Advantech Machine Vision Solution

∕ **Machine Vision Platforms**

∕ **Frame Grabbers**

∕ **Application Case Studies**
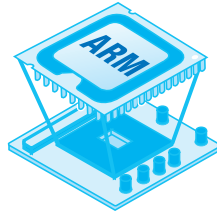
ADVANTECH

Enabling an Intelligent Planet

Modular IPCs and Frame Grabbers

Reliability
- Dedicated coprocessor for network traffic, image acquisition
- No frame and packet loss
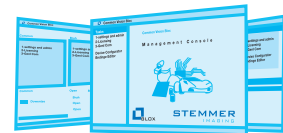
GigE Vision Support
- GigE Vision compliant
- Reduce CPU workload

Easy to Use
- ToE/PoE single cable solution to reduce installation and maintenance time

Shorten Development Time
- Provide viewer utility and .NET Component SDK
- GeniCam and GenTL compatible, support for MVTec HALCON, Stemmer Imaging CVB

Frame Grabber Bundle Solution

Modularized

MIC-7500

+

PCIE-1172
PCIE-1174
PCIE-1730

- Modularized expansion chassis
- Versatile I/O interface

Rugged

UNO-3283G

+

PCIE-1172
PCIE-1174
PCIE-1730

- Designed for hash environment
- Front accessible I/O interface and storage
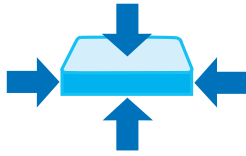
High Performance

AiMC-3421

+

PCIE-1172
PCIE-1174
PCIE-1730

- High price performance ratio
- State-of-art graphics performance

All-in-One Machine Vision Systems

Compact size for limited spaces

GiGE VISION   USB VISION

Support main stream camera interface

POINT GREY
Innovation in Imaging

BASLER
the power of sight

TOSHIBA TELI CORPORATION

Compliant vision camera partners

Speed & reliable transmission for image acquisition and analysis

Machine Vision System

Ruggedized All-in-One

AIIS-5410
Compact fanlcess

AIIS-1200
Palm-size

- Multiple processor options from entry to high performance demand
- 4-CH/2-CH GigE PoE/USB 3.0 camera interface
- Wide operating temperature (-20℃ to 60℃) for extreme environments

Performance All-in-One

AIIS-3400
Performance

AIIS-3410
Expandable

- 6th gen Intel Core i processors
- Integrated with advanced expansions
- 4-CH GigE PoE/USB 3.0 camera interface

