Mech-Mind Robotics

AI + 3D Vision Solutions in Automotive Industry

1000+ solutions successfully deployed
in world-leading OEMs and automotive parts factories

Bin Picking
Picking & Placing
Dispensing
Assembly
Inspection and Gauging

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

The automotive industry is one of the world's most important industries and is changing at an unprecedented rate.

Modern automobiles are more complex and require more processes to produce. This highlights the importance of automated production lines that improve production efficiency, productivity, and product quality.

By combining **AI technology** and **3D vision**, Mech-Mind empowers industrial robots with new ability and brings industrial automation to the next level. Mech-Mind has helped system integrators and companies stay at the top with the winners by delivering a wide range of **reliable automation solutions**.

We have successfully deployed **1000+** solutions in global-leading OEMs and automotive parts factories.

Mech-Mind AI + 3D Vision Solutions

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.

Capacities

- **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.

- **Accurate picking**

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

- **Collision-free operations**

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

- **Cope with harsh industrial environment**

  Mech-Eye industry-grade 3D cameras can stably operate in the harshest industrial environment.

Recommended Cameras

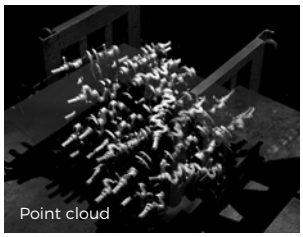
- Mech-Eye LSR
- Mech-Eye PRO

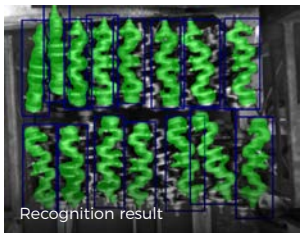
Examples of Parts

- Crankshafts, CV joints, brake discs, gearbox housings, etc.

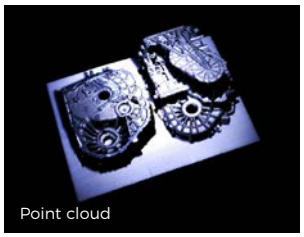
Point Clouds and Recognition Results

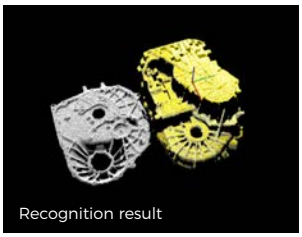
Crankshafts





Gearbox housings





Case Study

Vision-Guided Bin Picking of Inner Races

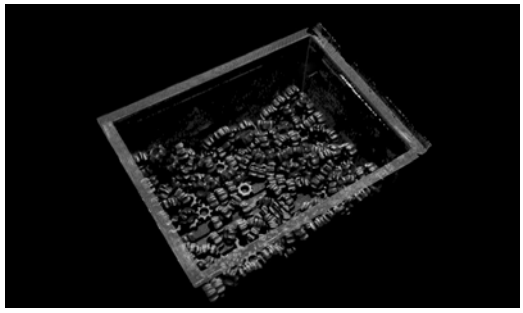
Large auto parts factory

Customer Requirement

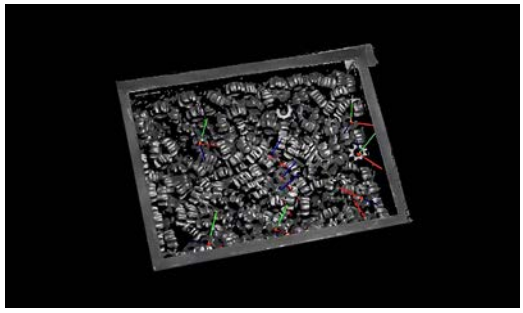
Vision-guided robots can accurately and quickly pick small and complex-shaped inner races, as well as empty the material bin full of overlapped parts. The vision-enhanced bin picking robot cell can stably operate 24/7.

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**, provides 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**).



Point cloud



Recognition result

Results

- First pick success rate: **> 99%**
- Bin emptying rate: **> 99.99%**

Mech-Mind AI + 3D Vision Solutions

Vision-Guided Picking & Placing

Quick detection, accurate picking, and reliable placing.

Vision-guided robots pick and place parts into machines or fixtures with high accuracy and stability.

Capacities

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

  Supports large parts and pallets.

  Parts can overlap or be densely stacked.

