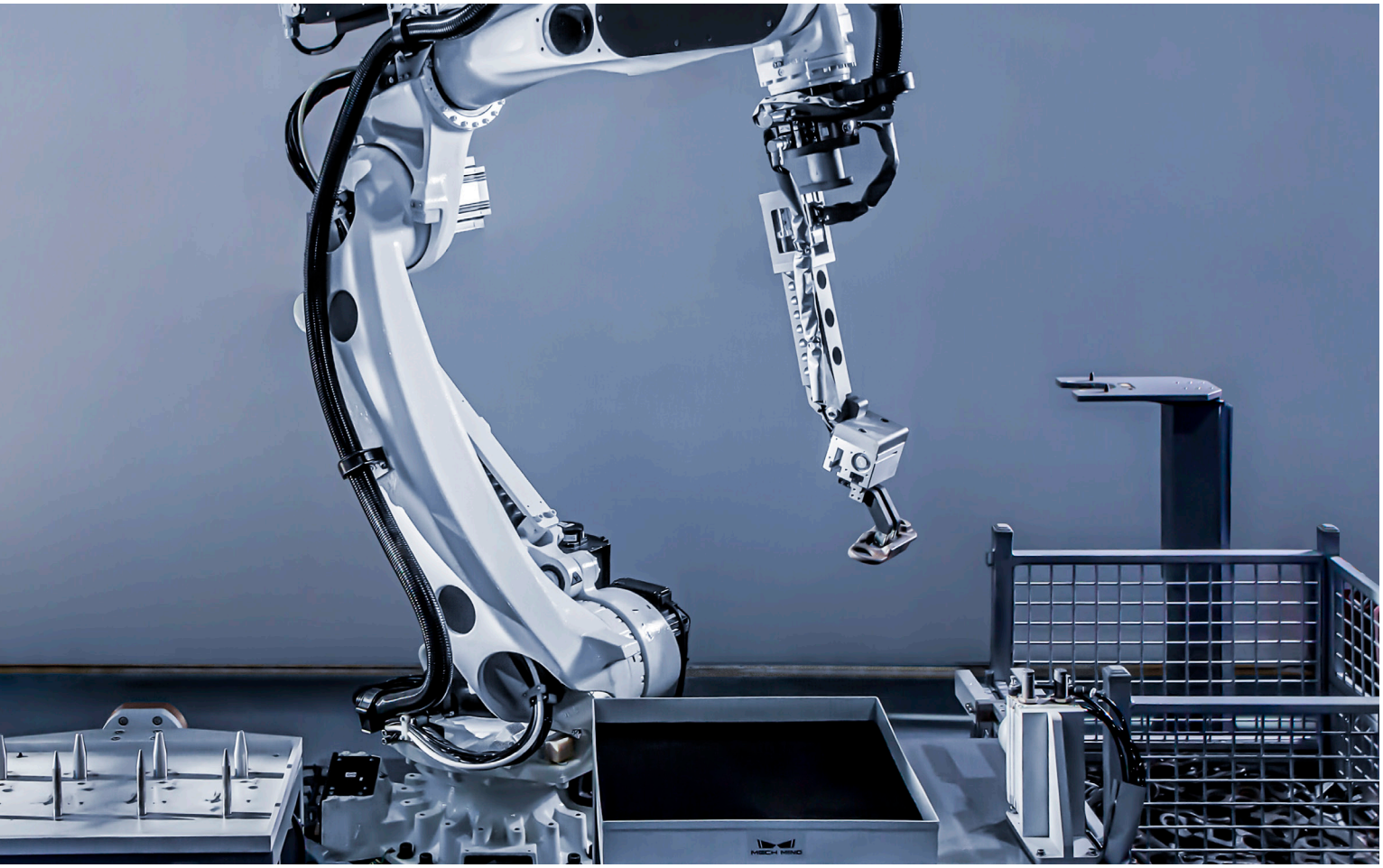


Mech-Mind Robotics

AI + 3D Vision Solutions in Construction Machinery Industry

500+ solutions successfully implemented
in the construction machinery industry

Machine Tending
Localization and Assembly
Dispensing

Mech-Mind AI + 3D Vision Pioneer in Construction Machinery Industry

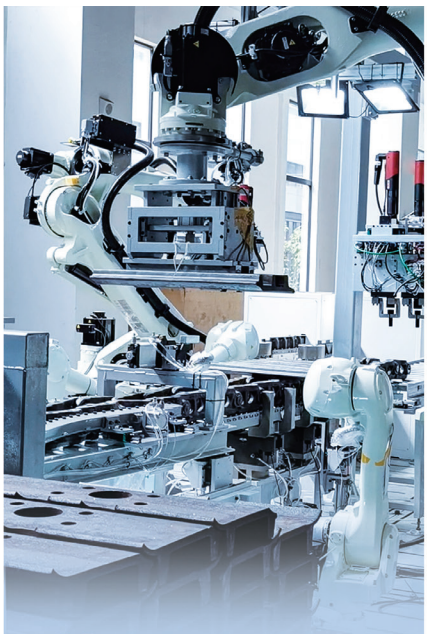
The landscape of the construction machinery industry becomes more and more sophisticated every year due to the ever-evolving technologies and fierce global competition. This also requires the construction machinery producers to continuously optimize their products while maximizing production capacities.

