Offering more than 25 Years of Material Science Experience

RESEARCH AND CONSULTATION
Extensive range of research content such as brochures, application notes, publications, and videos.

EXPERT ASSISTANCE
Dedicated Profilometry experts happy to guide you through any question or project request.

CUTTING EDGE INNOVATION
At Nanovea we are always developing cutting edge technologies and standards. We innovate our instruments so that you can innovate your own products.

PRE AND POST INSTALLATION SUPPORT
Full walk-through and guide to make sure the instrument is installed perfectly. Dedicated support team to help you after your instrument has been installed.
INSTRUMENTS
ST400 OPTICAL PROFILER

- 200 x 150mm XY stages
- Video imaging integration
- Ideal for wide range of samples with varied geometries
- Chromatic confocal sensors w/ speed up to 200 times faster
- Rotational stage parallel or perpendicular to the testing plate
- Height sample clearance up to 200mm

3D CHROMATIC SENSORS
- Standard Sensor
- High Speed Sensor

VIDEO OPTIONS
- Atomic Force Microscope
- Zoom Microscope
THE STANDARD FOR PROFILOMETRY

- Automated 50mm Z
- Color Video Zoom Camera Integration
- Adjustable Height Clearance
- High Speed or Standard Sensor
- Spacious and Open Platform
- Joy Pad or Software Stage Control

**X - Y SCAN AREA**
200 x 150mm Motorized

**HEIGHT RANGE**
2.5mm to 25mm

**DESKTOP DIMENSIONS**
62 x 62 x 82cm

**SCAN SPEED**
40mm/s
ST500 LARGE AREA OPTICAL PROFILER

- High speed large area measurement w/ high speed sensor
- 400 mm XY axis travel with a maximum speed up to 200 mm/s
- Video zoom camera to provide automated functions
- Measurements with a user friendly desktop platform

3D CHROMATIC SENSORS

- Standard Sensor
- High Speed Sensor

VIDEO OPTIONS

- Atomic Force Microscope
- Zoom Microscope
HIGH SPEED AND LARGE AREA MEASUREMENT

- High Speed or Standard Sensor
- Adjustable Height Clearance
- Standard or Custom Sample Stage
- Automated 50mm Z
- Spacious and Open Platform
- Automated 400mm XY
- Emergency Stop
- Joypad or Software Stage Control

- X-Y SCAN AREA
  400 x 400mm Motorized

- HEIGHT RANGE
  2.5nm to 25mm

- DESKTOP DIMENSIONS
  97 x 72 x 92cm

- SCAN SPEED
  200mm/s
JR25 PORTABLE OPTICAL PROFILER

- First truly portable non contact profilometer
- Weight less than 5.5 kg
- Lab quality results on the go
- Measurement capabilities up to 25mm x 25mm
- Able to measure samples at difficult angles
- Possible integration into automated robot arms and other equipment

3D CHROMATIC SENSORS

- Standard Sensor
- High Speed Sensor

VIDEO OPTIONS

- Atomic Force Microscope
- Zoom Microscope
LABORATORY QUALITY RESULTS IN ANY LOCATION

- **25mm XY Scanning**
- **Standard Sensor**
- **Vertical or Horizontal Standing Positions**
- **Quick and Easy Sensor Holder**
- **Manual 30mm Z Control**
- **Rotational Head**

**Technical Specifications**

- **X - Y SCAN AREA**: 25 x 25mm Motorized
- **HEIGHT RANGE**: 2.5mm to 25mm
- **DESKTOP DIMENSIONS**: 20 x 30 x 17cm
- **SCAN SPEED**: 20mm/s
PS50 COMPACT OPTICAL PROFILER

- Most advanced compact profilometer
- Small and simple footprint
- Measurement capabilities up to 50mm x 50mm
- All testing capabilities in compact version

3D CHROMATIC SENSORS
- Standard Sensor
- High Speed Sensor

VIDEO OPTIONS
- Atomic Force Microscope
- Zoom Microscope
MOST ADVANCED COMPACT BENCHTOP

- Quick and Easy Sensor Holder
- Standard Sensor
- Standard or Custom Sample Holder
- Automated 50mm XY Control
- Compact Base

