3D Line Confocal Sensor

Line Confocal Scanning in One Step

- Excellent dynamic detection, simultaneous output of 2D and 3D images

3C electronic products | Industrial field | Semiconductor industry | Lithium battery industry

China's First

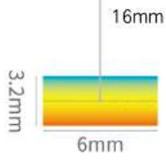
- Ultrahigh resolution: 2,048 points/line
- Ultrahigh-speed scan rate: 35,000 lines/sec
- Excellent material adaptability
- Simultaneous output of 2D and 3D images
- Precise measurement of multilayered materials
- IP55 protection degree

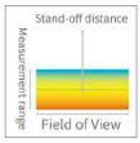
◎ Product Description

- Hypersen 3D Line Confocal Sensor (HPS-LCF Series) has broken through the limitations of traditional measurement methods and provided an optical measurement solution with higher accuracy and faster speed than the traditional ones for Industry 4.0. It can carry out high-precision 3D inspection with submicron precision for various complex materials like transparent glass, film, lithium batteries, 3C electronics products, and semiconductor components.

3D Line Confocal Sensor
Chromatic Confocal Sensor
High Speed Industrial Camera
6-Axis Force Torque Sensor
Laser Cross Beam Sensor
3D Solid-state LiDAR
ToF Ranging Sensor
Laser Displacement Sensor

Sensor





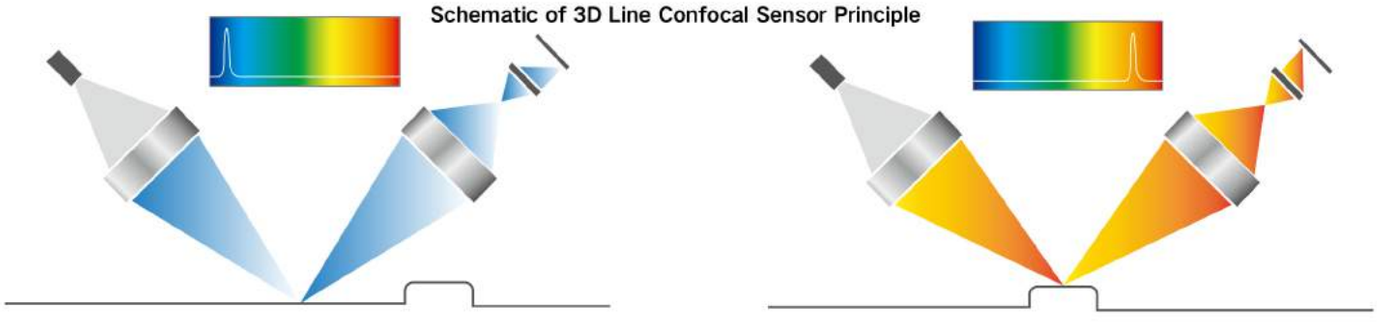
Controller

Principle Introduction

The principle of 3D line confocal sensor is to extend the focus halo range of different colors of light by using special lenses to form a special magnified chromatic aberration. According to the different distance between the target and the lens, the light with a certain wavelength will be focused on the target. Then, by measuring the wavelength of the reflected ray, the precise distance from the object to the lens can be obtained.

The measurement results will not be affected by the intensity of the reflected lights, which means that the distance results stay the same no matter how much light is reflected from the target. And because the intensity of the reflected light only depends on the reflectivity of the target, this sensor can conduct reliable measurement even if the target is a strong light-absorbing material, such as black rubber, or transparent materials, such as glass or liquid.

Schematic of 3D Line Confocal Sensor Principle

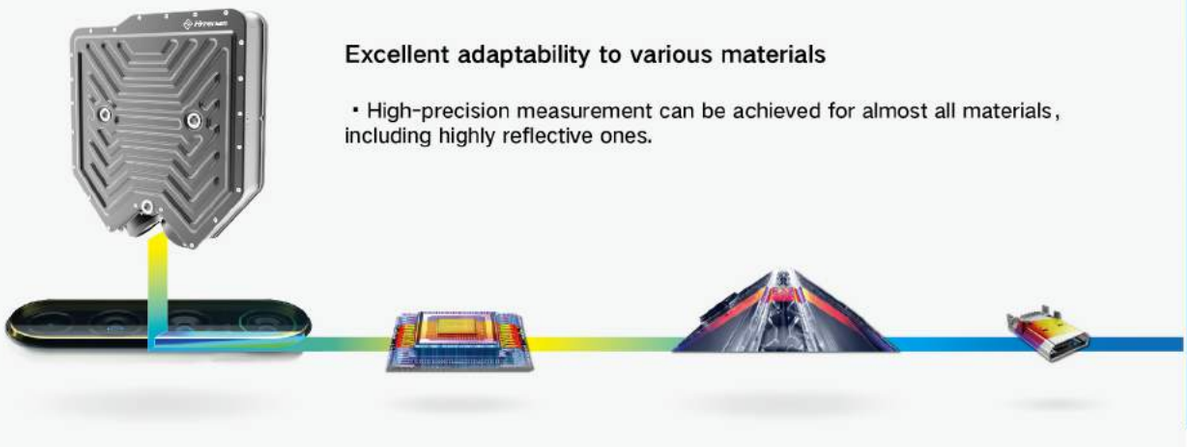


Excellence · Beyond Precision

3D Line Confocal Sensor

Excellent performance to deal with different scenarios

Advantages of Hypersen 3D line confocal sensor



Excellent adaptability to various materials

- High-precision measurement can be achieved for almost all materials, including highly reflective ones.

