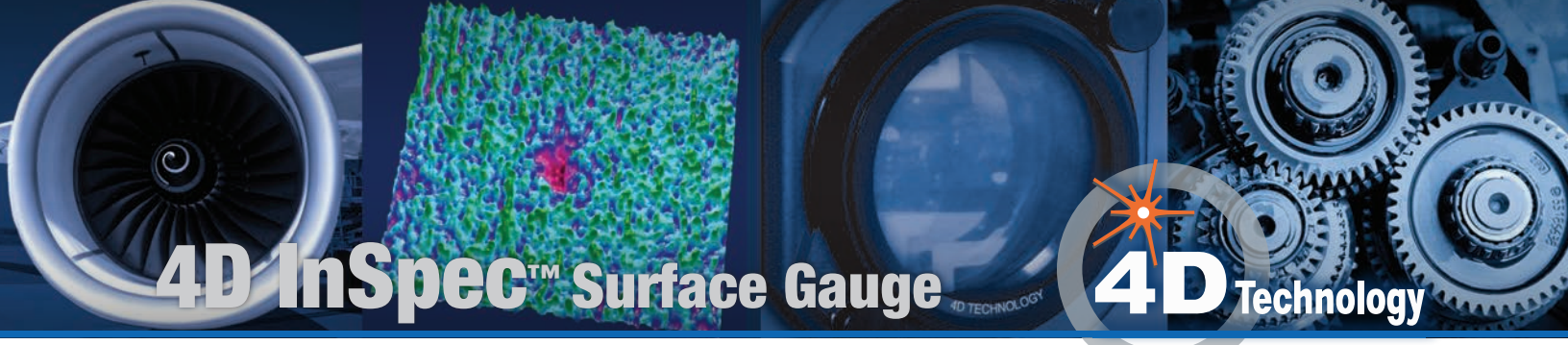


4D InSpec™ Surface Gauge

4D Technology

- Instant Defect and Fine Feature Detection and Analysis
- Measure Pits and Scratches from 0.1–100 mils
- Use Directly on Large Components
- Easy Measurement of Complex Geometries
- Handheld, Workstation or Robotic Operation

The 4D InSpec Surface Gauge is the first handheld, precision instrument for non-contact measurement of surface features and defects. With micrometer-level resolution, portability, affordability and ease-of-use, 4D InSpec puts high resolution measurement on the factory floor, in machine shops and deployed environments.

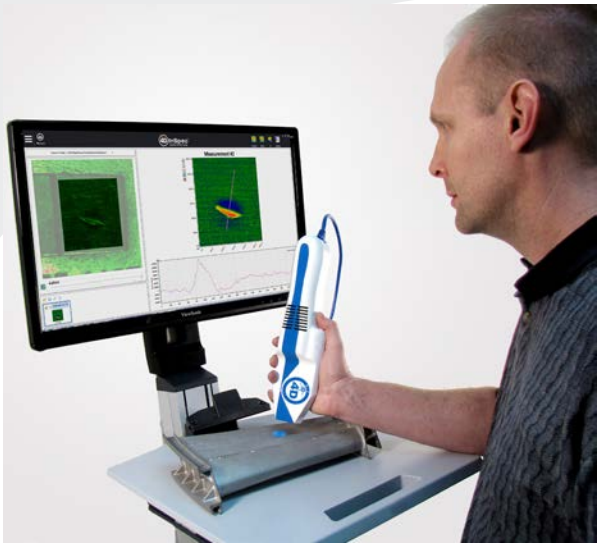
4D InSpec brings high resolution, 3D measurement to the factory floor, to quantify pits, scratches, nicks, dents, bumps, and other features from 0.1 to 100 mils deep. 4D InSpec is far more repeatable and accurate than visual comparison techniques typically used for surface defect measurements. And unlike high-end metrology systems it is rugged, flexible and affordable, to measure a wide range of part geometries in the most challenging environments.

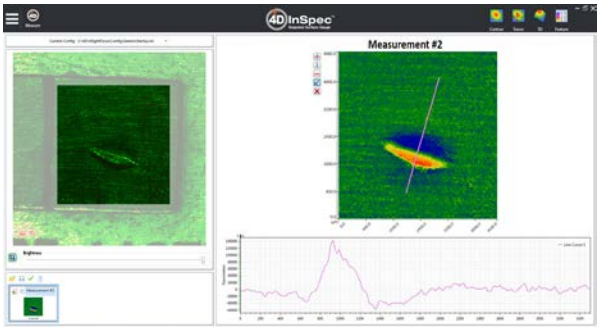
The 4D InSpec can be handheld to access tight corners or to sample large surfaces directly on components. An optional fold mirror accessory lets the system function like a borescope to access blind holes and features. One-button operation and immunity to sensor movement make it easy to align and measure, while a rugged design and single cable tether withstand the rigors of daily use.

In a workstation configuration 4D InSpec makes it fast and easy to obtain repeatable quality control data. An intuitive, touchscreen interface handles setup, operation, analysis and report generation. The 4D InSpec can also be mounted on a robotic manipulator for fully automated measurements of complex components.

The included software with intuitive touch-screen interface automatically locates defects and calculates their height, volume, area, slopes and location. The operator can choose from 2D traces or 3D plots to view defects in great detail. The system also supports easy data transfer to quality control systems via LAN, USB or WiFi for rapid pass-fail analysis.