**X - Y SCAN AREA**
50 x 50mm Motorized

**HEIGHT RANGE**
2.5mm to 25mm

**DESKTOP DIMENSIONS**
38 x 33 x 43cm

**SCAN SPEED**
20mm/s
JR100 PORTABLE & HIGH SPEED OPTICAL PROFILER

- Fast measurement (without stitching) using a 100 mm XY axis travel
- Z stage allows setup of measurements at various starting heights
- A high speed sensor gives ultra fast measurements at 382,000 points per second.
- Powerful for quality control

3D CHROMATIC SENSORS

Standard Sensor  High Speed Sensor

VIDEO OPTIONS

Atomic Force Microscope  Zoom Microscope
PORTABILITY AND HIGH SPEED

- High Speed Sensor
- Manual 25mm Z Control
- 100mm X Scanning
- 100mm Y Scanning

**Specifications:**

- **X - Y SCAN AREA:** 100 x 100mm Motorized
- **HEIGHT RANGE:** 2.5nm to 25mm
- **DESKTOP DIMENSIONS:** 44 x 49 x 32cm
- **SCAN SPEED:** 20mm/s
AFMPRO OPTICAL PROFILER

- 150 x 200mm XY stages and an adjustable height clearance of up to 140mm
- High magnification microscopy
- AFM expands the 3D capabilities into the sub nanometer range
- AFM gives the best lateral accuracy compared to optical techniques
- Easy to select zones on the video to be scanned

3D CHROMATIC SENSORS

- Standard Sensor
- High Speed Sensor

VIDEO OPTIONS

- Atomic Force Microscope
- Zoom Microscope
OPTICAL PROFILER WITH AFM MODULE

- Automated 50mm Z
- Color Video Zoom Camera Integration
- High Speed or Standard Sensor
- Spacious and Open Platform
- AFM Integration
- Adjustable Height Clearance
- Joy Pad or Software Stage Control

**X - Y SCAN AREA**
200 x 150mm Motorized

**HEIGHT RANGE**
2.5mm to 25mm

**DESKTOP DIMENSIONS**
64 x 64 x 82cm

**SCAN SPEED**
40mm/s
**HS2000 ZERO NOISE & FLATNESS OPTICAL PROFILER**

- Granite base and air bearing stages provide superior stability
- Flatness of <1 micron over 500mm with no software correction needed
- Automated inspection for quality control
- Workstation included to create fully contained stand alone instrument
- Excellent for roughness measurements, combined with advanced automation features

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**3D CHROMATIC SENSORS**

- Standard Sensor
- High Speed Sensor

**VIDEO OPTIONS**

- Atomic Force Microscope
- Zoom Microscope
HIGH SPEED AND PRECISION FLATNESS TOOL

- High Speed or Standard Sensor
- Automated 100mm Z Control
- Standard or Custom Stage Option
- Solid Granite Construction
- Stand Alone Enclosure
- High Speed Airbearing 400mm X
- Video Zoom Integration
- Spacious and Open Platform
- Customizable High Speed Airbearing 500mm Y

- **X - Y SCAN AREA**
  - 400 x 500mm Motorized

- **HEIGHT RANGE**
  - 2.5mm to 25mm

- **DESKTOP DIMENSIONS**
  - 101 x 106 x 195cm

- **SCAN SPEED**
  - 500mm/s
TECHNIQUE
CHROMATIC CONFOCAL

Chromatic Confocal technique uses white light that passes through a series of lenses with high degree of chromatic aberrations. Each wavelength will focus at a different distance creating the vertical measurement range. When a surface of interest is within the measurement range a single wavelength of the white light will be in focus while all others will be out of focus.

Only the focused wavelength will pass through the pin hole filter to reach the CCD spectrometer. The physical wavelength measured corresponds to a vertical position.

◆ NO USE OF COMPLEX ALGORITHIMS
◆ NO LEVELING REQUIRED
### Lateral Resolution vs Accuracy

#### The Problem with Other Techniques

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Pixel</td>
<td>Not enough data to calculate focus, no practical use. Pixel size resolution: 2 nm</td>
</tr>
<tr>
<td>3x3</td>
<td>Focus can be calculated, the smallest increment for any practical use. Effective accuracy: 1040 nm</td>
</tr>
<tr>
<td>6x6</td>
<td>Focus can be calculated, the smallest increment for any practical use. Effective accuracy: 1040 nm</td>
</tr>
<tr>
<td>30x30</td>
<td>Focus can be calculated, the smallest increment for any practical use. Effective accuracy: 1040 nm</td>
</tr>
<tr>
<td>135x135</td>
<td>Focus can be calculated, the smallest increment for any practical use. Effective accuracy: 1040 nm</td>
</tr>
<tr>
<td>520x520</td>
<td>Focus can be calculated, the smallest increment for any practical use. Effective accuracy: 1040 nm</td>
</tr>
</tbody>
</table>

**Them**

Camera pixel size or display resolution size are often used as lateral resolution to impress clients. For these, complex algorithms used to determine what is actually in focus gives a very different story of actual accuracy especially on complex surfaces.