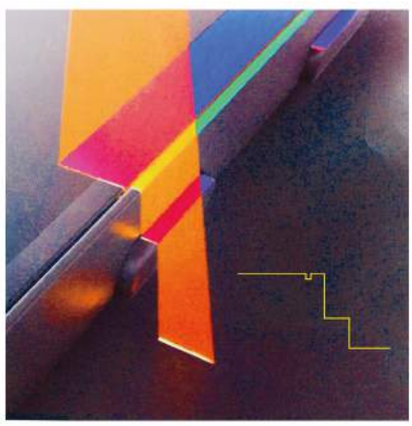
Multilayered materials inspection

By means of its unique line chromatic confocal scanning technology, Hypersen 3D line confocal sensors can construct 2D and 3D data of multiple transparent layers by scanning the display surface only once.

Regardless of the glass thickness, it can provide excellent scanning performance on the glass surface and curved edges (±20.5°), and perform inline defect detection accurately, such as chips and cracks.

3D glass/side seam gluing inspection

The outstanding performance of the Hypersen 3D line confocal sensor enables it to detect defects clearly, such as scratches, unevenness and contour feature mismatches of the material's surface on a high-speed assembly line.



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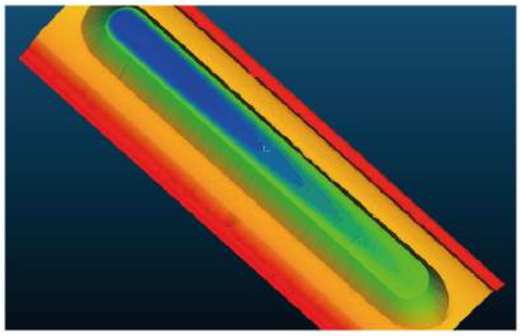
Laser Displacement Sensor

Line Confocal Scanning in One Step

This sensor adopts the unique line confocal scanning technology. Various forms of appearance diagrams and detailed raw data can be obtained by only one scan on the target surface.

- 3D point cloud
- 2D contour image
- HD depth image
- HD grayscale image

Detailed data and high-quality original images can match integrated equipments and complex measurement.



Inspection in detail

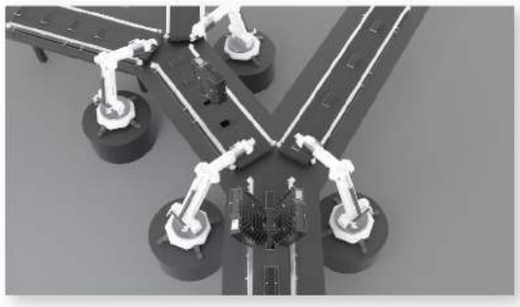
Scanning at 2,048 points/line with the minimum point interval of 2.9μm, Hypersen 3D line confocal sensors can show the target topography in detail and achieve surface defects inspection like tiny concave and convex defects.

The Z-axis repeatability is up to 0.1μm, which provides you with more accurate measurement results.

35,000 lines/s ultrahigh-speed scanning

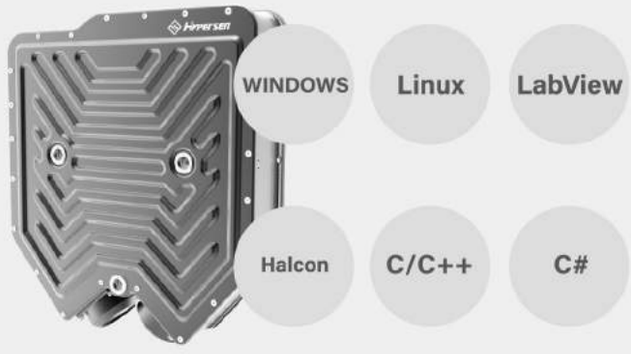
Hypersen 3D Line Confocal Sensor has the maximum scanning speed of 35,000 lines/sec, and is easy to be integrated into a customized inspection system. It can be applied perfectly to factory assembly lines and complex high-volume high-precision scanning scenarios to achieve multi-directional 3D imaging analysis of object surfaces.