By combining advanced **AI technology** and **3D vision** with industrial robots, Mech-Mind provides construction machinery manufacturers and system integrators with mature solutions, helping them be ahead of the industry and global market.

Mech-Mind has been innovating **flexible and viable solutions** to accelerate the full transformation of the construction machinery industry. We have successfully deployed **500+** solutions for leading construction machinery manufacturers worldwide.

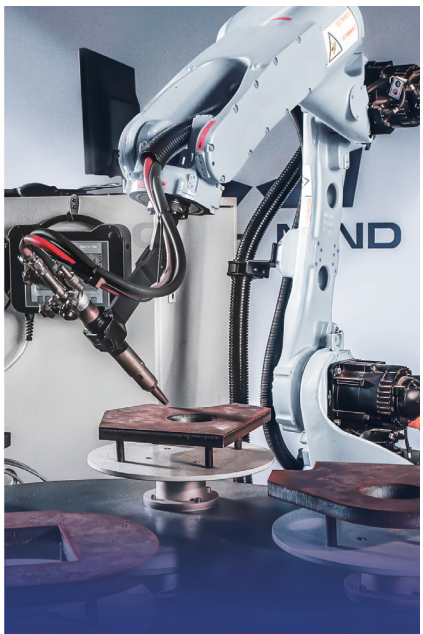
01

Machine Tending



02

Localization and Assembly



03

Dispensing

Mech-Mind AI + 3D Vision Solution

Vision-Guided Machine Tending

Vision-guided robots detect target parts, pick them from bins or pallets and place them correctly at the specific location (conveyor belts, fixtures, and machines) with high accuracy and stability.

Capacities

- **Recognize and handle complex parts**

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

  Parts can be arranged in a random array, overlap, or be densely stacked in large bins, on pallets, or racks.

- **Pick with dexterity**

  Intelligent picking strategy enables fast and reliable picking.

  Path planning and collision detection algorithms ensure reliable robotic operations without colliding or dropping parts.

- **Pick with accuracy**

  Powerful algorithms (multiple pick points, deep learning, etc.) combined with the multifunction end effector to enable highly accurate picking.

- **Reliable performance**

  Mech-Eye industry-grade 3D cameras secure solid performance under challenging light conditions (> 30,000 lx) and can stably operate in the harshest industrial environment.

Recommended Cameras

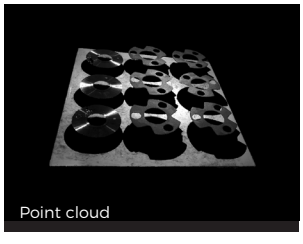
- Mech-Eye LSR
- Mech-Eye PRO

Examples of Parts

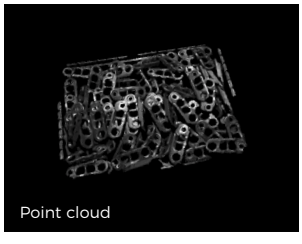
- Track links, axles, connecting rods, gears, sheet metals, etc.

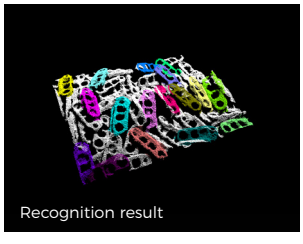
Point Clouds and Recognition Results

Planet carriers



Track links





Case Study

Vision-Guided Bin Picking and Machine Tending of Track Links

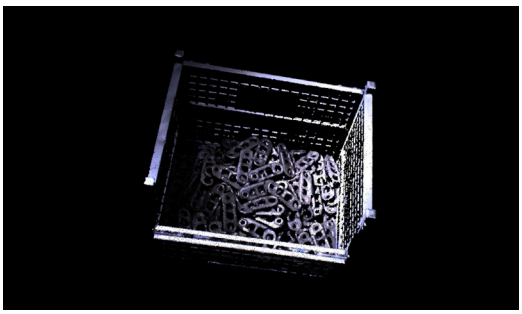
Construction machinery giant

Customer Requirement

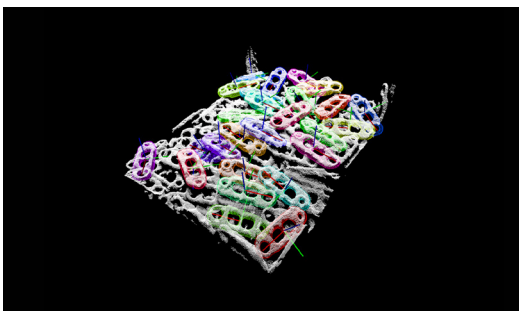
While track links are in random positions in the material bin, vision-guided robots should accurately and quickly pick overlapping and entangled track links without dropping and colliding.

