

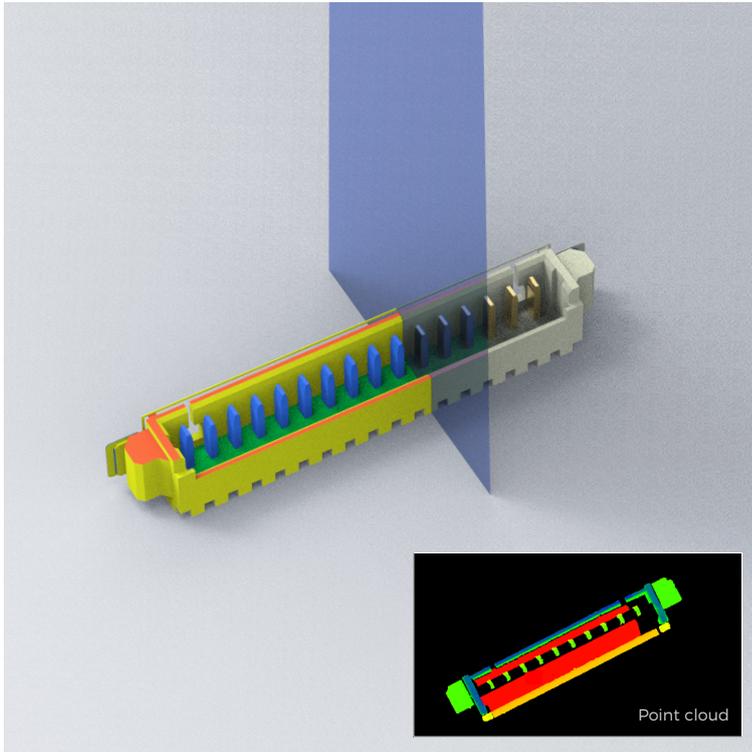
High-Speed 3D Laser Profilers

## **Mech-Eye LNX-8000 Series**

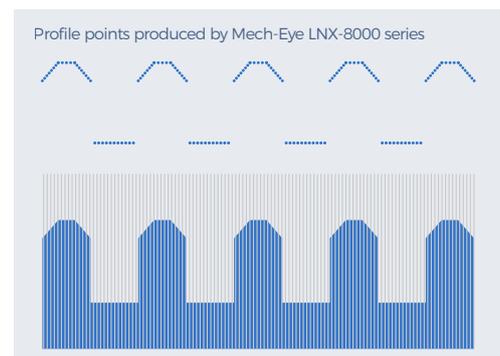
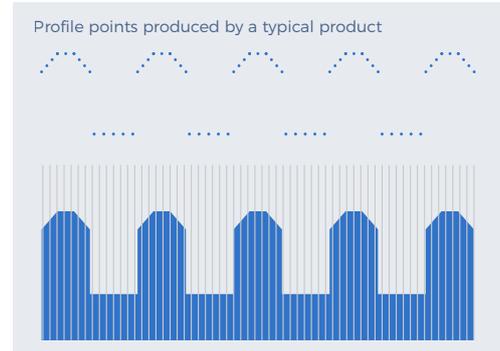
For inline inspection applications in automotive, EV battery, electronics, and other industries.

# 4K+ Resolution Laser Profiling to see every detail and feature

Mech-Eye LNX-8000 series is the new-generation 3D laser profiler with an astounding 4K+ resolution. Leveraging advanced optical design and AI algorithms, the Mech-Eye LNX-8000 produces 4,096 data points per profile for high-resolution 3D inspection of targets (dents, gaps, edges, etc.), even for microscopic features.



Mech-Eye LNX-8030 scans pins.



When the X-axis scanning range is constant, the LNX-8000 series generates more profile points than other line profilers.

# Micron Resolution and Precision to inspect microscopic defects

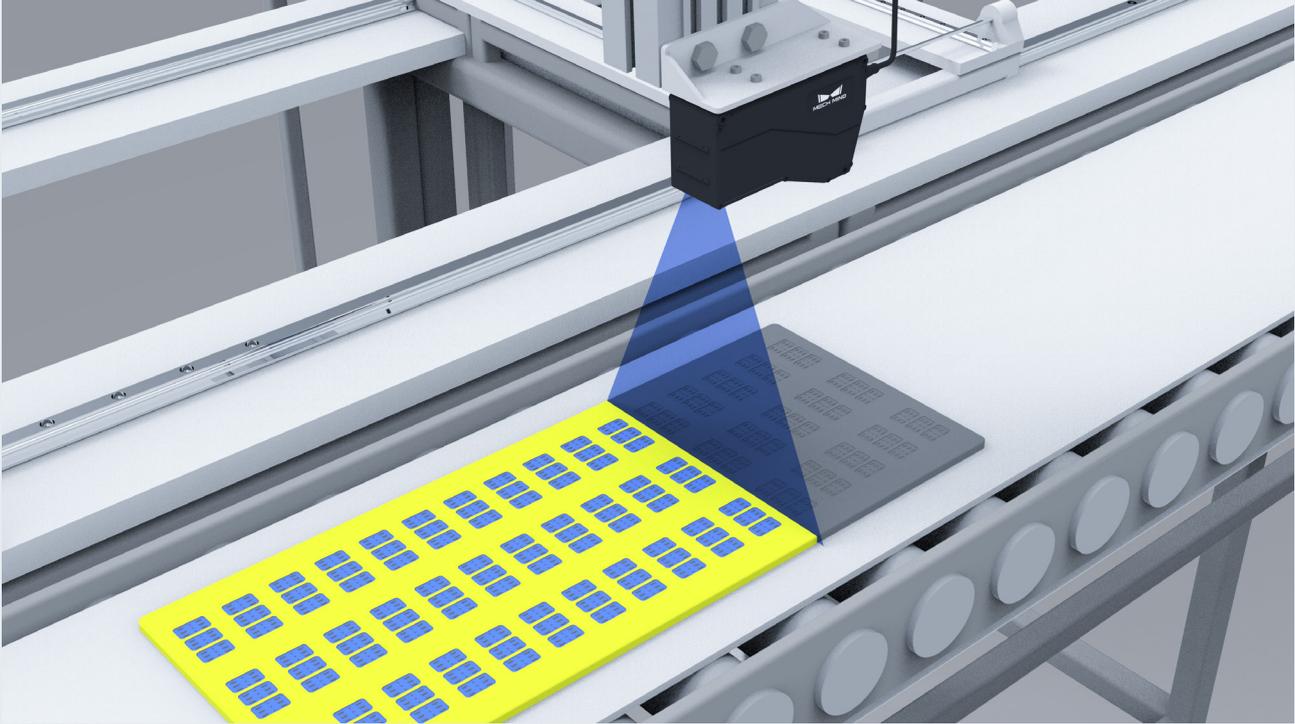
When maintaining a constant scanning range along the X-axis, the Mech-Eye LNX-8000 series outperforms other profilers by providing a higher density of profile points. It achieves an impressive Z repeatability at  $0.2 \mu\text{m}^{[1]}$  and  $\pm 0.02\%$  of F.S. linearity<sup>[1]</sup>. These features enable precise inspection, even on the tiniest details and most complex surfaces.