- **Collision-free operations**

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

- **Accurate picking and placing**

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

- **Perform reliably in harsh industrial environment**

  Mech-Eye industry-grade 3D cameras can stably operate in the harshest industrial environment.

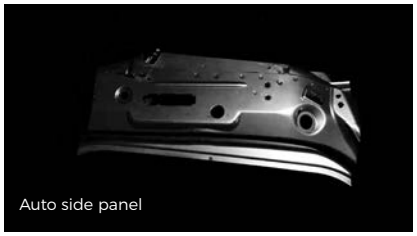
Recommended Cameras

- Mech-Eye LSR
- Mech-Eye PRO

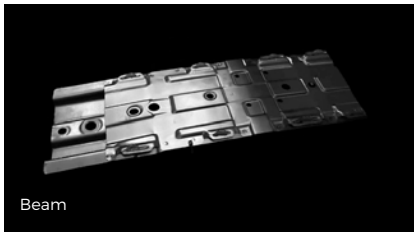
Examples of Parts

- Automotive door inner panels, automotive side panels, beams, etc.

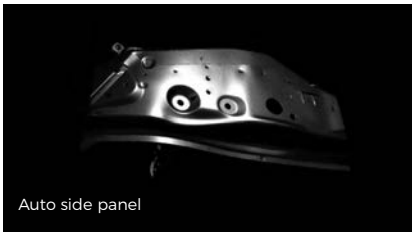
Point Clouds



Auto side panel



Beam



Auto side panel

Case Study

Vision-Guided Picking & Placing of Auto Door Panels

Automotive OEM

Customer Requirement

Vision-guided robots can stably pick up the bulky door panels from the rack and accurately place them into the fixture afterwards.

The Mech-Mind Solution

- Mech-Eye PRO S generates high-quality 3D point cloud data of tiny pinholes in door panels, ensuring quick and accurate picking.
- 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**.

Point cloud

Recognition result

Results

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

Mech-Mind AI + 3D Vision Solutions

Vision-Guided Dispensing

The 3D vision system detects target objects and guides robots to perform automation tasks (dispensing, spraying, etc.) by following shapes and contours with remarkable flexibility and dexterity.

Capacities

- **High-accuracy 3D vision system**

  Detects and locates parts with high accuracy even in long-range working distance.

  Supports large parts and various materials, including metals, plastics, rubbers, glass, etc.

- **Collision-free operations**

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

- **Perform tasks by following shapes and contours**

  Performs demanding tasks by accurately following the shapes and contours of target objects with extraordinary dexterity.

- **No fixture customization**

  The 3D vision system accurately locates target parts. Parts don't need to be fixed in customized fixtures.

Recommended Cameras

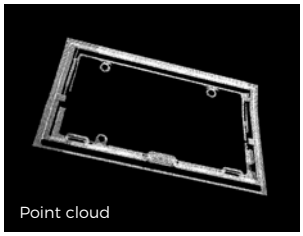
- Mech-Eye LSR
- Mech-Eye PRO

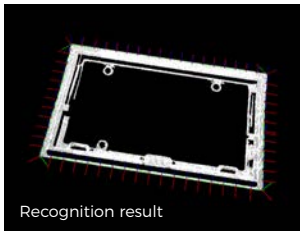
Examples of Parts

- Door frames, window glass, seat backrests, etc.

