iNSNEX

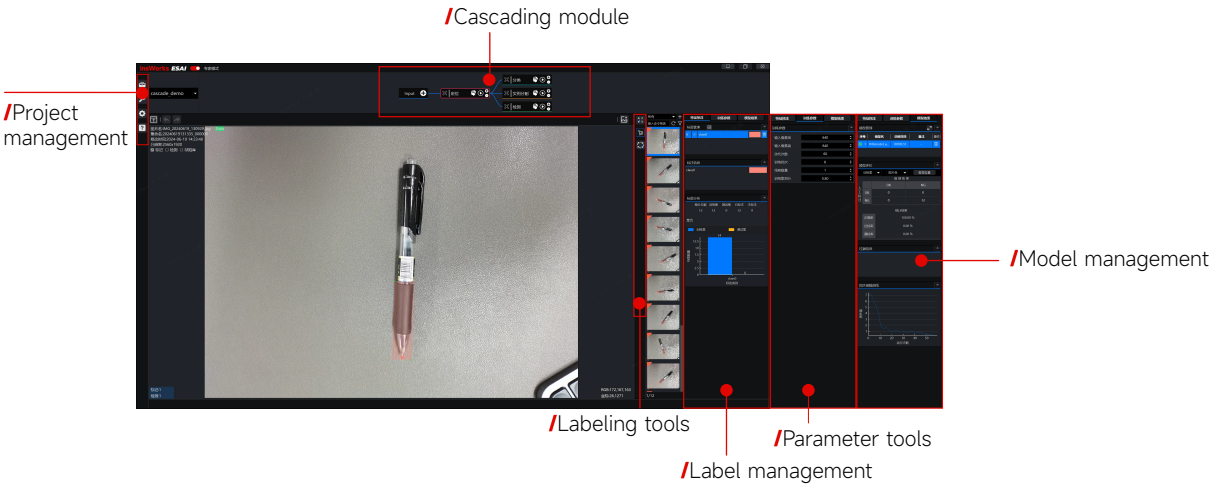
DEFECT IMAGING EXPERT

InsWorks ESAI

POWER YOUR VISION ENGINEERING

SOFTWARE OVERVIEW

ESAI is a feature-rich, user-friendly, and efficient deep learning vision application software. It handles complex deep learning tasks through simple annotation training and offers extensive deployment tools for easy integration. The software provides efficient and reliable solutions, focusing on ease of use and a WYSIWYG (what you see is what you get) design, allowing beginners to quickly get started. It integrates various deep learning models and algorithms, supporting tasks such as image classification, object detection, and image segmentation. Additionally, it includes multiple data processing and visualization tools to analyze problem data and facilitate iterative model optimization, meeting complex visual application needs.



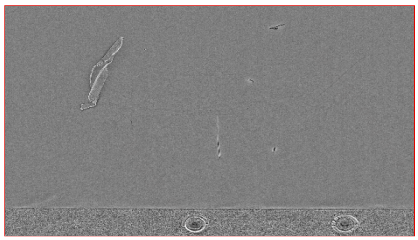
SOFTWARE FEATURES

①Simple to operate, allowing beginners to independently complete deep learning projects.
②Supports 8 deep learning tasks, covering a wide range of visual application scenarios.
③Offers various self-developed tools to effectively address common challenges in deep learning.

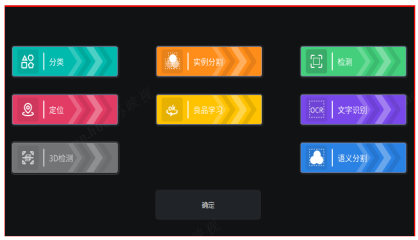
FAST TRAINING PROCESS

ESAI software uses adaptive parameter methods to avoid manual tuning, reducing the technical knowledge required to use the software. Its intelligent labeling feature enhances labeling efficiency and significantly reduces labeling time. The defect generation tool shortens the sample collection cycle. ESAI simplifies the entire AI project setup and model training-deployment process, making it more efficient and convenient. Users can quickly achieve the full workflow from project conception to model application without a deep technical background.