The Mech-Mind Solution

- Mech-Eye LSR L, featuring high accuracy, provides **high-quality 3D point clouds** of entangled track links with **complex structures** and **dark surfaces**.
- By installing Mech-Eye LSR L above the workstation, the FOV is large enough to cover the entire material bin.
- Powerful AI algorithms calculate **pick points** for the robots, ensuring accurate picking.
- **Path planning** and **collision detection** algorithms enable collision-free picking and placing.
- Mech-Eye LSR L secures solid performance under strong ambient light interference (**> 30,000 lx**).



Point cloud



Recognition result

Results

- Dozens of workstations have been automated, improving productivity drastically.
- By implementing Mech-Mind's solution, the customer reduced costs by **80%**.

Case Study

Vision-Guided Sheet Metal Loading and Beveling

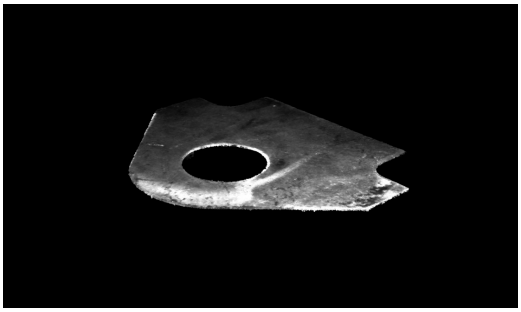
Construction machinery giant

Customer Requirement

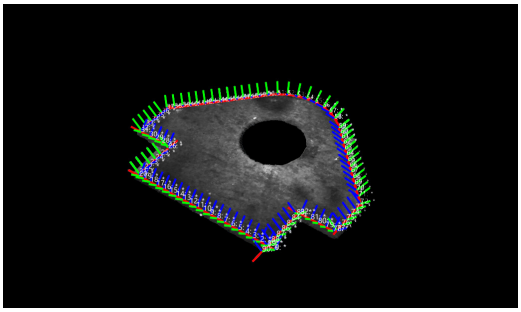
There're thousands of types of sheet metals in the factory. Most of them are symmetric parts or very similar in geometric construction. The vision-guided robots should be able to recognize geometrically similar and symmetric sheet metals, all while performing stably under strong ambient light interference.

The Mech-Mind Solution

- The robust 3D vision system combines model matching algorithms to accurately recognize and locate **geometrically similar** and **symmetric sheet metals**.
- The 3D vision system supports **thousands of** sheet metal types, ensuring consistent loading and beveling.
- Advanced AI algorithms calculate pick points, combined with **a magnetic suction gripper**, to ensure accurate picking.
- Automated beveling trajectory generation **without pre-programing and pre-learning**, improving beveling efficiency.



Point cloud



Recognition result

Results

- **No need for fixtures** for fine positioning, saving fixed costs.
- Mech-Mind's solution guides robots to perform loading with high consistency, improving overall beveling efficiency by **four times**.

Mech-Mind AI + 3D Vision Solutions

Vision-Guided Localization and Assembly

Vision-guided robots locate and pick random-arranged parts and place them in designated locations with remarkable dexterity.

Capacities

- **Assemble with accuracy**

  Detects and locates small features for accurate assembly.

  Works with a vast range of parts, including complex-shaped, reflective, etc. Size and shape flexibility.

- **Assemble in motion**

  Synchronizes robots with the assembly line for fast and accurate joining, inserting, and more.

- **Perform reliably in harsh industrial environment**

  Industry-grade 3D camera Mech-Eye delivers solid performance in harsh environments with dust, vibration, humidity, electromagnetic interference, and high temperature.

- **Collision-free operations**

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

Recommended Cameras

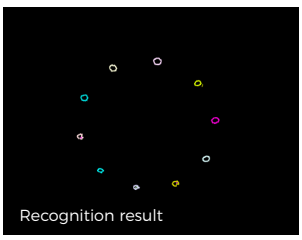
- Mech-Eye LSR
- Mech-Eye PRO

Examples of Parts

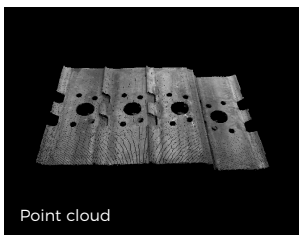
- Track shoes, connecting rods, wheel hubs, etc.

