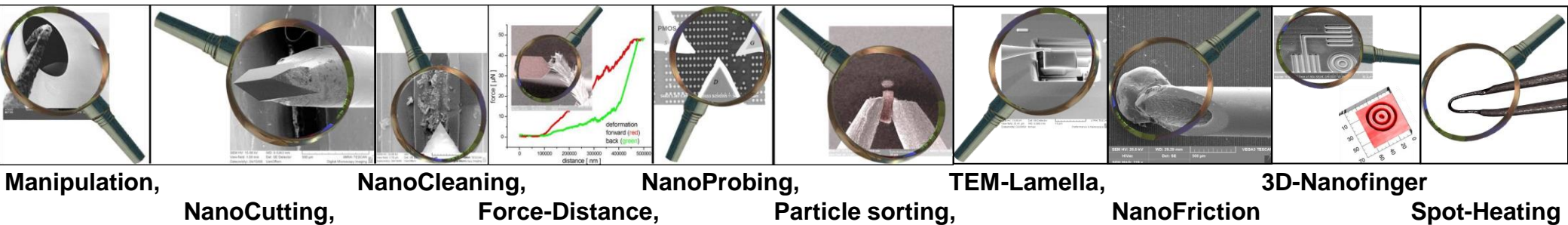
**At Light Microscopes** it is natural for everybody to use tool sets like tweezers, knives, hooks, probes and several different measurement tools, so it is with the Nanoworkbench.

# The Nanoworkbench

One Product for all applications

## The Nanoworkbench Standard Packet includes:

- The basic application package “Nanomanipulation” and
- one additional “Application Package” out of:



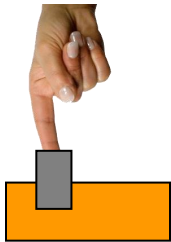
Each application package includes a standard tool, a standard sample and pre-defined processes as source-code and origin for own projects.

- The following set of modules for easy usage an application control:

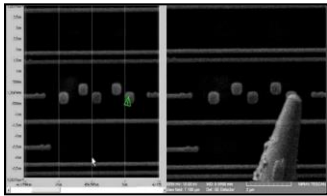


# The Standard Packet

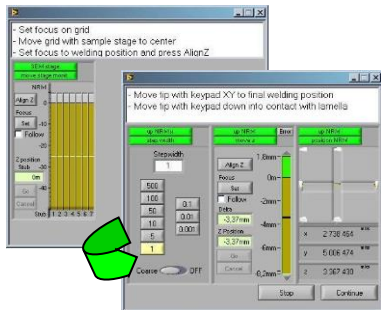
Hand-eye coordination:



Nanofinger® as scout, guiding the  
Nanoworkbench Tools,

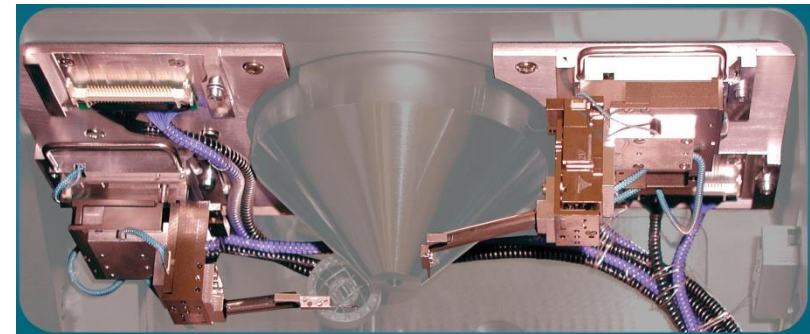
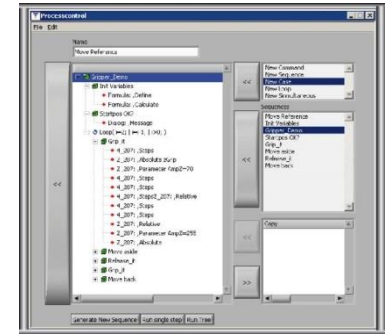


Live Image Positioning,



Assistants  
(Wizards),

Sequencer for automation,  
Macro Executor,  
Remote Control,  
...



2 Nanorobotics Manipulators  
with docking stations

**More information?**

**Please ask for the leaflet “Nanoworkbench”**

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