

T E N C O R I



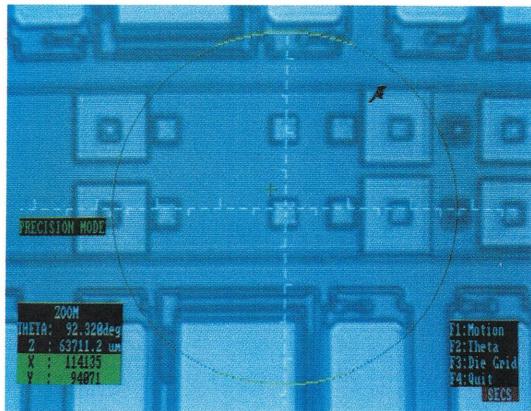
Tencor P-10 Surface Profiler

The Tencor® P-10 Surface Profiler provides high precision surface topography measurements on a wide variety of substrates. The system's exceptional performance features, flexible sample handling and powerful software capabilities make it the best choice for development engineering and research applications.

The P-10 features Tencor's Standard Range MicroHead measurement head, which offers fast scan speeds for high throughput, a constant stylus force throughout the measurement range for superior stylus control, and improved 3-D imaging.

With its stand-alone computer and powerful software, the Tencor P-10 can quickly characterize step heights, roughness, waviness, process-induced stress, radius of curvature and a range of geometric features. Two-dimensional traces and three-dimensional displays provide additional information critical to understanding surface conditions.

To meet a variety of development and process engineering requirements, the Tencor P-10's measurement chamber is designed to accommodate components of various forms and sizes including standard-sized semiconductor wafers, thin film disk heads, hybrids and other substrates.



A cross-hair in the video image view facilitates stylus positioning over the smallest features.

Roughness and waviness components can be separated and presented in a single display with other key data.

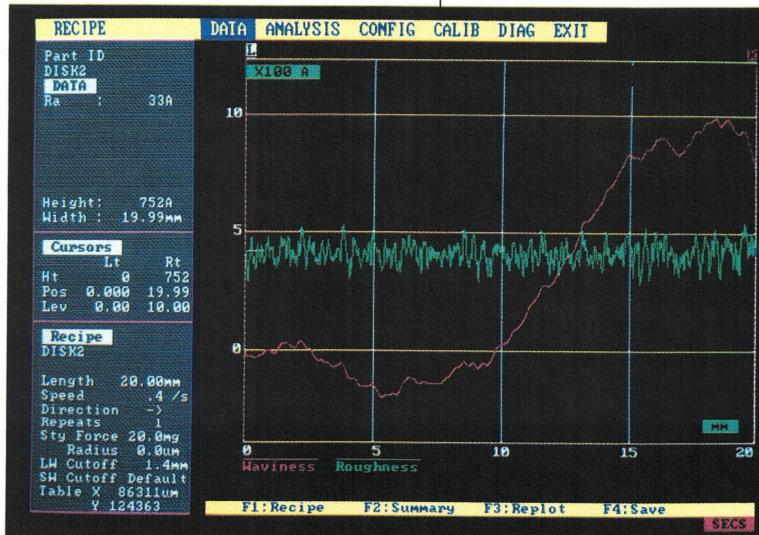
Precision Profiling

The Tencor P-10 offers a guaranteed step height repeatability of 8Å (1σ), allowing it to precisely determine the thinnest step heights, surface microroughness, microwaviness and overall form error on thin film coatings.

Tencor's state-of-the-art profiling technology ensures this guaranteed performance with ultra-low noise electronics, precision mechanical components, and exceptional measurement stability.

Accuracy on Soft Surfaces

With the optional MicroHead II measurement head—which offers stylus forces as low as 0.05 mg—the Tencor P-10 can provide accurate measurements even on soft surfaces such as indium, gold or photoresist.



The MicroHead II also offers dual-view optics, allowing operators to automatically switch between a top down view for fast stylus positioning, and an angled view for easily monitoring the stylus as it scans over the desired feature.

