The Profilometers are designed with leading edge Chromatic Confocal optical technology (axial chromatism) both ISO and ASTM compliant. The technique measures a physical wavelength directly related to a specific height without using any complex algorithms. This ensures accurate results for all surface conditions. There is no influence from sample’s reflectivity, no need for frequent calibrations and no effects due to changes in measurement parameters. Utilizing a raster scan, the Profilometer can measure in 2D and 3D at standard speeds with an Optical Pen or 200 times faster with a Line Sensor, allowing a flexible measurement solution for all applications. The platforms can be integrated with wide area video imaging which extends the Profilometers with user friendly automation. Several automation options are available including: programmable recipes, pattern recognition, machine vision, automatic pass/fail results and database communication. Many standard Profilometer models are available including a first fully portable Profilometer, the Jr-25. Profilometers can also be custom built with various platform sizes, motorization configuration (rotational, high speed and Class 1 Clean Room). The Profilometers durability and low cost of use are ideal for quality control environments.
The Jr25 is the first truly portable high performance Profilometer of its kind. With an optional battery pack and carrying case, the Jr25 provides measurement capability during field studies. The Jr25 is designed to utilize the superior Chromatic Confocal technique with complete portability. With a total weight less than 5.5 Kg, the operator can safely place the Jr25 onto the surface under inspection. The Jr25 has the ability to measure an area up to 25mm x 25mm and focusing on the surface is easy with an adjustment range of 30mm. With a fully rotational scanning head, the Jr25 has the ability to measure surfaces at difficult angles. Along with quick and ease of use, the Jr25 has been designed specifically for production environments where samples cannot be moved or in open field studies. The scanning head of the Jr25 can also be integrated onto automated robotic arms and other equipments.
With a small and simple footprint, the PS50 is the most advanced compact Profilometer available. The high-performance PS50, with 50mm X-Y stages, is the ideal choice for upgrade and replacing stylus and laser profilers. The PS50 has the option of running by laptop which makes for an easy moving and installation where space is critical. Comes standard with 150mm x 150mm sample stage to accommodate multiple and or larger samples. Quality Control options with macros for automatic testing and analysis recipes.
With 150mm X-Y stages and an adjustable height clearance of up to 200mm, the ST400 is ideal for a wide range of samples with varied geometries. With the optical video zoom or optical microscope, high magnification microscopy work can be done in combination with measuring roughness and other properties at precisely selected locations. An AFM integration expands the 3D capabilities into the sub nanometer range including laterally which is not attainable with any optical technique. The advanced software makes it easy to select zones on the video to be scan automatically by Profilometer or by the AFM. Quality control options are available to automate various aspects of testing including image pattern recognition, database communications, macros for automatic testing and analysis recipes. Chromatic Confocal line sensors are also available on this system to allow speed of up to 200 times faster than the single point sensor. Custom ST400’s are available for more open configurations that allow for larger X-Y stages, 360° rotational stages many other custom configurations.
After years of success with the ST400 and HS1000 Nanovea has created a middle, meet the ST500 Profilometer, for requirements exceeding the ST400 but not quite that of the HS1000. The ST500 provides fast large area measurement (without stitching) using a 400 mm X-Y axis travel with a maximum speed up to 200 mm/s. With a 50 mm Z axis the system can be equipped with either an optical pen or line sensor for ultra fast measurement (384,000 points per second). Unlike other technologies, each point is a direct, full depth of field during large area measurement without the need of refocusing. A video zoom camera can also be used to provide automatic function to large area measurement complete on a desktop user friendly platform.

**OPTICAL OPTIONS**

- Line Sensor
- Optical Pen

**Features**

- Line sensor or quick & easy pen holder
- Video zoom camera integration
- Automated 50mm Z
- Adjustable height clearance
- Spacious and extended open platform
- Standard or custom sample stage
- Joy Pad or software stage control
- Automated 400mm XY

**Dimensions**

86 x 73 x 88 cm
The HS1000 provides automated optical inspection at high speeds (up to 1m/s & data acquisition up to 31KHz) for quality control applications where speed and large areas or multiple measurements is critical. The HS1000 with its granite base provides superior stability at high speeds and comes with an enclosure and workstation to create a fully contained stand-alone instrument. The HS1000 equipped with a line sensor can inspect at speed of up to 200 times faster. Optimized versions of the HS1000 Profilometer is available with various options including scan areas up to 1m x1m for Photovoltaic, Solar Cell, Microelectronics and Aspheric production environments. Designed for stable high speed measurement, advanced automation and customizable options.

