Advantech Machine Vision Solutions

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ADVANTECH

Enabling an Intelligent Planet

GiGE VISION   USB VISION

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The Next Generation of Intelligent Machine Vision Solutions

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Complete Machine Vision Solutions to Meet Diverse Requests from the Field

Advantech's machine vision product portfolio offers an extensive selection of hardware and software solutions to accommodate users at all levels while fulfilling a wide range of machine vision applications. Our comprehensive machine vision hardware includes platforms and systems, frame grabber cards, and industrial / smart cameras which are all integrated with both our basic and advanced machine vision and image analysis software to achieve automated gauge, guidance, identification, and inspection capabilities. We support deep learning architecture from backend storage, and training servers, to front end edge systems and cameras that meet the increasing need for deep learning machine vision solutions that address a range of sophisticated automation challenges.

Vision at the Edge

Seamless Integrated One-Stop Solution

VisionNavi

Vision with Edge AI
Edge to Cloud Total Solution

WISE-PaaS/AFS

AINavi

Vision Platform
Complete Product Portfolio for
Flexible Selection

Server

Platform and System

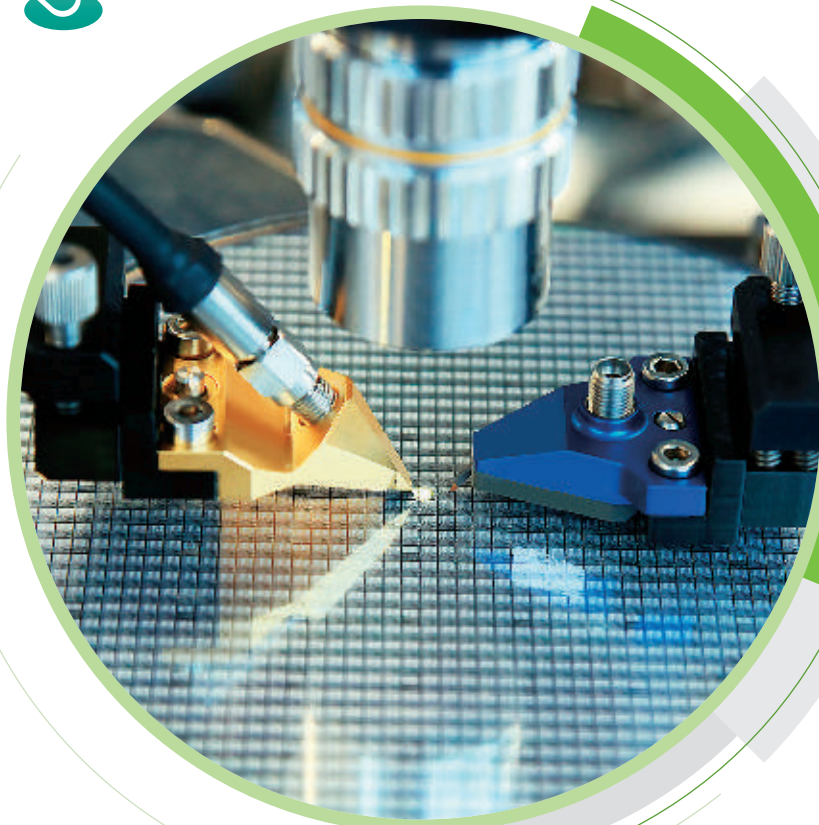Frame Grabber Card

Industrial Camera

AI Defect Inspection Solution and Service

Professionally Integrated AOI Solution

With inference and training technology, AI provides fast and accurate inspection for manufacturers but challenges still remains. The key obstacle is integrating a new AI solution into an existing machine vision system. In order to accelerate AI deployment, Advantech cooperated with Smasoft, a professional AI solution company focused on industrial automation, to deliver an AI total solution for defect inspection. Advantech and Smasoft provided a full service to help factories transition to AI manufacturing: from optical consulting in the beginning, image labeling, model training, and the final deployment and integration. The customer was able to adopt AI inspection into their exiting fully automated and semi-automatic production lines, greatly improving efficiency and product quality.