## Comparison with a typical laser profiler

X-axis (width)			Z-axis (height)		
	typical product	LNX-8030		typical product	LNX-8030
Measurement range	35 mm (RD) <sup>[2]</sup>	35 mm (RD) <sup>[2]</sup>	Repeatability	0.5 $\mu\text{m}$	0.2 $\mu\text{m}$
Data points per profile	3200	4096	Linearity	$\pm 0.03\%$ of F.S.	$\pm 0.02\%$ of F.S.
Profile data interval	12.5 $\mu\text{m}$	9 $\mu\text{m}$			

[1] Applicable to Mech-Eye LNX-8030

[2] Reference distance



Mech-Eye LNX-8080 scans SIM card slots. It can scan multiple parts in a single capture, boosting production efficiency by over **50%** and significantly increasing production capacity.

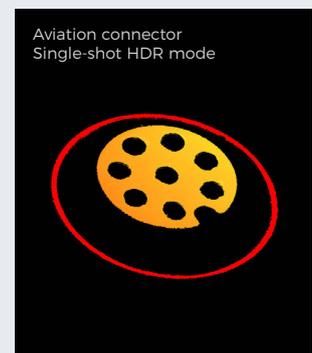
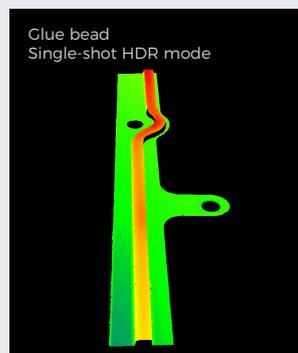
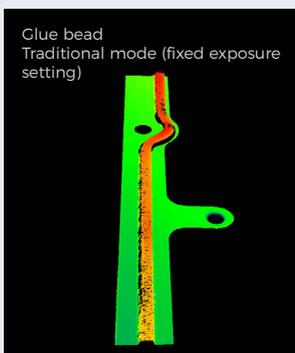
## Ultra-High Scan Rates and Large FOVs to scan large parts and edge details at a fast speed

Do more with fast scan rates and large measurement ranges.

- Achieve scan rates of 3.3 kHz (scan of the full field of view) and up to 15 kHz (scan of the complete X measurement range). Generate high-resolution 3D data at an accelerated pace.
- The X measurement range reaches 430 mm<sup>[1]</sup> and the Z measurement range reaches 305 mm<sup>[1]</sup>. Scan large objects in one exposure or multiple small parts simultaneously, significantly boosting inspection speed and keeping up with the production pace.

## Single-Shot HDR to scan dark and reflective surfaces in a single exposure

The Mech-Eye LNX-8000 series, equipped with a single-shot HDR function, makes it possible to scan both dark (low reflectivity) and reflective (high reflectivity) surfaces in one exposure and creates complete 3D point clouds.



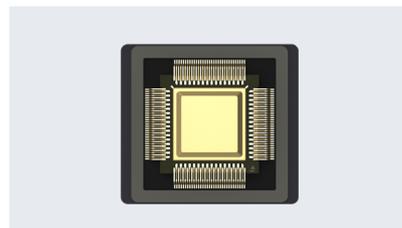
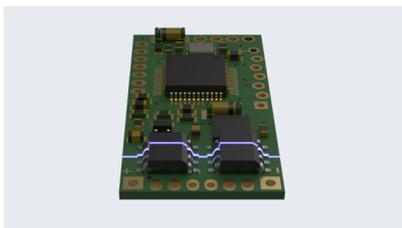
[1] Applicable to Mech-Eye LNX-8300

# Advanced Optical Design and Algorithms

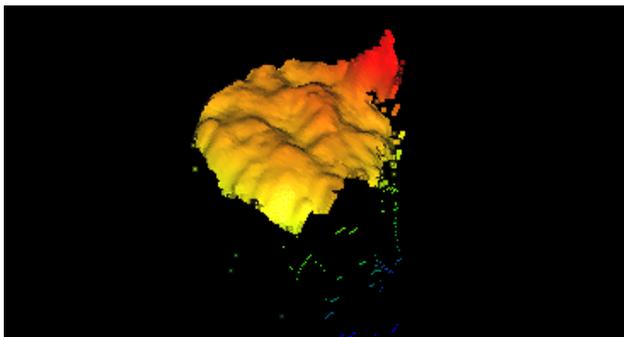
## to measure almost any material and surface

The Mech-Eye LNX-8000 series features an advanced optical design, incorporating a laser with a cylindrical lens, a large-aperture Schmidt lens, and an imaging sensor with a resolution of up to 10MP. These features enable more precise imaging of any surface and intricate detail.