**OPTICAL OPTIONS**

- Line Sensor
- Optical Pen
- Video zoom for pattern recognition
- Automated 50mm Z control
- Solid granite construction
- Standard or custom sample stage
- High speed 31KHz data acquisition
- Spacious and open platform
- Quick and easy pen holder or line sensor integration
- Customizable high speed 400mm x 600mm XY
**Wide Area Video Imaging** | The video imaging option provides user ability to select an area to be measured through live camera view. The camera is offset to the Optical Pen with a calibrated distance through the Nanovea 3D software. Complete with manual or motorized zoom capabilities with a diagonal field of view ranging from 11.42mm to 1.77mm. Broadview Map Selection is available in the software that allows user to take a picture of the surface and stitch multiple images together for Broadview Map Selection. (PRVision) Pattern recognition Software can also be included when imaging option is added. Microscope Video Imaging is also an option for higher magnification microscope applications. 12X Ultra zoom Lens with coax lighting & detent. Color Video Camera (PAL 1200x1600). 5X objective for total video magnification of 1X to 100X. Objectives up to 100x available for maximum magnification of 2000X.
The Chromatic Confocal technique uses a white light source (LED) that passes through a series of lenses, called an optical pen, which has a high degree of chromatic aberration. The refractive index of the lenses will vary the focal distance of each wavelength of the white light. In effect, each separate wavelength of the white light will focus at a different distance from the optical pen, creating the 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. The white light is then reflected back through the optical pen, then through a pin hole filter that allows only the focused wavelength to pass through to a CCD spectrometer. The CCD will indicate the wavelength in focus, which corresponds to a specific distance for a single point. The physical wavelength measured uses no algorithms providing the highest accuracy independent of form, roughness level, illumination and measurement speed. There is no special leveling procedure required. And while others make claims of resolutions Nanovea provides high accuracy.

Chromatic Confocal by design ensures the highest accuracy of all optical techniques. Specifically when measuring surfaces that are geometrically complex (randomly rough surfaces). Other techniques are subject to many error sources that are simultaneously present and it is not possible to remove or compensate for them or even to estimate their combined influences. The Profilometers offer high accuracy across the widest range of materials and surfaces conditions including tissues, biomaterials, polymers, plastics, metals, composites and ceramics. Examples of particularly demanding applications where Chromatic Confocal performs better than any other technique includes: corrosion, scratches & wear tracks, non-reflective/reflective surfaces and shapes or surfaces with steep angles.
Chromatic confocal provides the highest level of accuracy for the measurement of surface roughness, texture or finish. This is because the technique measures a direct physical wavelength linked to a specific height which ensures the accuracy of data. In addition to the technique working on any material, it allows the highest surface angles to be measured with no need of algorithms. Since testing parameters have no effect on results, the repeatable data is easily comparable from sample to sample and from one instrument to another.

**Standards:**
- ISO 25178 • ISO 4287 • ISO 13565 • ASME B46.1 • Includes: GB/T, DIN, JIS, NF, BSI, UNI, UNE
- ISO equivalents

**Standard Measurement Analysis:**
- 3D and 2D mean roughness (Ra, Sa), root mean square roughness (Rq, Sq), maximum height (Rz, Sz), maximum pit height (Rv, Sv), skewness (Rsk, Ssk), kurtosis (Rku, Sku), and many more
- 2D & 3D surface waviness
- Peak distribution
- Grain analysis
- Texture alignment and analysis including: aspect ratio, direction, auto correlation, length, fourier transform, isotropy, power spectrum, root mean square gradients and many more.

**Advanced Measurement Analysis:**
- Motifs (locates highest peaks and lowest valleys)
- Spectral (periodicity and orientation)
- Vectorisation of micro-valleys and furrows
- Fractal dimension

**Specialized Measurement Analysis:**
- Automotive: bearing ratio parameters
- Lead-tightness (Mercedes Benz MBN31007-7)
- Depth of gain and finish amplitude of granular plastic materials (Renault D45-1856)

**Software Features:**
- Easily defined line or area scans
- Recipes
- Lateral resolution
- Export raw data and images
- Real time display
- Automatic reporting
- Multi-language support
- Mapping

**Analysis Software Features:**
- Filtering
- Leveling
- Thresholding
- Zooming
- Area selection and form removal tools
- Subtract and compare functions and many others