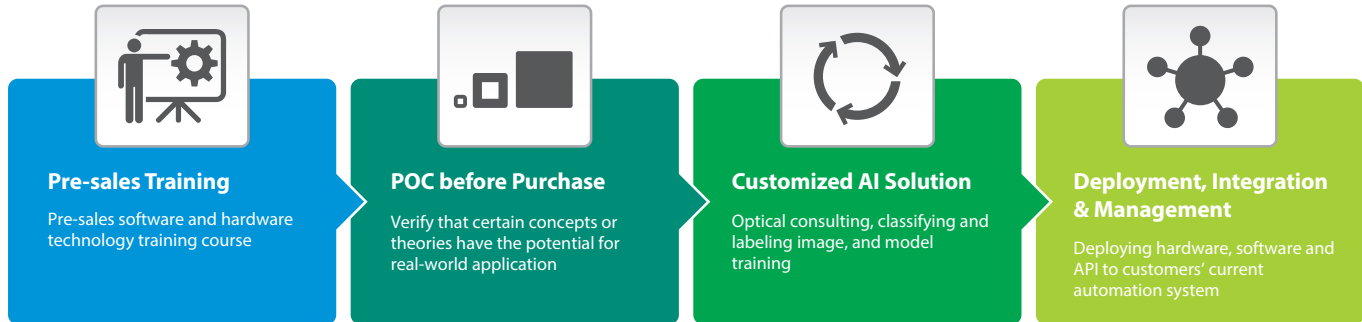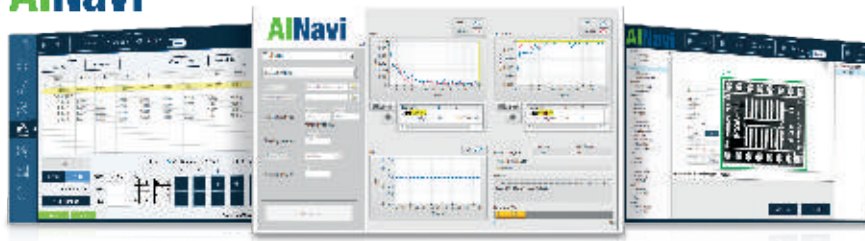
Specialized Factory AI

One-Stop Service Package

AI Service Package

Pre-sales Training
Pre-sales software and hardware technology training course

POC before Purchase
Verify that certain concepts or theories have the potential for real-world application

Customized AI Solution
Optical consulting, classifying and labeling image, and model training

Deployment, Integration & Management
Deploying hardware, software and API to customers' current automation system

AI Inference Solutions

AINavi

AI Inference System	Distributed AI Inference Solution	AI Training and Inference System
MIC-730AI	**MIC-770 + MIC-730AI**	**MIC-770+MIC-75G20**
• NVIDIA Jetson Xavier embedded • Supports 1xminiPCIE and 1xM.2 (NVMe) • Supports i-Door and i-Module • Fanless compact size • Ideal for high speed machine vision	• Intel 8th Gen Core i CPU + multiple NVIDIA Jetson architecture • Designed for multiple inspection and multiple defect model	• Intel 9th Gen Core i CPU + NVIDIA GPU architecture • PCIE slot or FlexIO for POE, USB cameras • Dual power input design for reliable operation

Vision at the Edge

One-Stop Solution Simplifies Your Vision System Deployment

Even though machine vision is superior in terms of accuracy, reliability, and efficiency when compared to a manual approach, some manufacturers still hesitate to adopt these kind of applications. There are several reasons for this: long system development times; compatibility issues integrating hardware components; and issues with maintenance and inspection that cannot be customized to specific needs. So companies are reluctant to make a move due to these concerns—causing them to miss out on opportunities.

Advantech's solution uses an intelligent inspection system which integrates an industrial camera, processing unit, and application software. This total solution integrates the entire process—from image sensing, image acquisition to application software—to simplify the project development process and allow for the rapid completion of machine vision inspection, without any coding, via an easy-to-use program. This significantly reduces system implementation time and subsequent maintenance costs. In doing so, Advantech helps users effectively realize the automated inspection of production lines.