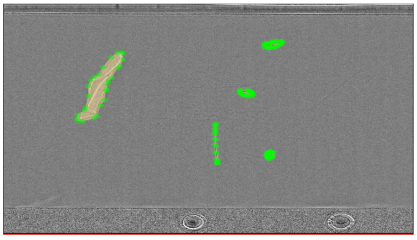
Create a project



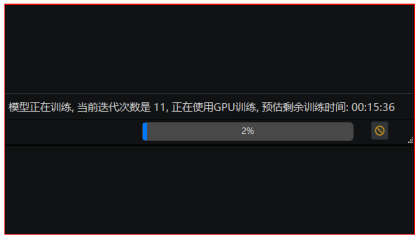
Import images



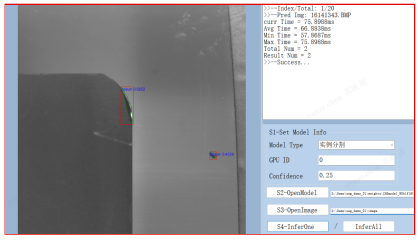
Select module



Label images



Train model

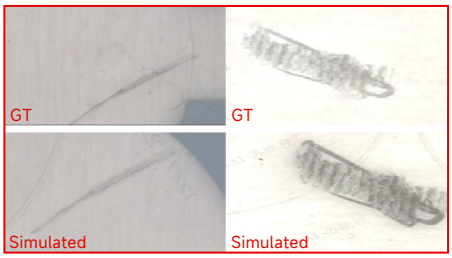


Deploy model

SOFTWARE OVERVIEW

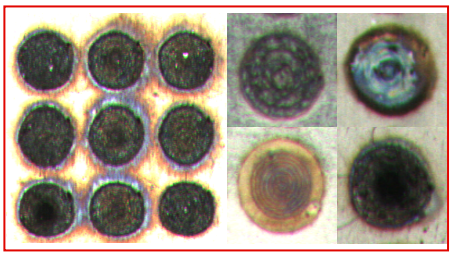
ESAI supports 8 AI tasks, including image classification, object detection, semantic segmentation, instance segmentation, object localization, optical character recognition (OCR), 3D artificial intelligence (3DAI), and unsupervised learning. These features make it suitable for a wide range of applications, from basic visual processing to complex scene understanding, providing comprehensive and flexible solutions to meet the needs of various fields and projects.

INTRODUCTION TO 8 MAJOR SUPPORTED TASKS



/Detect

The Detect function detects single or multiple feature targets in images. It can identify direction, position, and quantity of objects of any shape in complex scenes. The Detect module is fast, requires fewer samples for learning, and is more suitable for coarse-grained recognition tasks.



/Classify

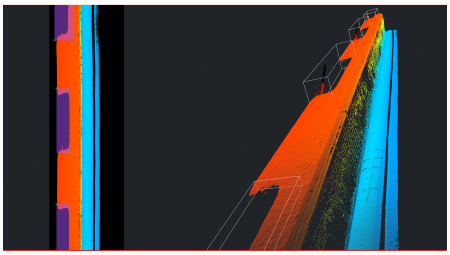
Classify incoming materials into various categories, commonly used for product sorting and grading, as well as for detailed differentiation of defects.

/Instance-Segments

Detect various small defects in irregular shapes and complex backgrounds, such as scratches and abrasions. Achieve pixel-level edge recognition for defect analysis in low-contrast images. The Instance-Segments segmentation module is one of the most commonly used surface inspection tools in the 3C and new energy industries.

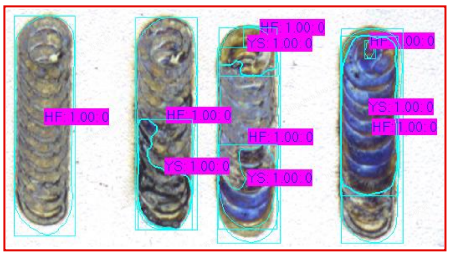
/Read-OCR

The OCR tool supports character recognition for various fonts, handwriting, and materials, addressing the limitations of traditional OCR algorithms that struggle with single-font images. It also excels in handling complex scenarios such as curved surfaces, steel stamps, and textiles.



/3DAI

In industrial scenarios, 3DAI (3D Artificial Intelligence) processes and analyzes three-dimensional data to achieve precise detection, quality control, and automation of complex objects and structures. It enhances production efficiency and product quality, with applications in manufacturing, construction, and equipment maintenance.