- Dimensions/Surface roughness
- Topography/Flatness
- Defects/Thickness
- Tomography/Step height measurement
- Gap and flush measurement



Complete SDK and one-stop software service

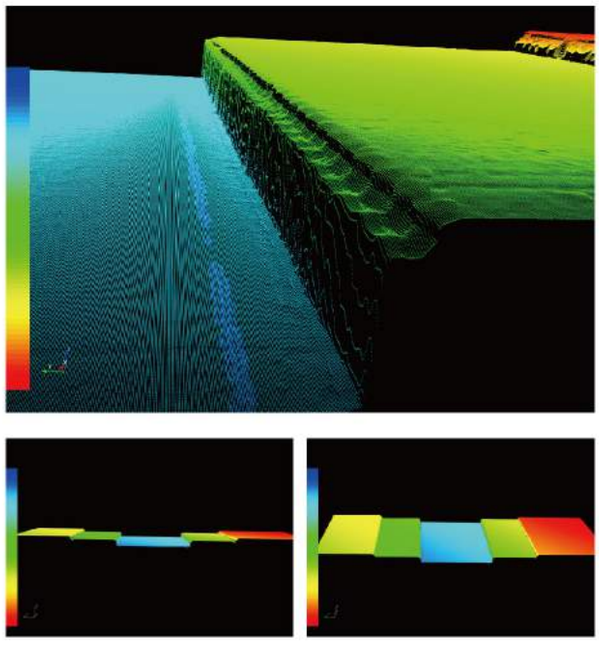
- Simple installation, not restricted by the applications
- Intelligent program setting; concise and clear software menu; simple operation
- Customized, worry-free after-sales service



Excellent performance to deal with different scenarios

Applications about mobile phone mid-frame

Applications in lithium battery industry



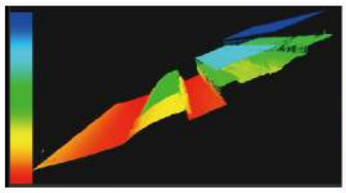
● Mobile phone mid-frame step height measurement

3D Line Confocal Sensor

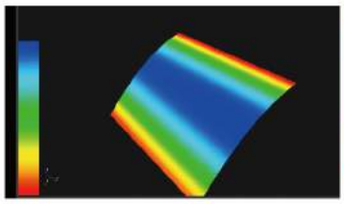
Hypersen

Once and for all

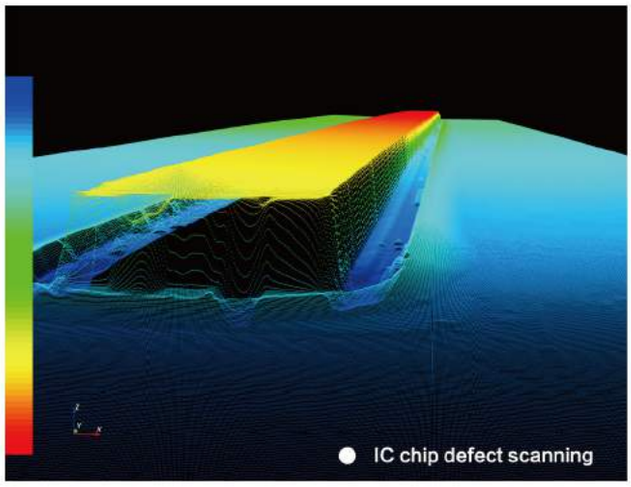
Measure step height/burr/defect/scratch/gap by scanning just once



● LED screen glue dispensing inspection



● Mobile phone curved frame



● IC chip defect scanning

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Excellence WALK THE TALK

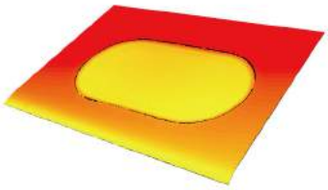
3C electronics

- Perfect image merging
- Multilayer data
- Defect detection

Perfect image merging

No matter how big the target is

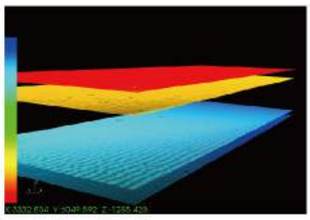
Camera module defect detection ●

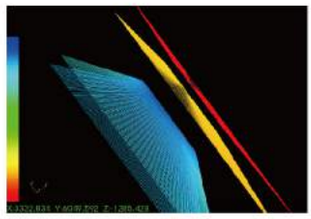


Button module defect detection ●

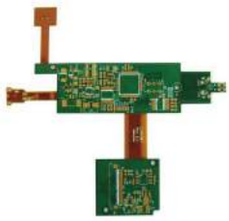
Multilayer data

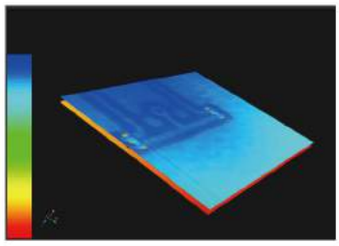
Scan once * Multilayer data





- Multilayer glass inspection

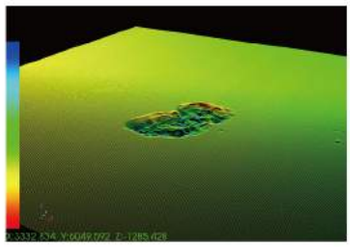




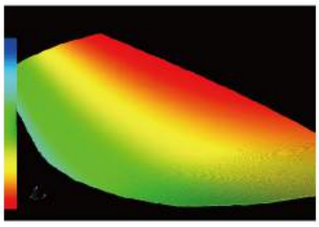
- Printed circuit board/gluing defect detection