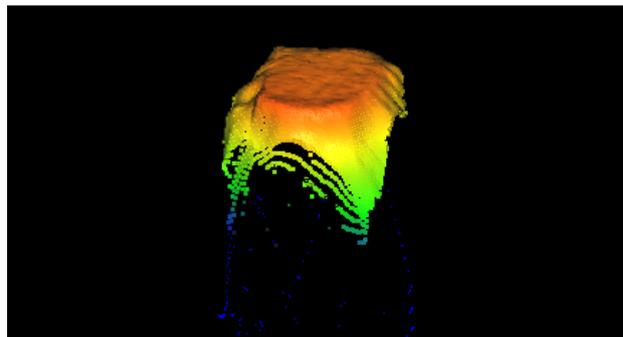
- Our self-developed laser, equipped with a uniquely designed **cylindrical lens**, emits light with a wide field of view and a narrow fan angle, minimizing blind spots effectively.
- **A large-aperture Schmidt lens** enhances received light intensity fourfold compared to conventional lenses. Its high-resolution, low-distortion design significantly improves imaging quality.
- With up to **10MP** resolution, the CMOS provides 4,096 data points per profile, enabling precise measurement of even the most intricate features.



### ▼ Point clouds: pin tip



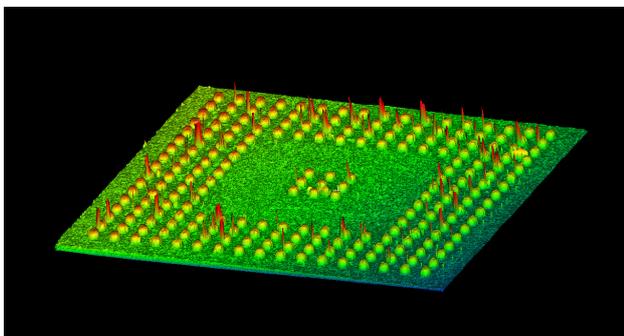
The point cloud generated by a conventional 3D line laser profiler has visible noisy data, like spikes, that can affect measurement accuracy.



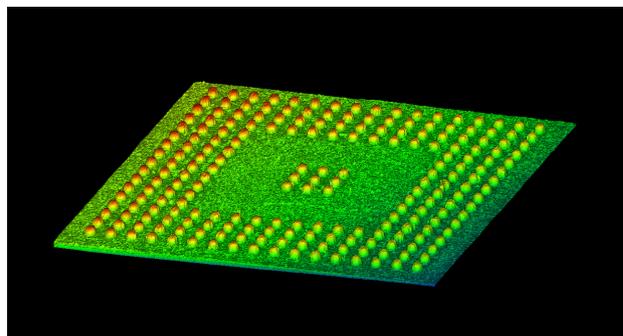
The Mech-Eye LNX-8000 series adopts high-resolution CMOS and advanced optical designs, allowing precise imaging of even the smallest pin tips.

With our **robust algorithms**, the Mech-Eye LNX-8000 series excels in handling **interreflection, dead zones, and other challenging situations**. Its enhanced resistance to interference ensures precise and reliable measurement results.

### ▼ Point clouds: BCA



Traditional algorithms struggle with interference caused by interreflection. This results in point cloud outliers that affect measurement accuracy.



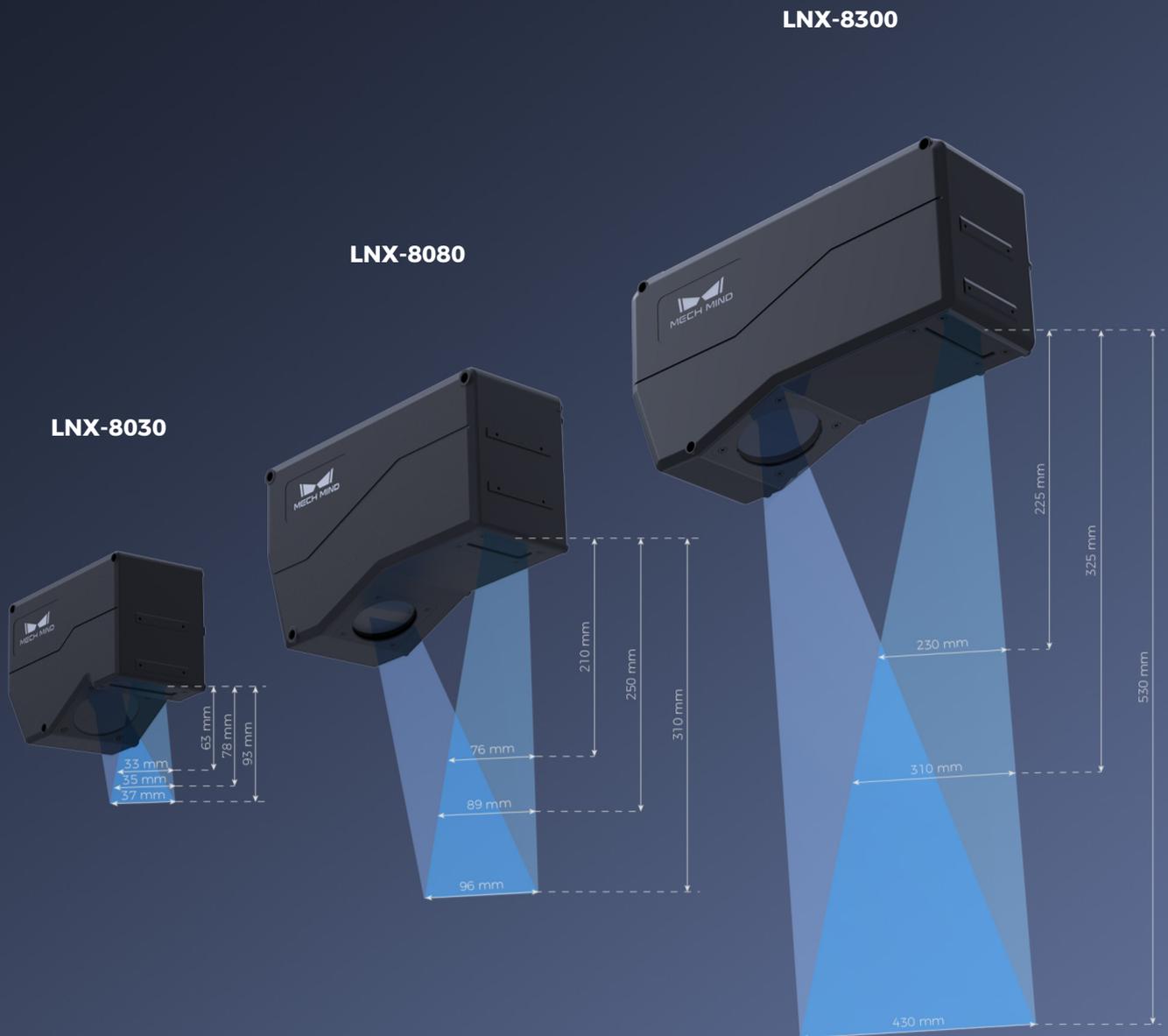
Robust anti-interreflection algorithms eliminate outliers and deliver high-quality point clouds, ensuring reliable measurement results.