Advantech Machine Vision Edge Solution Architecture

Applications

Traceability	Efficiency	Flexibility	Accuracy	Quality
Trace & Trace	Guidance	Gauge	Inspection	Identification

Application Software

VisionNavi

Algorithm		Script		Image Preprocessing	
• Alignment • Code reading • OCR & OCV • Recognition	• Measuring • Comparison • Inspection	• Conditional operator • Arithmetic • Logical operator	• Conditional operator • Comparison operation • String operation	• Filtering • Color extraction • Color conversion • Mirroring, rotation	• Scaling • Calibration • Shape correction

G.U.I	Communication	Database & Storage Services	Image Aca.
• Graphical, flow chat • Development & run-time	• Ethernet • PLC	• CSV • Image archive	• GigE vision • USB vision

Edge Computing

HMI	Industrial PC		Automation Controller	Smart Camera
TPC-B500 / PPC-6151C	MIC-770	AIIS-3410 UNO-2484G	AMAX-5580	CPU FPGAs ICAM-7000

Sensing

QCAM, 2.0MP, Mono	QCAM, 5.0MP, Mono	QCAM, 2.0MP, Color	QCAM, 5.0MP, Color	

One-Stop Solution	Intuitive and Multitasking	Scalable Computing Platforms

Seamless Integration with One-Stop Solution

The integration of cameras, sensor, software, and platforms, delivering a one stop shop solution.

VisionNavi

Software

Camera

Computing Platform

One-Stop Solution	Intuitive and Multitasking	Scalable Computing Platforms
1-STOP		
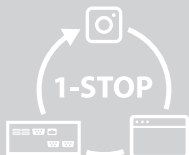
User-friendly, Flowchart-based User Interface for Fast Deployment

VisionNavi software is designed with a graphical and flowchart-based user interface, allowing users to develop and deploy a system in 4 easy steps.
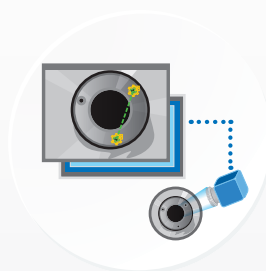
1 Image Acquisition   **2** Function Set-up   **3** Branching and Loops   **4** Result Output

Guidance   Measurement

Identification   Inspection

PLC
Sensors
Cloud
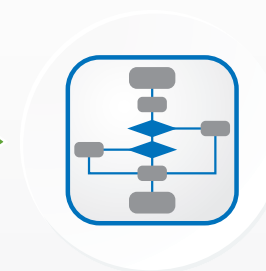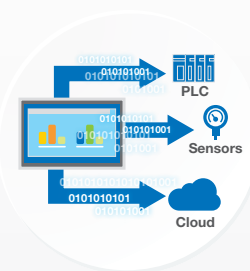
Multitask Capability to Improve Productivity and Efficiency
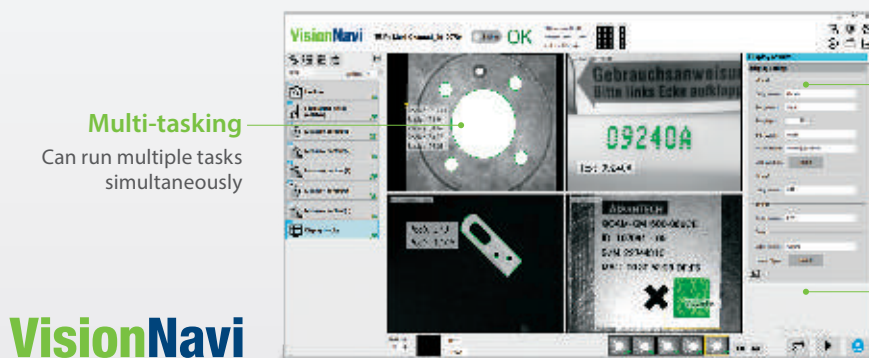
Multi-tasking
Can run multiple tasks simultaneously

VisionNavi

Multi-language
Supports English, Traditional / Simplified Chinese, Japanese

Multi-output
Can output the result to various devices or uploads to the cloud

One-Stop Solution	Intuitive and Multitasking	Scalable Computing Platforms

1-STOP
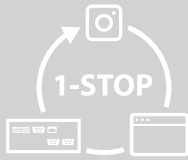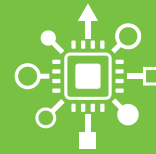
Powerful, Scalable Computing Platforms for Greater Stability and Compatibility

Supports various kinds of computing platforms with Intel Core i3 ~i7 CPU, providing powerful performance for a variety of applications.