Flexible Sample Handling

The Tencor P-10 accommodates a variety of substrate sizes, shapes and weights. Samples as large as 254 x 254 mm and as thick as 63 mm can be easily measured. Two pre-programmed stage locations facilitate sample loading and unloading, while a *Motorized Theta and Leveling* option allows precise rotation of the sample up to 360 degrees. Once the sample is loaded, the stylus can be positioned anywhere in a 150 x 150 mm area using the motorized stage.

Specific features can be quickly located using the high-resolution video monitor, which magnifies the sample up to 1200 times (in the top down view) and displays a cross-hair indicating the stylus location in relation to the sample.

For measuring features with a high vertical range, such as the curvature of a spherical lens or magnetic tape heads, an optional Extended Range MicroHead is available, providing a vertical range of 1000 μ m—more than three times that of the Standard Range MicroHead or MicroHead II.

Fast, Comprehensive Analysis

The Tencor P-10's proprietary software simplifies system operation with pull-down menus, pop-up windows and fast on-screen commands.

All key parameters—such as scan length, speed, vertical resolution, stylus force, stylus descent rate, leveling and measurement cursor positions—can be programmed into a measurement “recipe” tailored for a specific application. The recipe can then be saved for repeated use by different operators. Recipes are stored with the measurement data for further analysis.

A bandpass filter function quickly separates raw data into roughness and waviness components which can be displayed simultaneously. 31 key parameters provide detailed analysis of surface parameters, including:

- Roughness
- Waviness
- Step height
- Area
- Slope
- Radius of curvature
- Profile length.

In addition, a *Database Manager/Import* feature allows data to be saved and retrieved according to multiple, user-defined categories such as production site, equipment, operator, process, time and other factors.

Powerful Software Options

A number of useful software options can be added to the Tencor P-10 to meet the needs of specific applications.

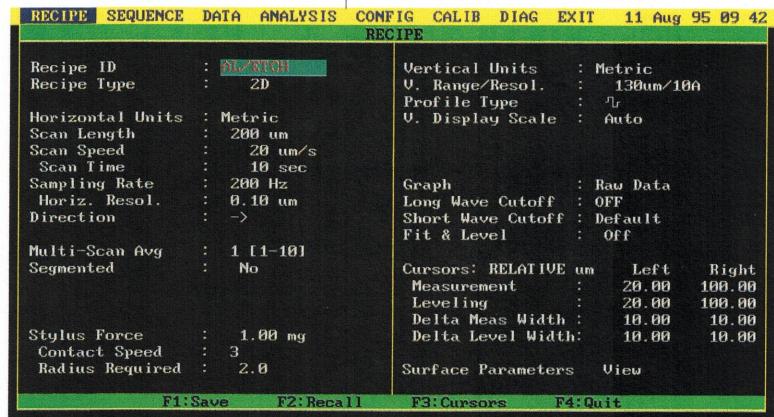
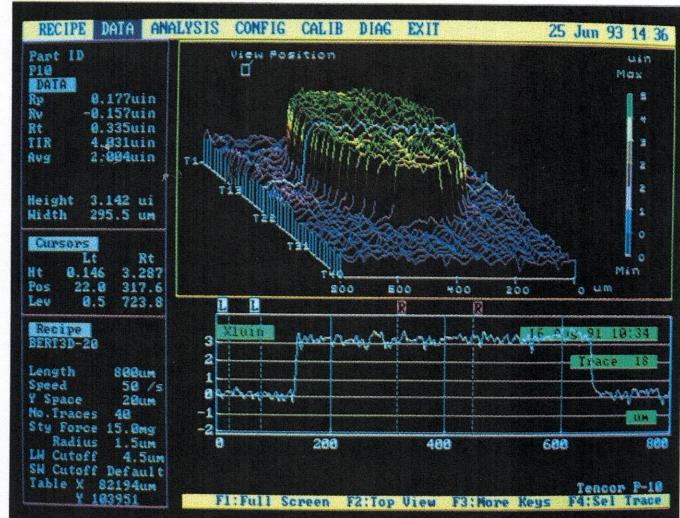
The *Additional Surface Roughness Parameters* option adds powerful in-depth analysis capabilities to the P-10.