Defect detection

Detect the smallest defect



- Screen defect detection



- Curved screen curvature/defect detection

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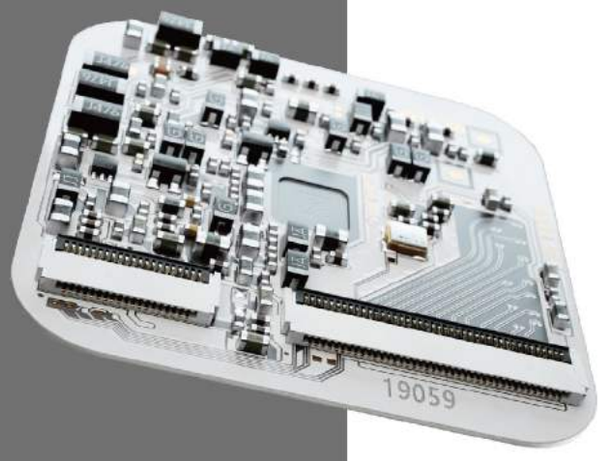
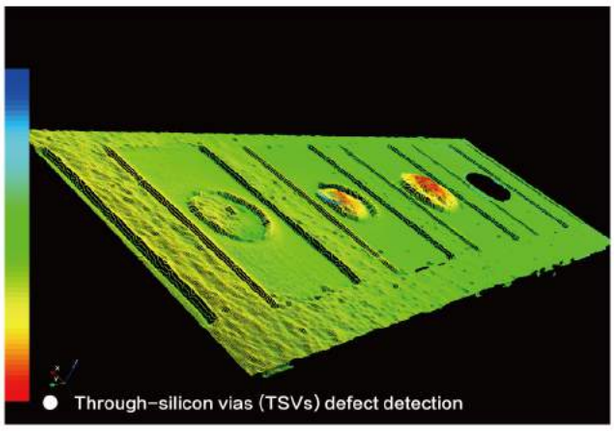


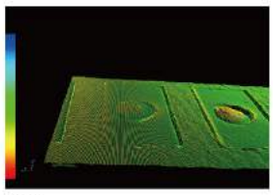
Semiconductor chip

- Various tests
- Extreme precision
- Defect detection

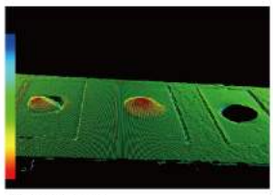
All Defects Detected in One Scan



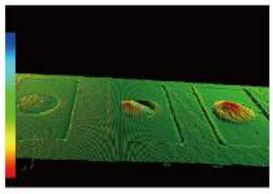
● Through-silicon vias (TSVs) defect detection



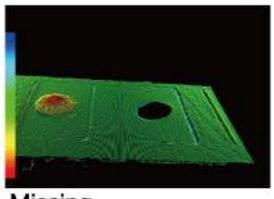
OK



Overflow



Insufficient



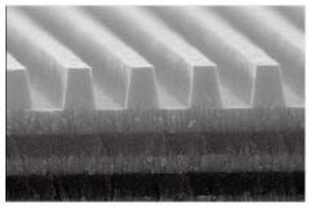
Missing

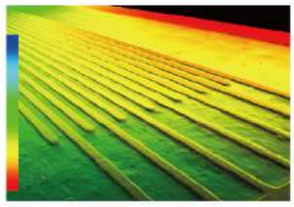
● Integrated circuit/Transistor/Resistor/Capacitor/Inductor/IC chip-Completed in one scan