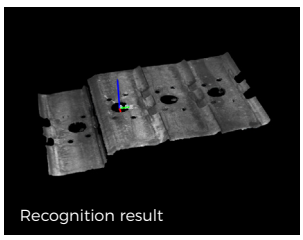
Point Clouds and Recognition Results

Wheel hub



Track shoes





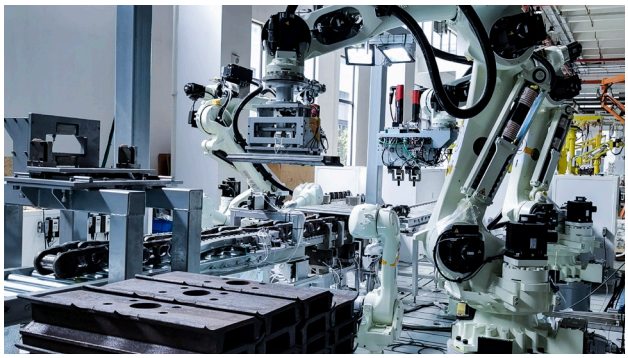
Case Study

Vision-Guided Track Shoe Assembly

Large construction machinery factory

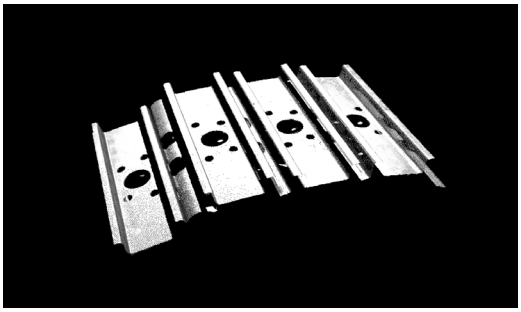
Customer Requirement

While the track shoes are bulky and picking them manually can be extremely labor intensive, the large construction machinery factory wanted to automate the assembly process of track shoes. The robots should be able to accurately pick track shoes with orientation and stably place them in designated locations for assembly.

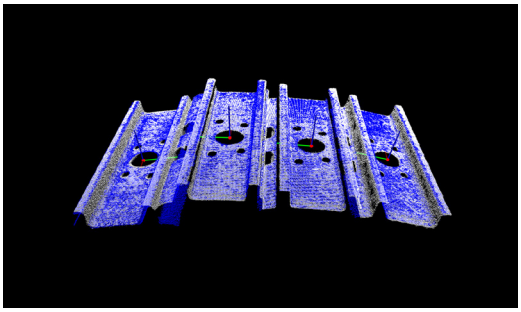


The Mech-Mind Solution

- Mech-Eye LSR L generates high-quality 3D point clouds of overlapping track shoes, ensuring accurate positioning.
- The robust 3D vision system can recognize **parts with extremely similar geometric structures**.
- **Path planning** and **collision detection** algorithms guide the robots to pick and assemble track shoes without collisions.
- Mech-Eye LSR L, featuring strong ambient light resistance, secures solid performance under light conditions of **> 30,000 lx**.



Point cloud



Recognition result

Results

- By implementing Mech-Mind's solution, this customer has successfully automated the production line, which is also the first fully automated loading and assembly line in China.
- Dozens of production lines have been replicated and daily output has increased significantly.

Mech-Mind AI + 3D Vision Solutions

Vision-Guided Dispensing

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

Capacities

- **High-accuracy 3D vision system in long-range working distance**

  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.

- **Flexible integration**

  Works with AGV, conveyor belts, and other equipment. Seamlessly integrates into upstream and downstream production, saving ramp-up time.

Recommended Cameras

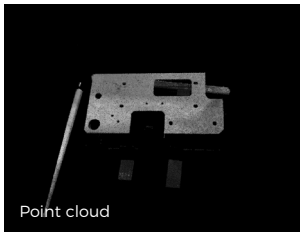
- Mech-Eye LSR
- Mech-Eye PRO

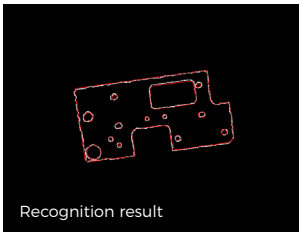
Examples of Parts

- Sheet metals, slewing bearings, automotive components, etc.

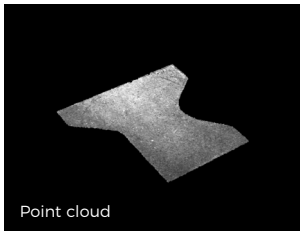
Point Clouds and Recognition Results

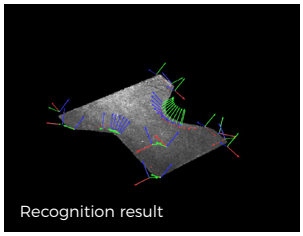
Sheet metals





Sheet metals





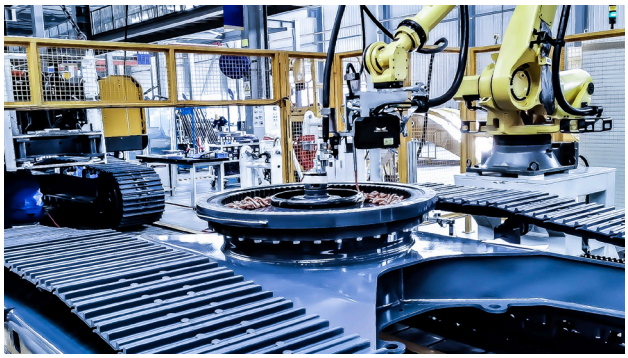
Case Study

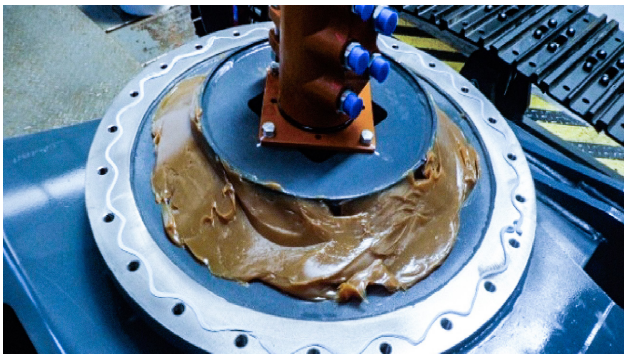
Vision-Guided Grease Applying for Slewing Bearing