# Choose from a lineup tailored to your application needs

The Mech-Eye LNX series introduces multiple models to enhance quality control and process optimization across diverse industries.

Work with Mech-MSR 3D Measurement and Inspection Software and Mech-DLK Deep Learning Software to help you rapidly deploy measurement/inspection applications

Develop your applications using multi-language SDK, including C++ and C#; Easily connect to HALCON and other third-party vision software through the native API or GenICam/CigE interface



# Applications in the Consumer Electronics

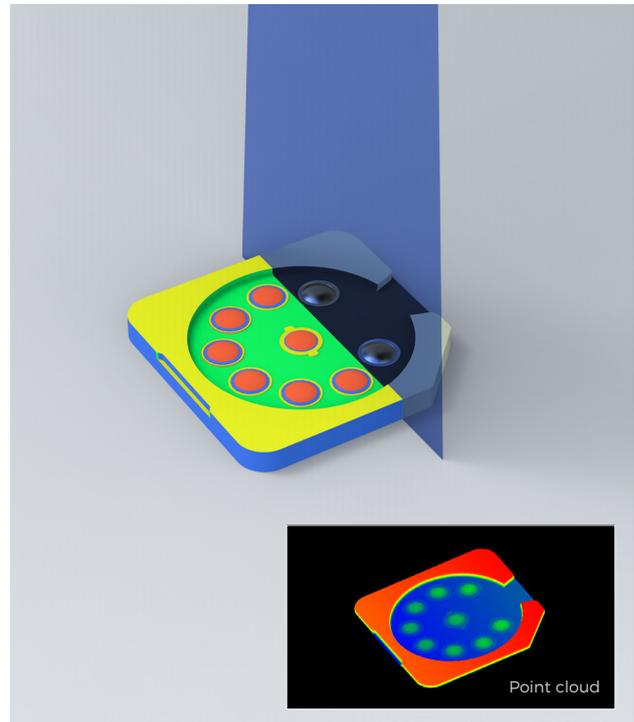
## Solder Joint Inspection

### ► The challenge

- Solder joints are tiny, typically ranging from tens to hundreds of micrometers in height.
- Solder joints have reflective surfaces, making precise 3D scanning and inspection more challenging.
- The shapes of the joints are highly varied and irregular, including spherical, conical, cylindrical, and other forms.

### ► The advantage

- Generate high-resolution 3D data (**4,096** data points per profile and Z repeatability down to **0.2 μm**) of each solder joint.
- Advanced algorithms effectively handle the reflection and generate **detailed and high-density 3D data**.
- **Mech-DLK** deep learning software strategically used to segment and recognize different sold joint types.