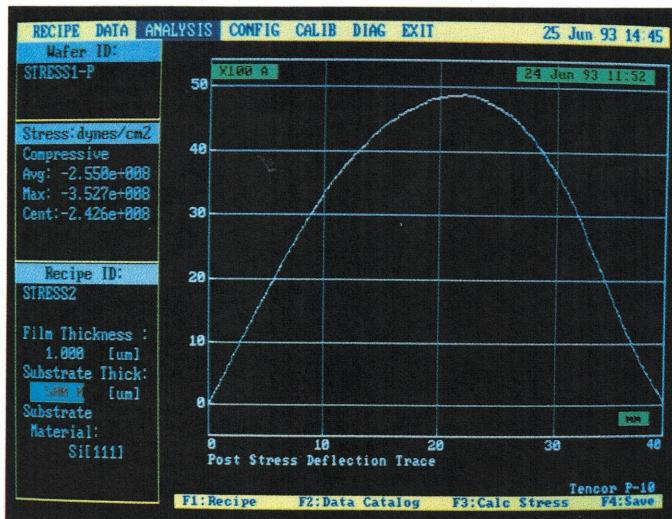
The total number of surface parameters is increased to 40 with the addition of the following functions:

- Bearing ratio (tp)
- Cutting depth (CutDp)
- Peak count (Pc)
- High spot count (HSC)
- Mean peak spacing (Sm)
- Mean peak height (Rpm)
- RMS slope and wavelength (Dq and Lq)
- Standard deviation of heights (SD)

Three-dimensional and selected two-dimensional data can be displayed on one easy-to-read screen.

User selected parameters can be programmed into a *Recipe* tailored for the specific application.





Pre- and post-stress profiles are used to calculate process-induced stress.

The Tencor P-10's low noise design and unique MicroHead measurement head ensure the precise and repeatable measurements required to create accurate three-dimensional images of the surface. The *Interactive 3-D* option allows surface artifacts such as defects, pits or scratches to be displayed. The software is highly interactive and provides unique zoom functions for closer inspection.

The *Stress Measurement* option accurately calculates process-induced film stress. A pre-stress scan is taken and saved prior to the process step selected for analysis. After processing, a post-stress trace is taken and the resulting difference trace shows the film stress created during the processing step. Average, maximum and center stress can be measured in dynes/cm² over a 60 mm scan length.

Selected Specifications

Scan Length: 60 mm (2.3")

Standard Stylus Force

Standard Range MicroHead: 1.0 - 50 mg,
0.1 mg resolution

Low Force Option

MicroHead II: 0.05 - 50 mg,
0.05 mg resolution

Extended Range Option

Extended Range MicroHead: Vertical range up to 1000 μ m

Step Height Repeatability, 1σ *

8 \AA maximum in the 13 μ m ($\pm 6.5 \mu\text{m}$) range

Maximum Sample Size

254 x 254 mm (10 x 10")
355 x 355 mm (14 x 14") with side panel removed

Physical Characteristics

Height(w/o monitor): 46 cm (17.5")
Width: 57 cm (23")
Depth: 78 cm (31")
Weight: 68 kg (150 lb)
Power Requirement: 150 VA

(For complete specifications see the Tencor P-10 specification sheet.)

*Measured 10 times at one position on a 9400 \AA VLSI Standard step height at 10 mg stylus force.

Specifications subject to change.



Tencor Instruments
Metrology Division
3231 Scott Blvd.
Santa Clara, CA 95054
Telephone: (408) 970-9500
FAX: (408) 982-9654