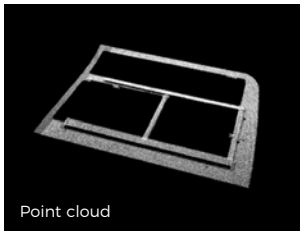
Point Clouds and Recognition Results

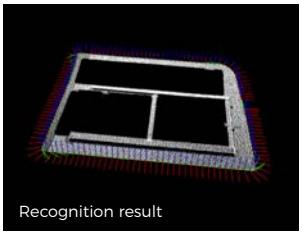
Door frame





Window glass





Case Study

Vision-Guided Window Glass Gluing

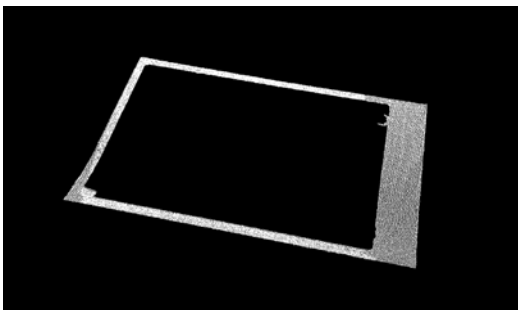
Large bus manufacturer

Customer Requirement

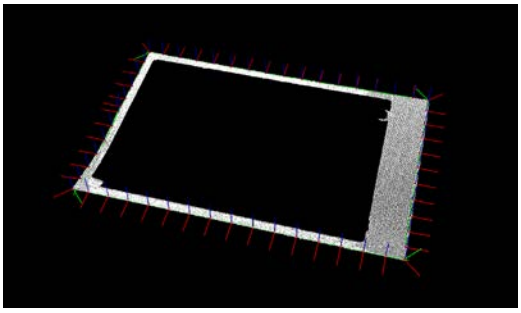
To boost productivity and eliminate production errors, a large bus manufacturer wanted to automate the gluing process using Mech-Mind AI + 3D vision solution. The solution should be able to handle large window glass with transparent surfaces, all while guiding robots to perform stably under strong ambient light interference.

The Mech-Mind Solution

- Mech-Eye LSR L generates high-quality point clouds of window glass under challenging light conditions (**> 30,000 lx**).
- Dual camera collaboration combined with the intelligent image stitching algorithm to present complete point clouds of the large window glass.
- The 3D vision system guides robots to perform gluing by accurately following the contours of the window glass.
- Thanks to the advanced 3D vision system for accurate positioning, **parts don't need to be fixed in fixtures**.



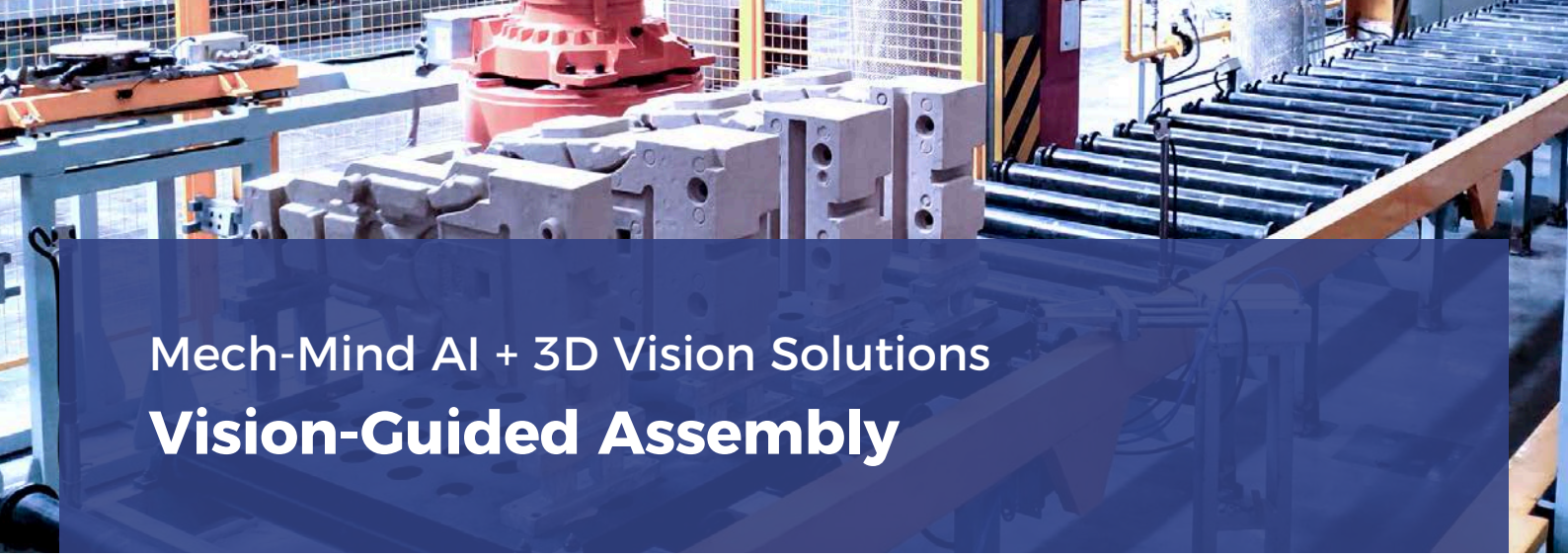
Point cloud



Recognition result

Results

- Gluing accuracy: ±1 mm @ 2.5 m
- Fully automated gluing process needs no manual intervention.