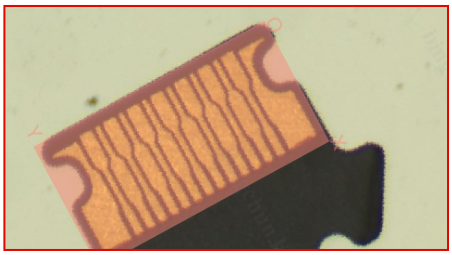


/Semantic segmentation

Semantic segmentation uses deep learning algorithms to classify each pixel in an image, enabling precise recognition and segmentation of different objects and regions. This improves the accuracy and efficiency of automated detection, defect identification, and quality control, and is widely used in manufacturing, logistics, construction, and agriculture.

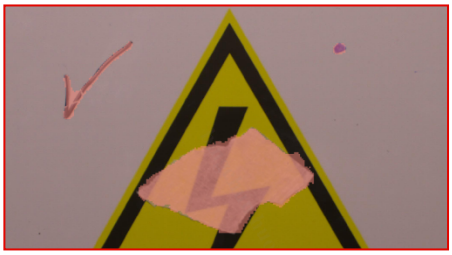
SOFTWARE OVERVIEW

INTRODUCTION TO 8 MAJOR SUPPORTED TASKS



/Localization

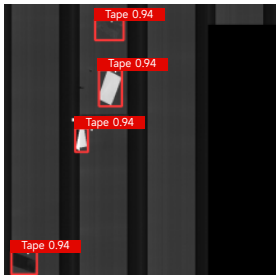
AI-based rotation box detection is an advanced object detection method that not only uses horizontal bounding boxes to locate objects but also employs rotated bounding boxes to more accurately fit the object's orientation and shape. This approach is often more effective than traditional horizontal bounding box detection in certain application scenarios.



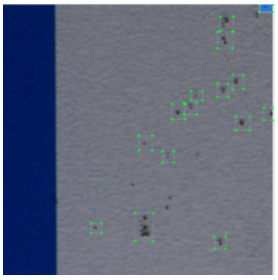
/Good product learning

The lack of defect samples is a major challenge in industrial defect detection. Traditional supervised models often struggle to learn defect features effectively under these conditions, leading to misjudgments. The Good Product Learning feature intelligently identifies anomalies and defects by deeply learning the characteristics of normal products, significantly improving defect detection efficiency and reducing reliance on defect samples.

