

**Connector Pin Inspection
With 3D Metrology**



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INTRO:

Electronic applications typically have challenging surfaces, angles, steps and structures to be measured during development. Whether it is circuit board flatness or microstructures on the board itself, precise measurement is crucial. As components continue to shrink in size, and surfaces become problematic, the measurement needs to be precise

IMPORTANCE OF 3D NON CONTACT PROFILOMETER FOR ELECTRONICS MEASUREMENT

Because the precise measurement is vital to the end use, it will be crucial to monitor and control the end result. Understanding surface roughness, planarity, flatness and others can lead to the best selection of processing and control measures. Insuring the quality control of such parameters will heavily rely upon quantifiable, reproducible and reliable inspection of the electronic applications. The Nanovea 3D Non-Contact Profilometers utilize chromatic confocal technology with unique capability to measure applications found within microelectronics. Where other techniques fail to provide reliable data, due to probe contact, surface variation, angle, absorption or reflectivity, Nanovea Profilometers succeed.

MEASUREMENT OBJECTIVE

In this application, the Nanovea ST400 is used to measure the full area of a connector surface and its pins. The application was chosen for its challenging features while highlighting the measurement options with Nanovea's technique. There is an endless list surface parameters that can be automatically calculated after the surface scan. Here we will review a full 3D profile, flatness of the connector base, coplanarity of the pins and the roughness of a pin tip.

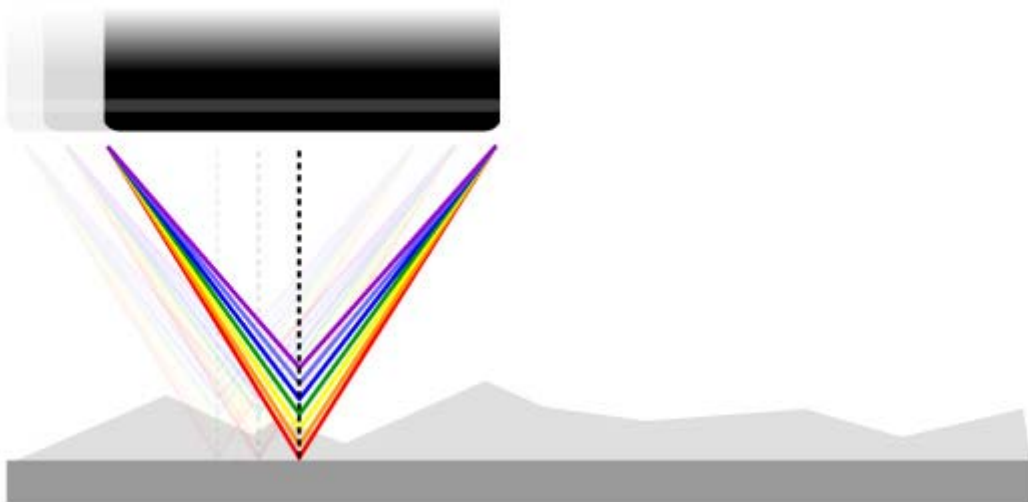


MEASUREMENT SET-UP & TIPS:

Measurements area randomly selected on the sample, drastic changes in surface topography are not an issue for Nanovea Profilometers. Small height variation down to nanometers up to 27mm of height variation can easily be measured.