Mech-Mind AI + 3D Vision Solutions

Vision-Guided Assembly

Vision-guided robots locate, singulate, pick, and assemble randomly arranged parts with remarkable dexterity.

Capacities

- **Assemble with accuracy**

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

- **Assemble with flexibility**

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

- **Assemble with reliablity**

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

- **Assemble with dexterity**

  Performs assembly tasks fast and stably thanks to advanced 3D vision system and AI technology.

Recommended Cameras

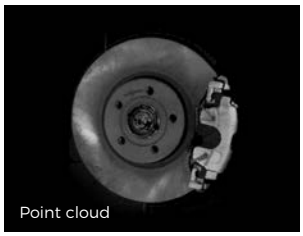
- Mech-Eye PRO
- Mech-Eye NANO

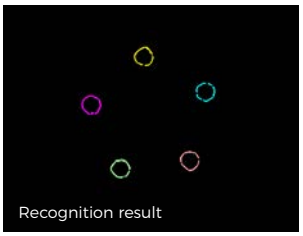
Examples of Parts

- Tires, wheel hubs, screws, etc.

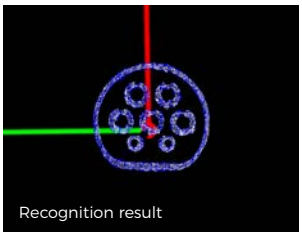
Point Clouds and Recognition Results

Wheel hub





Charging socket



Case Study

Vision-Guided Wheel Installation

Automotive OEM

Customer Requirement

Vision-guided robots can quickly and accurately install wheels in a moving line environment. 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**.

Point cloud

Recognition result

Results

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

Mech-Mind AI + 3D Vision Solutions

Vision-Guided Inspection and Gauging

Accuracy is essential for inspection as well as gauge applications. The Mech-Mind 3D vision system identifies, gauges, and inspects automotive parts to ensure that they can be correctly joined in the downstream processes (e.g., welding, bonding, etc.)

Capacities

- **See the subtlest features and fine details**

  The industrial 3D camera Mech-Eye shows the finest details and object dimensions (flatness, depth, and height) with micron-level accuracy.

- **Plug & play software**

  Users can fast implement various inspection and gauge applications utilizing our intuitive robotic machine vision software.

- **Accurate gauging in no time**

  Advanced algorithms enable fast gauging by optimizing the overall processing speed.

- **Easier digitalization**

  Data can be easily managed and organized, supporting custom filtering history and outputting reports.

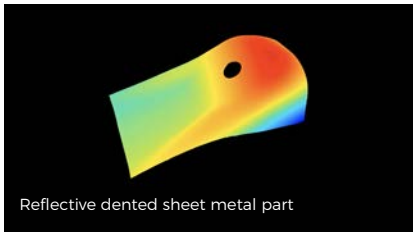
Recommended Cameras

- Mech-Eye UHP

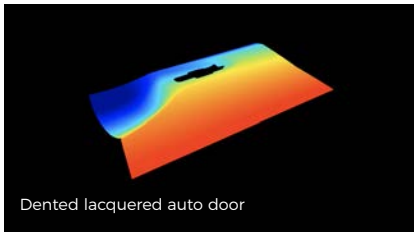
Examples of Parts

- Automotive parts, etc.

