

Mech-Mind Robotics

AI + 3D Vision Applications in Automotive Industry

4,000+ cameras successfully deployed in the automotive industry

**We Help Integrators WIN
with best-in-class AI + 3D vision tools and services.**

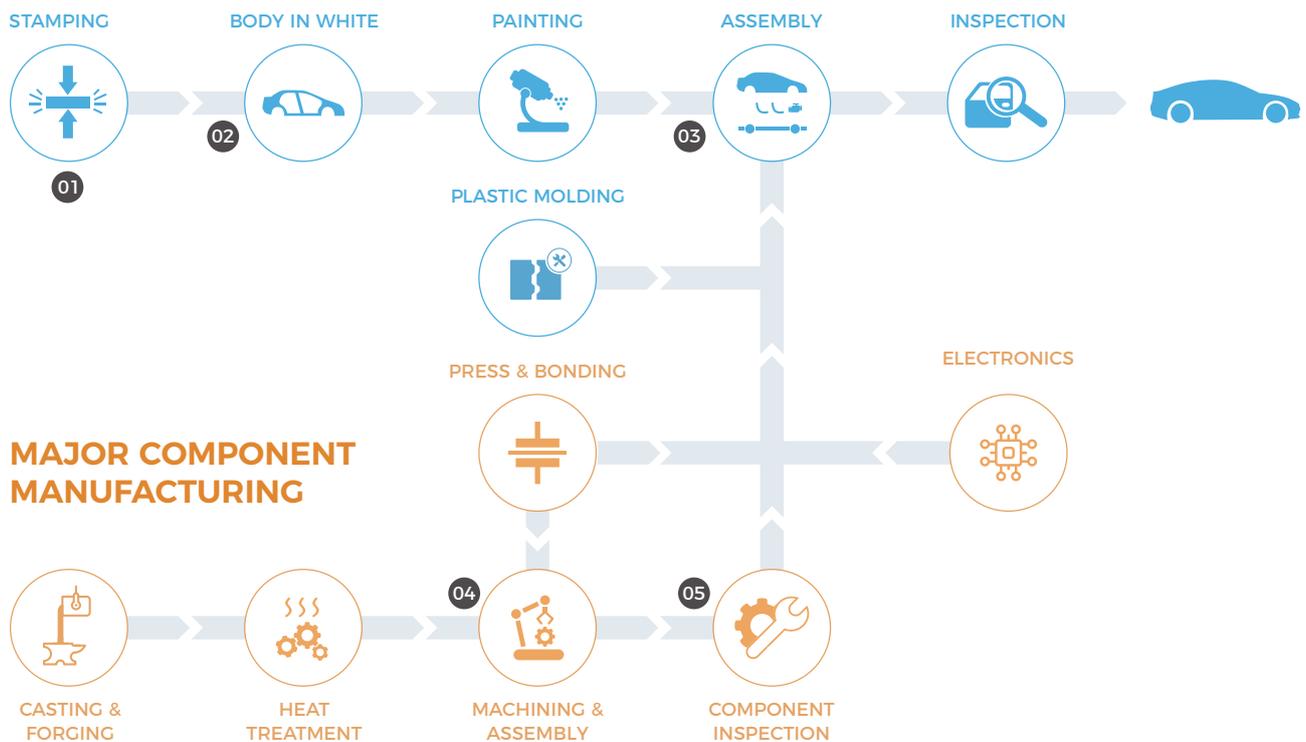
Advanced Techs | Proven | Versatile | Fast and Easy | No Black-Box | Industry-Ready | Open | Best Services

Mech-Mind AI + 3D Vision Pioneer in Automotive Industry

The automotive industry is at the forefront of innovation, constantly evolving and pushing the boundaries of what's possible.

Modern automobiles are more complex and require more efficient production processes. This is where Mech-Mind steps in. Leveraging **state-of-the-art AI technology**, our **proven and versatile 3D vision tools** assist **global integrators** in handling the most demanding applications, enabling them to maintain a competitive edge. From machine tending to quality control, we've got you covered.

VEHICLE MANUFACTURING



01
Mech-Eye automates the picking and placing of stamped, forged, and cast parts.

02
Mech-Eye automates the handling and inspection of automotive body-in-white components.

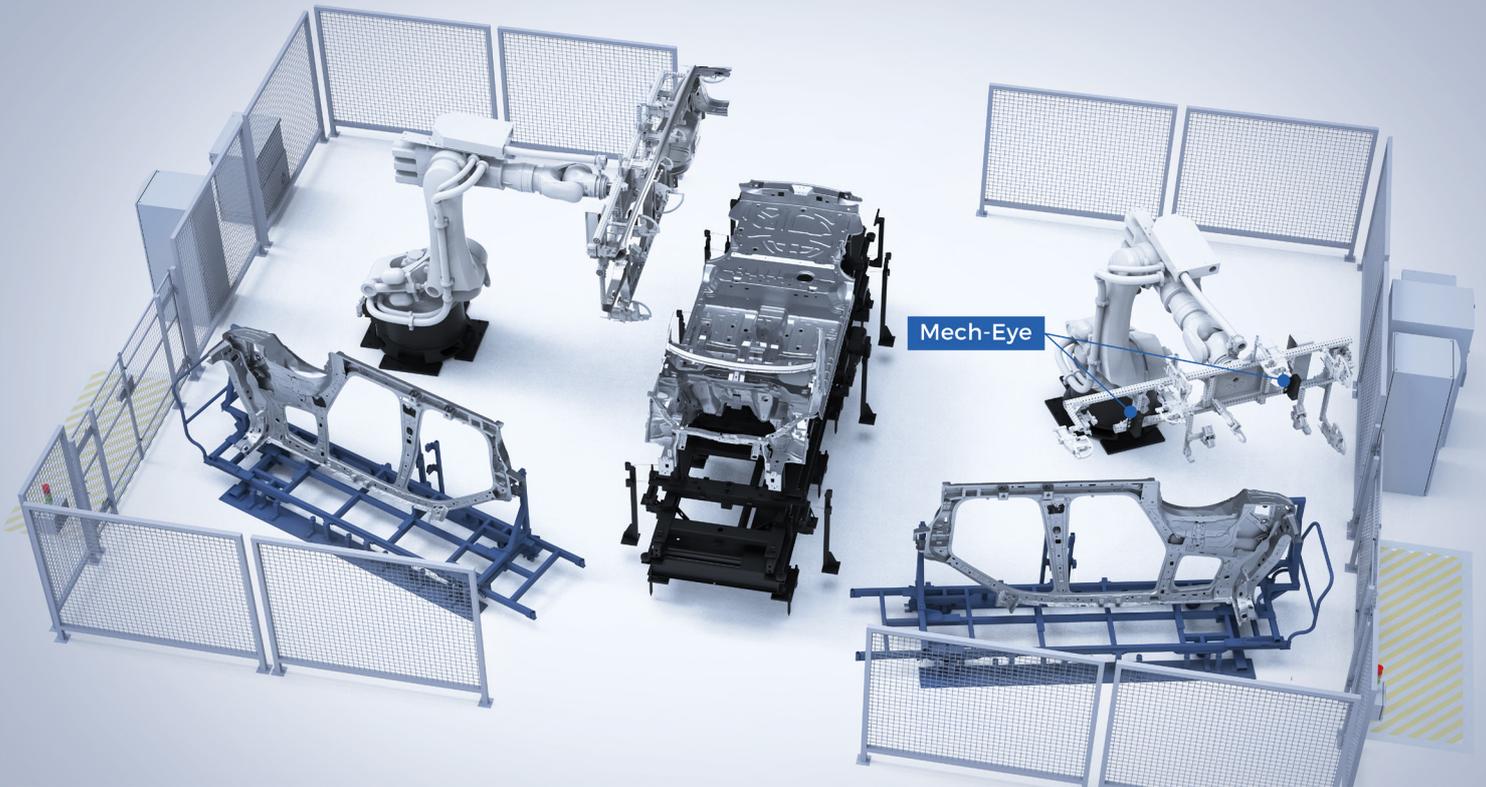
03
Mech-Eye automates assembly processes, such as screw driving, part fitting, wheel insertion, and EV battery module to pack.