Ultrahigh precision at submicron level

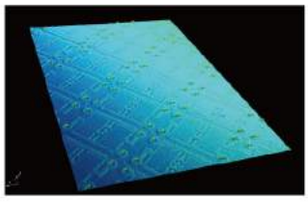
Extreme precision

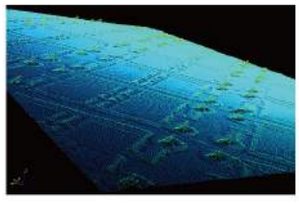
Ultrahigh precision at submicron level



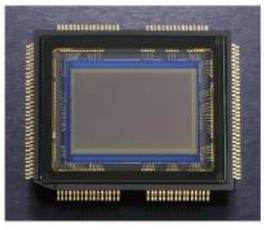


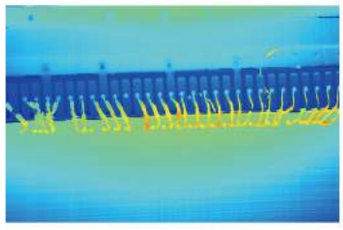
● Plasma etching defect detection





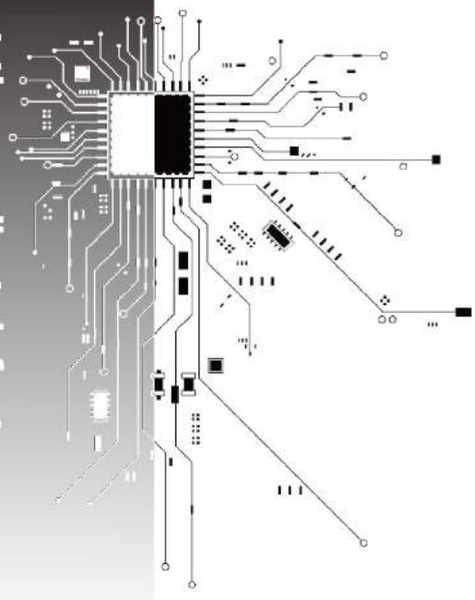
● Wafer solder joint defect detection





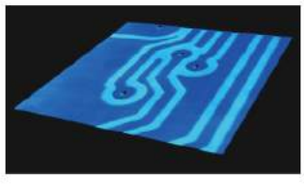
● CMOS chip gold wire defect detection

Detect the smallest defect

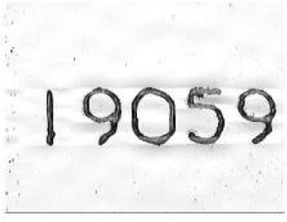


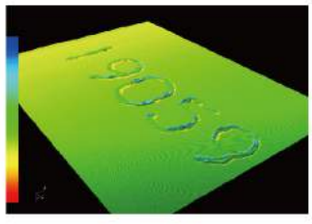
Defect detection

Detect the smallest defect



● Printed circuit inspection





● Metal's engraved characters detection

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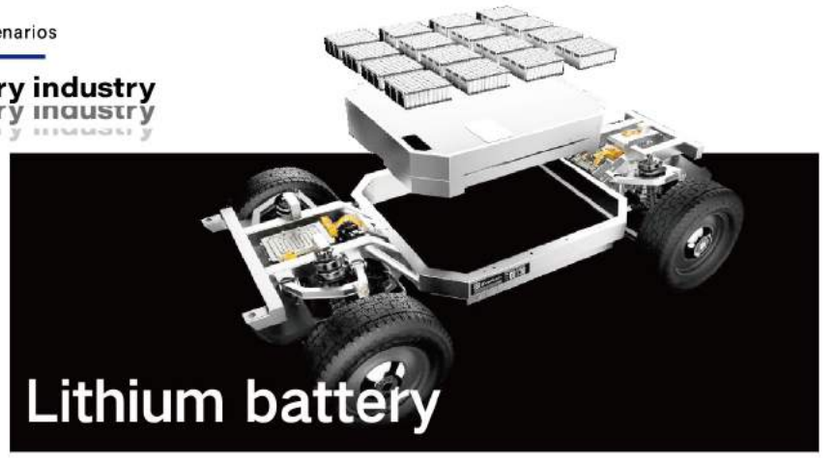
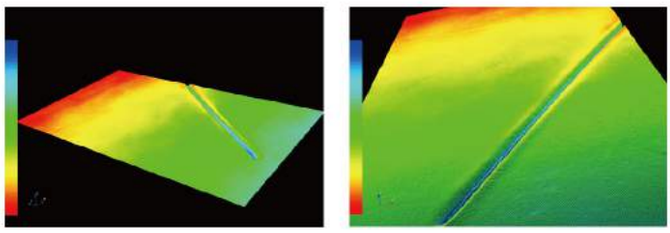
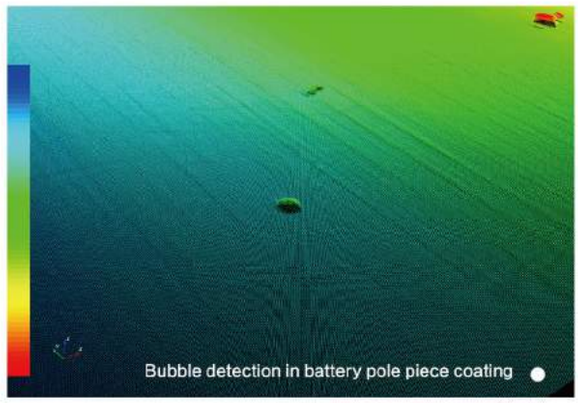
Excellent performance to deal with different scenarios