**Us**

Chromatic Confocal lateral accuracy is determined by physics and directly related to the spot size of the light.
<table>
<thead>
<tr>
<th>LASER SCANNING CONFOCAL MICROSCOPE</th>
<th>VS</th>
<th>WHITE LIGHT CHROMATIC CONFOCAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser Light Health Hazard</td>
<td>SAFE WHITE LIGHT</td>
<td></td>
</tr>
<tr>
<td>Need for care of reflected light</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in wavelength of laser</td>
<td>UNIFORM BROAD WHITE LIGHT</td>
<td></td>
</tr>
<tr>
<td>light affects results on the same</td>
<td>SPECTRUM</td>
<td></td>
</tr>
<tr>
<td>sample</td>
<td>No effect of light intensity on</td>
<td></td>
</tr>
<tr>
<td></td>
<td>results</td>
<td></td>
</tr>
<tr>
<td>Non significant “display</td>
<td>INDEPENDENT LATERAL &amp; HEIGHT</td>
<td></td>
</tr>
<tr>
<td>resolution” Height &amp; lateral</td>
<td>ACCURACY</td>
<td></td>
</tr>
<tr>
<td>accuracy fixed by objective used</td>
<td>Any scan area at selected height</td>
<td></td>
</tr>
<tr>
<td>Complex accuracy calculations</td>
<td>accuracy</td>
<td></td>
</tr>
<tr>
<td>Alpha blending algorithms to</td>
<td>NO ALGORITHMS</td>
<td></td>
</tr>
<tr>
<td>combine layer by layer data for</td>
<td>Physical Wavelength Measured =</td>
<td></td>
</tr>
<tr>
<td>complex accuracy calculation</td>
<td>Accurate Height</td>
<td></td>
</tr>
<tr>
<td>Limited fixed field of view</td>
<td>NO STITCHING</td>
<td></td>
</tr>
<tr>
<td>Inaccurate stitching algorithms</td>
<td>Continuous scanning of larger</td>
<td></td>
</tr>
<tr>
<td>for larger surfaces</td>
<td>surfaces</td>
<td></td>
</tr>
<tr>
<td>Data Acquisition speed 7900 Hz</td>
<td>Accuracy constant across any</td>
<td></td>
</tr>
<tr>
<td></td>
<td>measurement size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50x FASTER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High Speed Sensor 384000 Hz</td>
<td></td>
</tr>
</tbody>
</table>
### Scanning a Coin

**50x Objective vs High Speed Sensor (950 μm)**

#### Lateral Accuracy

For 50x objective (370 x 277 μm):
- ± 2% of measuring value
- ± 2% x 370 μm
- ≈ 15 μm
- w/ stitching algorithms >> 15 μm

**Step size:**
- = 5 μm
- **Ultimate Limit:** 0.9 μm

**3x Better Lateral Accuracy**

#### Height Accuracy

- ≈ 0.2 + L/100 μm
- ≈ 0.2 + 950/100 μm
- ≈ 9.7 μm

- **950 μm range**
- ≈ 0.6 μm
- **Ultimate Limit:** 0.014 μm

**16x Better Height Accuracy**

#### Area Tested

**Stitching Required**

- # scans (25 x 25 mm)
- 25 000 μm / 370 μm x 25 000 μm / 277 μm
- 68 x 91
- = **6188 scans**

**No Stitching**

- Constant accuracy across any measurement size

**1 Scan**

#### Test Time

- 6 sec per scan
- + 4 sec displacement & stitching
- = 10 sec/scan x 6188 scans
- = **61860 seconds** (≈ 17 hours)

**Scan time (25 x 25 mm)**
- = **29.6 seconds**

**2090x Faster**
TESTING
SOLUTIONS
**ROUGHNESS | FINISH**

- One second Ra measurement
- Any materials or surface complexity (3D or 2D)
- Automotive roughness finish standards

