MECH MIND

Mech-DLK

Deep Learning Software

Solve challenging applications with speed and accuracy

- Complex workpiece location
- Character reading
- Defect classification
- Defect detection

Mech-DLK is a versatile and easy-to-use deep learning software for complex applications. With industry-leading AI algorithms and a graphical interface, it allows for **fast**, **intuitive training** and **easy deployment**. Mech-DLK is designed to automate applications with unmatched speed and consistency in **automotive**, **electronics**, **EV battery**, **home appliance** and other industries.

Intuitive Graphical User Interface

Simplifies model training for all users, even those without programming knowledge.

Innovative Toolset for Fast Labeling

Simplifies image labeling and significantly reduces labeling time.

Efficient Training and Easy Deployment

Speeds up the model training while ensuring accuracy, allowing for fast deployment.

Flexible Architecture for Easy Integration

Provides SDKs in various programming languages (**C, C++, C# and Python**) for easy integration.

Faster Line Duplication

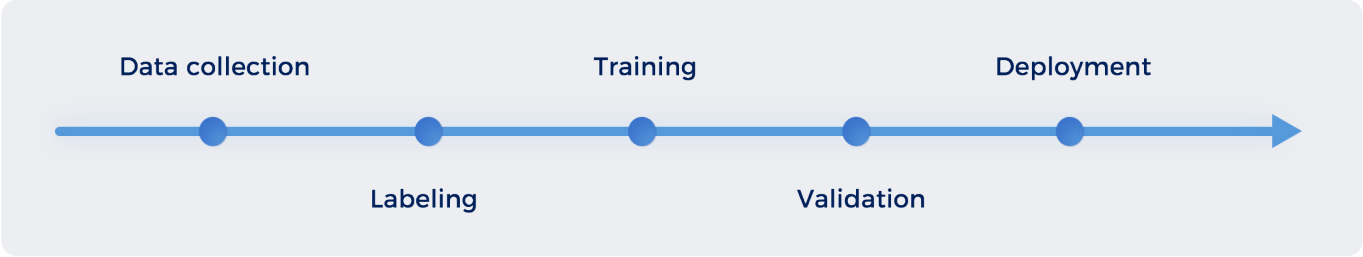
Finetunes your existing models, streamlines retraining process, and delivers efficient mass deployment.

Powerful Model Cascading

Makes applications tailored to your specific needs and simplifies applications in complex scenarios.

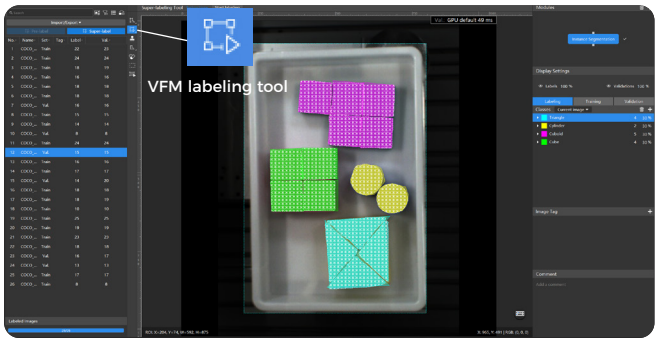
Manage your applications at EVERY step

The Mech-DLK encompasses the whole process of data collection, labeling, training, validation and deployment for your applications.



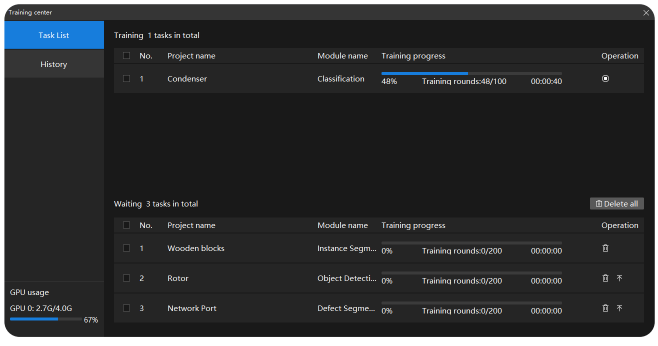
Tackle vision tasks with speed and accuracy

A range of efficient tools and innovative features enable you to streamline your entire vision workflow, from labeling to deployment, ensuring speed and accuracy.