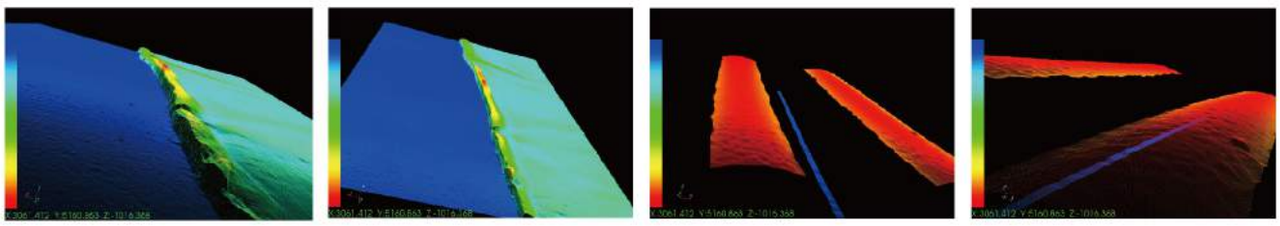
Applications in lithium battery industry





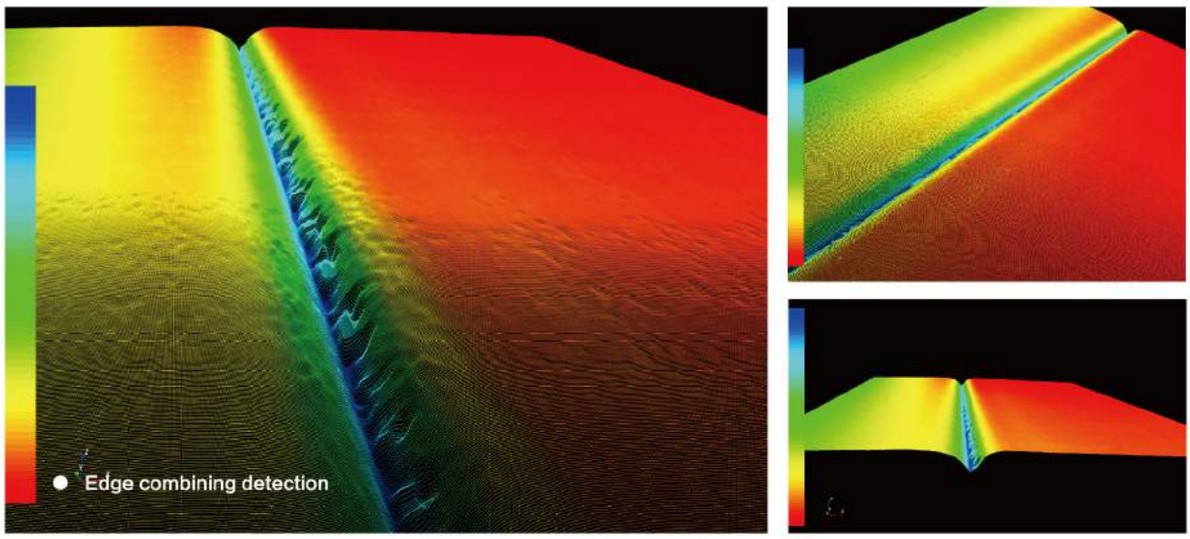
● Metal film scratch detection





● Electrode edge burr detection

● Detection of defects in metal wire insulation adhesive

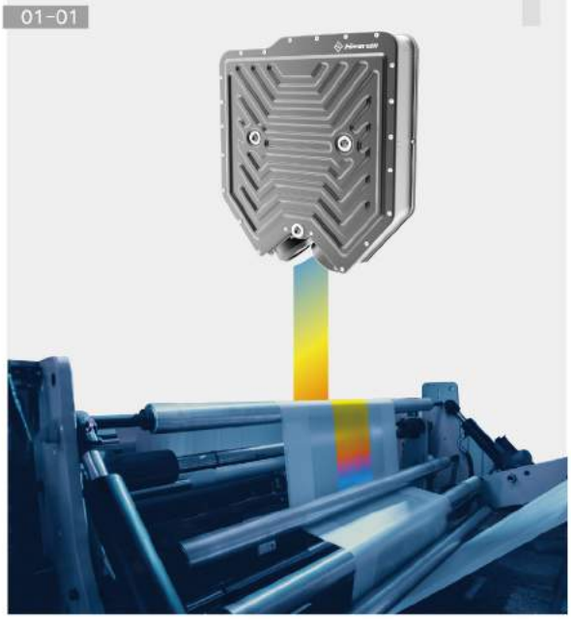


Excellent performance to deal with different scenarios

Applications

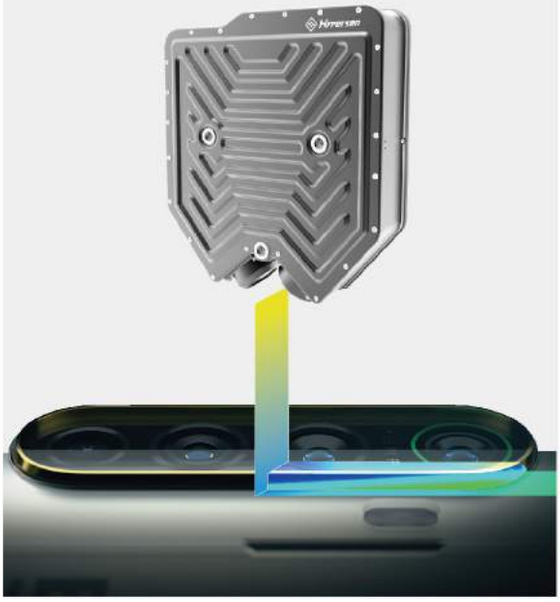
Research/Industrial field/3C Industry

01-01



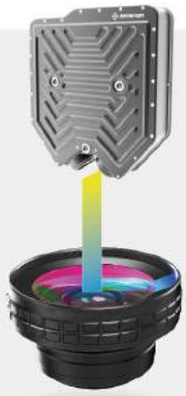
• Coating flatness/defect/scratch measurement