**ROUGHNESS | FINISH ANALYSIS**

- Ra | Sa profile & surface average roughness
- Rq | Sq profile & surface rms roughness
- Rz | Sz maximum height
- Sp | Sv maximum peak & pit height
- SKu | Ssk kurtosis & skewness of height distribution
- Bearing ratio and index
- Sk kernel roughness depth
- Spk | Svk reduced peak height & valley depth
- Sr1 | Sr2 upper & lower material ratio
- Sci & Svi core & valley fluid retention index

**TEXTURE**

- Isotropic & anisotropic surfaces
- Hills and valleys analysis

**TEXTURE ANALYSIS**

- % of isotropy
- 1st, 2nd and 3rd direction
- % of periodicity
- Period
- Density of peaks
- Peak curvature (pointed or rounded)
- Average area of valleys & hills
- Average volume of valleys & hills
**FLATNESS | WARPAGE**

- Flatness <1μm over 500mm with no correction

**FLATNESS | WARPAGE ANALYSIS**

- 3D & 2D surface waviness & flatness
- Best polynomial match
- Material & bearing ratios
- Distance measurement
- FLT peak to valley flatness deviation of the surface
- FLTp peak to reference flatness deviation
- FLTv reference to valley flatness deviation
- FLTq rms flatness deviation

**AND MORE**

**VOLUME | AREA**

- Surface subtraction & volume lost
- Corrosion analysis
- Motif and grain analysis

**VOLUME | AREA ANALYSIS**

- Volume of void, hills or valleys
- Sdar | Spar developed surface area & projected area
- Volume of void & material from given height
- Map area above or below given heights (%,um²)
- Mean thickness of void & material from given height
- # of grains & average size
- Area & perimeter of grains
- Height, area, volume of motifs
- Max and min pitch of motifs

**AND MORE**
GEOMETRY AND SHAPE

- Direct comparison to CAD geometry
- Curvature, radius, angles
- Lateral dimension
- Drill bit studies
- Cutting tools studies

STEP HEIGHT | THICKNESS

- Measure through transparent materials
- Transparent film and coating thickness down to 20nm
- Steps from 20nm to 25mm

GEOMETRY AND SHAPE ANALYSIS

- Radius of curvature
- Relative angle measurement
- Distance measurement
- Mean diameter
- Contour analysis
- Rake and wedge angle of drill bit
- K symmetry of cutting edge
- S alpha and gamma dist apex to end of clearance & rake roundness

STEP HEIGHT | THICKNESS ANALYSIS

- Point to point
- Point to plane
- Maximum, minimum and mean heights
- 3D or 2D map of thickness
- Thickness distribution curve

AND MORE
**MICROSCOPE VIDEO IMAGING**

Available on: **ST400, ST500, AFMPRO, & HS2000**

- Ultra zoom lens with coax lighting & detent
- Large area stitching capability
- Color video camera (1200x1600)
- Maximum magnification of 8000X
- Three positions turret (optional)

**Broadview map selection tool**

**PRVision for machine vision capability**

**Image area selection measurement and image overlay**
ATOMIC FORCE MICROSCOPE

Available on: AFMPRO

- Scan of XY 110μm | high resolution XY 25μm
- Lateral resolution 1.7nm
- Static, dynamic and extended modes
- Max Z range 22μm | 5μm
- Integrated video camera
- AFM to/from indenter position or video imaging with accuracy of < 0.2μm
ADVANCED AUTOMATION