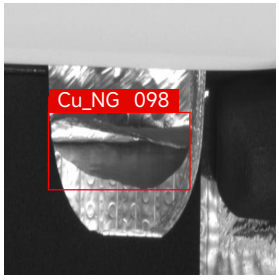
DEPLOYMENT CASES



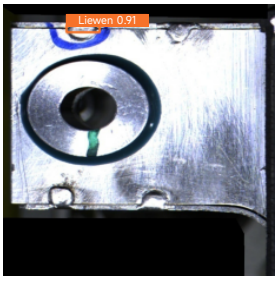
Offset printing inspection



Large-area defects

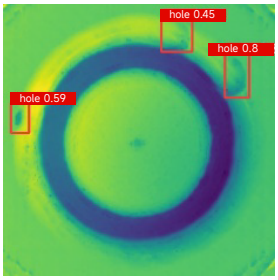


Tab folding detection

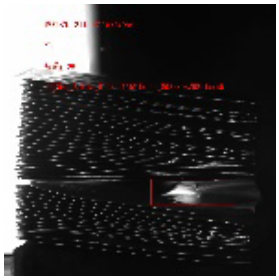


Scratch detection

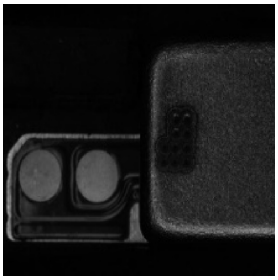
Pack appearance inspection



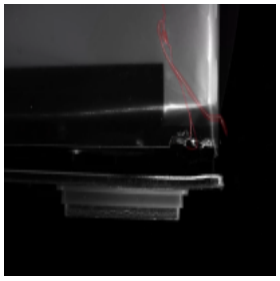
Seal nail defect detection



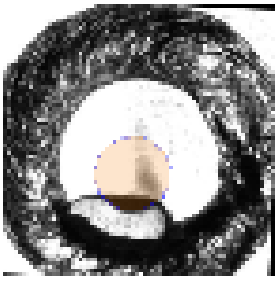
Tab bending defect detection



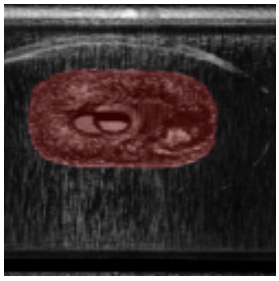
Motor appearance defect detection



Bare cell appearance inspection



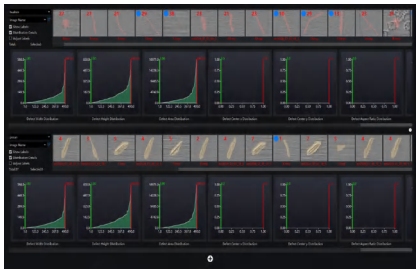
Welding inspection



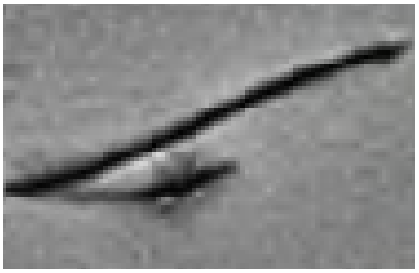
Welding inspection

INTRODUCTION TO USER-FRIENDLY TOOLS

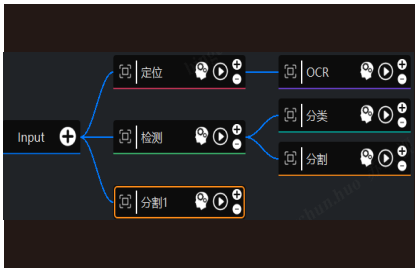
ESAI software offers a range of powerful tools and algorithms. The small sample detection and incremental learning algorithms help users achieve efficient and accurate model training even with limited data. The sample manager simplifies the data processing workflow, the defect generation tool addresses the issue of insufficient defect samples, and the automatic labeling tool significantly improves labeling efficiency. The cascading functionality allows for the combination of multiple models to tackle complex visual applications. These new features support users in achieving outstanding results in complex visual tasks and provide solutions to common AI challenges.



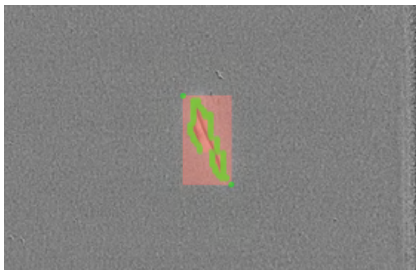
Sample Manager



Defect generation

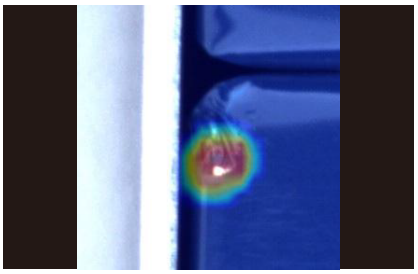


Cascade module



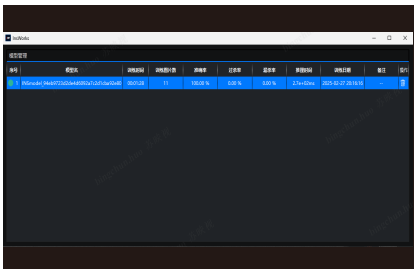
AI-assisted annotation

Annotation/Defect localization



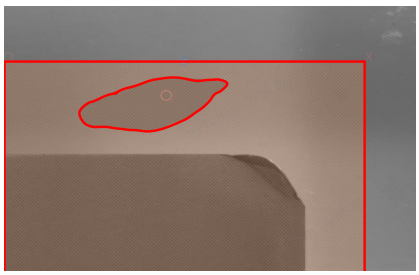
Feature map display

Recommend training sets



Model management

Adaptive training hyperparameters



Interested in the local/masking function.

SOFTWARE OPERATING SPECIFICATIONS

INSWORKS ESAI MINIMUM HARDWARE REQUIREMENTS		
Graphical & Application Programming Interfaces		No additional requirements. For running the inference SDK, please refer to the corresponding configuration requirements of the SDK.
Hardware & OS Requirements	CPU	AMD Ryzen 5 / Intel Core i5 or higher
	GPU	Nvidia GTX 1650, 4GB VRAM or higher
	RAM Memory	8GB RAM or higher
	USB	One available USB port (for license dongle)
	OS	Windows 10 or later, 64-bit operating system
	Storage	128GB SSD or higher
Supported image file formats		Jpeg, Png, Bmp, Tif
Supported image properties		8-bit / 24-bit