01-02



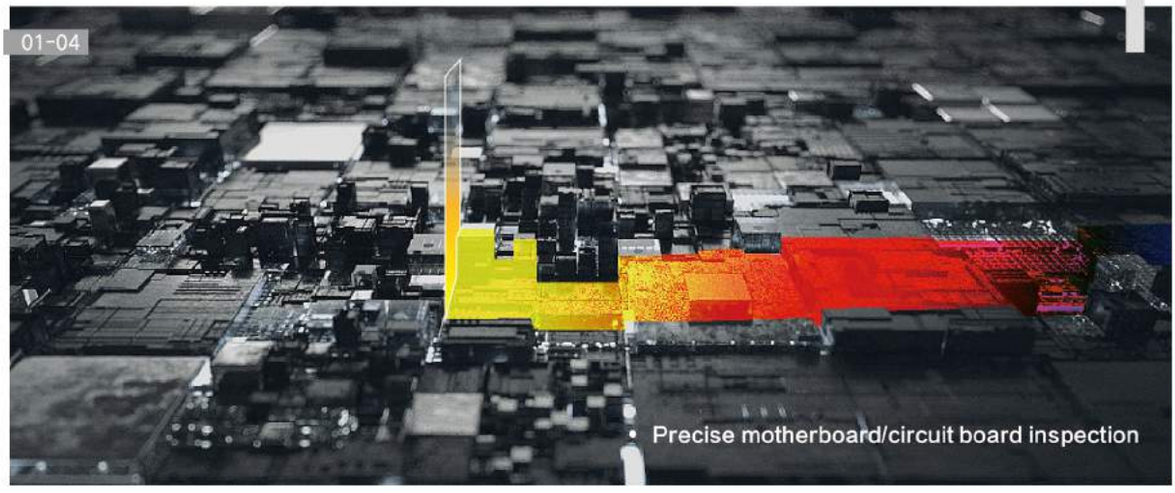
• Cellphone's multilayer lenses/gluing measurement

01-03



• Camera glass curvature/defect measurement

01-04



• Precise motherboard/circuit board inspection

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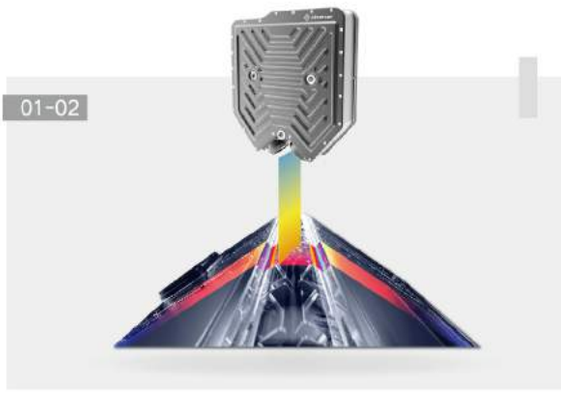
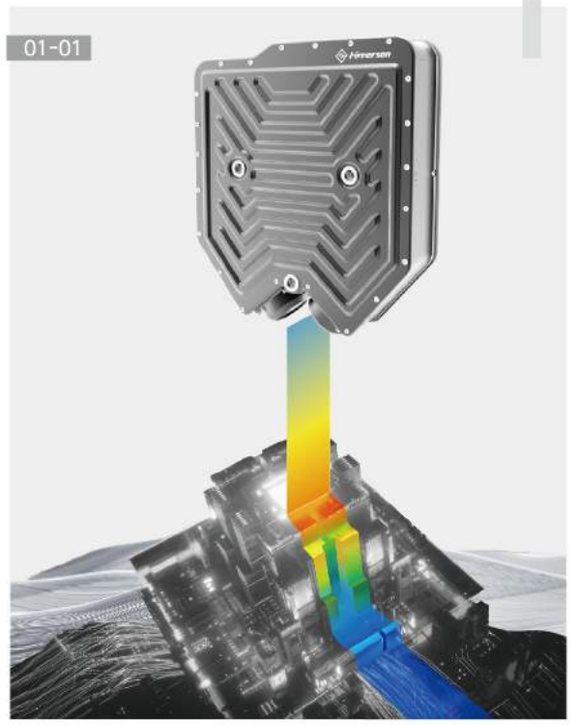