04
Mech-Eye automates the machining and assembly processes of automotive components.

05
Mech-Eye performs inspection of various machined automotive components before final assembly.

OEM - APPLICATION

Vision-Guided Picking & Placing



Quick detection, accurate picking, and reliable placing.

The vision-guided robot can accurately and securely pick and place parts. It can insert them into a machine or fixture, or neatly stack them into a bin or rack. This process is carried out with high accuracy and stability.

► Capabilities

- **See a broad range of parts with high accuracy**

Sees complex-shaped, highly reflective, machined parts, entangled, overlapped, or densely stacked.

- **Accurate picking and placing**

Powerful algorithms, including multiple pick points and deep learning, enable precise picking and placing operation, ensuring handling of objects with the utmost accuracy.

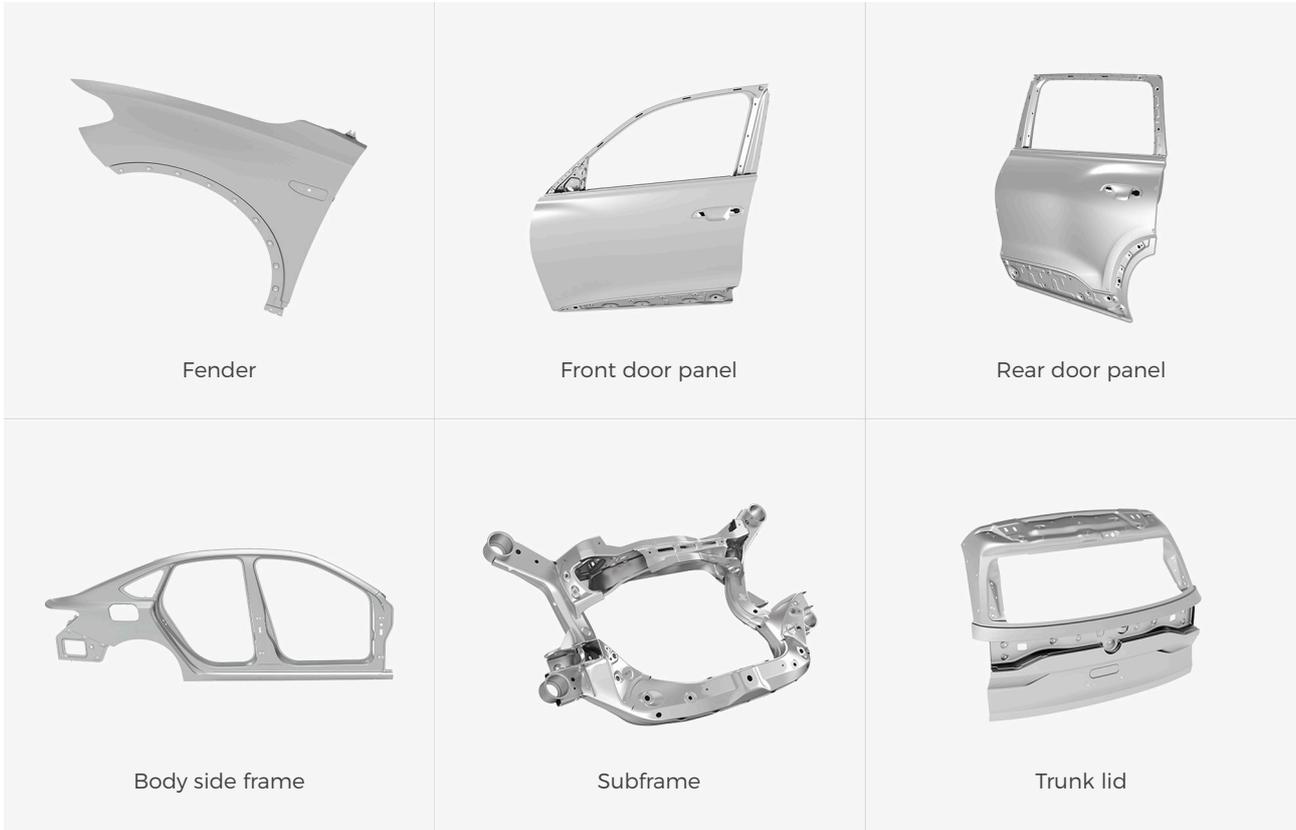
- **Collision-free operation**

Advanced motion planning algorithms enable seamless robotic operation, ensuring smooth and efficient movements without collisions.

- **Perform reliably in harsh environments**

Rely on the exceptional durability of Mech-Eye industrial 3D cameras, designed to last long even in the harshest industrial environments, including high temperatures, vibrations, dust, and humidity.

Mech-Eye industrial 3D cameras automate picking and placing of:



Mech-Eye industrial 3D cameras are ideal for the robotic picking and placing of automotive components in automotive manufacturing applications. They offer **exceptional accuracy, speed, and compact size**. Mech-Eye 3D cameras can easily fit into space-constrained environments while keeping up with production cycle times.

► Unparalleled Point Cloud Quality



► Recommended Cameras

- Mech-Eye PRO
- Mech-Eye NANO

Case Study

Vision-Guided Picking & Placing of Auto Door Panels Automotive OEM

► The Challenge

Door panels have small batch sizes and come in many different variations. Additionally, picking them requires a high level of precision. These factors necessitate a robot system that can handle these challenges. The 3D vision acts as the robot's eyes, guiding it to pick up the large door panels from the rack and place them accurately into the fixture for further processing.



► The Mech-Mind Solution

- The Mech-Eye PRO S generates **high-quality 3D point cloud data** that enables precise detection of small pinholes on door panels. This data guides the robot's grippers to accurately insert into the pinholes and securely hold the door panel in place.
- Mech-Mind 3D vision system supports various door panel types.
- **Path planning** and **collision detection** algorithms enable collision-free picking and placing.
- Mounted on the end of the robot arm, **one camera can cover multiple workstations**.

► The Result

- The fully automated production line can stably operate without manual intervention.



Point clouds



Recognition results

Case Study

Vision-Guided Racking of Stamped Parts

Automotive OEM

► The Challenge

A global tier 1 automotive OEM needed to automate the racking process of stamped parts, making the end-of-line rackings more scalable and efficient. The challenge lay in the variants of stamped parts and the high requirement for accuracy. Mech-Mind AI and 3D vision tools seamlessly integrated into the production line and guided robots to rack stamped parts into specific containers with high flexibility and reliability.

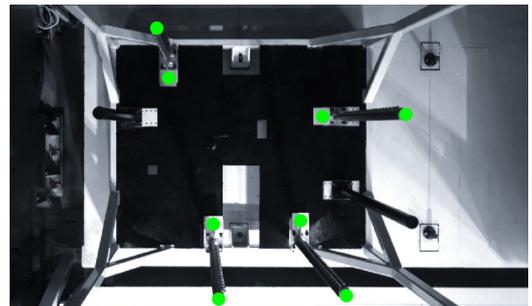


► The Mech-Mind Solution

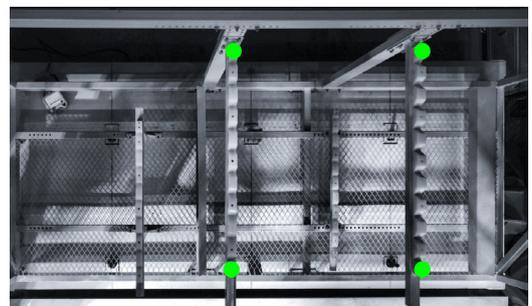
- High-precision positioning of different features on various racks, allowing the calculation of robot placement poses to ensure precise loading of parts into the racks.
- Handles **dozens of automotive body stampings** and their corresponding material racks, providing enhanced production flexibility.
- Mech-Eye LSR L can meet the high-precision positioning requirements for material racks with a maximum size of 4.0 × 1.8 × 1.8 m.

► The Result

- Mech-Mind AI and 3D vision tools added accuracy and speed to the production line, **significantly improving the efficiency and flexibility** of the end-of-line racking process.