**Advanced Automation:**
- Focus
- Analysis template
- Multi sample handling macros
- Microscope to profiling or AFM
- Dual frequency for surfaces with varying reflectivities
- Rotational staging
- Pattern recognition
- Database communications
- Pass/Fail limits
- Line sensors for up to 200 times faster measurements

**Sample(s) Holders and Environmental Conditions:**
- Custom and standard sample holders
- Heating stage
With a wide height range up to 25mm and the capability to measure steep angles, the chromatic confocal technique is ideal for many surface profile dimensional measurements including applications such as micro lenses and precision tooling. Because no stitching is needed for large surfaces, the chromatic confocal technique can be used to measure dimensions in seconds with a single profile. With pattern recognition and automation in addition to pass fail conditions and database communication, the instrument can be used as an advanced quality control tool.

**Standards:**
- ISO 5436-1

**Standard Measurement Analysis:**
- Maximum, minimum and mean heights
- Width
- Distance
- Radius
- Slope
- Center point and quantity of a specific feature
- Point to point
- Plane to point
- Plane to plane.

**Software Features:**
Easily defined line or area scans • Recipes • Lateral resolution • Export raw data and images • Real time display • Automatic Reporting • Multi-language support • Mapping

**Analysis Software Features:**
- Filtering • Leveling • Thresholding • Zooming • Area selection and form removal tools • Subtract and compare functions and many others

**Advanced Automation:**
- Automatic focus (optical and microscope), automatic analysis template
- Multi sample handling macros • Easy selection of area under the microscope for profiling or AFM testing • Automatic dual frequency for surfaces with varying reflectivities • Rotational staging • Pattern recognition • Database communications • Pass/Fail limits • Line sensors for up to 200 times faster measurements

**Sample(s) Holders and Environmental Conditions:**
- Custom and standard sample holders • Heating stage

Superior ability to precisely measure steep angled features

Superior ability to accurately measure challenging profile dimensions

Reflection intensity data or video zoom imaging can also be used for lateral dimension measurements.
With a wide height range up to 25mm and the capability to measure steep angles, the chromatic confocal technique is ideal for measurements of topography, shape and form on unknown and complex surfaces such as soft tissue, plants & rock, small parts and many others. Since no stitching is needed for large surfaces, the chromatic confocal technique can measure required shape and form data in a few seconds. The resulting data is the best polynomial match for the shape under test. With pattern recognition and automation in addition to pass/fail conditions and database communication, the instrument can be used as an advanced quality control tool for shape and form measurements.

**Standards:**
• ISO 25178 • ISO 4287 • ISO 13565-2 • ISO 12085 • ISO 12780 • ISO 12181

**Standard Measurement Analysis:**
• Waviness and lay parameters • Skewness and kurtosis • Surface comparison or subtraction • Abbott-Firestone Curve • Best polynomial match

**Software Features:**
Easily defined line or area scans • Recipes • Lateral resolution • Export raw data and images • Real time display • Automatic reporting • Multi-language support • Mapping

**Analysis Software Features:**
• Filtering • Leveling • Thresholding • Zooming • Area selection and form removal tools • Subtract and compare functions and many others

**Advanced Automation:**
• Automatic focus (optical and microscope), automatic analysis template • Multi sample handling macros • Easy selection of area under the microscope for profiling or AFM testing • Automatic dual frequency for surfaces with varying reflectivities • Rotational staging • Pattern recognition • Database communications • Pass/Fail limits • Line sensors for up to 200 times faster measurements

**Sample(s) Holders and Environmental Conditions:**
• Custom and standard sample holders • Heating stage

**Precise surface topography measurement on any surface**

**Accurate shape measurement of small parts and features**

**Superior ability to accurately measure and analyze surface form**
Using the wide height range, up to 25mm and a fast linear speed capability, the chromatic confocal technique is ideal for measuring flatness, warpage and planarity on applications where critical such as micro parts, glass, seals and many others. Because no stitching is needed for large surfaces, the chromatic confocal technique can accurately measure in seconds these in addition to detecting local defects. It is also possible to obtain the best match polynomial of the shape that causes deviation in flatness. With pattern recognitions and automation, in addition to pass fail conditions and database communication, the instrument can be used as an advanced quality control tool.