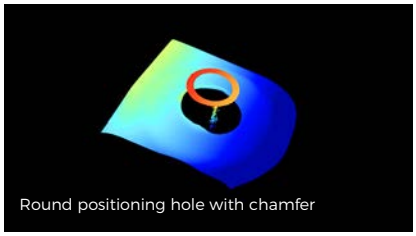
Point Clouds



Reflective dented sheet metal part



Dented lacquered auto door



Round positioning hole with chamfer

Color rendered by height

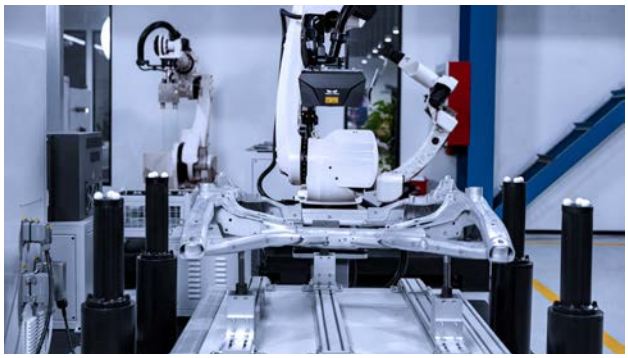
Case Study

Vision-Guided Subframe Gauging and Inspection

Automotive OEM

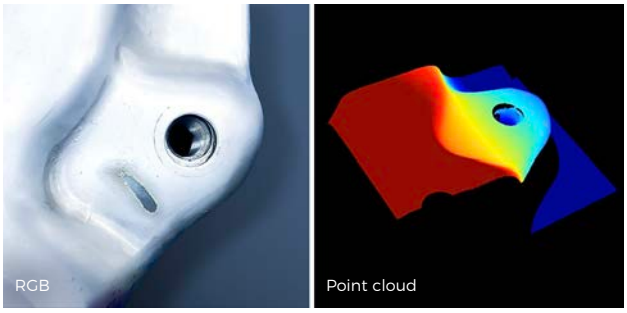
Customer Requirement

Vision-guided robots precisely measure the key parameters of each assembly feature on the subframe (bore diameter, position, flatness, coaxiality, etc.) to ensure subframes can be correctly jointed in the downstream welding process.

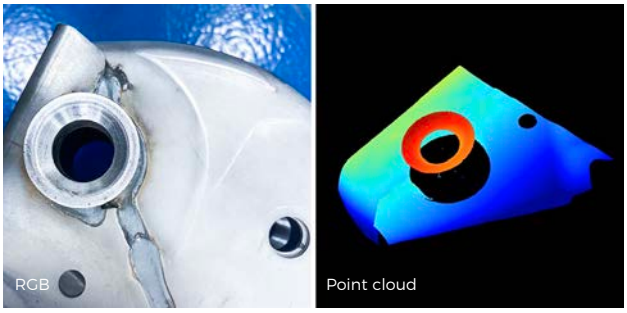


The Mech-Mind Solution

- Mech-Eye UHP-140, featuring ultra-high 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, waist-shaped 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 operations even in a compact space.



Screw hole, color rendered by height



Hole position with reflection, color rendered by height

Results

- 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.

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 Gearbox Housing Picking

- Generates high-quality point clouds of gearbox housings with **complex structures** and **reflective surfaces**
- Quickly adapts to new types
- Secures solid performance under demanding light conditions of **> 20,000 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 **pick point** for accurate picking
- Intelligent AI algorithms ensure accurate picking & placing without dropping and colliding

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 Door Frame Gluing

- Quickly adapts to new types of door frames
- Performs gluing by accurately following contours
- Parts don't have to be placed in fixtures, saving costs and time
- Gluing accuracy: ±1 mm @ 2.5 m

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 Bin Picking of Brake Discs

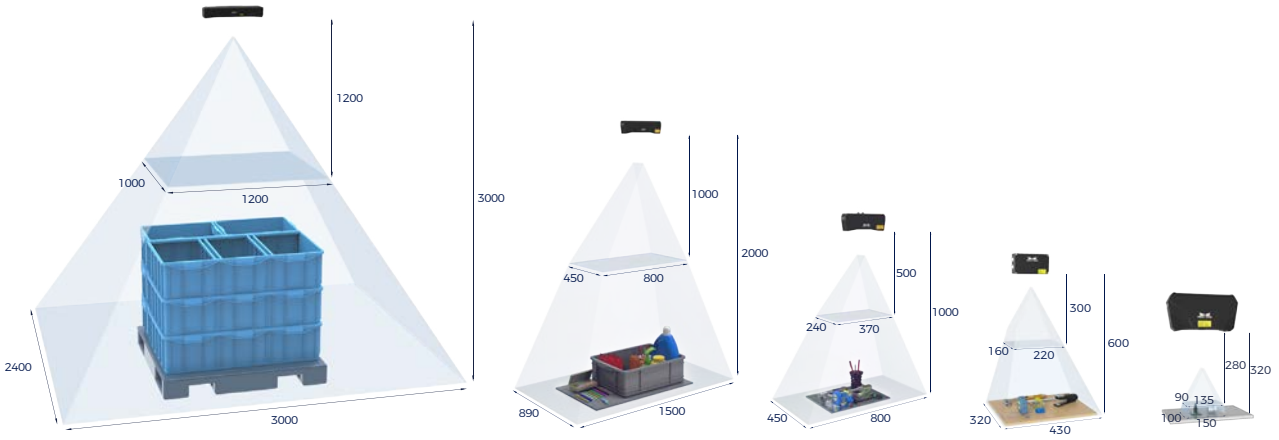
- Supports brake discs with **reflective surfaces**
- Supports **large pallets**
- Accurately detects overlapping brake discs
- Intelligent AI algorithms ensure accurate picking & placing without dropping and colliding