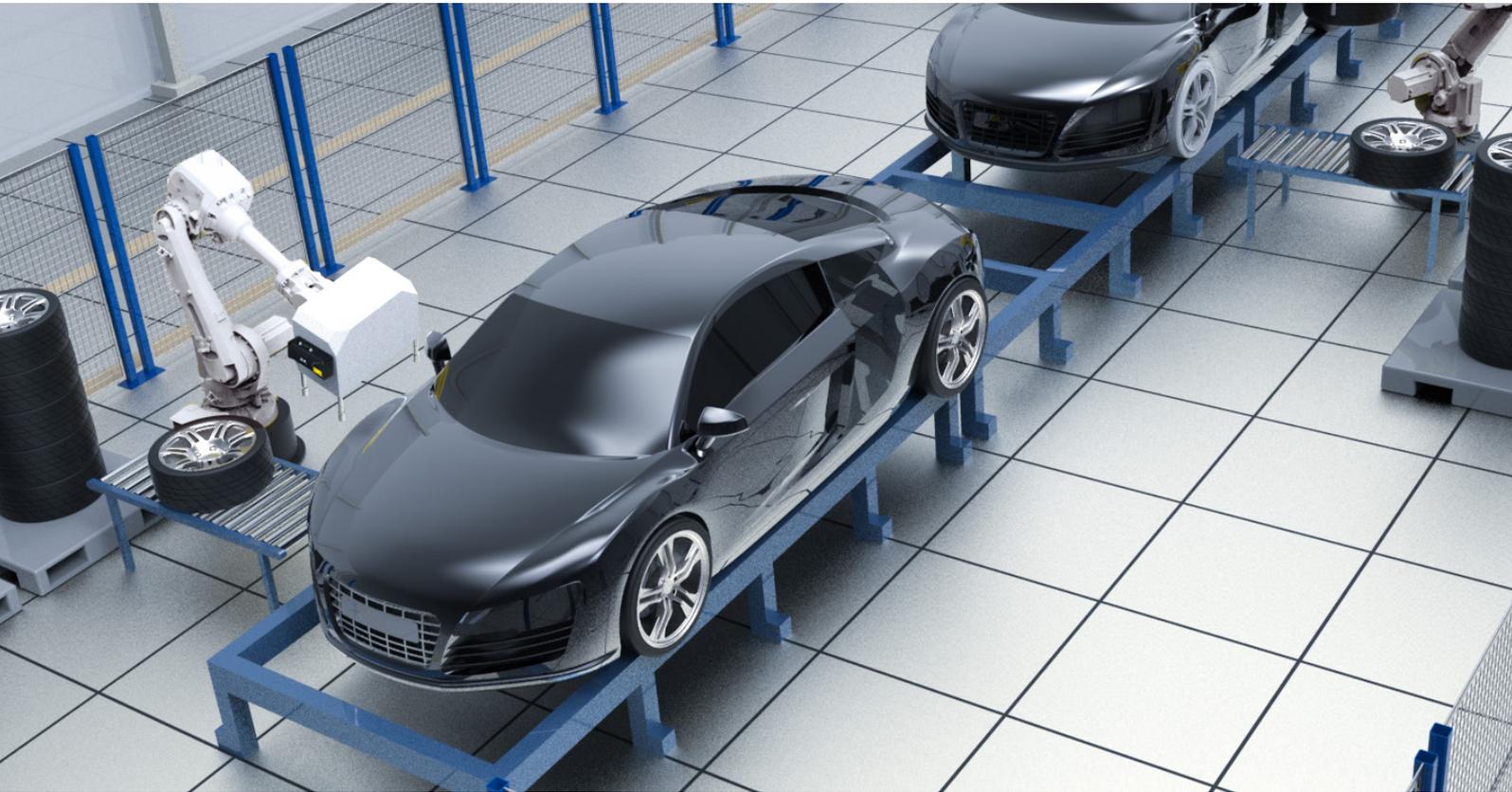
Recognition results (features on the container)



Recognition results (features on the container)

OEM - APPLICATION

Vision-Guided Assembly



Develop repeatable assembly processes such as screw driving, part fitting, and insertion while ensuring remarkable accuracy. The vision-guided robot precisely identifies, picks up, and assembles parts, even when they are randomly arranged, showcasing impressive dexterity.

► Capabilities

- **Assemble with accuracy**

Detects and locates target objects in random arrays with extraordinarily high accuracy.

- **Assemble with flexibility**

With a compact and lightweight design, the Mech-Eye industrial 3D camera enables flexible handling of challenging assembly tasks even in a tight space.

- **Assemble with reliability**

Path planning and collision detection algorithms ensure reliable robotic operations without collisions.

- **Assemble with dexterity**

The robust 3D vision system has the ability to perceive, think, and act, enabling it to adapt to changes in complex assembly tasks.

► Recommended Cameras

- Mech-Eye PRO
- Mech-Eye NANO

► Examples of Parts

- Tires, wheel hubs, screws, EV batteries, etc.

Case Study

Vision-Guided Wheel Installation Automotive OEM

► The Challenge

The vision-guided robot must quickly and accurately install wheels in a moving production line. The automated assembly line can stably operate 24/7.



► The Mech-Mind Solution

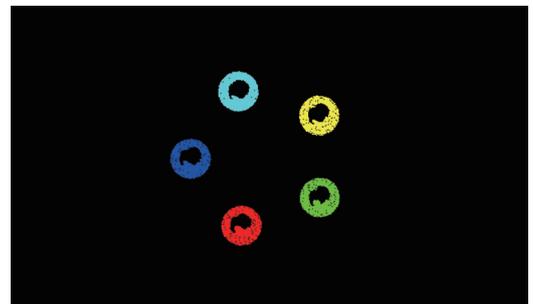
- Mech-Eye PRO S generates **accurate and detailed 3D point clouds** of the wheel hub with **reflective surfaces**, enabling accurate positioning.
- The flexible 3D vision system synchronizes the robot with the moving assembly line. It's also adaptable for multiple vehicle models and wheel types.
- **Path planning** and **collision detection** algorithms guide the robots to install wheels fast and stably in a **compact space**.

► The Result

- **No need for fixture customization**, saving fixed costs.
- **24/7** stable operation without manual intervention.



Point clouds



Recognition results

Case Study

Vision-Guided Module-To-Pack Assembly Automotive OEM

► The Challenge

The assembly process for battery packs begins with preparing the housing components, such as the tray and cover. Thermal management components, such as cooling plates or heat sinks, may be installed within the pack to regulate and maintain optimal operating temperatures for the battery modules.

Next, the battery modules are inserted into the pack housing and securely fastened. During this step, the 3D vision system plays a vital role in identifying the tray's position, guiding the robot in picking of modules, and ensuring the accurate assembly of the modules into the tray.

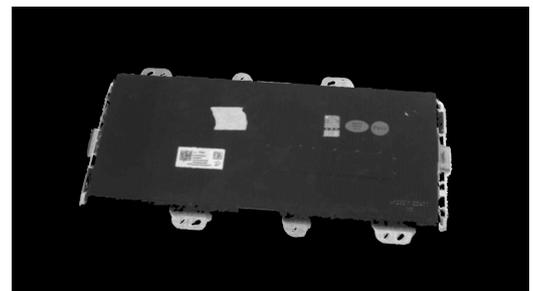


► The Mech-Mind Solution

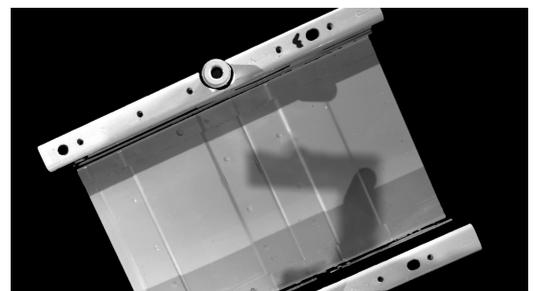
- Two Mech-Eye PRO S 3D cameras collaborate to create a comprehensive 3D model of the entire tray by stitching together **high-resolution and accurate 3D data**.
- The 3D vision system identifies the tray's features and guides the robot in accurately picking modules, ensuring precise pack assembly.
- Mech-Eye PRO S is mounted on the robot arm, seamlessly synchronizing with the robots and capturing images of modules, trays, and covers with great flexibility.

► The Result

- Mech-Mind 3D vision guided robots in performing **99.99%** picking accuracy, resulting in highly accurate and efficient pack assembly.