**Standards:**
- ISO 25178 • ISO 4287 • ISO 13565-2 • ISO 12085 • ISO 12780 • ISO 12181

**Standard Measurement Analysis:**
- 3D and 2D surface waviness and flatness • Best polynomial match • Material and bearing ratios

**Software Features:**
- Easily defined line or area scans • Recipes • Lateral resolution • Export raw data and images • Real time display • Automatic reporting • Multi-language support • Mapping

**Analysis Software Features:**
- Filtering • Leveling • Thresholding • Zooming • Area selection and form removal tools • Subtract and compare functions and many others

**Advanced Automation:**
- Automatic focus (optical and microscope), automatic analysis template • Multi sample handling macros • Easy selection of area under the microscope for profiling or AFM testing • Automatic dual frequency for surfaces with varying reflectivities • Rotational staging • Pattern recognition • Database communications • Pass/Fail limits • Line sensors for up to 200 times faster measurements

**Sample(s) Holders and Environmental Conditions:**
- Custom and standard sample holders • Heating stage

Precise measurement of flatness, warpage and planarity with a single 2D profile or 3D area

Accurately measure flatness across large areas and rotational capability

Superior ability to accurately measure co-planarity
The chromatic confocal technique provides the highest level of accuracy for volume and area measurement on the widest range of materials. This is because the technique measures a direct physical wavelength linked to a specific height which ensures accuracy of the data. Nearly any material surface can be measured, including textile and highly corroded surfaces, and the highest surface angles can be measured with no need of algorithms. Because testing parameters have no effect on results, the repeatable data is easy to compare from sample to sample and from one instrument to another. With pattern recognition and automation in addition to pass fail conditions and database communication, the instrument can be used as an advanced quality control tool.

**Standards:**
- ISO 25178  •  ISO 4287  •  ISO 13565  •  ISO 12085  •  ISO 12780  •  ISO 12181

**Standard Measurement Analysis:**
- Volume of void  •  Volume of hill or valley  •  Peak or pit  •  Surface area  •  Maximum and minimum depths  •  Highest peak

**Software Features:**
- Easily defined line or area scans  •  Recipes  •  Lateral resolution  •  Export raw data and images  •  Real time display  •  Automatic reporting  •  Multi-language support  •  Mapping

**Analysis Software Features:**
- Filtering  •  Leveling  •  Thresholding  •  Zooming  •  Area selection and form removal tools  •  Subtract and compare functions and many others

**Advanced Automation:**
- Automatic focus (optical and microscope), automatic analysis template  •  Multi sample handling macros  •  Easy selection of area under the microscope for profiling or AFM testing  •  Automatic dual frequency for surfaces with varying reflectivities  •  Rotational staging  •  Pattern recognition  •  Database communications  •  Pass/Fail limits  •  Line sensors for up to 200 times faster measurements

**Sample(s) Holders and Environmental Conditions:**
- Custom and standard sample holders  •  Heating stage
The chromatic confocal technique accurately measures step heights up to 25mm with depth resolutions down to 2.7nm. The chromatic confocal technique is a non-destructive method for the measurement of step heights with no influence from on accuracy reflectivity or material change between coating and substrate. Thickness of an optical transparent layer can also be measured with similar resolution and range (lower limit of about 7μm).

**Standards:**
- ISO 5436-1

**Standard Measurement Analysis:**
- Point to point • Plane to plane • Maximum, minimum and mean heights • 3D or 2D map of thickness • Thickness distribution curve

**Software Features:**
- Easily defined line or area scans • Recipes • Lateral resolution • Export raw data and images • Real time display • Automatic reporting • Multi-language support • Mapping

**Analysis Software Features:**
- Filtering • Leveling • Thresholding • Zooming • Area selection and form removal tools • Subtract and compare functions and many others

**Advanced Automation:**
- Automatic focus (optical and microscope), automatic analysis template • Multi sample handling macros • Easy selection of area under the microscope for profiling or AFM testing • Automatic dual frequency for surfaces with varying reflectivities • Rotational staging • Pattern recognition • Database communications • Pass/Fail limits • Line sensors for up to 200 times faster measurements