Construction machinery giant

Customer Requirement

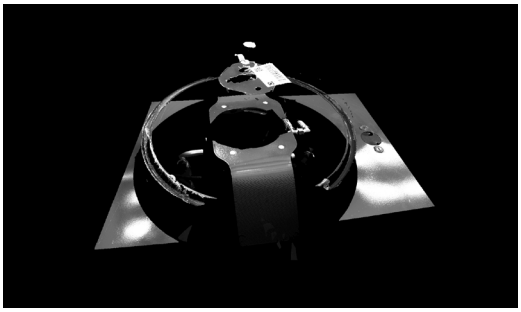
Slewing bearing is an important transmission part of machinery and equipment. To make them more durable, the slewing bearings need to be applied with grease and adhesives so that they can be lubricated, rustproof, and sealed. The vision-guided robot needs to perform accurate greasing without applying grease to holes at the edge of the rotary table.



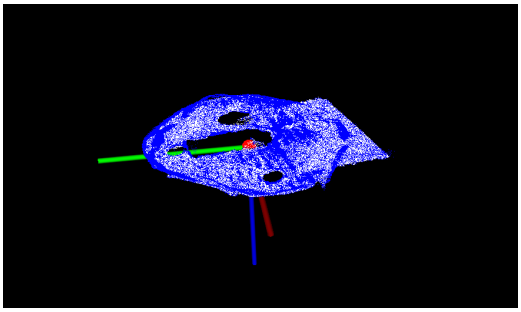


The Mech-Mind Solution

- Mech-Eye PRO S industrial 3D camera generates high-quality 3D point cloud data of swing bearings with **reflective surfaces**.
- **No robot teaching is needed**. The greasing trajectory can be automatically generated in real-time according to the recognition results.
- By installing Mech-Eye at the end of the mechanical arm, the field of view is large enough to cover various large parts.
- Quickly adapts to new types of slewing bearings.



Point cloud



Recognition result

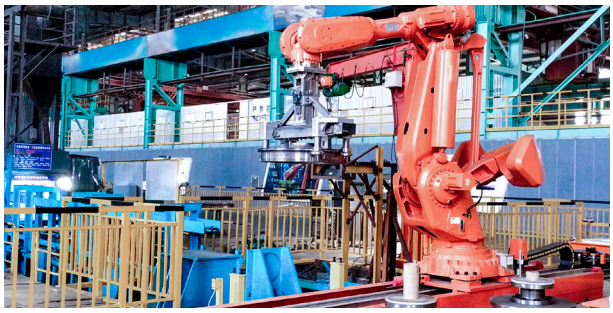
Results

- Fully automated greasing process needs no manual intervention.
- No need for robot teaching, **reducing downtime significantly**.