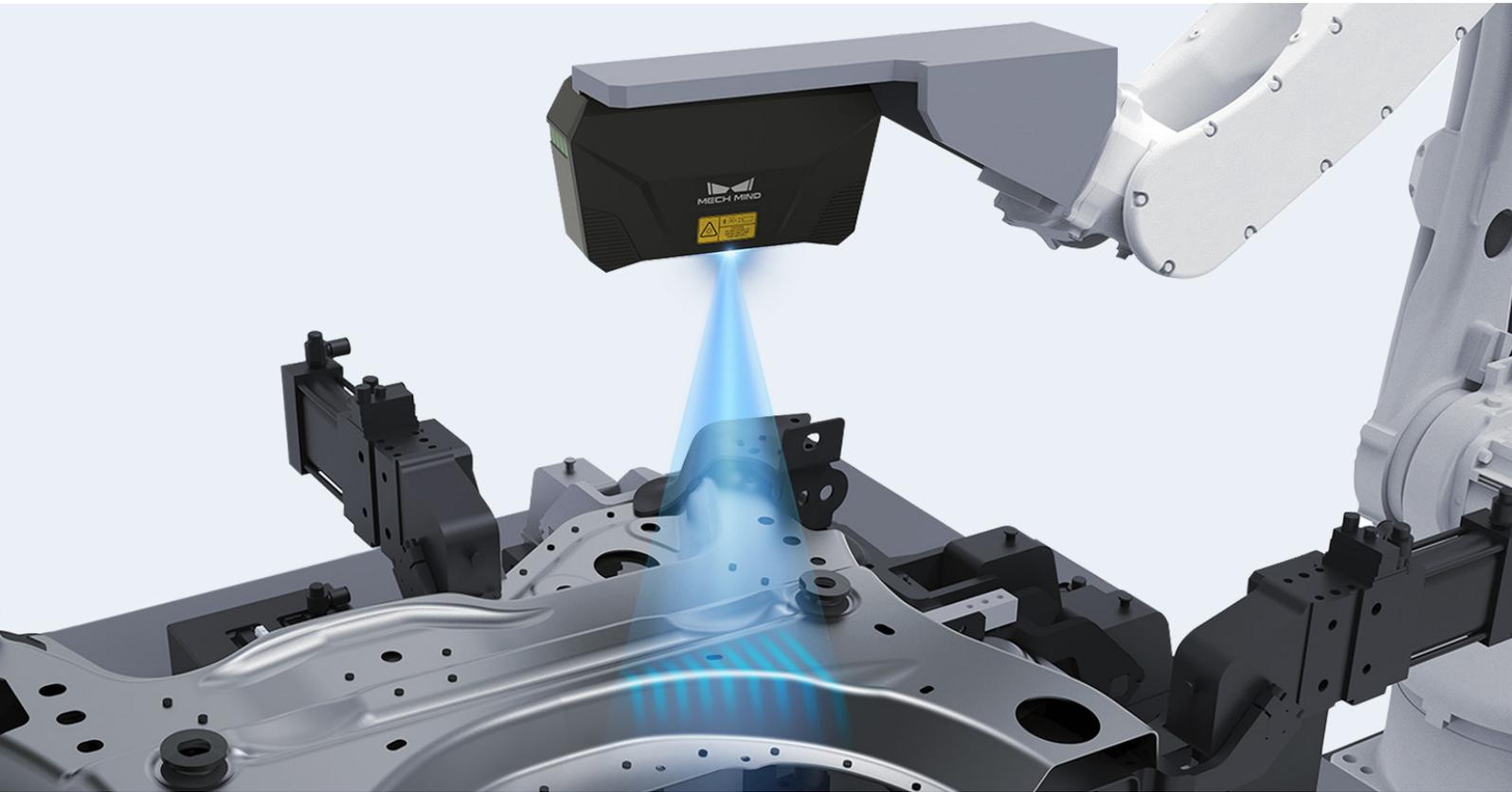
Point clouds (battery module)



Point clouds (tray)

OEM & AUTO PARTS FACTORY - APPLICATION

3D Inline Measurement



Mech-Mind 3D inline measurement meets the quality control requirements of critical manufacturing processes such as part manufacturing and component assembly in the automotive and EV battery industries. This efficient solution provides high-speed & high-accuracy measurements of GD&T (geometric dimensioning and tolerancing), guaranteeing superior product quality, reducing errors, minimizing measurement cycle times, and speeding up your time to market.

► Capabilities

- **Industry-leading accuracy**

Mech-Eye UHP-140 industrial 3D camera with micron-level accuracy and advanced GD&T measurement algorithm deliver measurement accuracy of ± 0.2 mm.

- **Easy setup & fast deployment**

Drag-and-drop measurement and point cloud processing modules can be used with Mech-Vision vision software to quickly set up different measurement projects.

- **High-speed measurement**

With advanced measurement logic throughout the solution, the measuring speed can be up to **2 secs** per measurement point.

- **Real-time quality control**

Quicker decision-making with fast and reliable data to optimize manufacturing processes. Instantaneous feedback on product quality in real-time, allowing you to make adjustments on the fly.

Transform Your Quality Control

01 Pre-Production Inspection

Detect and correct problems in the production process before manufacturing begins.

02 In-Process Inspection

Monitor the quality of the process during assembly, reducing scrap and improving quality.

03 Post-Production Inspection

Verify that your product meets all specification and quality standards before shipping.

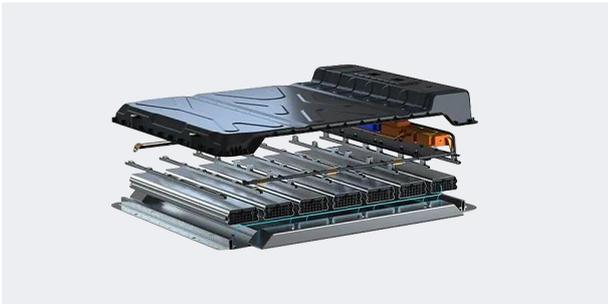
Ready for Inline Measurement

Mech-Mind inline measurement is used in critical manufacturing processes to provide 100% quality control.



► Automotive Manufacturing

- Monitor and measure body components and BIW throughout welding and assembly. Benefit from real-time data processing, rapid quality issue feedback, and seamless integration for enhanced manufacturing quality control.

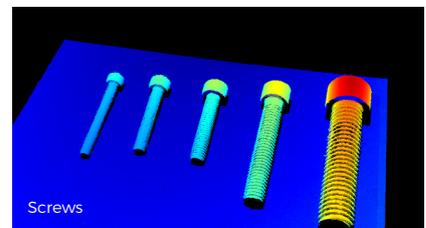
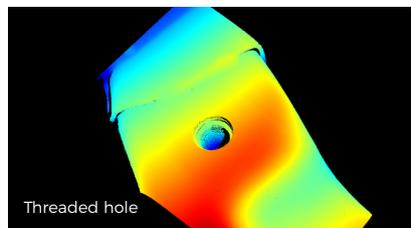
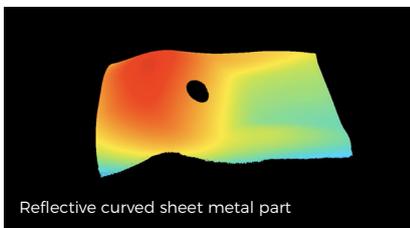


► EV Battery Production

- Achieve precise height, flatness, and surface measurements in battery tray manufacturing, riveting, and welding. Streamline production, minimize errors, and enhance production quality and speed.

Make Quality Control Easier

The Mech-Eye UHP-140 3D camera captures precise and detailed 3D point cloud data with micron-level accuracy, even for tiny features. Its advanced algorithms for image-stitching and anti-reflection 3D reconstruction enhance its capabilities, making it ideal for inspection and measurement applications with strict adherence to GD&T requirements.



Case Study

Subframe Inline Measurement Automotive OEM

► The Challenge

The vision-guided robot needs to precisely measure the key parameters of each assembly feature on the subframe (diameter, position, flatness, etc.) , ensuring subframes can be properly and securely joined together.