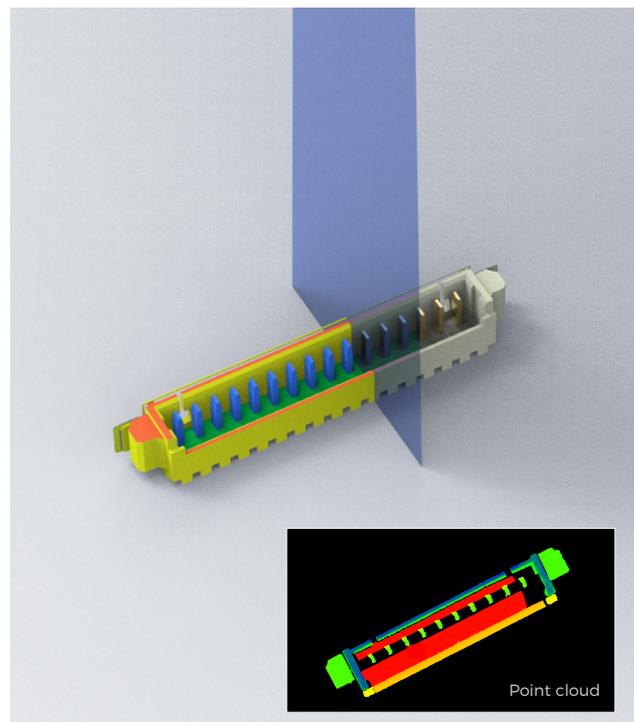
## Pin Height Measurement

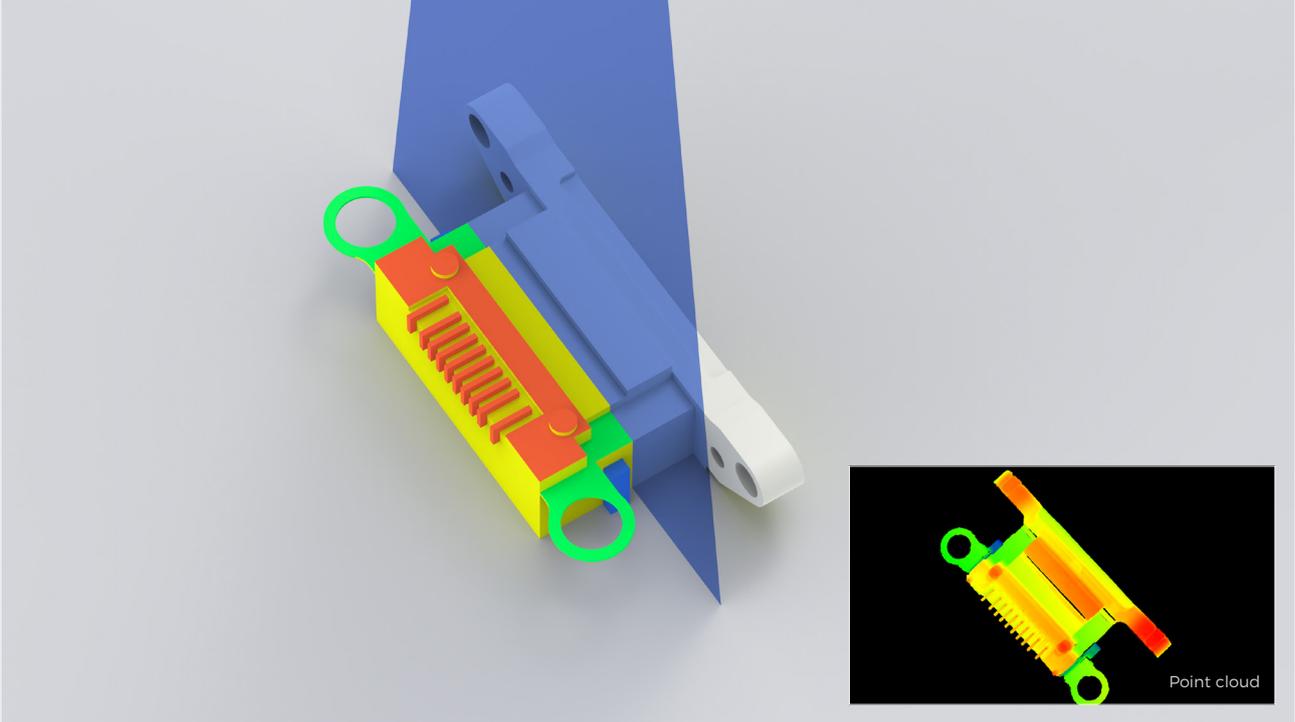
### ► The challenge

- Pins are difficult to scan and measure because they are tiny, highly reflective, and come in varying heights and materials.
- Noise, such as spikes, in the 3D data regularly appears between pins.
- Pins of slightly incorrect height can result in short circuits and poor contact.

### ► The advantage

- Generate high-resolution 3D data (**4,096** data points per profile) of each tiny, highly reflective pin.
- Advanced optical design and algorithms effectively handle different types of noise, such as dead zones and spikes.
- **Micron resolution** to measure the pin's height precisely and accurately.





# Card Edge Connector Coplanarity Inspection

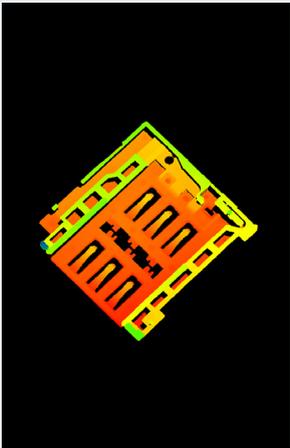
## ► The challenge

- The light reflected from the metal coating impacts the inspection result.
- Complex surfaces and tiny features (e.g., grooves, protrusions, and patterns) pose challenges to the imaging.
- A moving production line requires quick and consistent inspection.

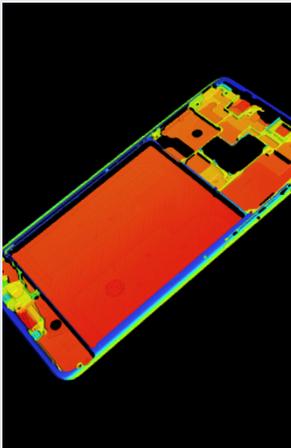
## ► The advantage

- Create a high-resolution image by scanning each reflective pin in high density (4,096 points/profile).
- Measure targets at ultrahigh scanning speeds and produce stable profiles for **efficient and consistent inspection**.
- Advanced imaging algorithms handle dead zones and reflection for accurate results.

