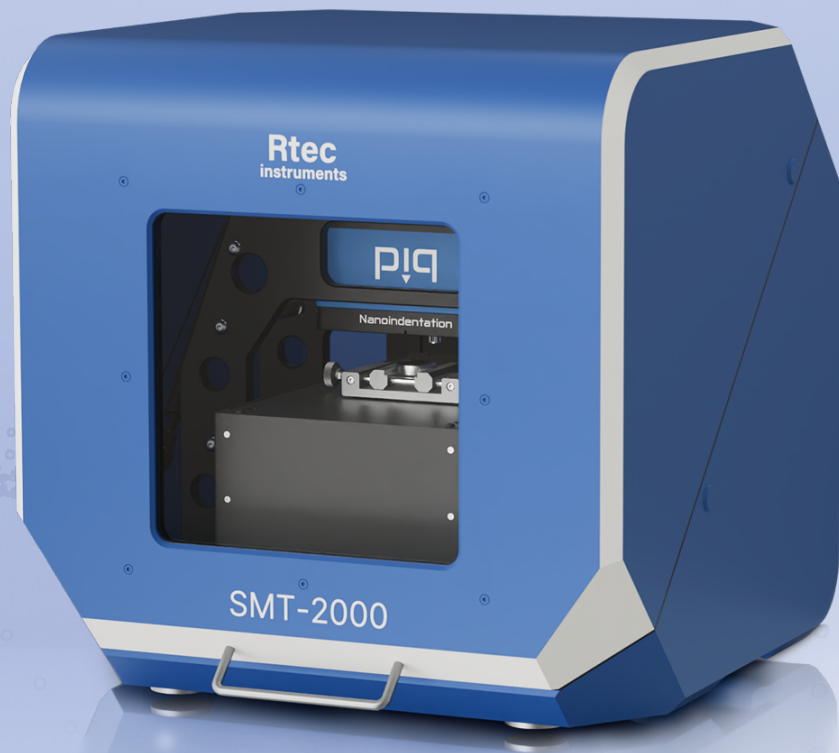




# Nanoindentation Tester SMT-2000



Precision in Every Measure  
Powering Industry Innovation

Hardness, Elastic Modulus,  
Viscoelasticity, Creep, Stiffness



# Next Generation Nanoindenter

Innovative, Robust, ASTM and ISO Compliant

- Hardness ( $H_{IT}$  and  $HV_{IT}$ )
- Elastic modulus ( $E_{IT}$ )
- Indentation creep ( $C_{IT}$ )
- Relaxation ( $R_{IT}$ )
- Work of indentation ( $W_{IT}$ )

## Closed-Loop Down Force Control

Real-time measurement and control of applied force  
Programmable constant, linear or step force profiles

## True Force and True Depth Sensors

Real force and depth sensors with unique capacitive technology

## Smart Nanoindenter Head

Force programmable and removable reference for the lowest frame compliance ( $< 0.01 \mu\text{m}/\text{N}$ )

## X, Y and Z Motorized Tables

For indentation matrices and fully automated processes, a 3-axis motorized stage with resolution of 20 nm

## High Reliability – Robust Design

Sound proof enclosure for a compact SMT-2000 platform with integrated vibration damping

## Optional Optical Microscope

Recognizing the importance of visual inspection, the SMT-2000 can be equipped with an optical microscope for precise test area selection and post-test impression visualization (5 Mpx camera)

## Full Digital Controller

Embedded state-of-the-art data acquisition controller connected with only one USB cable



## Introduction

The Rtec Instruments SMT-2000 PIQ Nanoindenter delivers exceptionally accurate and precise measurements of mechanical properties at the nanoscale.

With loads up to 500 mN, the SMT-2000 can perform a wide range of nanomechanical tests on a variety of materials, including thin films, metals, ceramics, coatings, polymers, and biomaterials.

## Precise Indentation Control

The high-precision nano-indenter SMT-2000 measures hardness, elastic modulus, creep and fatigue on almost any materials, from soft to hard and from fragile to brittle.

Using the latest actuation (piezo) and sensing technologies (capacitive sensors), the PIQ Nanoindenter quantifies reliable properties of any surfaces at the nanoscale without any compromise.

Force and displacement are controlled and measured continuously. The resulting load-displacement curves are used to calculate hardness, elastic modulus and additional properties.

## XYZ Stage

The tester has an automated XYZ platform for accurate movement of the sample under the indentation head.