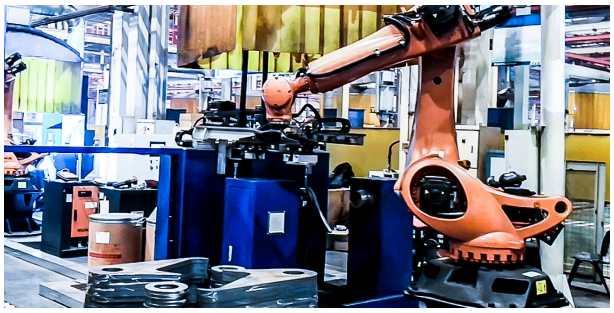
More Cases

Scan QR code
to watch videos

Tending of Drive Gear

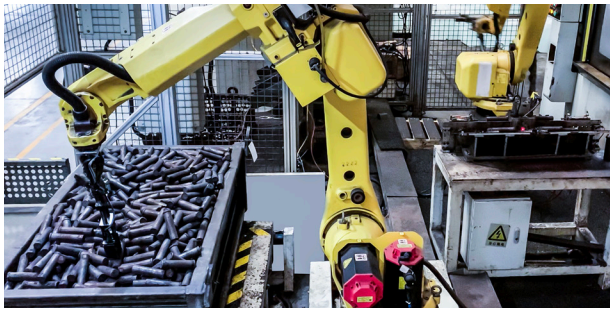


Tending of Train Wheels

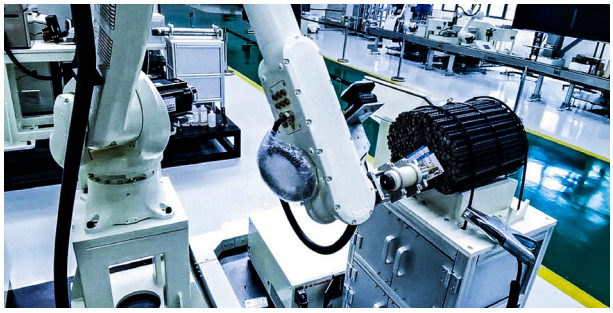


Sheet Metal Picking

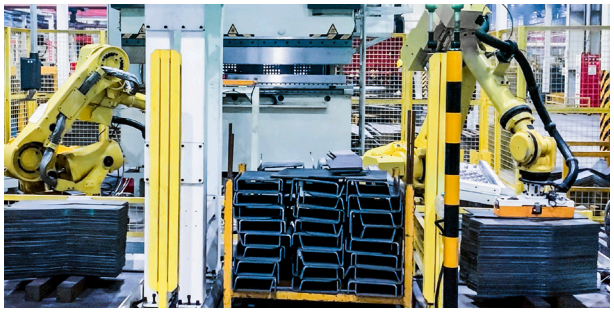
Tending of Track Rollers



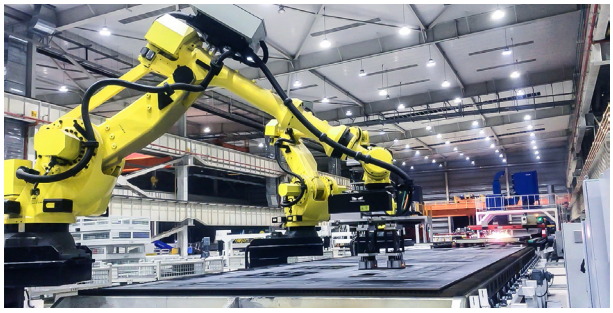
Bin Picking of Axle Pins



Rebar Labeling



Sheet Metal Bending



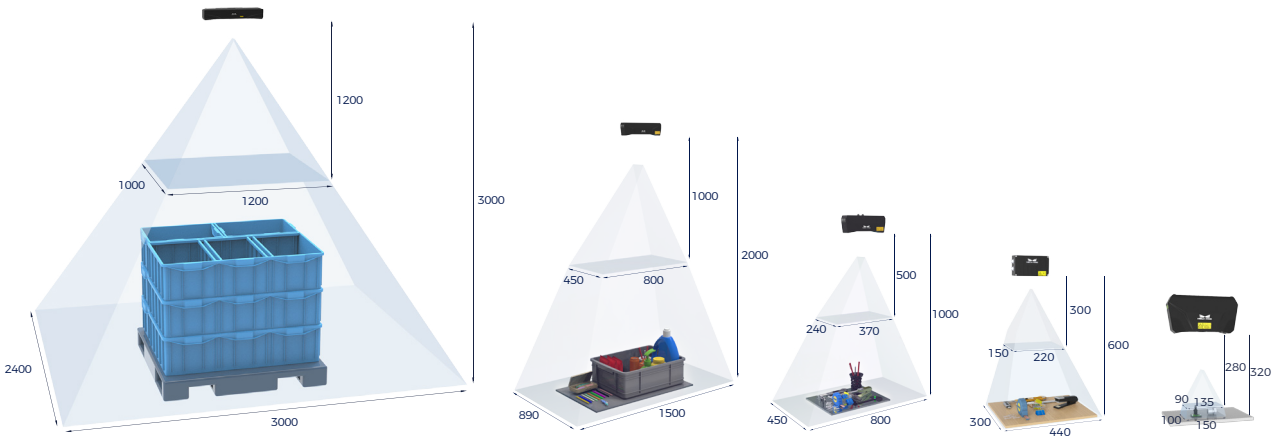
Cut Sheet Metal Unloading

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 
Recommended working distance	1200–3000 mm	1000–2000 mm	500–1000 mm	300–600 mm	300 ± 20 mm
Near FOV	1200 × 1000 mm @ 1.2 m	800 × 450 mm @ 1.0 m	370 × 240 mm @ 0.5 m	220 × 150 mm @ 0.3 m	135 × 90 mm @ 0.28 m
Far FOV	3000 × 2400 mm @ 3.0 m	1500 × 890 mm @ 2.0 m	800 × 450 mm @ 1.0 m	440 × 300 mm @ 0.6 m	150 × 100 mm @ 0.32 m
Resolution	Depth map: 2048 × 1536 RGB: 4000 × 3000/2000 × 1500	1920 × 1200	1920 × 1200	1280 × 1024	2048 × 1536
Megapixels	3.0 MP	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 μm @ 0.3 m Region[2]: 0.09 μm @ 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	Approx. 380 mm	Approx. 270 mm	Approx.180 mm	Approx.68 mm	Approx.80 mm
Dimensions	Approx.459 × 77 × 86 mm	Approx.353 × 57 × 100 mm	Approx.265 × 57 × 100 mm	Approx.145 × 51 × 85 mm	Approx.260 × 65 × 142 mm
Weight	Approx. 2.9 kg	Approx.1.9 kg	Approx.1.6 kg	Approx.0.7 kg	Approx.1.9 kg
Light source	Red laser (638 nm, Class 2)	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/UKCA/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