Intelligent Edge Solution

High Computing Expandable

VisionNavi

MIC-770

General Fan-Based

VisionNavi

AIIS-3410P

Rugged Fanless

VisionNavi

UNO-2484G

Smart HMI Solution

Modular Fanless HMI

VisionNavi

TPC-B500

Modular Fanless HMI

VisionNavi

PPC-6151C

Automation Control Solution

Slice I/O Expandable

VisionNavi

AMAX-5580

Machine Vision Platforms
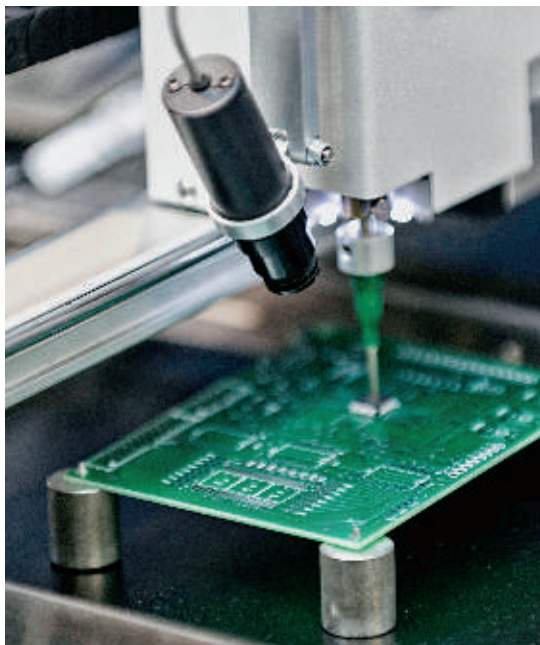
≥ 16 Cameras

To ensure reliability, future expandability, and easy deployment, this solution employs our industrial server and storage series, which include rack-mountable and customizable servers. We also offer a range of server motherboards, server chasses, and GPU servers. For storage, our range includes external disk arrays, JBOD systems, and storage servers.

CPU
High Computing Power

Maximal Bandwidth

Redundant Power Supply

Solution 1

HPC-7483
4U Rackmount / Tower Chassis

ASMB-975
Dual LGA 3647-P0 Intel® Xeon® Server Board

+

PCIE-1674
PCI Express GigE Vision Frame Grabber

x 7

+

QUARTZ
0.3-15.0 Mega Pixel PoE Industrial Camera

Solution 2

ACP-4340
4U Rackmount Chassis with PICMG Backplane or ATX/ Micro-ATX Motherboard

PCE-5B13-03
13-slot BP for 14-slot chassis

PCE-7131
8th/9th Generation Intel® Xeon® E/ Core™ i7/ i5/i3/Pentium® LGA1151 System Host Board

4~16 Cameras

With compact modular PCs that support i-module expansion, this solution can meet a range of application requirements. Our modular computers reduce lead times for CTOS with their simple configuration, making this solution suitable for deployment in various factory and machine automation applications.

Modular

Rugged

Customizable

Solution

MIC-770 + MIC-75G20
GPU-Supportive Compact System

UNO-3285G
Automation Computer

+

x 4

x 4
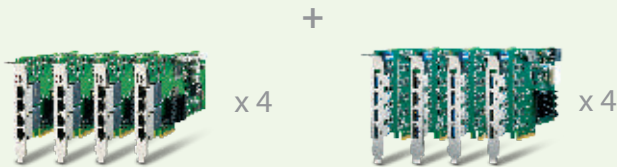
PCIE-1674
PCI Express GigE Vision Frame Grabber

PCIE-1154
PCI Express USB Vision Frame Grabber

+

•••

QUARTZ
0.3-15.0 Mega Pixel PoE Industrial Camera

≤ 4 Cameras

This solution uses Advantech's AIIS series, which are suitable for such machine automation applications as automated visual inspection label inspection, both of which rely on machine vision. With support for PoE and USB 3.0 vision and a rich I/O Interface, the AIIS series offer high-performance, low-power computing, intelligent management capabilities, and extended product longevity.

Compact Size

Mainstream Interface

High Interoperability

Solution 1

ICAM-7000
Smart Camera

Solution 2

AIIS-3410
Compact Vision System

+

x 4

QUARTZ
0.3-15.0 Mega Pixel PoE Industrial Camera

Maximize Your Hardware Potential

Compact Modular Computers

Compact modular PCs support i-module expansion to satisfy a diverse range of application requirements. They reduce lead times for CTOS due to their easy configuration and can be widely deployed for factory and machine automation.

Modularized **Ruggedized** **Customized** **Optimized**

All-in-One Vision Systems

AIIS series are specially designed for machine automation applications as automated optical inspection, label inspection, and alignment inspection, all of which rely heavily on machine vision. With PoE vision, USB 3.0 vision, and a rich I/O Interface, the AIIS Series consists of high-performance computing and low power consumption for intelligent management and extended product longevity.