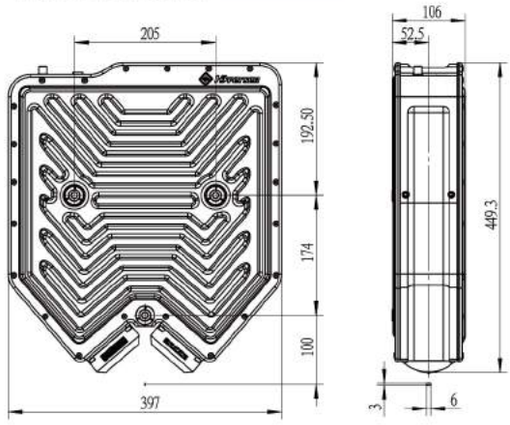
• High-precision workpiece inspection



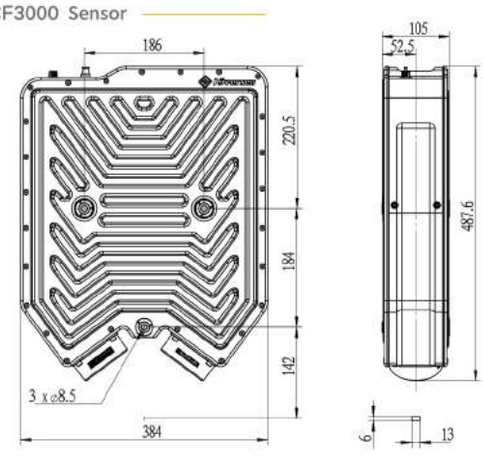
• Metal wire layers/transistor layers measurement

Product Size

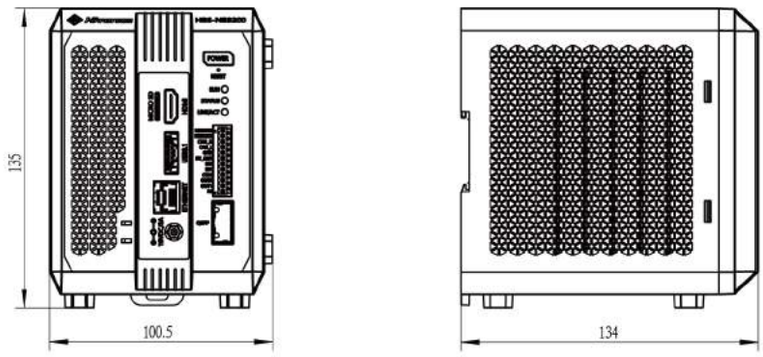
HPS-LCF1000 Sensor



HPS-LCF3000 Sensor



Controller



Excellent performance to deal with different scenarios

Technical Parameters

HPS-LCF Sensor

Model	HPS-LCF1000	HPS-LCF2000	HPS-LCF3000
Field of View(mm)	6	6	13
X-resolution (μm)	2.9	2.9	6.3
Z-repeatability(μm)*1	0.1	0.25	0.15
Stand-off distance (mm)	16	17	59
Measurement range (mm)	3.2	2.5	6
Scan rate at full measurement range (Hz) *2	5000	5000	5000
Max. scan rate (Hz) *3	35000	35000	35000
Number of data points/profile	2048	2048	2048
Max. surface slope on mirror (deg)	±20.5	±15	±13.5
Dimensions (W*H*D) (mm)	397*449.3*106	260*340*70	384*487.6*105
Weight (kg)	19	10	20
Power	35W		
Protection degree (EN 60529)	IP55		
Power supply	24 VDC,2A		
Connection to the controller	40G optical fibre		
Digital input	Optocoupler input and output		

*1 This value is a 3σ value, which is obtained by measuring the mirror standard gauge block on the optical platform in our company's cleanroom. The number of contours: 200,000; Integration time: 200us; Light signal intensity (Manually adjusted): 20%.
*2 The number of data points/profile at this scan rate is 1024, while the scan rate will be 2400Hz with 2048 data points/profile.
*3 The measurement range under this scanning rate is 1/8 of the full range.
*All technical specifications are subject to the latest official datasheet. Hypersen reserves the right of final interpretation.

HPS-LCF Controller

Model		 HPS-NB3200
Input power requirements		19V ⩾ 5A
Power		55W
Operating temperature		0~50°C
Relative humidity		35-85%RH (non-condensing)
Weight		≈1400g
Dimensions (L*W*H) (mm)		134*100.5*135
Communication interface		QSFP 40G optical fiber interface USB3.1/HDMI/Gigabit Ethernet/SD card socket/RS232
Input/output port	Optocoupler isolation input*2	AB phase signal input
	Optocoupler isolation output*2	Optocoupler isolation
Installation method	DIN rail	DIN rail/screws
Interactive part	Button*3	Button*1, Bi-Color LED (red and green)
Accessories		DIN bracket mounting buckle/cable clip

3D Line Confocal Sensor
Chromatic Confocal Sensor
High Speed Industrial Camera
6-Axis Force Torque Sensor
Laser Cross Beam Sensor
3D Solid-state LiDAR
ToF Ranging Sensor
Laser Displacement Sensor