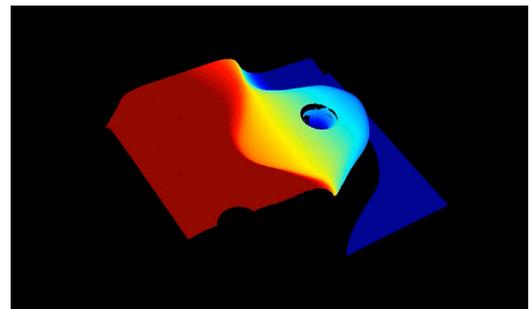


► The Mech-Mind Solution

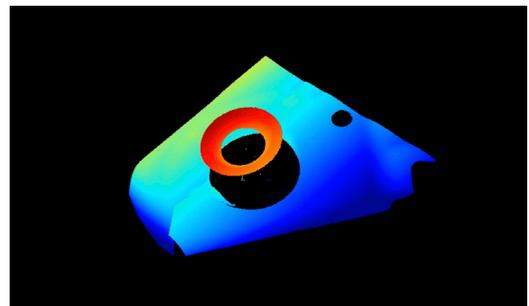
- Mech-Eye UHP-140, featuring micron-level accuracy, generates high-quality point cloud data of features on the subframes with reflective surfaces.
- The Mech-Mind 3D vision system can handle a variety of feature types, including **round holes, threaded holes, studs, slotted holes, etc.**
- Multi-camera and multi-robot collaboration to provide images of features from **multiple viewpoints**.
- **Path planning** and **collision detection** algorithms ensure reliable and collision-free operation even in a compact space.

► The Result

- The customer can filter historical data and output measurement reports, making it easier to manage and organize the data.
- Fully automated inspection and gauging process improves the product quality to meet strict quality standards.



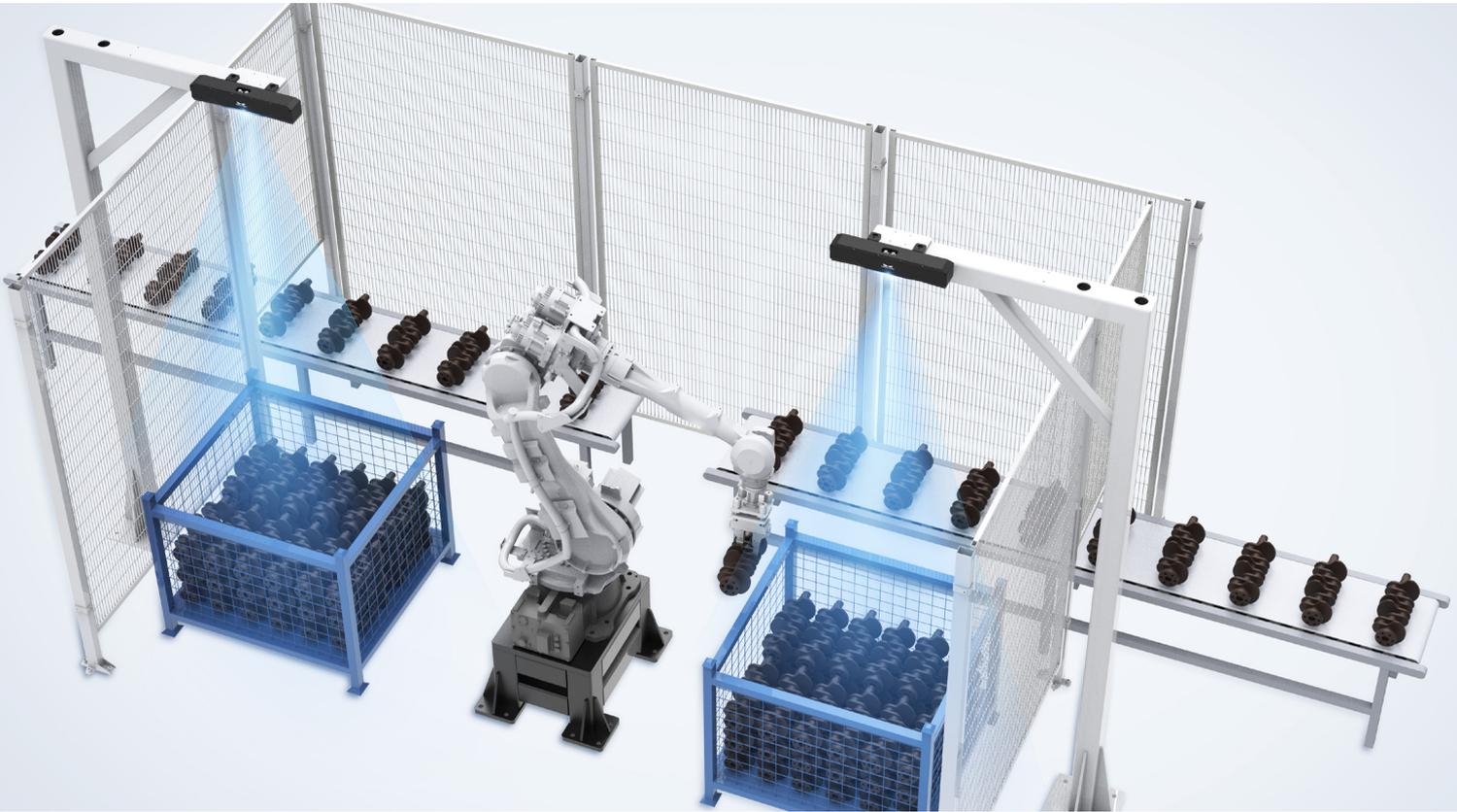
Point clouds (threaded hole, color rendered by height)



Point clouds (reflective round hole, color rendered by height)

AUTO PARTS FACTORY - APPLICATION

Vision-Guided Bin Picking



With Mech-Mind AI + 3D vision solutions, there is no need for placing parts on static fixtures or arranging parts in specific stacking patterns.

Vision-guided robots can empty the deep material bin full of random parts and stably place parts on conveyor belts or intermediate stations for further processing.

► Capabilities

- **Handle a variety of complex parts**

Parts can be reflective, finished, glossy, tiny, thin, curve-edged, or complex-shaped.

Parts can be arranged in a random order, overlap or be densely stacked.

- **Collision-free operation**

Path planning and collision detection algorithms ensure reliable robotic operation without collisions.

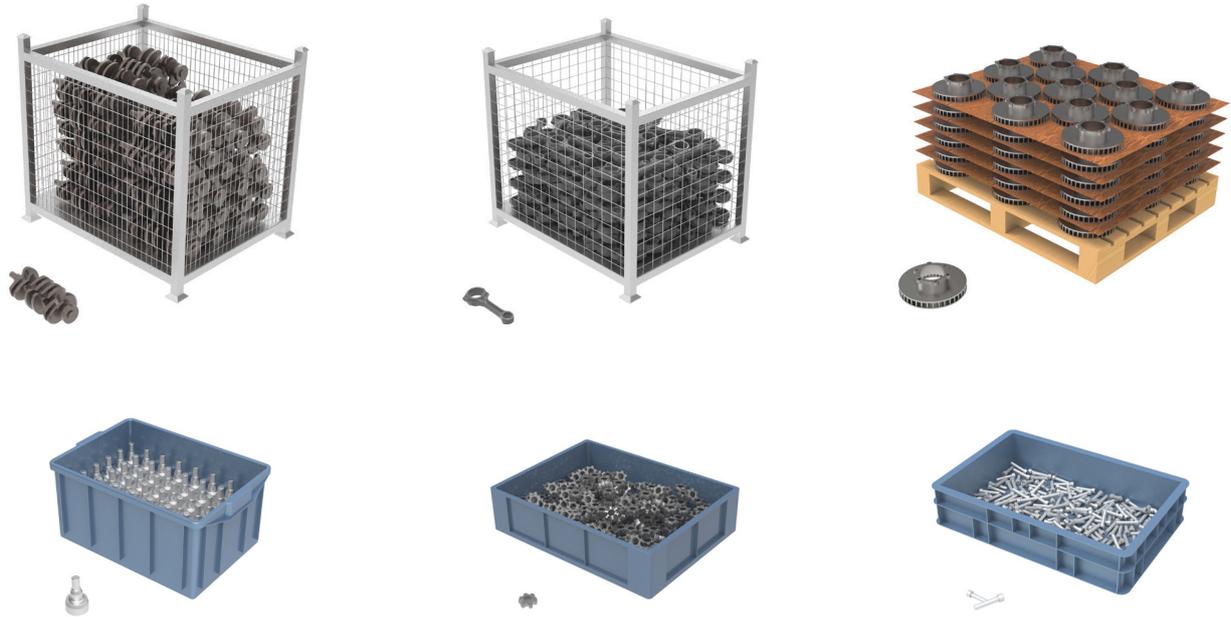
- **Accurate picking**

Powerful algorithms including multiple pick points and deep learning enable highly accurate picking.