Compact Size **Mainstream Interface** **Outstanding Performance** **High Interoperability**

Modular Panel Computers

To offer customers a quick time to market and exceptional flexibility for Industry 4.0, Advantech has developed a new generation of modular solutions that allow computing box modules to be interchangeably combined with Advantech's display panel modules modules to provide a comprehensive range of customizable platform solutions.

Modular Design **IP66-Rated True-Flat Screen** **24V+/-20% Wide Input Power Range (24 V$_{DC}$ +/-20%)** **Wi-Fi / NFC Wi-Fi-/NFC Built into the Front Panel**

Industrial Servers

Our industrial server and storage series include multiple server racks and custom servers to ensure reliability, expansion, and easy deployment. The server series include server motherboards, server chasses, and GPU servers. Our storage series includes external disk arrays, and dedicated storage servers.

Industrial-Grade Design	High-Availability and Redundancy	Life Cycle Management	High Performance Server

Frame Grabbers

Frame grabbers can be configured and monitored remotely through Ethernet via a PC or factory network. Small and rugged devices with built-in opto-isolated I/Os allow for direct wiring to associated control devices and can be easily integrated into existing production lines, machinery, or moving equipment. The Ethernet port provides setup and monitoring access, runtime control, and support for standard communication protocols, and the passive PoE supports single cable interfaces.

Reliability	GigE Vision Support	Easy to Use	Shorten Development Time
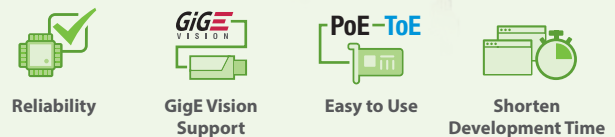
Smart Camera

The ICAM-7000 series cameras are fully integrated compact vision systems specifically designed for industrial automation applications. Preinstalled with Advantech's graphical user interface-based application software EzBuilder, which supports the Intel® OpenVINO™ deep learning toolkit, ICAM-7000 provides an easy-to-use automated machine vision system that can be rapidly deployed for diverse factory applications.

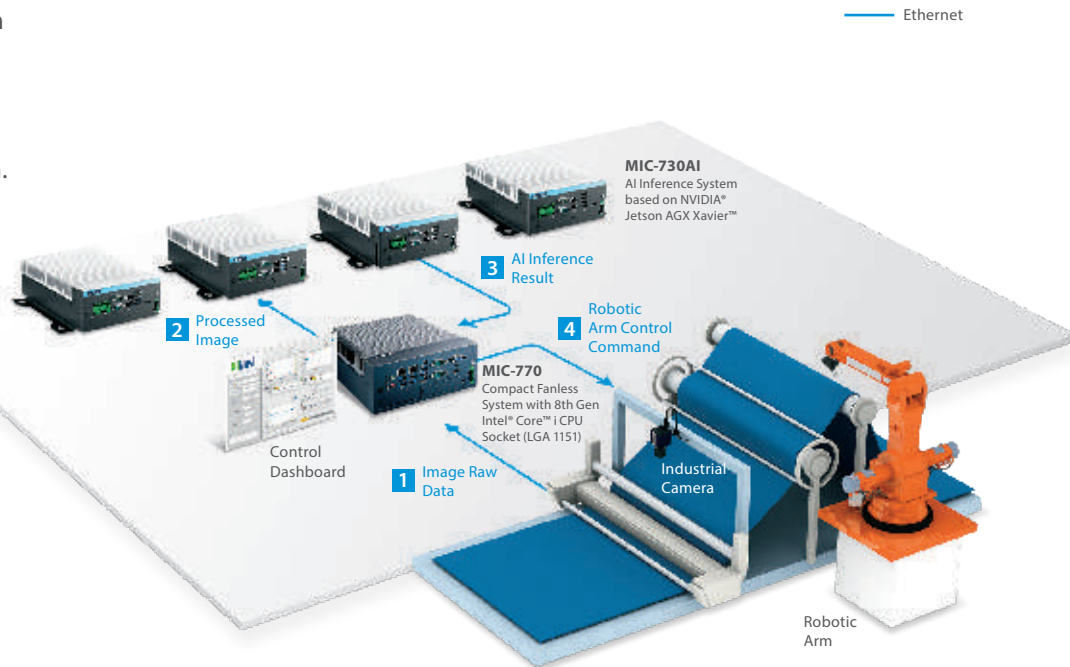| Sensor	Heterogeneous Computing	Intuitive Application Software	Robust

AI Defect Inspection for Textile

In traditional textile industries, design, selection, spinning, weaving, dyeing, and finishing, all processes consume a lot of resources and time. For example, it takes several days or weeks to manually identify the right types of fabrics and quality materials. However, if there are material defects, it can seriously stall the whole process from pre-production all the way to mass production and of course, delivery to the customer.