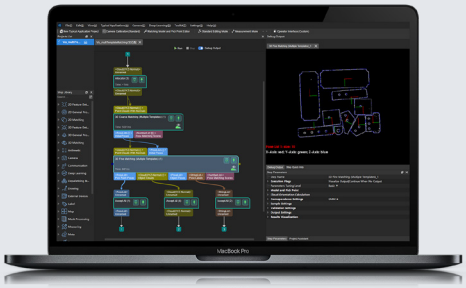
Field of view (mm)

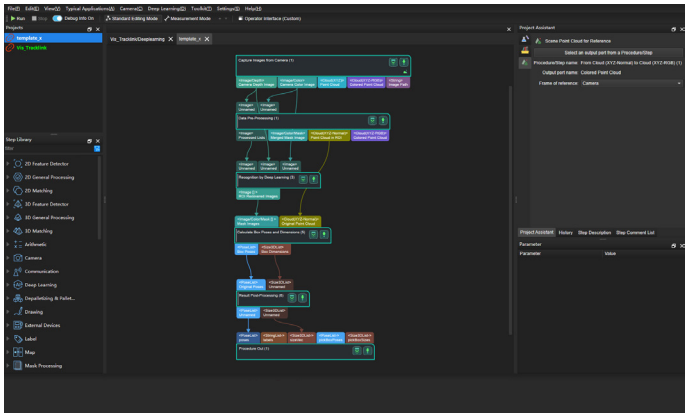
[1] One standard deviation of 100 Z-value measurements of the same point. The measurement target was a ceramic plate.
[2] One standard deviation of 100 measurements of the difference between the Z-value means of two same-sized regions. The measurement target was a ceramic plate.
[3] According to VDI/VDE 2634 Part II.

Mech-Vision

Machine Vision Software

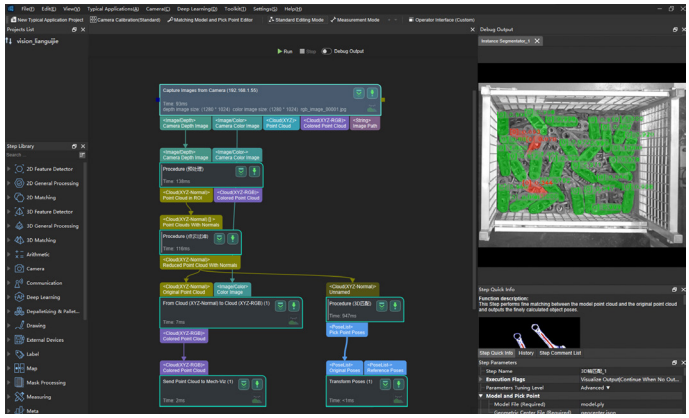
Mech-Vision is an industry-leading machine vision software. It is designed to quickly build vision applications, whether simple or complex. With Mech-Vision, users can manage a wide range of vision tasks, including identification, localization, inspection & gauging, etc.





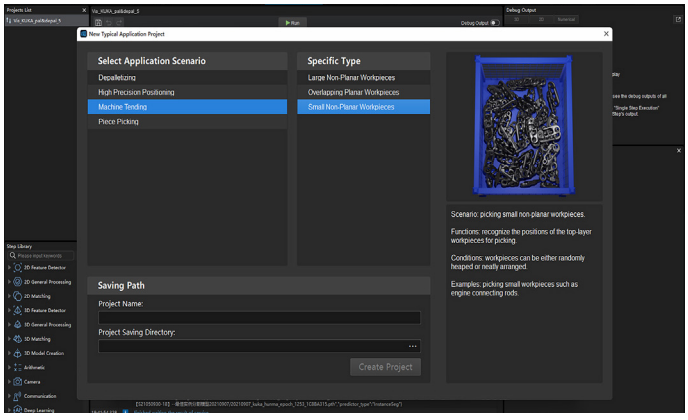
Build your vision applications efficiently

- 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.



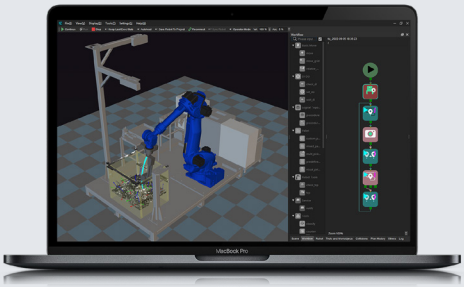
Develop vision applications easily and flexibly

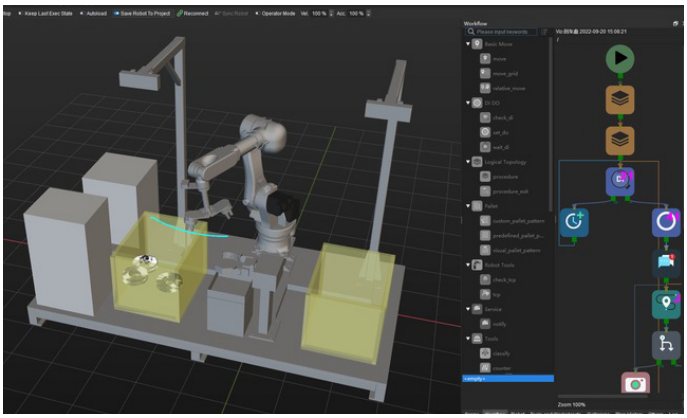
- Support for embedded scripting, customization, and system integration
- Multiple languages: English, Japanese, Chinese, and Korean