## Software

The SMT-2000 has a Windows-based computer and an operation and data analysis software package. The operation software is a recipe-based software that allows it to run standard or previously created standard programs with a click of a button.

The software allows changes in force, frequency, and humidity during each step. It also allows the user to define endpoints

based on several in-line data that are monitored.

The analysis package comes with visualization and statistical data analysis. Multiple files and reports can be opened for easy comparison. Data can be stored in binary or ASCII format.

## Environmental Control

The tester has several environmental control options, including a closed-loop humidity control that uses a humidifier.

## Easy Connexion

The tester features a single USB cable for computer connectivity and a power cable for power supply.

## Applications

The SMT-2000 Nanoindentation Tester's versatility enables it to be used across several applications, such as biomaterial research, semiconductor devices, the development of new materials, polymers in medical devices, and so much more. Understand how materials respond to different parameters and design materials with enhanced wear resistance.

The SMT-2000 plays a critical role in advanced research and technology in these diverse fields.

## ISO and ASTM standards

Recognizing the importance of adherence to international standards, the SMT-2000 Nanoindentation is designed to fully meet all current regulatory requirements.

### ISO 14577-1:2015

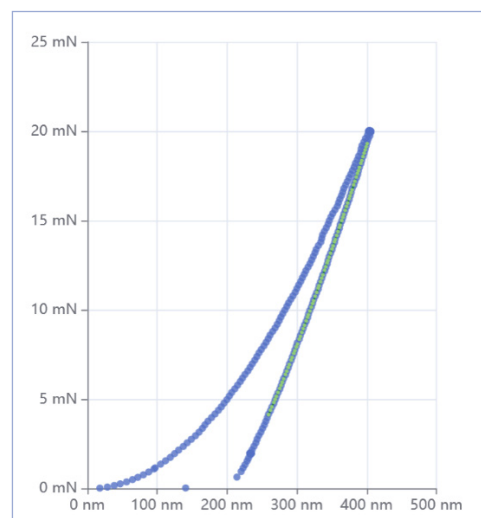
Metallic materials - Instrumented indentation test for hardness and materials parameters

### ASTM E2546-15

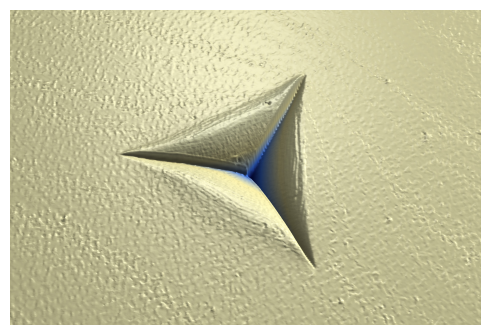
Standard Practice for Instrumented Indentation Testing

### ISO/TS 19278:2019

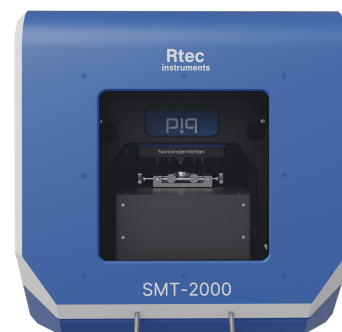
Plastics — Instrumented micro-indentation test for hardness measurement



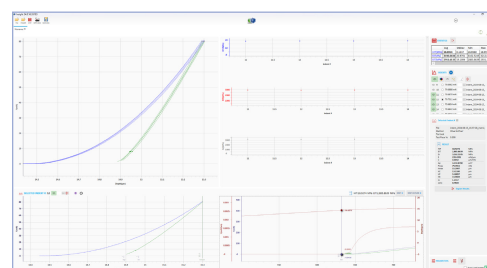
Load - displacement curve



3D Nanoindentation imprint



Front View of the SMT-2000



Software Interface



## Specifications

### Surface Materials Tester Platform (SMT-2000)

- Compact XYZ Stage  
50 x 120 x 15 mm
- Acoustic enclosure
- Size of 40 x 40 x 40 cm
- 30 kg

### PiQ Nanoindenter

Maximum indentation load	500 mN
Load resolution	0.015 $\mu$ N
Load noise floor [rms]	1 $\mu$ N
Maximum indentation depth	200 $\mu$ m
Depth resolution	0.005 nm
Depth noise floor [rms]	0.1 nm
Data acquisition rate	1 MHz



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