Thanks to artificial intelligence (AI), manual operations like textile or fabric pattern inspection can be performed by smart AI models. Robotic mechanical arms can perform many routine automated processes in textile manufacturing. When we combine robotic arms with AI capability, textile manufacturing processes can be significantly shortened from weeks to days to hours even. AI can really make a radical difference to the whole textile industry.

Requirements:

■ The management system needs high processing capabilities to perform image pre-processing in parallel, such as contrast adjustment, image calibration, and image segmentation.

■ The pre-processed images are needed to be sent to the edge AI system to perform AI inference and return metadata results back to the management system. Once defects are recognized, the management system will control the robotic arms to identify and rectify any defective materials.

Diagram:

Ethernet

MIC-730AI
AI Inference System based on NVIDIA® Jetson AGX Xavier™

3 AI Inference Result

2 Processed Image

4 Robotic Arm Control Command

MIC-770
Compact Fanless System with 8th Gen Intel® Core™ i CPU Socket (LGA 1151)

Control Dashboard

1 Image Raw Data

Industrial Camera

Robotic Arm

Why Advantech?

To meet all edge AI requirements in various environments, Advantech provides an AI end-to-end solution and offers a full range of edge computing and AI inference systems, which combine to perform AI inference solutions. Advantech's product offering leverages AI computing to support customers. This AI-guided robotic arm for textile defect inspection solution is designed to help textile manufacturers and fabric mills get up to speed with applications in AI. Advantech's MIC-770 and MIC-730AI are perfectly adapted to meet all AI computing requirements.

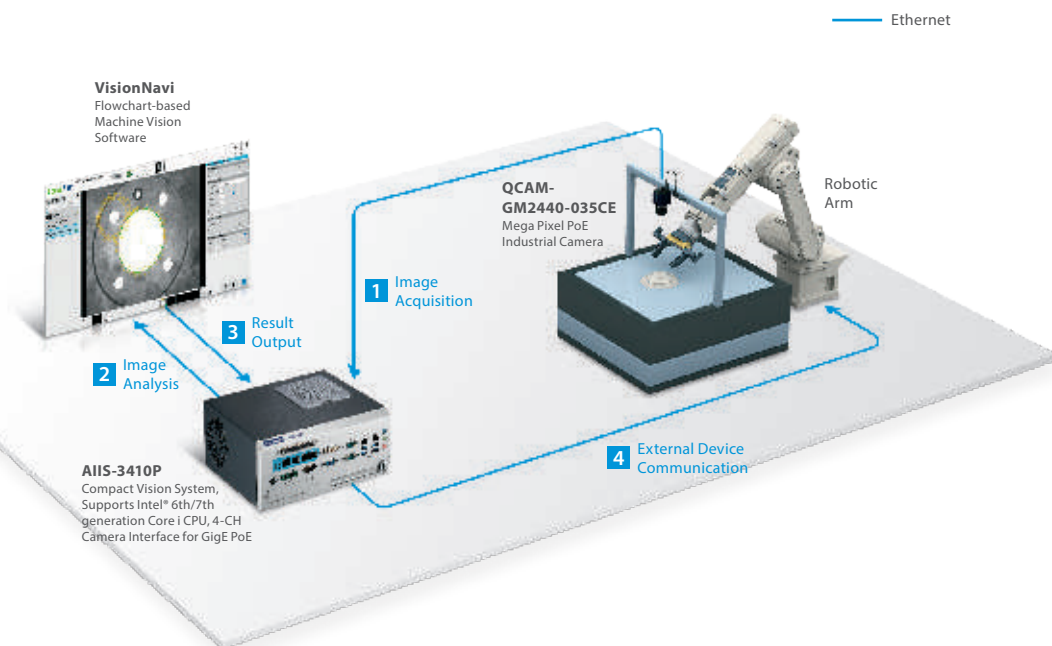# Fast Deployment of Vision System for Flywheel Manufacturing

A Taiwanese factory had an ODM project for a U.S. fitness cycle manufacturer using its specialized metal processing service to manufacture flywheels. Even though the factory has a dedicated system to inspect the quality of its flywheels, it takes over three minutes to complete each inspection. At present, the production line controls product quality through random inspections along with manual inspections.