USB 3.0 Hub and DIO modules

USB-4630
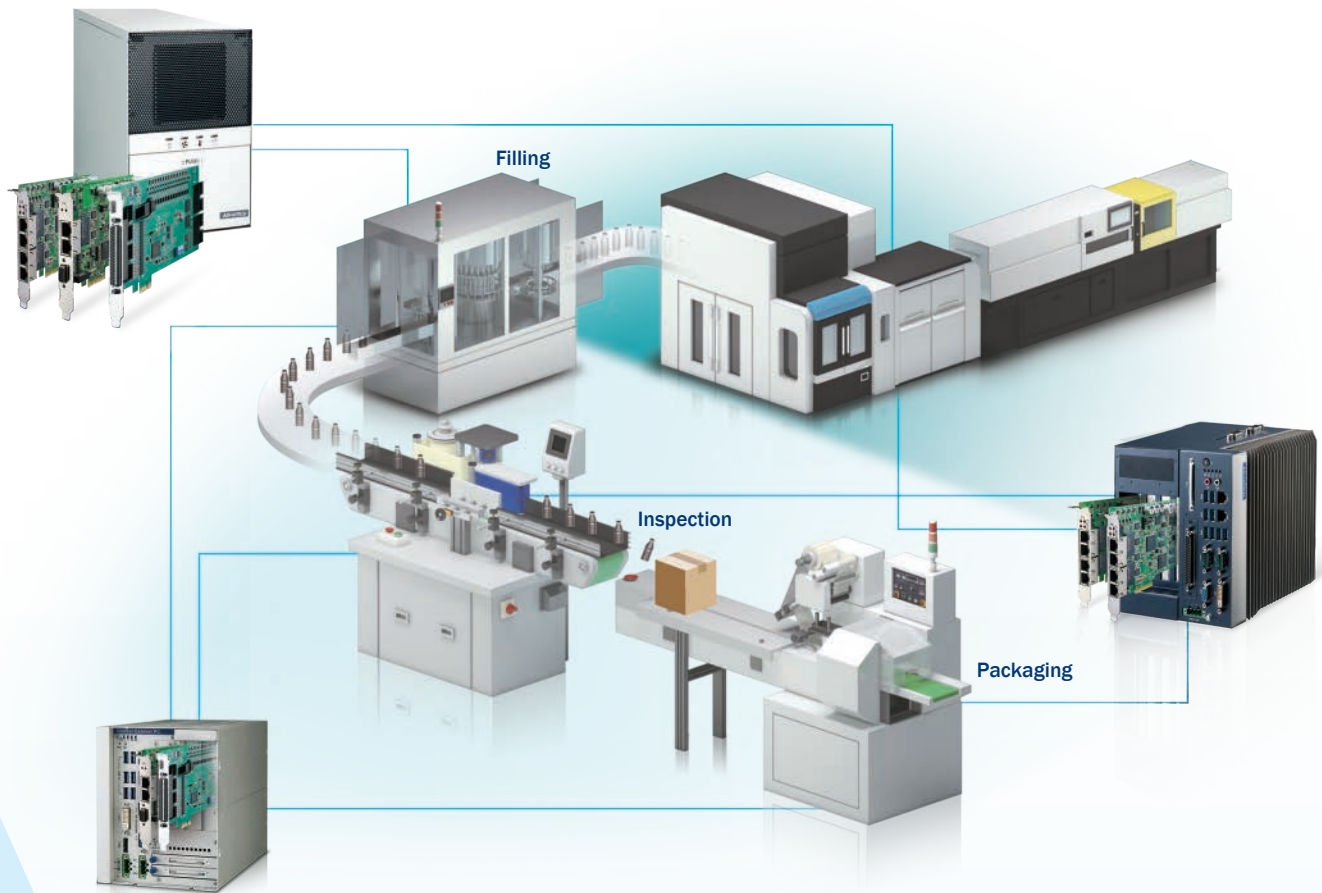World's first 4-port isolated USB 3.0 hub
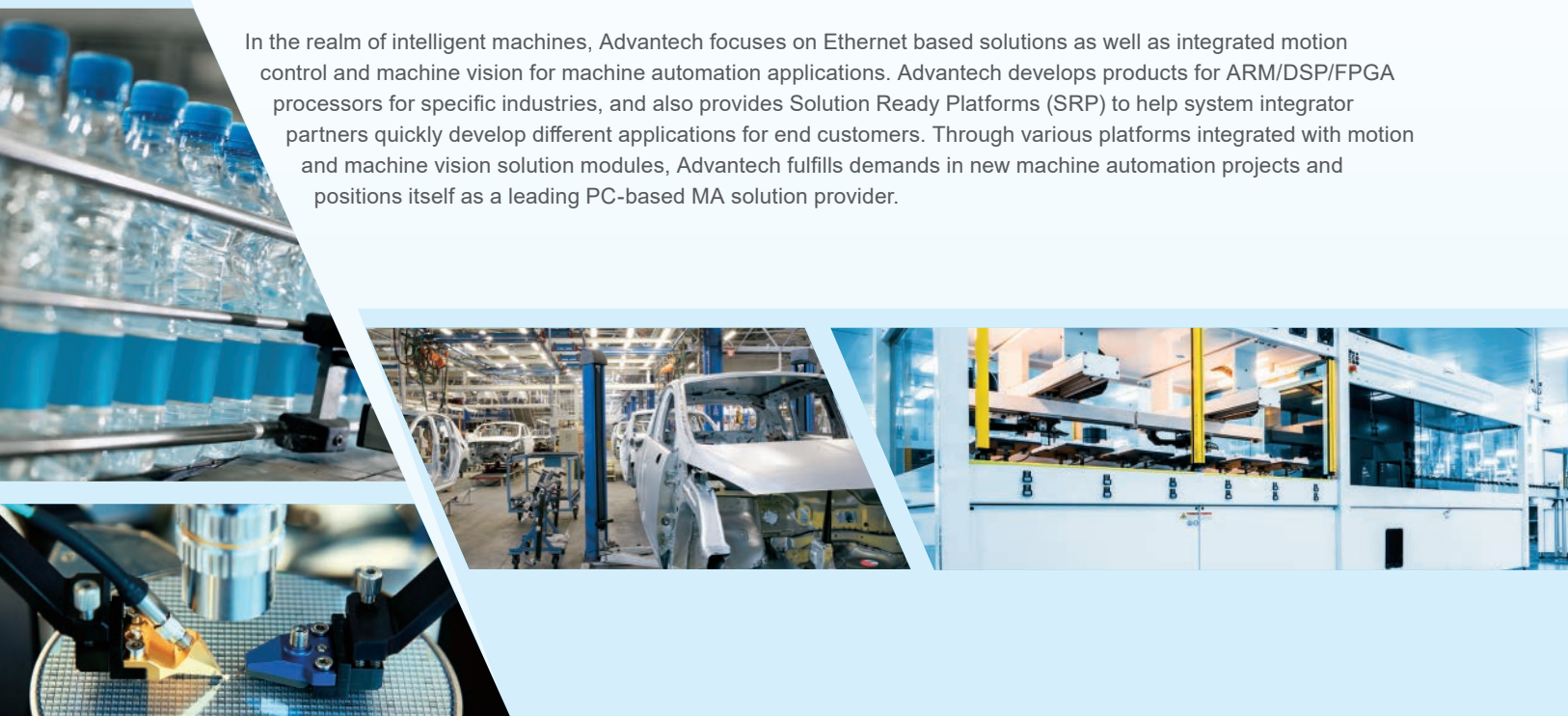
USB-4750
32-ch isolated digital I/O USB module

USB-4761
8-ch Relay and 8-ch isolated digital input USB Module

Ethernet-based machine vision solutions for smart factories

Filling

Inspection

Packaging

In the realm of intelligent machines, Advantech focuses on Ethernet based solutions as well as integrated motion control and machine vision for machine automation applications. Advantech develops products for ARM/DSP/FPGA processors for specific industries, and also provides Solution Ready Platforms (SRP) to help system integrator partners quickly develop different applications for end customers. Through various platforms integrated with motion and machine vision solution modules, Advantech fulfills demands in new machine automation projects and positions itself as a leading PC-based MA solution provider.