- Automatic focus (optical and microscope)
- Automatic analysis template
- Multi sample handling macros
- Easy selection of area under microscope
- Automatic dual frequency for surfaces with varying reflections
- Custom mounting setup of sensors for inline roughness QC
- Pattern recognition, database communications, pass/fail limits
Nanovea Optical Profilers **measure any material with a wider range of measurement** than any other Profilometer.
<table>
<thead>
<tr>
<th>BASE</th>
<th>Jr25</th>
<th>Jr100</th>
<th>PS50</th>
<th>ST400</th>
<th>ST500</th>
<th>HS2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Portable &amp; Compact</td>
<td>Compact</td>
<td></td>
<td>Standard</td>
<td>Large Area</td>
<td>Zero Noise / Flatness</td>
</tr>
<tr>
<td>X-Y Stage Travel</td>
<td>25 x 25mm</td>
<td>100 x 100mm</td>
<td>50 x 50mm</td>
<td>200 x 150mm</td>
<td>400 x 400mm</td>
<td>400 x 500mm</td>
</tr>
<tr>
<td>Z Axis</td>
<td>30mm Manual</td>
<td>25mm Manual</td>
<td>30mm Manual</td>
<td>50mm Motorized</td>
<td>50mm Motorized</td>
<td>100mm Motorized</td>
</tr>
<tr>
<td>Maximum X-Y Speed</td>
<td>20 mm/s</td>
<td>20 mm/s</td>
<td>20 mm/s</td>
<td>40 mm/s</td>
<td>200 mm/s</td>
<td>500 mm/s</td>
</tr>
<tr>
<td>System Dimensions</td>
<td>20 x 30 x 17cm</td>
<td>44 x 49 x 32cm</td>
<td>38 x 33 x 43cm</td>
<td>62 x 62 x 82cm</td>
<td>97 x 72 x 92cm</td>
<td>101 x 106 x 195cm</td>
</tr>
<tr>
<td>Rotational Options</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Stage or Cylinder</td>
<td>Stage or Cylinder</td>
<td>Software</td>
</tr>
<tr>
<td>Video Microscope</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Max Sample Weight</td>
<td>No Limit</td>
<td>No Limit</td>
<td>8 Kg</td>
<td>23 Kg</td>
<td>34 Kg</td>
<td>34 Kg</td>
</tr>
<tr>
<td>High Speed Line Sensor</td>
<td>N/A</td>
<td>Included</td>
<td>N/A</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Customizable</td>
<td>50mm Stage Travel</td>
<td>N/A</td>
<td>N/A</td>
<td>4 axis &amp; AFM</td>
<td>4 axis</td>
<td>400 x 750mm &amp; 5 axis</td>
</tr>
</tbody>
</table>

**MEASUREMENT TECHNOLOGY**

- **Technique**: Non Contact • Chromatic Light
- **Data Stitching**: Not Required within X-Y Stage Travel
- **Materials Types**: ALL - Including Dark, Transparent, & Reflective
- **Max Surface Angle**: Up To 87°
- **Max Vertical Resolution**: 1 nm

**STANDARD SENSOR** (Single Point)

<table>
<thead>
<tr>
<th>PS1</th>
<th>PS2</th>
<th>PS3</th>
<th>PS4</th>
<th>PS5</th>
<th>PS6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Height Range</td>
<td>110µm</td>
<td>300µm</td>
<td>1.1mm</td>
<td>3.5mm</td>
<td>10mm</td>
</tr>
<tr>
<td>Working Distance</td>
<td>3.35mm</td>
<td>10.8mm</td>
<td>12.0mm</td>
<td>16.2mm</td>
<td>25.9mm</td>
</tr>
<tr>
<td>Lateral Accuracy (X-Y)</td>
<td>0.9µm</td>
<td>1.2µm</td>
<td>2.0µm</td>
<td>3.0µm</td>
<td>7.0µm</td>
</tr>
<tr>
<td>Height Repeatability (Ra) *</td>
<td>1.2nm</td>
<td>2.2nm</td>
<td>3.4nm</td>
<td>17nm</td>
<td>31nm</td>
</tr>
</tbody>
</table>

**HIGH SPEED SENSOR** (192 Points)

<table>
<thead>
<tr>
<th>LS1</th>
<th>LS2</th>
<th>LS3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Height Range</td>
<td>200µm</td>
<td>0.95mm</td>
</tr>
<tr>
<td>Working Distance</td>
<td>5.3mm</td>
<td>18.5mm</td>
</tr>
<tr>
<td>Height Repeatability (Ra) *</td>
<td>14nm</td>
<td>21nm</td>
</tr>
<tr>
<td>Line Width</td>
<td>0.96mm</td>
<td>1.91mm</td>
</tr>
<tr>
<td>Pitch</td>
<td>5µm</td>
<td>10µm</td>
</tr>
<tr>
<td>Lateral Accuracy of each point</td>
<td>1µm</td>
<td>2µm</td>
</tr>
<tr>
<td>Acquisition Rate (points per second)</td>
<td>384KHz</td>
<td>384KHz</td>
</tr>
</tbody>
</table>

* Fixed point on glass, average height variation for 1200 points (100 sampling)
Today's Standard For Tomorrow's Materials.

NANOVEA instruments can be found in renowned education and industrial organizations around the world. From aerospace applications to medical devices, thousands of clients at the frontiers of the most demanding industries, with no room for error, rely on our instruments' unmatched accuracy and technical superiority.