Unlike the human eye, machine vision does not make mistakes due to fatigue and does not face the limitations of cost or manpower. Automated image analysis not only improves quality control but also overall productivity. But even though machine vision is superior in terms of accuracy, reliability, and efficiency, some manufacturers still hesitate to pursue this application—causing them to miss out on valuable opportunities for improvement.

Requirements:

- Factory owner wanted a total solution that could be up and running within the shortest amount of time (less than three months).

- The system needed to be able to execute multiple inspection tasks at once, as well as add or modify inspection items and products being inspected.

- Hardware and software needed to be simple to integrate and the system needed to be easy use and maintain.

Diagram:

Ethernet

VisionNavi
Flowchart-based Machine Vision Software

QCAM-GM2440-035CE
Mega Pixel PoE Industrial Camera

Robotic Arm

1 Image Acquisition

3 Result Output

2 Image Analysis

4 External Device Communication

AIIS-3410P
Compact Vision System, Supports Intel® 6th/7th generation Core i CPU, 4-CH Camera Interface for GigE PoE

Why Advantech?

Advantech's intelligent inspection systems dispel the stereotype that optical inspection systems require long development times and are hard to maintain. A simple, flowchart-based user interface and practical functions accelerate implementation while providing high performance hardware for multitasking full inspection applications. The system offered flexibility for expanding the number of inspection units so that factory owners can continue delivering quality products in the future.

Platforms

Model	Compact	Configurable			AI Computing	
	AIIS-3410	AIMC-3421	TPC-B500	UNO-3283G	MIC-770	SKY-6400
Camera Interface	GigE Visionx4 USB Visionx4	GigE Vision: PCIE-1672E/1674E/1172/1174 USB Vision: PCE-USB2/USB4, PCIE-1154				
Application	Processing Bottling & Labeling	Packaging Processing	Packaging Processing	Material Handling	Packaging Processing	Defect Inspection
Expansion	None	1 x PCIe x16 1 x PCIe x1 2 x PCI	1 x PCIe x1 2 x mPCIe	1 x PCIe x16 1 x PCI 2 x mPCIe	1 x PCIe x8 3 x PCIe x4	4 x PCIe x16 1 x PCIe x8
Max. Channel	4	8	4	4	16	20
Performance	★★	★★★★	★★★	★★	★★★★	★★★★★
Environment	-	-	Fanless IP66	Fanless Cableless Wide Temp.	Fanless Wide Temp.	-

Frame Grabber

Camera Interface	GigE Vision				Camera Link			USB Vision (USB 3.0)	
Model	PCIE-1672	PCIE-1674	PCIE-1172	PCIE-1174	Grablink Base	Grablink DualBase	Grablink Full	PCIE-1154	PCE-USB8
Bandwidth (Gbpsper channel)	1				2.0 - 6.4			5	
Realtime signaling	-				V			-	
Host CPU loading	>5%				0%			< 5%	
Max. Cable length (meter)	100				10			4.5	
System Cost (Camera + cable + frame grabber)	Low				High			Low	

Smart Camera

Model Number	ICAM-7000
Sensor	• 1.2MP@54fps , Global shutter, C-mount, Monochrone/Color • 2.0MP@60fps or above, Global shutter, C-mount, Monochrone/Color • 5.0MP@14fps, Global Rolling shutter, C-mount, Monochrone/Color
Processor	INTEL E3930, Cyclone V5CGTD5
RAM/Storage	4GB LPDDR4/3264GeMMC
Display	DP (USB Type C connector)
LAN, Serial Port	1 x 1000BASE-T (M12 connector)
USB	USB 2.0 (USB Type C connector)
Digital I/O	2x isolated inputs, 2x isolated outputs (M12 connector)
Lighting control	PWMx1 (M12 connector)
Power input	12-24VDC (M12 connector)
Dimensions	95mm (W) x 63mm (H) x 40.5mm (D)
Environment & certification	0-50° C, 5Grms, CE/FCC class A /KCC, IP67
Software	OS: Windows 10 IoT