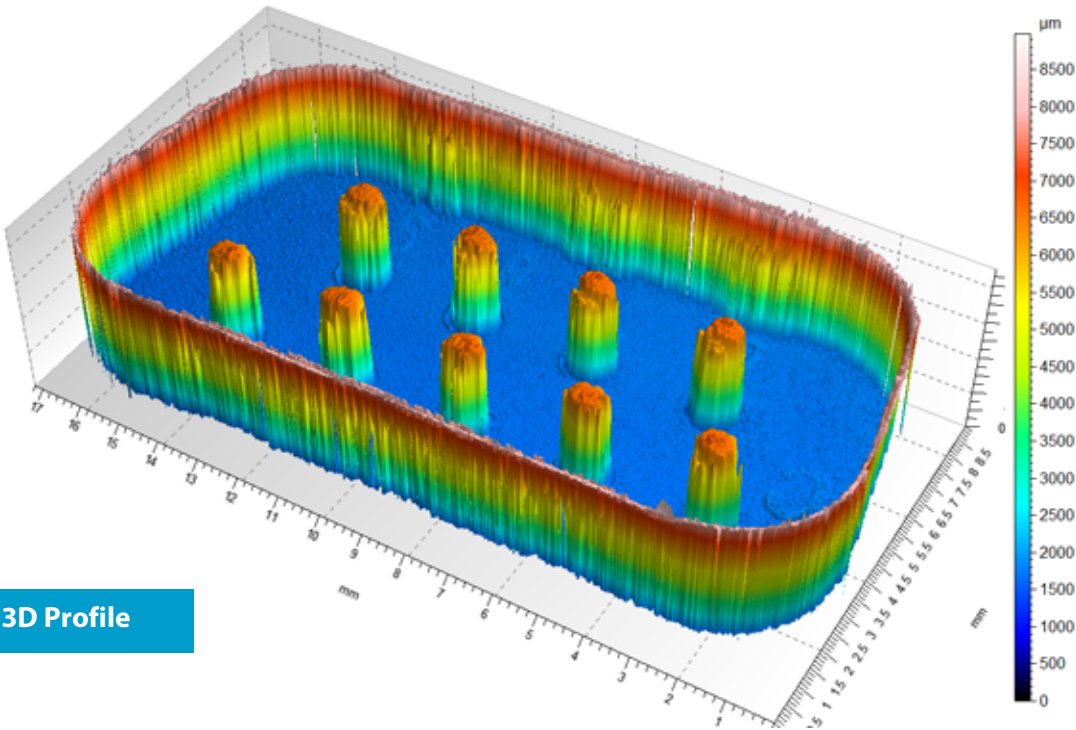
MEASUREMENT PRINCIPLE:

The axial chromatism technique uses a white light source, where light passes through an objective lens with a high degree of chromatic aberration. The refractive index of the objective lens will vary in relation to the wavelength of the light. In effect, each separate wavelength of the incident white light will re-focus at a different distance from the lens (different height). When the measured sample is within the range of possible heights, a single monochromatic point will be focalized to form the image. Due to the confocal configuration of the system, only the focused wavelength will pass through the spatial filter with high efficiency, thus causing all other wavelengths to be out of focus. The spectral analysis is done using a diffraction grating. This technique deviates each wavelength at a different position, intercepting a line of CCD, which in turn indicates the position of the maximum intensity and allows direct correspondence to the Z height position.