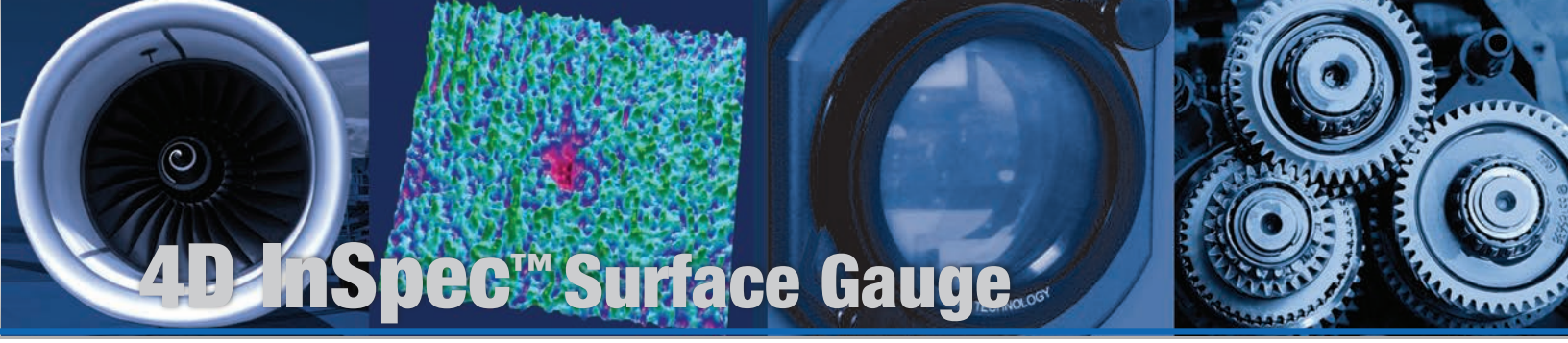
A complete 4D InSpec system includes the instrument, computer with HD 1080p touch-screen interface, single Ethernet cable tether and software. A portable workstation and Li-ion rechargeable battery with up to 8 hours of operational time are also available.





The 4D InSpec quantifies damage, wear and corrosion directly on parts with complex geometries, such as this turbine blade section. Arbitrary 2D traces and 3D plots make it easy to analyze surface features and defects.

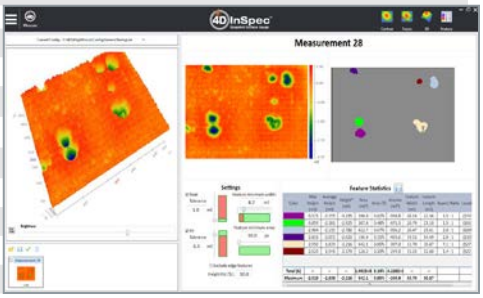
3280 E Hemisphere Loop, Ste 146, Tucson, AZ 85706 • Tel: +1 (520) 294-5600 • Fax: +1 (520) 294-5601 • www.4DTechnology.com

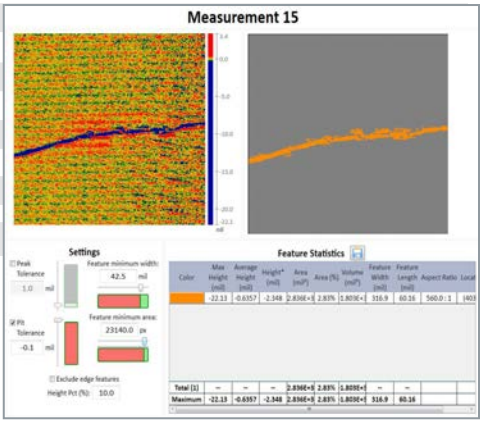


4D InSpec™ Surface Gauge

Specifications

Description	4D InSpec Surface Gauge
Basic Specifications	
Acquisition	Instantaneous, non-contact 3D surface measurement
Measurable Range	Pits and scratches from 0.1 to 100 mil (2.5 to 2540 µm) deep
Field of View (module)	0.3 x 0.3 in (7.6 mm x 7.6 mm)
Lateral Resolution	0.2 mil (5.6 µm)
Vertical Resolution	0.1 mil (2.5 µm)
Mounting	Handheld or workstation mounted
Standoff Distance	1.7 in (42 mm)
Software	
Analysis	4D InSpec control and analysis software
Measurement Modes	Single snapshot; enhanced resolution multi-snapshot mode
Defect Detection	Identify features based on height and area thresholds
Defect Calculations	Max height, volume, area, max slope, X and Y location within field of view
Data Displays	Contour, 3D, XY slice with arbitrary cursors
Data Output	Tabular feature analysis statistics with 3D surface maps
Data Masking	Masking based on signal to noise ratio; rectangular ROI masks for analysis
Import and Export	Export data to XYZ point cloud
Computer	All-in-one computer with 1080p touch-screen interface
Electrical/Mechanical	
Dimensions	11 x 2 x 2.8 in (280 mm x 50 mm x 70 mm)
Light Source	450 nm LED with 100,000 hour MTBF
Sensor	1200 x 1200 pixel, 12-bit scientific CMOS camera
Power Consumption	< 10 W 4D InSpec unit; < 250 W with computer system @ 120 VAC
Weight	< 2 lbs (0.9 kg) instrument only
Cable Length	32.8 ft (10 m)
Operating Temperature	50–86° F (10–30° C)
Operating Humidity	> 98% non-condensing
Performance	
Noise Floor	< 0.1 mil (3.5 µm)[1]
Vertical Repeatability	< 0.03 mil (0.6 µm) [2]
Step Height Accuracy	< 3%[3]
Step Repeatability	< 0.5%
Depth of Focus	> 100 mils (2.5 mm)
Minimum Part Roughness	5 µin (120 nm) Ra
Warranty	One Year, limited





1 Average Ra of difference between two measurements on 4D calibration sample.

2 1σ Ra for 30 measurements on 4D calibration sample.

3 Difference vs. PTB-certified values sample for features from 0.8–35 mils (20–900 µm) tall.

4 1σstandard deviation on 30 measurements of 50 µm tall feature.

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