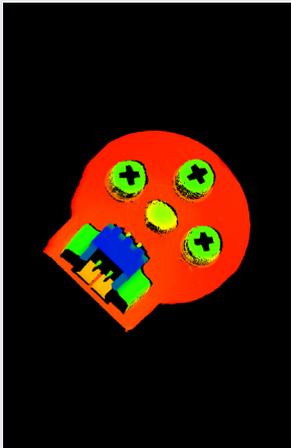
## More Applications



SIM card holder height measurement



Cellphone midplate inspection



Screw height measurement



Shielding frame inspection

# Applications in the EV Battery

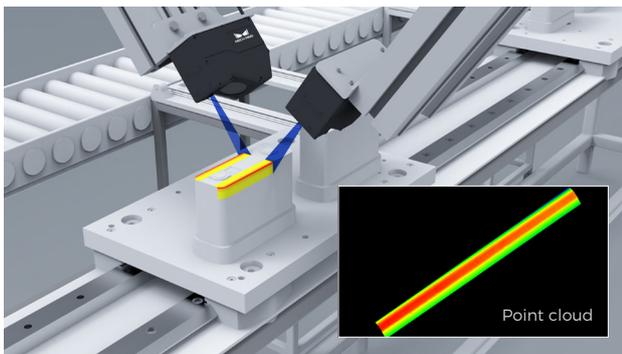
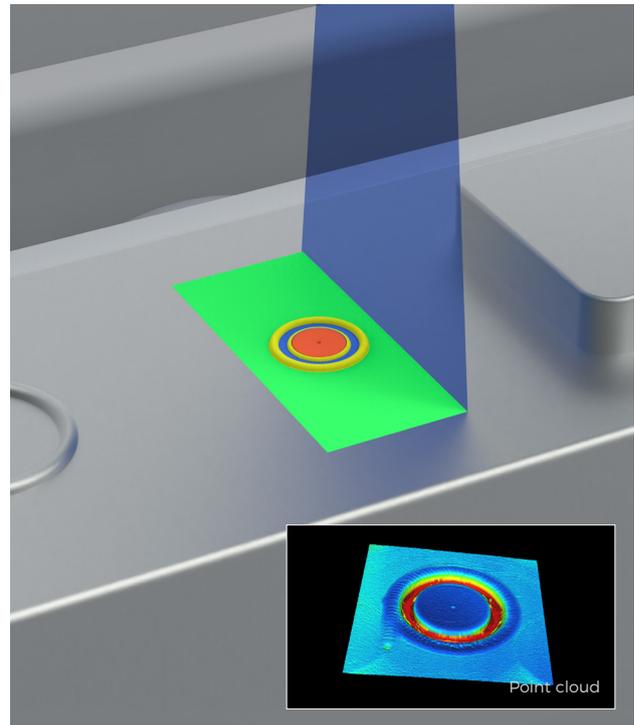
## Sealing Pin Welding Inspection

### ► The challenge

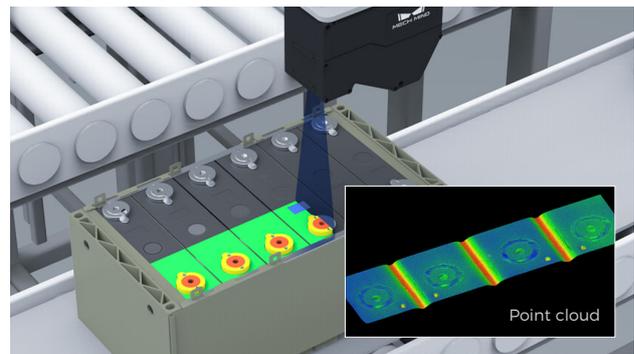
- Tiny pin welds require high inspection accuracy.
- Some defects occur on the pin welds, such as burns, dents, pinholes, broken and missing welds.
- Fast and stable scanning is required in the process to avoid line shutdowns and maximize yields.

### ► The advantage

- High-speed and high-quality imaging of tiny welds for accurate and efficient inspection.
- **Pixel-level defect segmentation** and inspection with robust algorithms.
- Stable and durable operation for efficient production and high productivity.