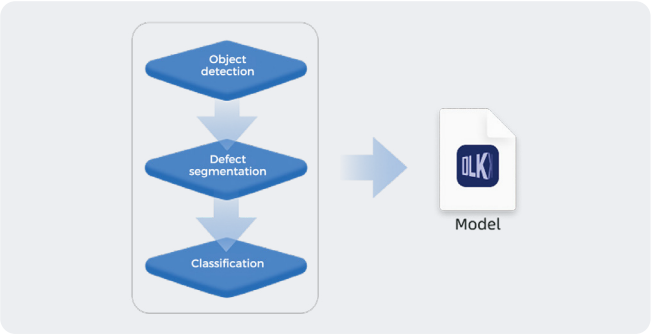
Labeling

Using our quick labeling toolset, including **VFM labeling tool, smart labeling tool** and **pre-trained labeling tool**, you can label 50% faster than manually, while maintaining high accuracy. This significantly reduces time spent on labeling typical items in depalletization applications, such as bags, shrink-wrapped bottles, cartons, and complex metal workpieces.



Training

You can benefit from the efficient training center. Models will be automatically trained in sequence after added in the software.



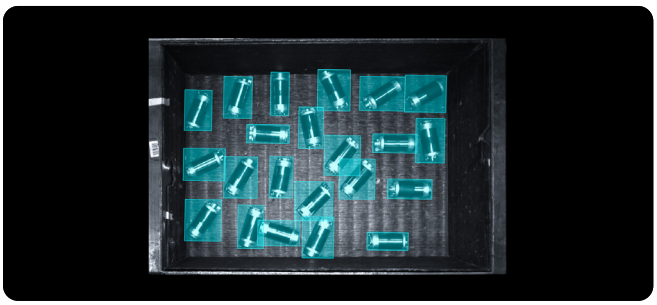
Deployment

Algorithm module cascading makes detection applications in complex scenarios much easier. Using the single one model package, you can quickly deploy applications.

Robust algorithms for reliable performance

Fast positioning

Recognizes the object in the target area and rotates the images to a specified orientation.

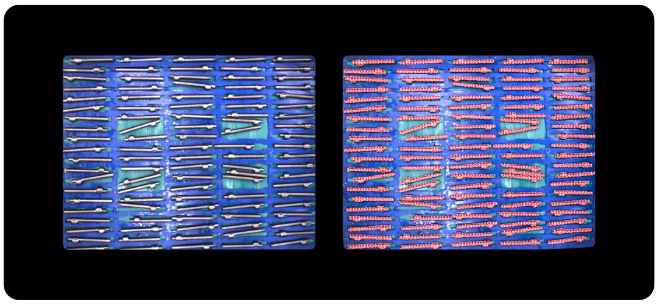


Object detection

Locates parts despite variations in perspective and orientation and determines their classes.

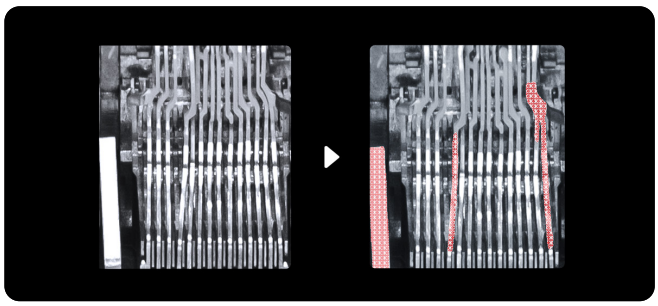
Classification

Recognizes workpiece front and back faces, orientations, and defect types and determines whether objects are missing, disordered, or neatly arranged.



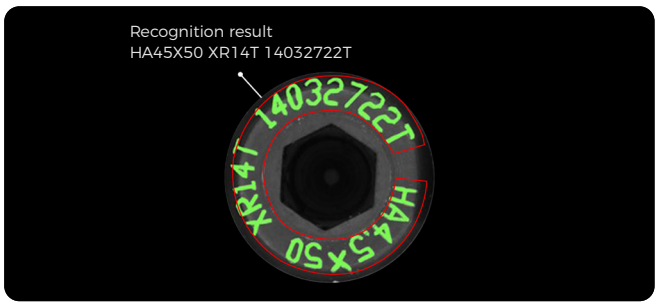
Instance segmentation

Identifies the specific objects from piled items, marks the contours, and identifies their classes.