Mech-Eye Industrial 3D Cameras

High-performance industrial 3D cameras for the most demanding automation applications

Specification	LSR L 	PRO M 	PRO S 	NANO 	UHP-140 
Optimal working distance (mm)	1200–3000	1000–2000	500–1000	300–600	300 ± 20
Near FOV (mm)	1200 × 1000 @ 1.2 m	800 × 450 @ 1.0 m	370 × 240 @ 0.5 m	220 × 160 @ 0.3 m	135 × 90 @ 0.28 m
Far FOV (mm)	3000 × 2400 @ 3.0 m	1500 × 890 @ 2.0 m	800 × 450 @ 1.0 m	430 × 320 @ 0.6 m	150 × 100 @ 0.32 m
Resolution	2048 × 1536 (depth resolution) 4000 × 3000/2000 × 1500 (RGB)	1920 × 1200	1920 × 1200	1280 × 1024	2048 × 1536
Megapixels (MP)	3.0	2.3	2.3	1.3	3.0
*Point repeatability Z (σ)	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 μm @ 0.3 m **Region: 0.09 μm @ 0.3 m
***VDI/VDE accuracy	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 (s)	0.5–0.9	0.3–0.6	0.3–0.6	0.6–1.1	0.6–0.9
Baseline (mm)	380	270	180	68	80
Dimensions (mm)	459 × 77 × 86	353 × 57 × 100	265 × 57 × 100	145 × 51 × 85	260 × 65 × 142
Weight (kg)	2.9	1.9	1.6	0.7	1.9
Light source	Red laser (638 nm, Class 2)	Blue LED (459 nm, RG2)			
Image sensor	Sony CMOS for high-end machine vision			Other high-performance CMOS for high-end machine vision	Sony CMOS for high-end machine vision
Operating temperature (°C)	-10–45	0–45			
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				
IP rating	IP65				
Cooling	Passive				

Mech-Eye LSR L	Mech-Eye PRO M	Mech-Eye PRO S	Mech-Eye NANO	Mech-Eye UHP-140



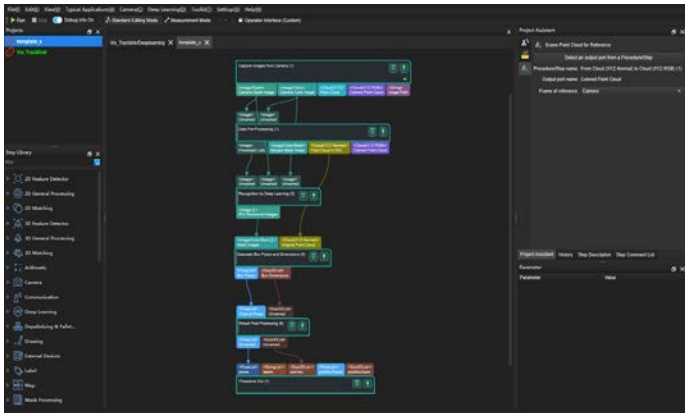
Field of view (mm)

*The standard deviation of the single point Z value for 100 measurements. The measurement target is a ceramic plate.
**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.
***Standard: VDI/VDE 2634 Part II.