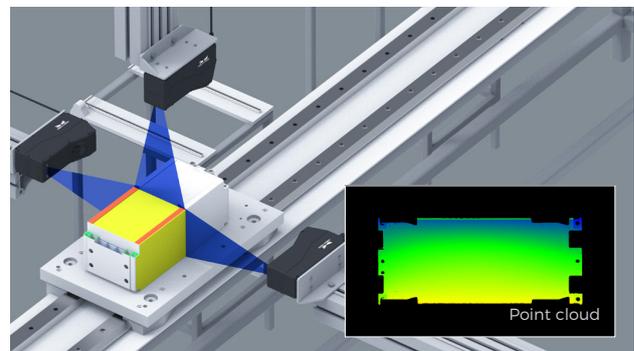
Cap welding inspection



Busbar welding inspection

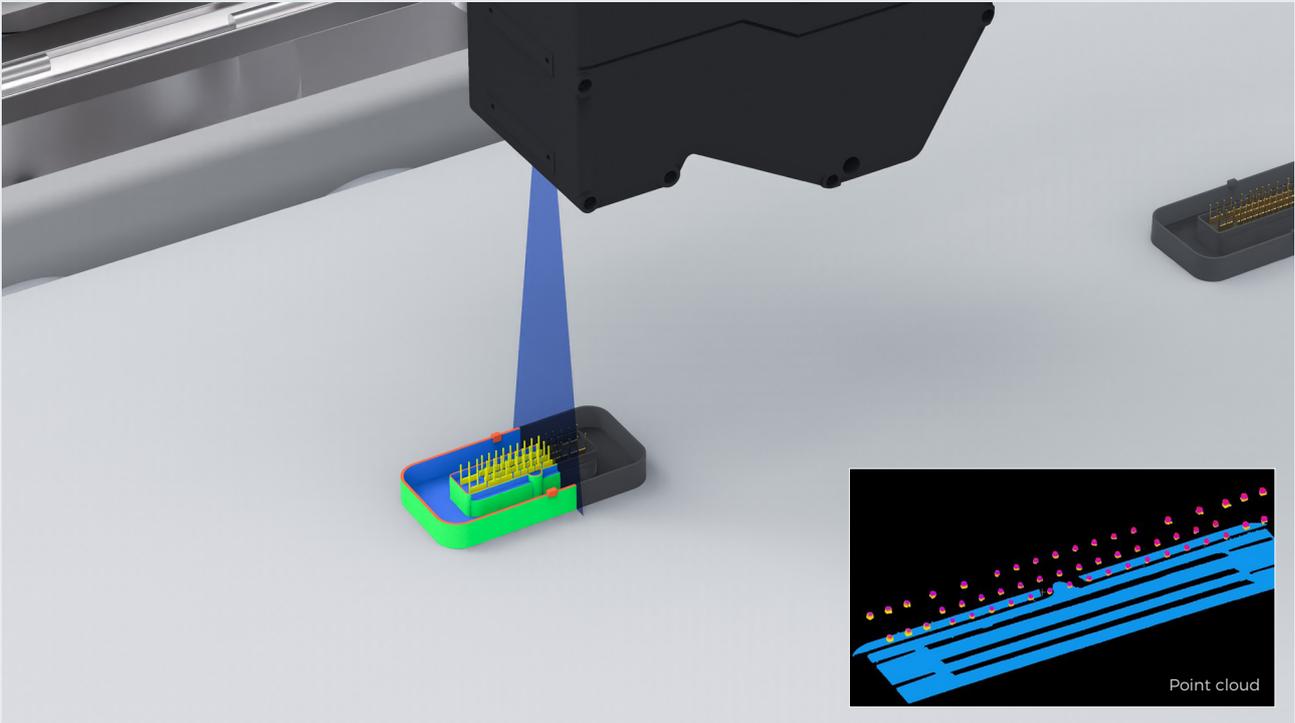


Height measurement of battery cell



Dimensional measurement of battery module

# Applications in the Automotive Industry



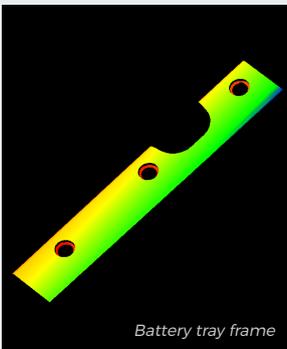
## Connector Pin Inspection

### ► The challenge

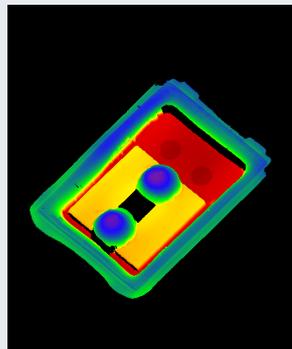
- Pins of slightly incorrect height can result in voltage drops and intermittency.
- The tiny pin inspection places high demands on accuracy and resolution.
- Noise resulting from interreflection between pins impacts the image quality.
- Intricate geometries of pins are easy to create curves in the 3D point clouds.

### ► The advantage

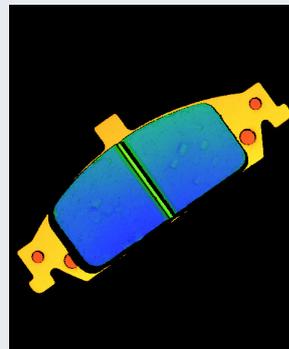
- Produce **high-density and high-resolution profiles** and detailed 3D point clouds of tiny pins.
- The robust algorithms effectively deal with the noisy data resulting from reflection.
- Advanced algorithms and AI-powered tools precisely measure the height of the pins and separate the curved point clouds.



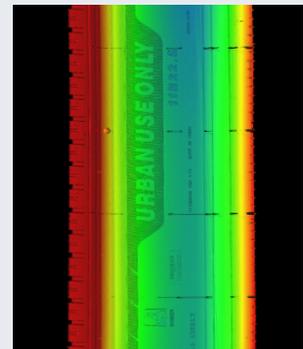
EV battery tray inspection



Glue bead inspection



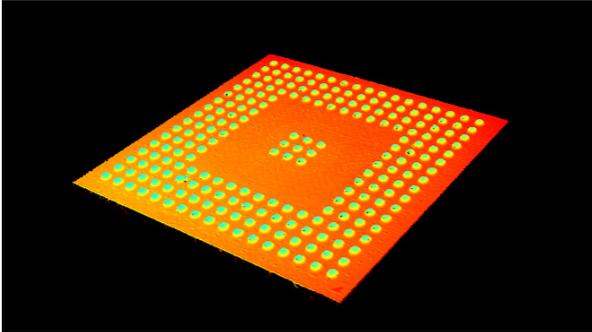
Brake pad defect detection



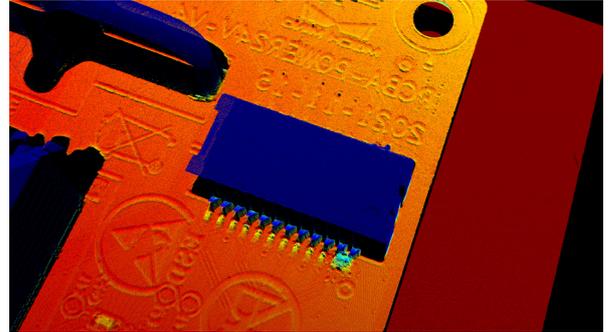
Tire DOT code reading

# Applications

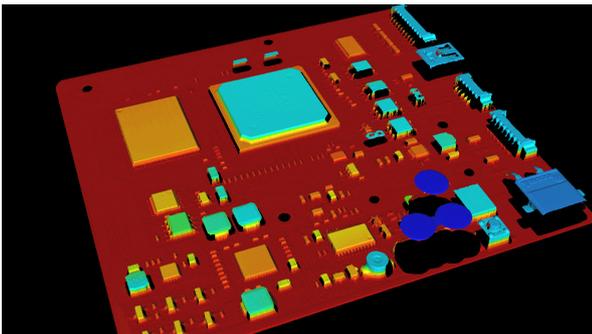
## in semiconductor, pharmaceutical, metal and more industries



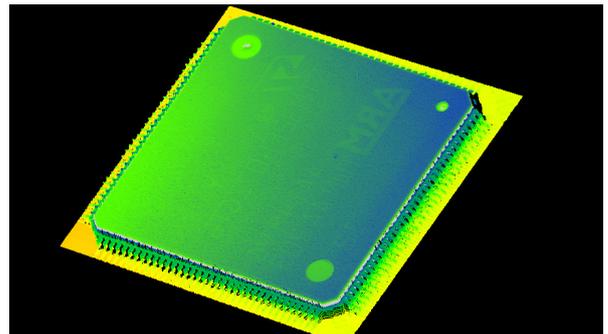
BGA inspection (height, coplanarity, etc.)