- **Cope with harsh industrial environments**

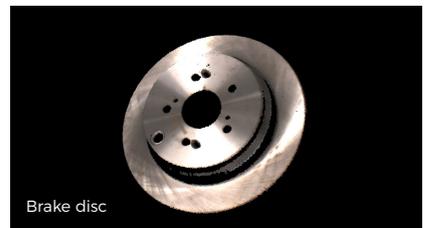
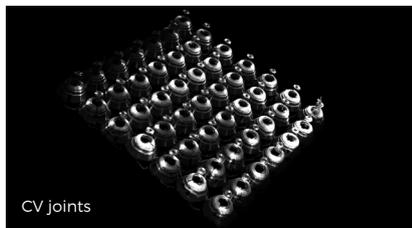
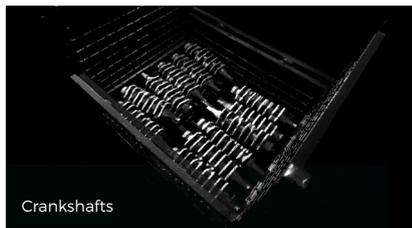
Mech-Eye industrial 3D cameras can stably operate in the harshest industrial environments.

Mech-Eye industrial 3D cameras enable accurate 3D placing of:



Mech-Eye industrial 3D cameras generate precise and highly detailed 3D data, enabling robots to perform accurate picking of complex automotive components with an impressive success rate of **99.99%**.

► Unmatched Point Cloud Quality



► Recommended Cameras

- Mech-Eye LSR
- Mech-Eye PRO

Case Study

Vision-Guided Bin Picking of Inner Races

Large auto parts factory

► The Challenge

Accurately imaging and picking inner races can be a complex task due to their small size and intricate structure. The vision-guided robot needs to quickly and precisely pick inner races while efficiently emptying material bins filled with overlapping parts.



► The Mech-Mind Solution

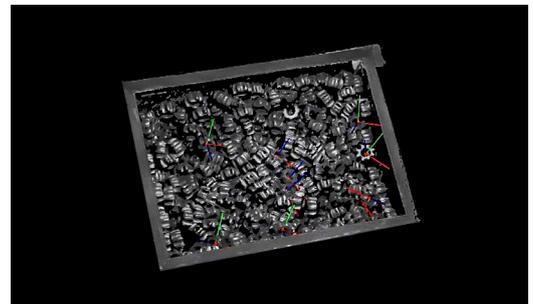
- Powerful AI algorithms calculate **pick points** for the robots, ensuring accurate picking.
- **Path planning** and **collision detection** algorithms enable the robots to pick the inner races without collisions.
- Mech-Eye LSR L, featuring a **large FOV** and **high accuracy**, can cover the entire material bin and provide high-quality 3D point clouds of inner races with reflective surfaces.
- Mech-Eye LSR L secures solid performance under strong ambient light interference (> 30,000 lx).

► The Result

- Bin emptying rate: > **99.99%**
- Supported by 3D vision and AI technology, the robot cell can stably operate 24/7.



Point clouds



Recognition results

Case Study

Vision-Guided Semi-Structured Bin Picking of Gearbox Housings

Large auto parts factory

► The Challenge

Accurately imaging gearbox housings can be tricky due to their intricate structure. The 3D vision system must precisely identify gearbox housings and provide clear 3D data, even when they overlap. So the vision-guided robots can accurately pick and place each gearbox housing.



► The Mech-Mind Solution

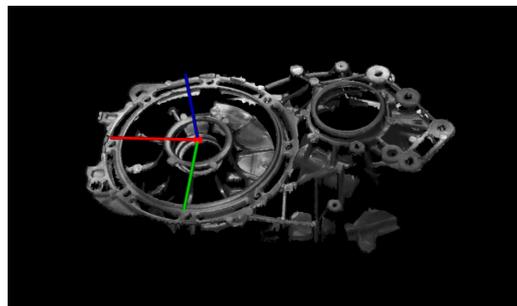
- Mech-Eye PRO S generates **highly accurate 3D data of reflective, complex-structured** gearbox housings.
- Installed at the end of the robot arm, Mech-Eye PRO S can capture images of each gearbox housing with flexibility.
- The 3D vision system can quickly identify gearbox housings, **distinguish between front and back**, guide the robot in accurate picking. In addition, the 3D vision system supports various specs of gearbox housings.

► The Result

- This project's production line has achieved automated manufacturing, resulting in significant cost savings for customers.



Point clouds



Recognition results

More Cases

Scan QR code
to watch videos



Vision-Guided Bin Picking of Driveshafts

- Supports driveshafts with **highly reflective surfaces and oil stains**
- Supports driveshafts varying in sizes
- Intelligent AI algorithms ensure accurate picking & placing without dropping and colliding



Vision-Guided Side Panel Picking

- **Dual camera collaboration** to take images of large side panels
- Supports various types of side panels
- Parts don't have to be placed in certain fixtures for fine positioning, saving maintenance costs



Vision-Guided Picking of Stamping Parts

- Generates **high-quality point clouds** of complex-shaped, reflective stamping parts
- Picks deformable, overlapping stamping parts
- Performs efficient and error-free picking and placing tasks in tight workspace



Vision-Guided Bin Picking of Rotors

- Supports rotors with **highly reflective surfaces and oil stains**
- Supports various rotor specs
- Intelligent AI algorithms that **eliminate the chances of dropping objects or collisions**

More Cases

Scan QR code to watch videos



Vision-Guided EV Charging

- Generates high-quality point clouds of charging sockets with complex structures
- Supports **various car models and socket types**
- Mech-Eye NANO is compact and easy to install
- Performs stably in challenging light conditions (> 60,000 lx)



Vision-Guided Bin Picking of Crankshafts

- Generates high-quality point clouds of crankshafts with **complex structures and oil stains**
- Quickly adapts to new types
- Performs stably under challenging light conditions of > 30,000 lx
- Intelligent AI algorithms ensure accurate picking & placing without dropping and colliding



Vision-Guided Bin Picking of CV Joints

- Generates high-quality point clouds of high reflective CV joints
- Calculates **the optimal pick point** for accurate and reliable picking
- Intelligent AI algorithms ensure accurate picking & placing without dropping and colliding



Vision-Guided Bin Picking of Brake Discs

- Supports large pallets and brake discs with **reflective surfaces**
- Accurately detects overlapping brake discs
- Performs flawless picking and placing operations **without dropping or collisions**

Mech-Eye Industrial 3D Cameras

- Detailed and accurate 3D point clouds
- Ambient light resistance
- Short capture time
- IP65 water and dust resistance
- Rugged aluminum alloy housing
- MTBF (Mean Time Between Failures): $\geq 40,000$ hours