Mech-Vision

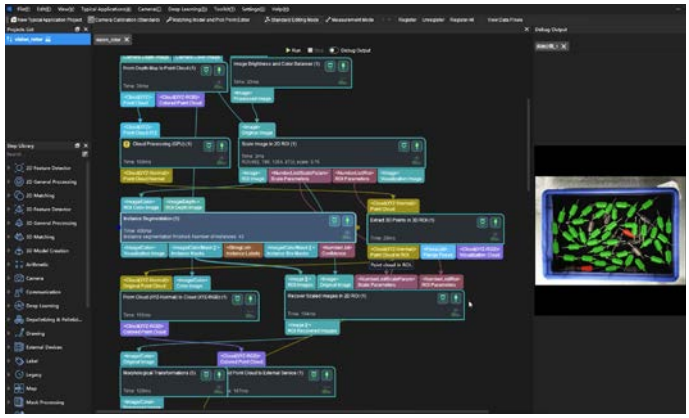
Machine Vision Software

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 & gauging, etc.



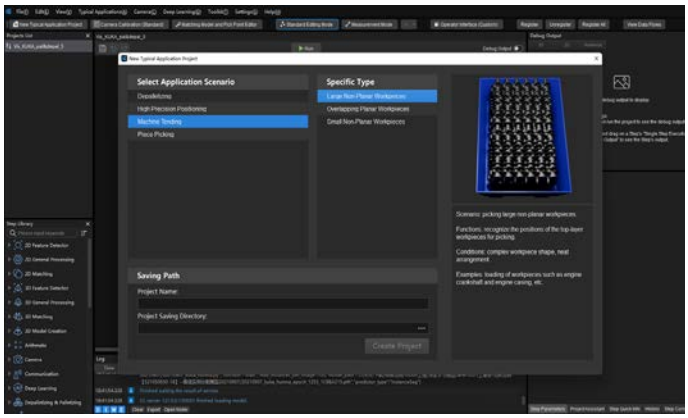
Build your vision applications efficiently

- Intuitive graphical user interface
- Code-free programming
- Visualized debugging



Manage complex vision applications with extensive tools

- Powerful algorithms: model matching, deep learning, etc.
- Integrated machine vision tools: point cloud editing, automatic calibration, etc.
- Multiple application templates: random bin picking, depalletizing, registration-free item picking, parcel induction, gluing, etc.



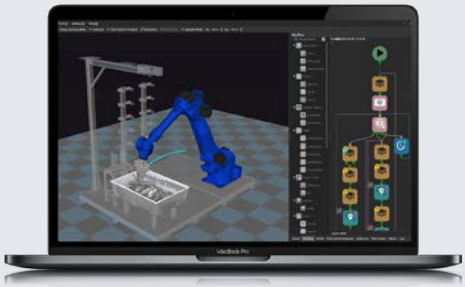
Develop vision applications easily and flexibly

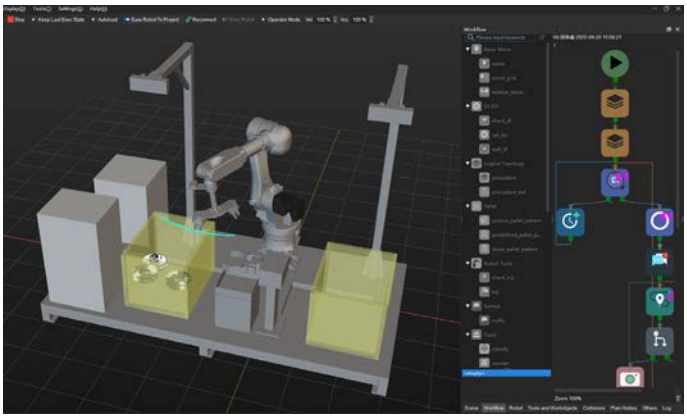
- Support for embedded scripting, customization, and system integration
- Multiple languages: English, Japanese, Chinese, and Korean

Mech-Viz

Robot Programming Software

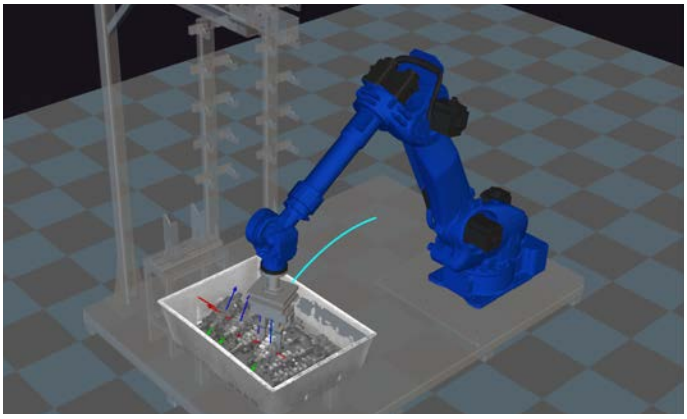
Mech-Viz is a software product for efficiently implementing robotic applications without writing a line of code. Mech-Viz enables robots to manage demanding automation tasks with excellent stability, extraordinary flexibility, and outstanding consistency.