Mech-Viz

Robot Programming Software

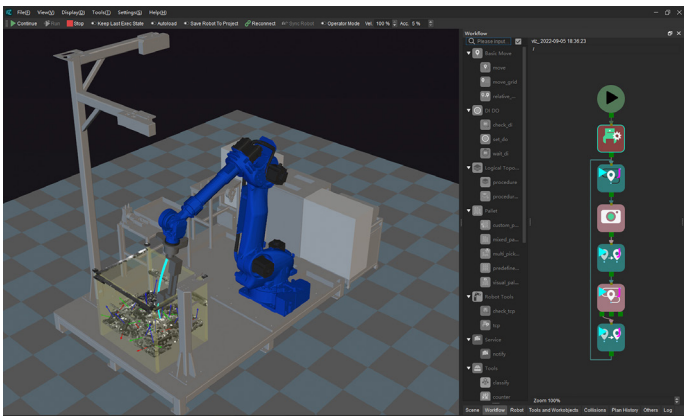
Mech-Viz is a software product for efficiently implementing robotic applications without writing a line of code. Mech-Viz enables robots to manage demanding automation tasks with excellent stability, extraordinary flexibility, and outstanding consistency.





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.

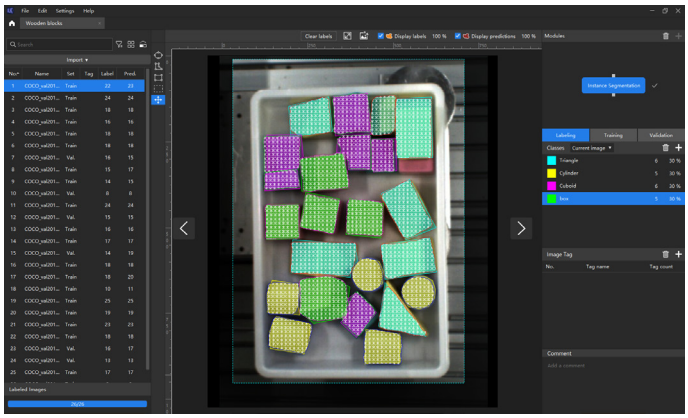
Flexible and Easy Implementation

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

Mech-DLK

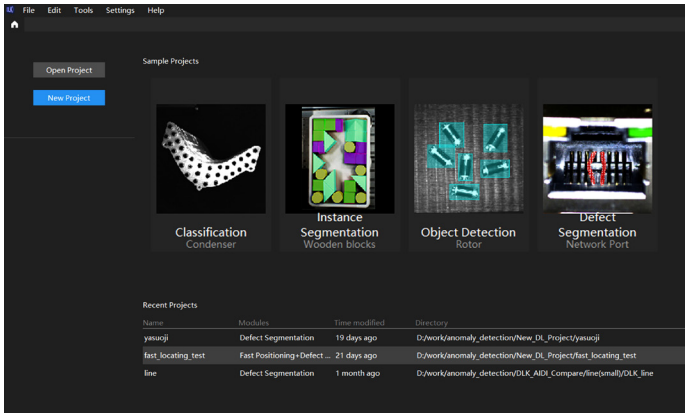
Deep Learning Software

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

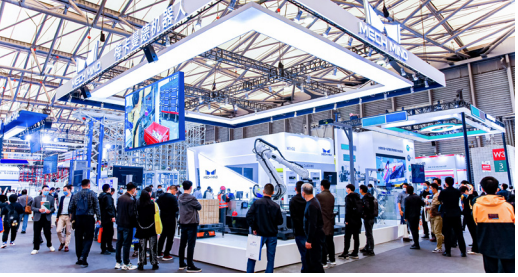


Manage complex machine vision tasks with advanced algorithms

- Defect 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

XCMG · ZOOMLION · SANY · RCC · LiuGong · ZMJ · TZ · CNHTC · CAT · MESSER · SHANTUI · CSSC · BAOSTEEL · SUNWARD · DEMATIC · SKF · SIEMENS · SDS · BOSCH · TOYOTA · TESLA · NISSAN · BYD · NIO · GEELY · ABB · YASKAWA · KUKA · Kawasaki · FANUC · DENSO · NACHI · MITSUBISHI ELECTRIC · UNIVERSAL ROBOTS · DOBOT · FOXCONN · brose · DAIKIN · Arçelik · HIGHLY · GMCC · Midea · Haier · GREE · SUGINO · HITACHI · HGTECH · BAOWU · NIPPON STEEL · intel

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3D VISION & AI FOR ROBOTS AND MORE

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