**Sample(s) Holders and Environmental Conditions:**
- Custom and standard sample holders • Heating stage
Nanovea Profilometers measure nearly any material with a wider range of measurement than any other Profilometer. And because so, virtually any surface can be an application in fields including: Bio & Biotechnology, Building Materials, Consumer Products, Medical, Metals, Oil & Mines, Optics, Paint & Coating, Pharmaceutical, Semiconductor/Electronic/Solar, Textiles/Leather/Paper, Tooling & Machinery and Transportation.
<table>
<thead>
<tr>
<th>BASE</th>
<th>Jr25</th>
<th>PS50</th>
<th>ST400</th>
<th>ST500</th>
<th>HS1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-Y Axis Travel</td>
<td>25 mm</td>
<td>50 mm</td>
<td>150 mm</td>
<td>400 mm</td>
<td>400 x 600 mm</td>
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<tr>
<td>Z Axis</td>
<td>30 mm</td>
<td>30 mm</td>
<td>60 mm</td>
<td>50 mm</td>
<td>50 mm</td>
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<tr>
<td>Maximum X-Y Speed</td>
<td>20 mm/s</td>
<td>20 mm/s</td>
<td>20 mm/s</td>
<td>200 mm/s</td>
<td>1 m/s</td>
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<td>Dimensions</td>
<td>20x30x17</td>
<td>38x33x43</td>
<td>69x68x51</td>
<td>78x78x76</td>
<td>130x120x185</td>
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<tr>
<td>Rotational Stage</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Zoom Video Imaging</td>
<td>N/A</td>
<td>N/A</td>
<td>Optional</td>
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<td>Optional</td>
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<tr>
<td>Max Sample Weight</td>
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<td>8 Kg</td>
<td>12 Kg</td>
<td>8 Kg</td>
<td>8 Kg</td>
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<tr>
<td>Customizable</td>
<td>Optional</td>
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<td>Optional</td>
<td>Optional</td>
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**Optical Pens (Standard)**

<table>
<thead>
<tr>
<th>MEASUREMENT RANGE</th>
<th>WORKING DISTANCE (mm)</th>
<th>VERTICAL RESOLUTION (nm) (Averaging of 10)</th>
<th>LATERAL RESOLUTION (μm) (Spot Size 2x LR)</th>
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</thead>
<tbody>
<tr>
<td>110μm</td>
<td>3.35</td>
<td>2.5</td>
<td>0.9 / 1.4</td>
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<tr>
<td>300μm</td>
<td>10.8</td>
<td>5.7</td>
<td>1.2 / 1.7 / 3.5</td>
</tr>
<tr>
<td>1.1mm</td>
<td>12.0</td>
<td>17</td>
<td>2.0 / 4.0</td>
</tr>
<tr>
<td>3.0mm</td>
<td>16.2</td>
<td>40</td>
<td>3.0 / 7.0</td>
</tr>
<tr>
<td>10mm</td>
<td>25.9</td>
<td>133</td>
<td>7.0 / 12.3</td>
</tr>
<tr>
<td>20mm</td>
<td>21.5</td>
<td>250</td>
<td>8.0 / 14.0</td>
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</tbody>
</table>

**Line Sensors (High Speed)**

<table>
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<th>BASE</th>
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<th>PS50</th>
<th>ST400</th>
<th>ST500</th>
<th>HS1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement Range (mm)</td>
<td>0.2</td>
<td>0.95</td>
<td>3.9</td>
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<td>Working Distance (mm)</td>
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<td>18.5</td>
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<tr>
<td>Vertical Resolution (mm)</td>
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<tr>
<td>Line Length (mm)</td>
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<td>Lateral Resolution (μm)</td>
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<td>2</td>
<td>5</td>
<td></td>
<td></td>
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<td>Pitch (μm)</td>
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<tr>
<td>Numerical Aperture</td>
<td>0.7</td>
<td>0.55</td>
<td>0.33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Specifications may change, please contact Nanovea for clarification.*
Nanovea began designing and manufacturing instruments after years of experience in providing solutions for profilometry, mechanical and tribology applications. Firmly aligned with its vision, Nanovea aims to simplify advanced measurement technology to stimulate materials engineering for the common good. Ease of use, advanced automation and the dedication to superior accuracy are the driving forces behind Nanovea's full range of Profilometers, Mechanical Testers and Tribometers. Unlike other manufacturers, Nanovea also provides Laboratory & consulting services. Thus, clients are given access to years of experience in finding solutions to improve quality control and materials development. Nanovea offers many critically important tests including surface roughness, nanoindentation, scratch and wear testing among many others. Nanovea's instruments can be found internationally in distinguished educational and industrial organizations ranging from automotive to cosmetic, biotechnology to medical devices to microelectronics and space applications. Thousands of clients rely on Nanovea for accurate solutions, technically superior instruments, experienced assistance and comprehensive laboratory services.