Industrial Camera

GigE				
Model Number	QCAM-GM0640-121CE	QCAM-GM1300-060DE	QCAM-GM2500-014DE	QCAM-GM5400-005CE
Resolution	659x 494	1280 x 1024	2592 × 1944	5472 x 3648
Frame Rate	130 fps	60 fps	14 fps	5 fps
Pixel Size (µm)	5.6 x 5.6	5.3 x 5.3	2.2 x 2.2	2.4 x 2.4
Color/ Mono	Mono			
Sensor — Company	Sony	e2v	Aptina	SONY
Sensor — Model	ICX618 replacement	EV76C560	MT9P031	IMX183
Sensor — Shutter	Global Shutter		Rolling Shutter	
Sensor — Size	1/4 inch	1/1.8 inch	1/2.5 inch	1 inch
Sensor — Type	CMOS			
Input	1			
Output	1			
Power	PoE or 12 VDC			
PoE	3.1 W	2.6 W	2.7 W	3 W
Lens mount	C/CS			
Size (L x W x H)	42.0 x 29.0 x 29.0 mm			
Weight	90 g			
Operating Temp.	0 °C - 50 °C			

USB				
Model Number	QCAM-UC0640-750CE	QCAM-UM1300-200CE	QCAM-UM1440-220CE	QCAM-UM2440-035CE
Resolution	659 x 494	1280 x 1024	1440 x 1080	2448 x 2048
Frame Rate	751 fps	203 fps	227 fps	35 fps
Pixel Size (µm)	4.8 x 4.8	4.8 x 4.8	3.45 x 3.45	3.45 x 3.45
Color/ Mono	Color	Mono		
Sensor — Company	Onsemin	Onsemin	SONY	SONY
Sensor — Model	PYTHON300	PYTHON1300	IMX273	IMX264
Sensor — Shutter	Global Shutter			
Sensor — Size	1/4 inch	1/2 inch	1/2.9 inch	2/3 inch
Sensor — Type	CMOS			
Input	1			
Output	1			
Power	USB 3.0			
PoE	2.8 W	3 W	3.3 W	2.5 W
Lens mount	C			
Size (L x W x H)	29.3 x 29.0 x 29.0 mm			
Weight	80 g			
Operating Temp.	0 °C - 50 °C			

Regional Service & Customization Centers

China	Kunshan 86-512-5777-5666	**Taiwan**	Taipei 886-2-2792-7818	**Netherlands**	Eindhoven 31-40-267-7000	**Poland**	Warsaw 00800-2426-8080	**USA**	Milpitas, CA 1-408-519-3898

Worldwide Offices

Asia

Taiwan
Toll Free	0800-777-111
Taipei & IoT Campus	886-2-2792-7818
Taichung	886-4-2372-5058
Kaohsiung	886-7-392-3600

China
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Shanghai	86-21-3632-1616
Shenzhen	86-755-8212-4222
Chengdu	86-28-8545-0198
Hong Kong	852-2720-5118

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Osaka	81-6-6267-1887
Nagoya	81-0800-500-1055
Nogata	81-949-22-2890

Korea
Toll Free	080-363-9494/5
Seoul	82-2-3660-9255

Singapore
Singapore	65-6442-1000

Malaysia
Kuala Lumpur	60-3-7725-4188
Penang	60-4-537-9188

Thailand
Bangkok	66-02-2488306-9

Vietnam
Hanoi	84-24-3399-1155

Indonesia
Jakarta	62-21-751-1939

Australia
Toll Free	1300-308-531
Melbourne	61-3-9797-0100

India
Bangalore	91-80-2545-0206
Pune	91-94-2260-2349

Europe

Netherlands
Eindhoven	31-40-267-7000
Breda	31-76-523-3100

Germany
Toll Free	00800-2426-8080/81
Munich	49-89-12599-0
Düsseldorf	49-2103-97-855-0

France
Paris	33-1-4119-4666

Italy
Milan	39-02-9544-961

UK
Newcastle	44-0-191-262-4844
London	44-0-870-493-1433

Spain
Madrid	34-91-668-86-76

Sweden
Stockholm	46-0-864-60-500

Poland
Warsaw	48-22-31-51-100

Russia
Moscow	8-800-555-01-50
St. Petersburg	7-812-332-5727; 7-921-575-1359

Czech Republic
Ústí nad Orlicí	420-465-524-421

Ireland
Galway	353-91-792444

Americas

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Toll Free	1-888-576-9668
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Irvine	1-949-420-2500
Ottawa	1-815-433-5100

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São Paulo	55-11-5592-5367

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Middle East and Africa
Israel	072-2410527
Turkey	90-212-222-0422

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