Specification	LSR L	PRO M	PRO S	NANO	UHP-140
Recommended working distance	1200-3000 mm	1000-2000 mm	500-1000 mm	300-600 mm	300 \pm 20 mm
Near FOV	1200 \times 1000 mm @ 1.2 m	800 \times 450 mm @ 1.0 m	370 \times 240 mm @ 0.5 m	220 \times 150 mm @ 0.3 m	135 \times 90 mm @ 0.28 m
Far FOV	3000 \times 2400 mm @ 3.0 m	1500 \times 890 mm @ 2.0 m	800 \times 450 mm @ 1.0 m	440 \times 300 mm @ 0.6 m	150 \times 100 mm @ 0.32 m
Resolution	Depth map: 2048 \times 1536 RGB: 4000 \times 3000/2000 \times 1500	1920 \times 1200	1920 \times 1200	1280 \times 1024	2048 \times 1536
Megapixels	/	2.3 MP	2.3 MP	1.3 MP	3.0 MP
Point repeatability Z (σ) ^[1]	0.5 mm @ 3.0 m	0.2 mm @ 2.0 m	0.05 mm @ 1.0 m	0.1 mm @ 0.5 m	2.6 μ m @ 0.3 m Region ^[2] : 0.09 μ m @ 0.3 m
VDI/VDE accuracy ^[3]	1.0 mm @ 3.0 m	0.2 mm @ 2.0 m	0.1 mm @ 1.0 m	0.1 mm @ 0.5 m	0.03 mm @ 0.3 m
Typical capture time	0.5-0.9 s	0.3-0.6 s	0.3-0.6 s	0.6-1.1 s	0.6-0.9 s
Baseline	380 mm	270 mm	180 mm	68 mm	80 mm
Dimensions	459 \times 77 \times 86 mm	353 \times 57 \times 100 mm	265 \times 57 \times 100 mm	145 \times 51 \times 85 mm	260 \times 65 \times 142 mm
Weight	2.9 kg	1.9 kg	1.6 kg	0.7 kg	1.9 kg
Light source	Red laser (638 nm, Class 2)	Blue LED (459 nm, RG2)/White LED (RG2)			Blue LED (459 nm, RG2)
Image sensor	Sony CMOS for high-end machine vision				
Operating temperature	-10-45°C	0-45°C			
Communication interface	Gigabit Ethernet				
Input	24V DC, 3.75 A			24V DC, 1.5 A	24V DC, 3.75 A
Safety and EMC	CE/FCC/VCCI/KC/ISED/NRTL				
IP rating	IP65				
Cooling	Passive				

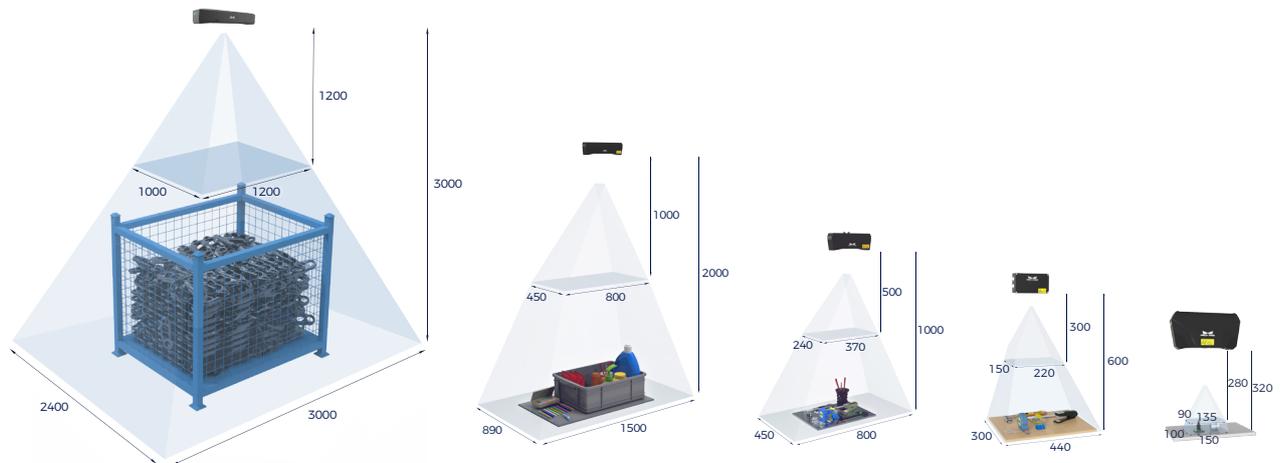
Mech-Eye LSR L

Mech-Eye PRO M

Mech-Eye PRO S

Mech-Eye NANO

Mech-Eye UHP-140



Field of view (mm)

[1] The standard deviation of the single point Z value for 100 measurements. The measurement target is a ceramic plate.

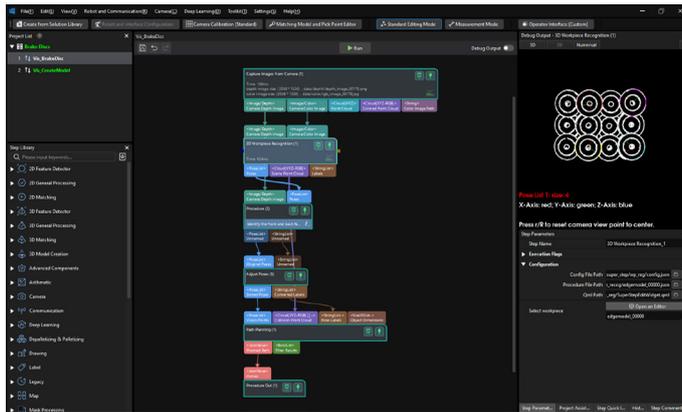
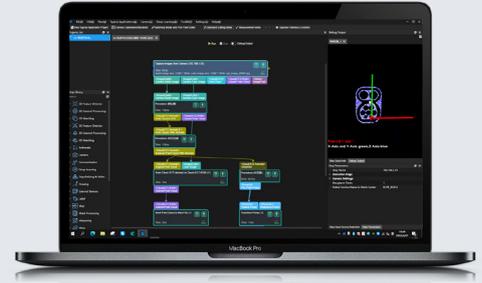
[2] The standard deviation of the difference of the average Z value in two local regions for 100 measurements. The measurement target is a ceramic plate.

[3] Standard: VDI/VDE 2634 Part II.

Mech-Vision

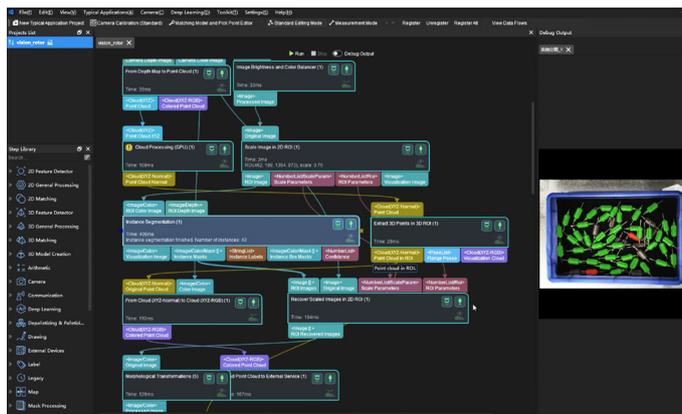
Machine Vision Software

Mech-Vision is an industry-leading machine vision software. It is designed to quickly build vision applications, whether simple or complex. With Mech-Vision, users can manage a wide range of vision tasks, including identification, localization, inspection & measurement, etc.



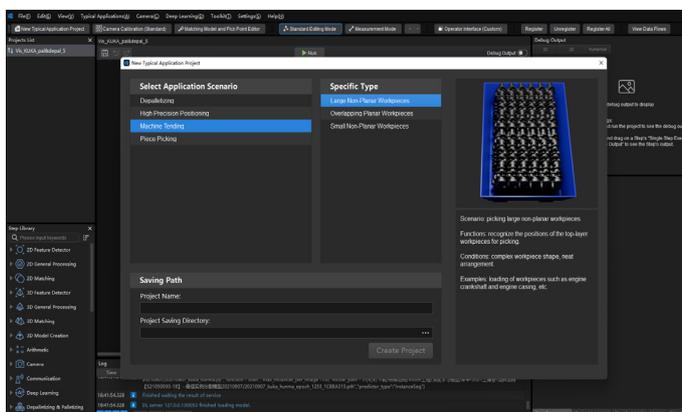
Build your vision applications efficiently

- Intuitive solution-oriented graphical user interface
- Drag-and-drop programming simplifies setup without writing a line of code
- Visualized configuration



Manage complex vision applications with extensive tools

- Powerful algorithms: 2D/3D matching, 2D/3D deep learning, 2D/2.5D measurement, etc.
- Integrated machine vision tools: matching model, pick point editor, automatic calibration, caliper, etc.
- The **3D Workpiece Recognition** tool delivers recognition results in 1 sec, enabling easier and faster deployment of various loading and handling applications