INSWORKS ESAI RECOMMENDED HARDWARE REQUIREMENTS		
Graphical & Application Programming Interfaces		No additional requirements. For running the inference SDK, please refer to the corresponding configuration requirements of the SDK.
Hardware & OS Requirements	CPU	AMD Ryzen 7 / Intel Core i7 or higher
	GPU	Nvidia RTX 3060, 8GB VRAM or higher
	RAM Memory	16GB RAM or higher
	USB	One available USB port (for license dongle)
	OS	Windows 10 or later, 64-bit operating system
	Storage	512GB SSD or higher
Supported image file formats		Jpeg, Png, Bmp, Tif
Supported image properties		8-bit / 24-bit

INSWORKS ESAI SDK MINIMUM HARDWARE REQUIREMENTS		
Graphical & Application Programming Interfaces		Visual C++ Redistributable for Visual Studio 2019, .NET Framework 4.7.2
Hardware & OS Requirements	CPU	AMD Ryzen 3 / Intel Core i3 (9th generation) or higher
	GPU	NVIDIA GTX 1030 or higher
	RAM Memory	8GB RAM or higher
	USB	One available USB port (for license dongle)
	OS	Windows 10 or later, 64-bit operating system
	Storage	128GB SSD or higher
Supported image file formats		Jpeg, Png, Bmp, Tif
Supported image properties		8-bit / 24-bit

INSWORKS ESAI SDK RECOMMENDED HARDWARE REQUIREMENTS		
Graphical & Application Programming Interfaces		Visual C++ Redistributable for Visual Studio 2019, .NET Framework 4.7.2
Hardware & OS Requirements	CPU	AMD Ryzen 5 / Intel Core i5 (11th generation) or higher
	GPU	NVIDIA GTX 3060 or higher, 6GB VRAM or higher
	RAM Memory	16GB RAM or higher
	USB	One available USB port (for license dongle)
	OS	Windows 10 or later, 64-bit operating system
	Storage	512GB SSD or higher
Supported image file formats		Jpeg, Png, Bmp, Tif
Supported image properties		8-bit / 24-bit

Software Operating Configuration Specification Sheet

SDK Performance Testing C++									
Graphic Card	Image Size	3060ti							
Inference Method and Resource Usage		Normal Inference				Fast Inference			
Reasoning time / Algorithm model		Min_Time	Max_Time	Avg_Time	GPU_Usage	Min_Time	Max_Time	Avg_Time	GPU_Usage
Classify(Small)	224*224	2.66ms	3.35ms	2.88ms	0.5GB	1.42ms	2.20ms	1.70ms	0.5GB
Classify(Medium)	224*224	2.85ms	6.22ms	5.66ms	0.5GB	2.08ms	2.86ms	2.51ms	0.5GB
Classify(Large)	224*224	26.95ms	27.87ms	27.21ms	0.7GB	3.50ms	8.54ms	8.08ms	0.6GB
Detect(Small)	640*640	4.94ms	16.46ms	15.32ms	0.5GB	7.03ms	8.34ms	7.35ms	0.3GB
Detect(Medium)	640*640	32.52ms	35.54ms	32.94ms	0.6GB	14.10ms	15.88ms	14.60ms	0.3GB
Detect(Large)	640*640	44.99ms	108.54ms	72.56ms	0.9GB	11.35ms	46.18ms	43.90ms	0.4GB
Instance Segment(Small)	640*640	20.42ms	21.76ms	20.74ms	0.6GB	9.48ms	11.69ms	9.78ms	0.3GB
Instance Segment(Medium)	640*640	38.96ms	43.82ms	41.26ms	0.6GB	18.17ms	19.37ms	18.57ms	0.3GB
Instance Segment(Large)	640*640	54.49ms	125.75ms	81.37ms	0.9GB	13.61ms	49.94ms	36.39ms	0.4GB
Semanic Segment(Small)	512*512	6.83ms	11.25ms	7.37ms	0.4GB	2.13ms	7.68ms	3.31ms	0.4GB
Semanic Segment(Medium)	512*512	8.65ms	12.62ms	9.45ms	0.5GB	2.72ms	8.25ms	3.94ms	0.4GB
Semanic Segment (Large)	512*512	30.89ms	39.56ms	31.23ms	0.8GB	10.68ms	21.15ms	11.88ms	0.7GB
Unsuper Learning	320*320	43.02ms	50.31ms	44.51ms	1.3GB	14.76ms	15.83ms	15.15ms	1.1GB
Locate Algorithm	640*640	10.66ms	14.28ms	11.72ms	0.5GB	3.62ms	4.68ms	3.93ms	0.5GB
3D Detect	640*640	4.94ms	16.46ms	15.32ms	0.5GB	7.03ms	8.34ms	7.35ms	0.3GB
OCR Algorithm	960*960	116.85ms	144.07ms	122.23ms	0.5GB	—	—	—	