Intuitive Robot Programming

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



Powerful Algorithms for Reliable Robotic Operations

- Motion planning and collision detection
- Mixed palletizing & multi-pick depalletizing algorithms
- Picking strategies: multiple pick points, symmetry, etc.

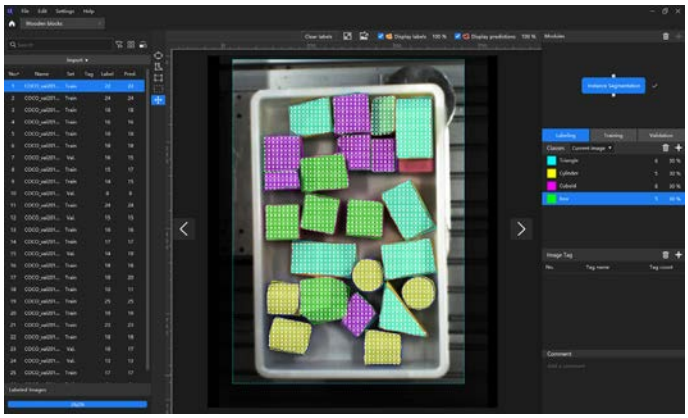
Flexible and Easy Implementation

- Support for almost all major-brand robots
- Multiple languages: English, Japanese, Chinese, and Korean

Mech-DLK

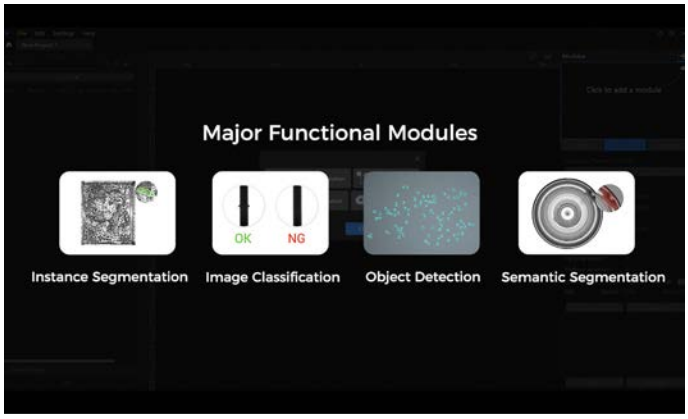
Deep Learning Software

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, 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

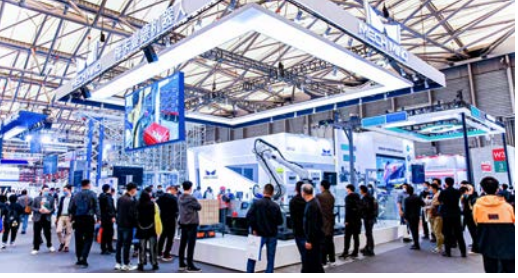


Manage complex machine vision tasks with advanced algorithms

- Semantic segmentation: defect detection
- Image classification: presence & absence detection, front & back detection, etc.
- Object detection: labeling, counting, etc.
- Instance segmentation: high-accuracy positioning and classification

Integrate your vision tasks into your production environment easily

- Multi-language SDKs: C, C++, C#, etc.
- Multiple languages: English, Japanese, Chinese, and Korean



About Mech-Mind

Mech-Mind is an industry-leading company focusing on industrial 3D cameras and software suite 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 top global investors including **Sequoia Capital and Intel**, 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.

3000+ Applications Implemented for 1000+ Global Customers

Mech-Mind partnered with industry-leading enterprises and has deployed **3000+** applications in **50+** regions. By delivering cutting-edge technology and reliable solutions, Mech-Mind has created visible ROI for **1000+** global customers across diverse industries, including **automotive, construction machinery, logistics, home appliances, food and beverage, etc.**

3000+	1000+	700+	50+
applications	customers	employees	regions

Customers and Partners

Compatible with Major-Brand Robots

3D VISION & AI FOR ROBOTS AND MORE

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