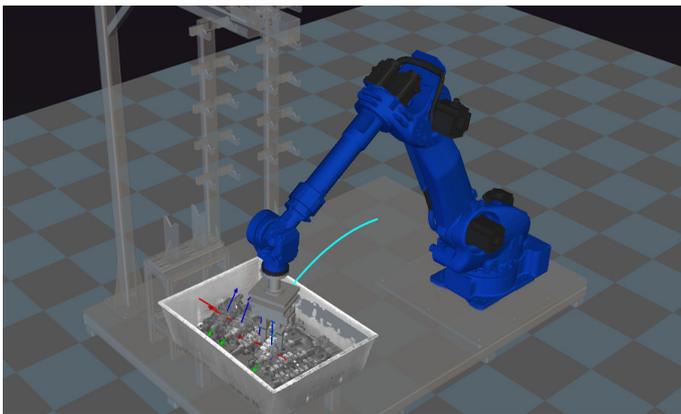
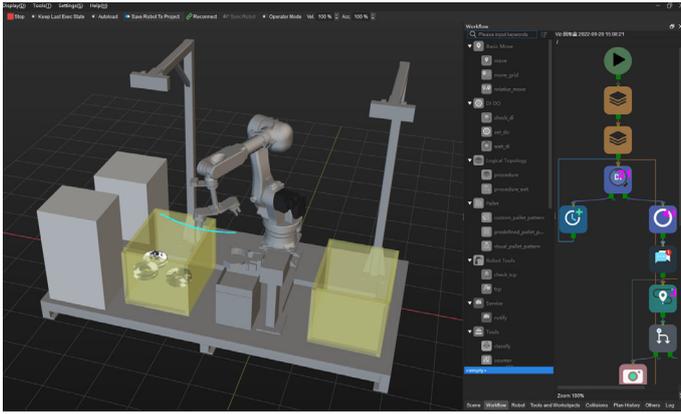
Develop vision applications easily and flexibly

- **Robust Solution Library:** get faster application deployment by adapting an existing project after simple modifications
- **Production Interface** for easy production status monitoring and data reporting
- Multiple languages: English, Japanese, Chinese, and Korean

Mech-Viz

Robot Programming Software

Mech-Viz is a software product for efficiently implementing robotic applications without writing a line of code. Mech-Viz enables robots to manage demanding automation tasks with excellent stability, extraordinary flexibility, and outstanding consistency.



Intuitive Robot Programming

- Intuitive graphical user interface
- Code-free programming environment
- One-click simulation of robot path

Powerful Algorithms for Reliable Robotic Operation

- Motion planning and collision detection
- Multi-pick depalletizing algorithms
- Picking strategies: multiple pick points, rotational symmetry, etc.

ABB	KUKA	YASKAWA	FANUC	Kawasaki
NACHI	DENSO	UNIVERSAL ROBOTS	STÄUBLI	EFORT
GREE	ROKAE	ELITE ROBOTS	BEI PEITIAN ROBOTICS	TM ROBOT
ESTUN ROBOTICS	TURIN	AUBO	DOBOT	QJAR
HAN'S ROBOT	HYUNDAI	JAKA	SIASUN	DELTA

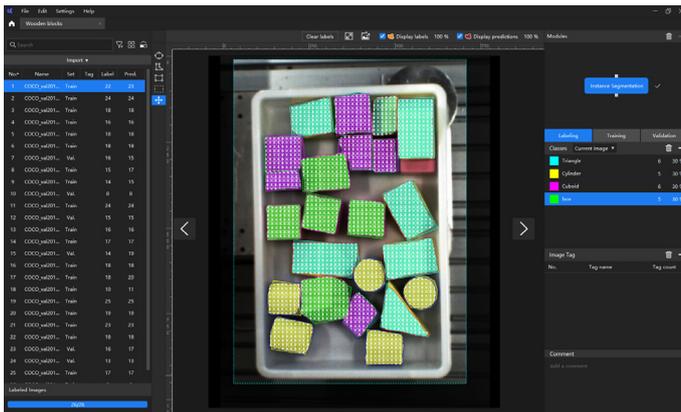
Flexible and Easy Implementation

- Support for almost all major-brand robots
- Streamlines configuration and redeployment with robot path reporting and tracking capabilities
- Multiple languages: English, Japanese, Chinese, and Korean

Mech-DLK

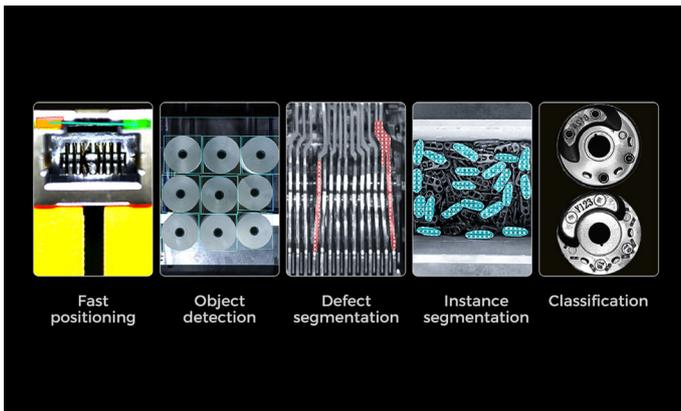
Deep Learning Software

Mech-DLK is a versatile deep learning software solving complex machine vision tasks. It enables users to rapidly train models and easily solve demanding vision applications, including overlapping object recognition and classification, complex defect detection, character reading, etc.



Train models efficiently without writing a line of code

- Intuitive code-free user interface
- Visualized model validation
- Advanced data augmentation: train models with smaller image sets
- **Finetune** function: leverage pre-trained models to expedite training, rather than train a model from scratch



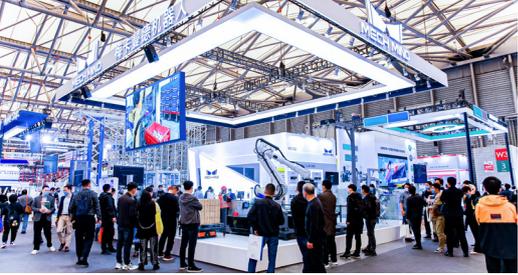
Manage complex machine vision tasks with speed and accuracy

- Manages complex vision applications with powerful algorithms such as fast positioning, defect segmentation, and instance segmentation
- **Smart Labeling Tool** and **Template Tool** simplify the labeling process, saving time and effort



Integrate your vision tasks into your production environment easily

- Multi-language SDKs: C, C++, C#, and Python
- Easy integration with Mech-Vision for quick deployment



About Mech-Mind

Mech-Mind is an industry-leading company focusing on industrial 3D sensors and software suites for intelligent robotics. By combining 3D vision with AI technology, Mech-Mind brings automation to the next level and empowers partners and system integrators to manage the most challenging automation tasks, including bin picking, depalletizing & palletizing, picking & placing, and more.

One of the Highest-Funded AI + Robotics Companies

Founded in 2016, Mech-Mind has closed its Series C+ with total funding of > USD 200 million. Backed by Intel and other global top investors, Mech-Mind has been one of the highest-funded AI + robotics companies all over the world.

World-Class Team with Deep Technical Knowledge

Mech-Mind assembles a world-class team of 700+ amazing individuals. Our global team with highly qualified experts provides deep technical knowledge in 3D sensing, vision and robotics algorithms, robotics software, and intelligent robotic solutions.

Create Success Together with Partners and Integrators

Excellent usability, approved quality, high flexibility, comprehensive service, and competitive price, that's what we stand for and how we help our customers and partners to exceed in their business. Our mature solutions empower system integrators and partners to solve the most demanding applications and bring automation to the next level.

10,000+ Cameras Deployed

Mech-Mind partnered with industry-leading companies and has deployed applications in 50+ regions. By delivering cutting-edge technology and reliable solutions, Mech-Mind has created visible ROI for global customers across diverse industries, including automotive, construction machinery, logistics, home appliances, food and beverage, etc.

10,000+ cameras
installed worldwide

> \$200 million
total funding

700+
employees

50+
regions

Customers and Partners



Compatible with Major Robot Brands



3D VISION & AI FOR ROBOTS AND MORE



Mech-Mind Robotics Technologies Ltd.

Website: www.mech-mind.com

E-mail: info@mech-mind.net