SDK Performance Testing C++									
Graphic Card	Image Size	3090ti							
Inference Method and Resource Usage		Normal Inference				Fast Inference			
Reasoning time / Algorithm model		Min_Time	Max_Time	Avg_Time	GPU_Usage	Min_Time	Max_Time	Avg_Time	GPU_Usage
Classify(Small)	224*224	1.33ms	8.28ms	2.02ms	0.7GB	0.70ms	5.96ms	1.19ms	0.7GB
Classify(Medium)	224*224	2.20ms	12.63ms	3.38ms	0.7GB	0.85ms	7.14ms	1.62ms	0.7GB
Classify(Large)	224*224	11.24ms	38.79ms	17.03ms	0.9GB	3.22ms	14.58ms	4.83ms	0.8GB
Detect(Small)	640*640	3.71ms	21.64ms	5.73ms	0.8GB	1.72ms	12.43ms	3.16ms	0.5GB
Detect(Medium)	640*640	7.08ms	45.27ms	11.31ms	0.8GB	2.08ms	23.22ms	3.88ms	0.5GB
Detect(Large)	640*640	19.27ms	64.41ms	30.51ms	1.1GB	4.05ms	28.86ms	11.52ms	0.7GB
Instance Segment(Small)	640*640	5.12ms	19.46ms	9.70ms	1.1GB	2.39ms	13.42ms	4.53ms	0.5GB
Instance Segment(Medium)	640*640	8.77ms	29.86ms	12.78ms	1.1GB	2.93ms	16.66ms	6.21ms	0.6GB
Instance Segment(Large)	640*640	22.65ms	67.72ms	28.91ms	1.2GB	5.76ms	34.82ms	11.24ms	0.7GB
Semanic Segment(Small)	512*512	4.32ms	9.63ms	5.23ms	0.6GB	1.86ms	8.23ms	3.53ms	0.6GB
Semanic Segment(Medium)	512*512	4.96ms	9.36ms	5.95ms	0.7GB	2.95ms	6.83ms	3.79ms	0.7GB
Semanic Segment (Large)	512*512	19.62ms	23.94ms	21.83ms	1.0GB	8.61ms	13.45ms	10.05ms	0.9GB
Unsuper Learning	320*320	24.60ms	29.77ms	27.11ms	1.6GB	14.57ms	15.62ms	14.83ms	1.4GB
Locate Algorithm	640*640	9.28ms	10.04ms	9.52ms	0.9GB	2.42ms	2.96ms	2.56ms	0.7GB
3D Detect	640*640	3.71ms	21.64ms	5.73ms	0.8GB	1.72ms	12.43ms	3.16ms	0.5GB
OCR Algorithm	960*960	111.26ms	121.12ms	112.80ms	0.8GB	—	—	—	

Software Product Specification Sheet

InsWorks ESAI					
	Version	Education Edition	45-Day Trial	Official - Train & Run AI-TR	Official - RunAI-R
Model	Detection	✅	✅	✅	❌
	Classification	✅	✅	✅	❌
	Segmentation	✅	✅	✅	❌
	Localization	✅	✅	✅	❌
	Unsupervised	✅	✅	✅	❌
	OCR	✅	✅	✅	❌
	3D Detection	✅	✅	✅	❌
Model Deployment	Inference	⚠	✅	✅	✅
	Model Export	❌	✅	✅	❌
Validity Period		1 Year	45 Days	Permanent	
Licensing		No License Required	Software License	Dongle	
Acquisition Method		Official Website Registration & Download	Official Website Registration & Download & Request Activation Code	Sales Channels	
Usage Restrictions		Cannot Export Models for Deployment & Secondary Development	Time-limited Full Features	Unlimited	
Use Cases		Learning/Teaching/Personal Projects	Project Evaluation	Industrial Inspection/Automated Production	
Target Users		Students/Educational Institutions/Non-commercial Use	All User Groups		
Technical Support		Limited Support (Docs & Forum)		Full Support (Consulting/Training/Customization)	

INSNEX

DESIGNED FOR DEFECT IMAGING

If you have any testing needs,
please contact us:

+86 186 6233 5421

www.insworks.insnex.com

No.218 Xingming Street,Suzhou Industrial Park, Jiangsu Province

tech_support@insnex.com