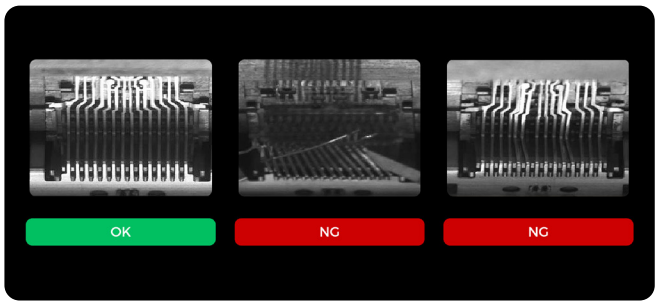
Defect segmentation

Accurately detects subtle and challenging defects on noisy backgrounds and low-contrast parts, or with random part positioning.



OCR

Reads application-specific characters, like badly deformed, skewed, and poorly etched characters.



Unsupervised segmentation

Quickly labels datasets and trains defect segmentation models to increase labeling efficiency by 300%. Ideal for defect inspection of electronics, pins, PCBs and seals.

Small Data Sets

Model training can be done with vastly smaller image sets.

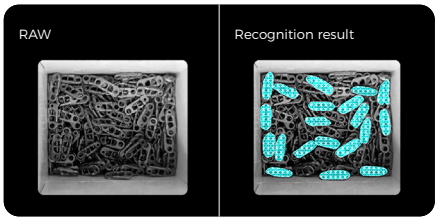
High Accuracy

The powerful deep learning algorithms deliver faster training while ensuring the accuracy of your results.

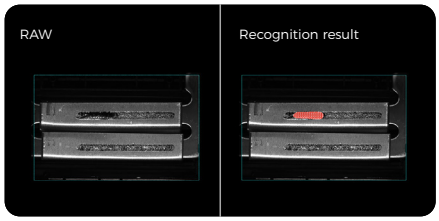
Fast Model Inference

It takes about **10+ ms** for a deep learning model to make an inference on new data, much faster than the industry average.

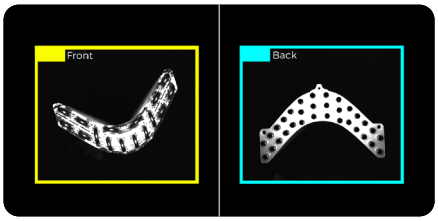
With Mech-DLK you can do



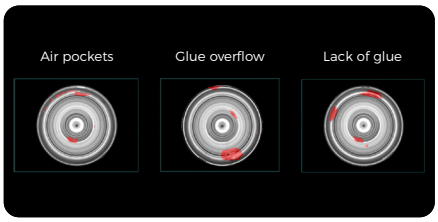
Complex workpiece location



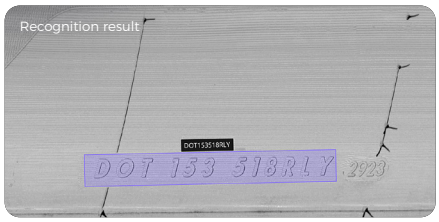
Defect detection



Quality control



Defect classification



Character reading

Case studies

FPC solder joint inspection

The requirement

- Inspect various soldering defects, such as cracks, voids, or weak bond strength.

The challenge

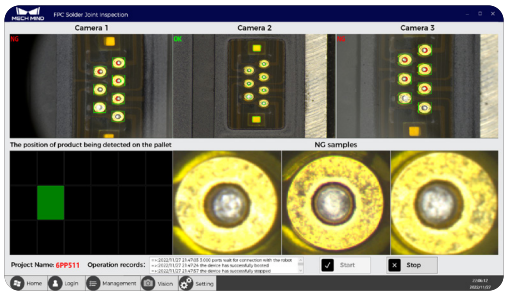
- High accuracy requirements of small solder joint inspection;
- Difficulty in defect inspection due to variations in defect types, sizes, and locations;
- Multiple types and sizes of products;
- High-speed requirements of inspection.