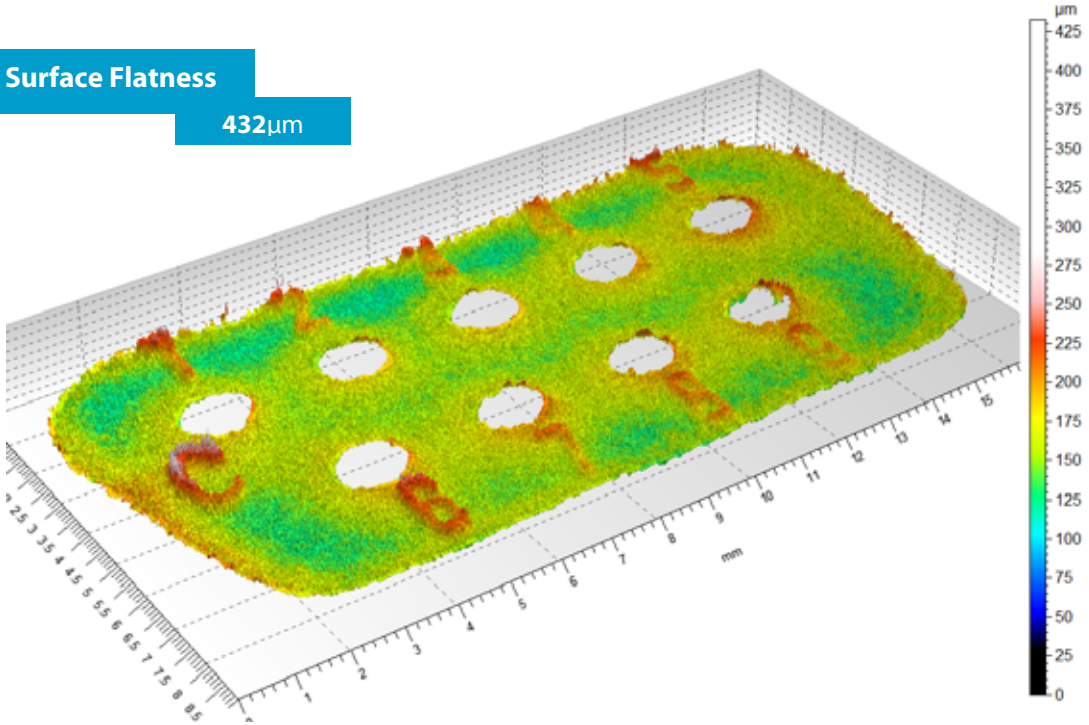


Nanovea optical pens have zero influence from sample reflectivity. Variations require no sample preparation and have advanced ability to measure high surface angles. Capable of large Z measurement ranges. Measure any material: transparent or opaque, specular or diffusive, polished or rough.

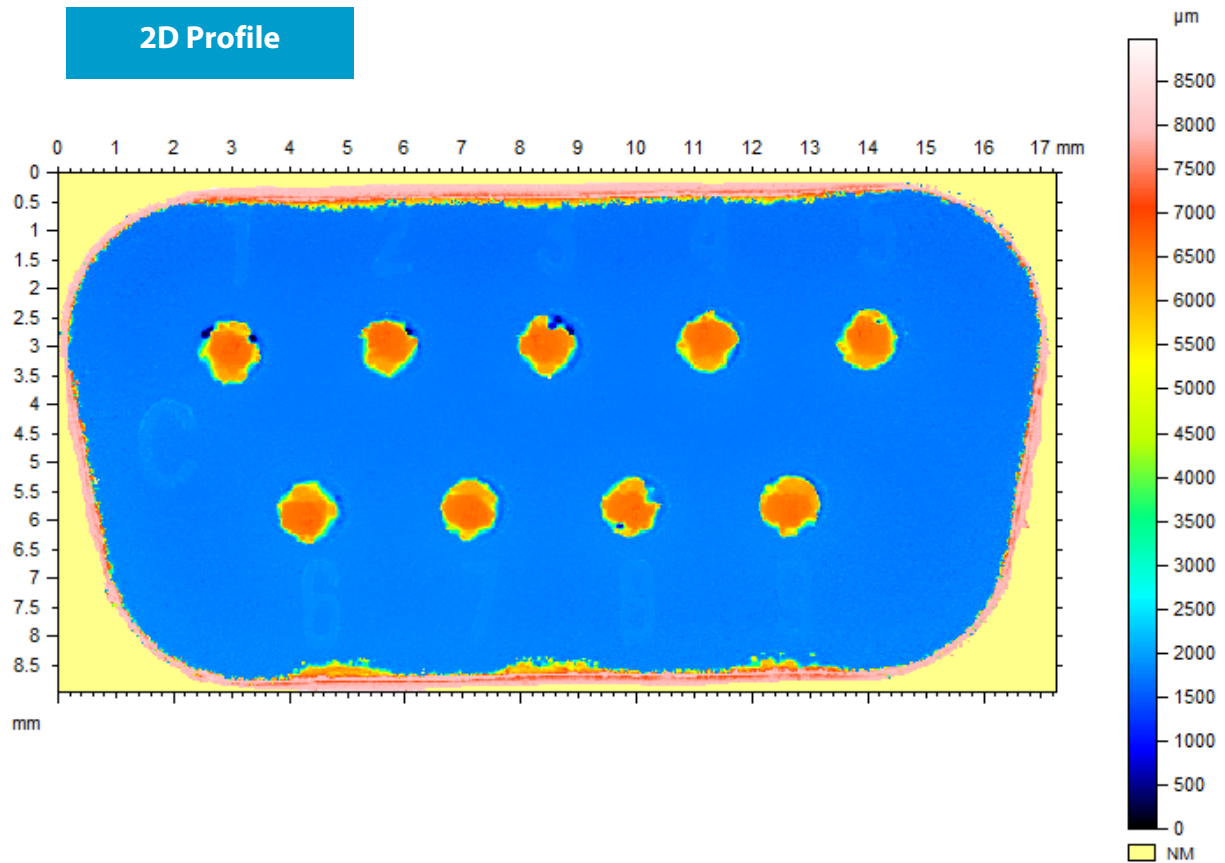
RESULTS:



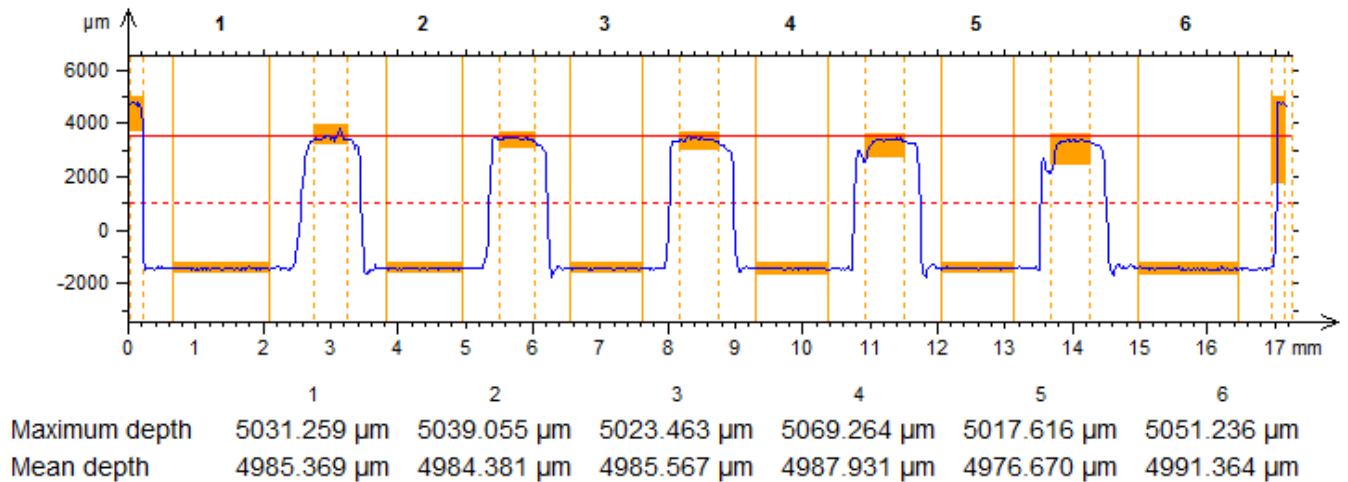
Surface Flatness
432μm



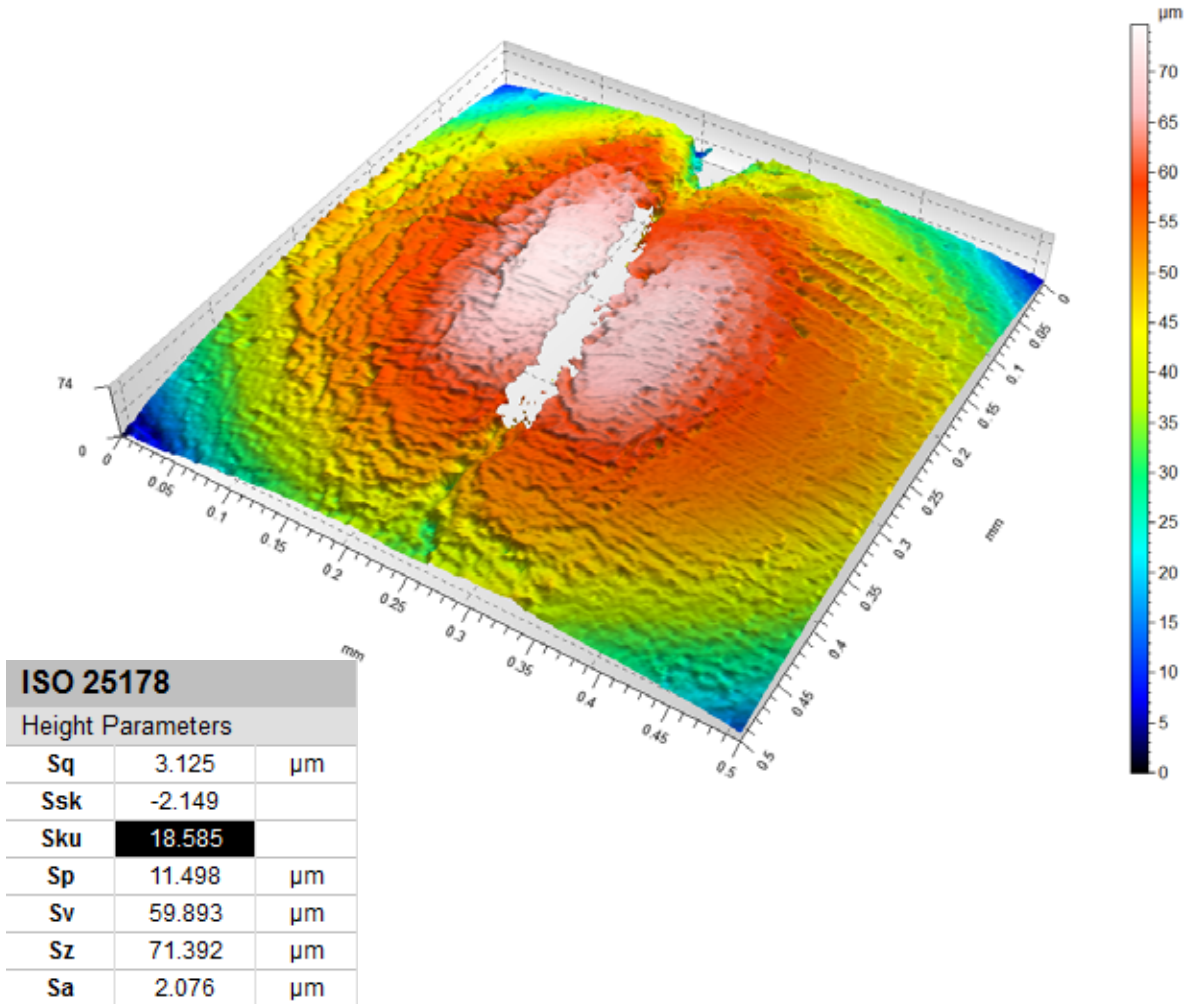
2D Profile



Planarity of Pins



Roughness of Pin Tip



CONCLUSION:

In this application, we have shown how the Nanovea ST400 3D Non Contact Profilometer can precisely characterize both the topography and the nanometer details of an electronic connector and its pins. From the 3D surface measurements, areas of interest can quickly be identified and then analyzed with a list of endless measurements (Dimension, Roughness Finish Texture, Shape Form Topography, Flatness Warpage Planarity, Volume Area, Step-Height Depth Thickness and others). To further view in detail, a 2D cross section can quickly be chosen to analyze at nanometer range. With this information electronic surface areas can be broadly investigated with a complete set of surface measurement resources. Special areas of interest could have been further analyzed with integrated AFM module. Nanovea 3D Profilometers speeds range from 20mm/s to 1m/s for laboratory or research to the needs of hi-speed inspection; can be built with custom size, speeds, scanning capabilities, Class 1 Clean Room compliance, with Indexing Conveyor and for Inline or online Integration.