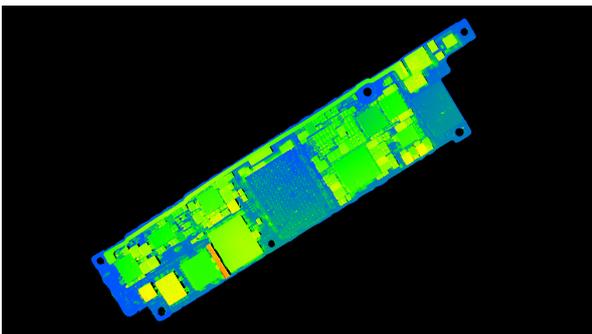
PCB solder paste inspection



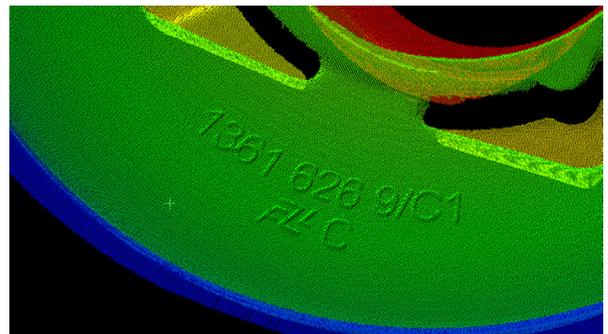
Height measurement of PCB-mounted parts



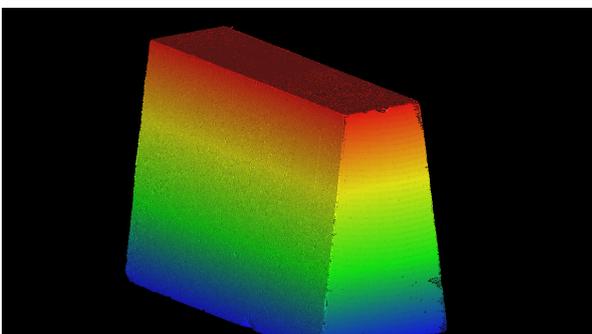
Chip welding inspection



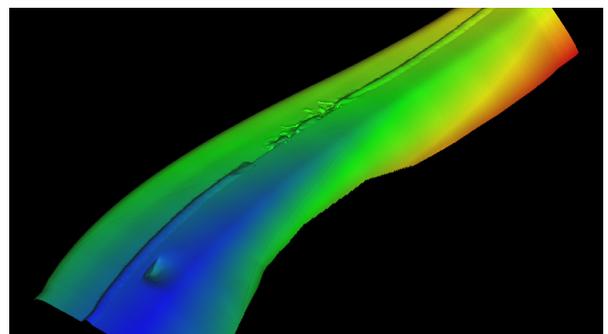
Part presence/absence detection



Character recognition on cast surfaces



Refractory brick dimensional measurement



Welding seam inspection

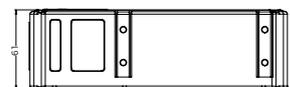
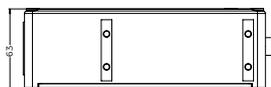
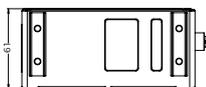
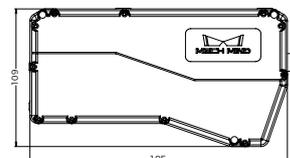
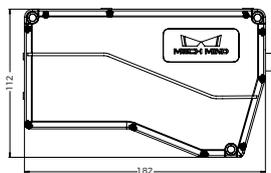
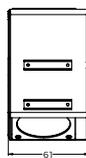
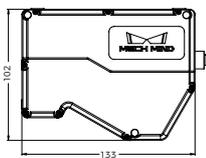
# Mech-Eye LNX-8000 Series and Key Specs

Specification	LNX-8030	LNX-8080	LNX-8300
Data points/profile	4096		
Reference distance (RD)	78 mm	250 mm	325 mm
Measurement range Z	30 mm	100 mm	305 mm
Measurement range X (near/RD/far)	33/35/37 mm	76/89/96 mm	230/310/430 mm
Resolution X	9 $\mu$ m	23.5 $\mu$ m	105 $\mu$ m
Repeatability Z	0.2 $\mu$ m	0.5 $\mu$ m	2 $\mu$ m
Linearity Z	$\pm$ 0.02% of F.S.		
Scan rate	3.3-15 kHz		
Dimensions	133 x 61 x 102 mm	182 x 63 x 112 mm	195 x 61 x 109 mm
Weight	0.9 kg	1.2 kg	1.2 kg
Laser	Blue (405 nm, Class 2)	Blue (405 nm, Class 2M)	Blue (405 nm, Class 2M)
Lens inclination	30°	22°	19°
Input voltage	24V DC		
Max. input power	48W (25W for sensor head)		
Communication interface	Gigabit Ethernet		
Encoder input	Single-ended and differential encoders supported		
Operating temperature	0-45°C		
Safety and EMC	CE/FCC/VCCI/KC/ISED/NRTL		
IP rating	IP67		
Cooling	Passive		

Mech-Eye LNX-8030

Mech-Eye LNX-8080

Mech-Eye LNX-8300



Unit: mm

**3D VISION & AI FOR ROBOTS AND MORE**

---



Mech-Mind Robotics Technologies Ltd.

Website: [www.mech-mind.com](http://www.mech-mind.com)

E-mail: [info@mech-mind.net](mailto:info@mech-mind.net)

---