The Mech-Mind solution

- The multi-perspective imaging and micron-level accuracy allow the capture of solder joints in clear focus;
- Deep learning **model cascading** enables pixel-level defect segmentation;
- **High-speed imaging in motion** and model-based inference techniques raise the inspection speed.

The result

- Increased efficiency and productivity: UPH > **800 pcs**;
- Improved product quality: **< 0.5%** of false positive rates;
- Good performance in the inspection of various circuits.



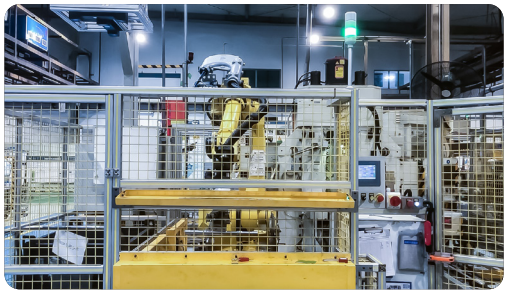
Software Interface

Deep Learning-Based Segmentation

Driveshaft bin picking

The requirement

- Locate and mark the contours of the reflective driveshafts from the bulk to allow accurate picking for robots.



The challenge

- Reflective and overlapping driveshafts in the deep bin;
- Difficulty in accurate picking when the blurred edges lead to unclear point clouds.

The Mech-Mind solution

- Train instance segmentation models of driveshafts to match targets even amidst defective point clouds;
- Detect and mark the contour of target driveshafts, allowing accurate picking for robots.

The result

- Picking accuracy: **99.99%**

Battery tab welding inspection

The requirement

- Inspect battery tab defects that occur during the laser welding process.

The challenge

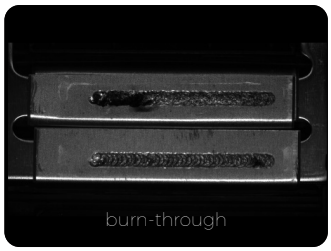
- Various types of batteries with poor consistency;
- Different types of defects: burn-through, bending, lack of fusion, welding deviation, porosity, and incorrect folding;
- High requirements of optical imaging and algorithms due to tabs with different reflections, colors, and textures, and positions.

The Mech-Mind solution

- Training of a high-accuracy detection model with **small amounts of samples**;
- Defect detection and classification based on model cascading;
- Fast application and deployment of deep learning models in tandem with Mech-Vision.

The result

- Improved product quality: **< 0.2%** of false negative rates and **< 1%** of false positive rates;
- Increased productivity: **< 500** ms for defect inspection of each tab.


burn-through


bending


missing welds


welding deviation

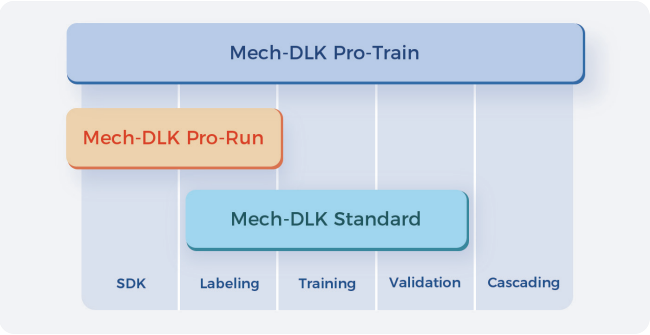
Open and flexible architecture for your deployment

The flexible architecture of Mech-DLK ensures higher efficiency and compatibility in future development. The Mech-DLK supports secondary deployment of SDKs in common programming languages (C and C++) and .NET language (C#). Our SDKs can also be called in Mech-Vision and other machine vision software.

Programming languages (C, C++, C# and Python)	Mech-Vision	Other vision software

Find the RIGHT version for your applications

The Mech-DLK comes in three versions, each designed with different functions combined to cater to your specific needs. You can choose the optimal version based on how challenging your task is. With its versatile functions seamlessly combined, you can confidently elevate your vision to new heights of success and efficiency.



3D VISION & AI FOR ROBOTS AND MORE

Get the most from Mech-Mind's 3D vision - get in touch with us!

Website: www.mech-mind.com
E-mail (business): info@mech-mind.net
E-mail (PR & marketing): marketing@mech-mind.net

Learning guidance to deploy your vision application STEP BY STEP, please visit

Documentation: docs.mech-mind.net
Online community: community.mech-mind.com