AIIS Machine vision platforms for automatic inspection

Filler

Manufacturing Process

Inserter

Capper/Sealer

Labeler

Carton Filling

Case Packaging

Packaging Process
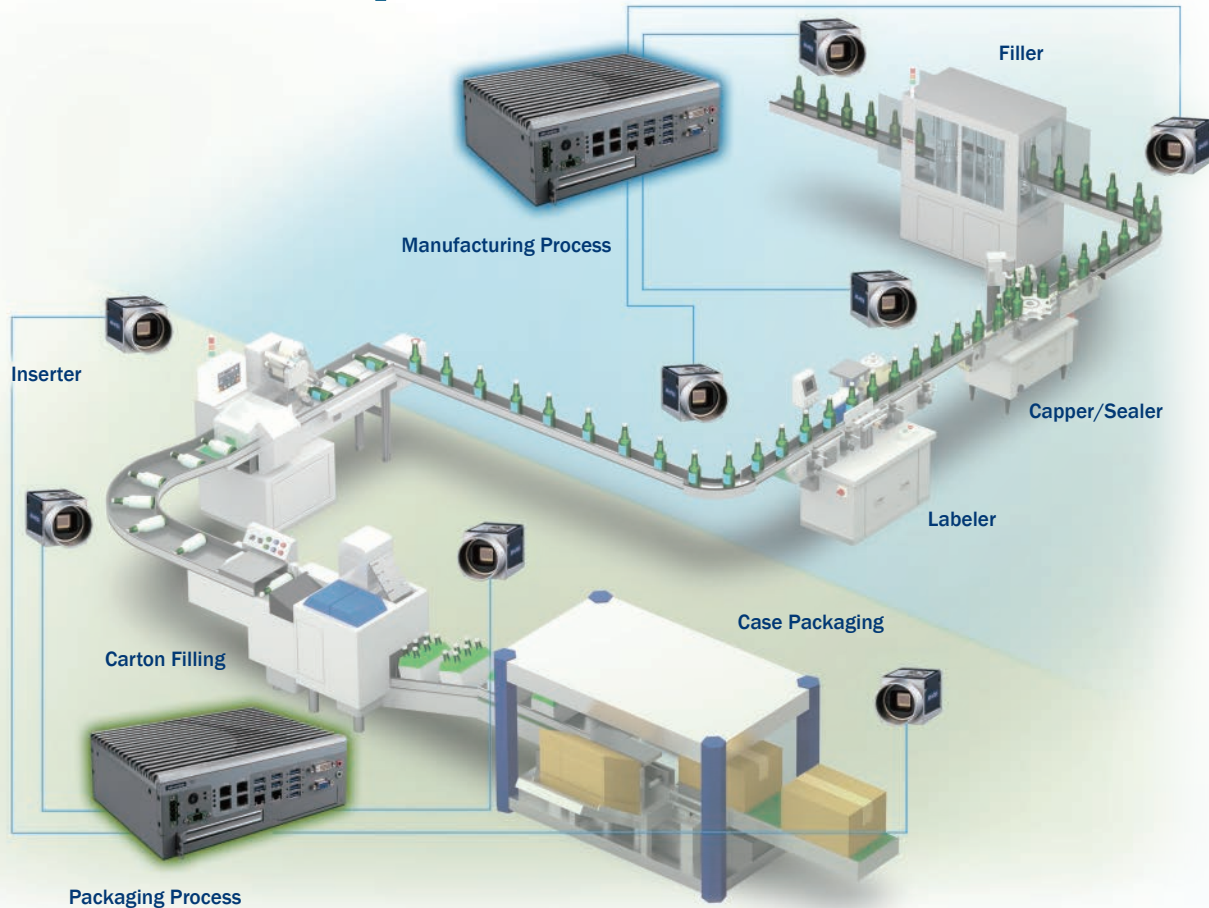
Advantech AIIS Series are closely aligned with Machine Automation applications such as Automated Optical Inspection (AOI), Wafer Inspection, and alignment inspection which heavily rely on machine vision. With PoE/USB3.0 Vision and rich I/O Interface, AIIS Series are characterized with performance computing and low power consumption, intelligent management, and extended product longevity. Our machine vision controllers, AIIS Series, save on space and make installation economical and easy— perfect for vision inspection applications. With a powerful CPU and built-in PoE/USB3.0 channels, AIIS Series enhance overall application by outstanding machine vision performance. With the latest Intel Core processors, Advantech deliver state-of-art computing and graphics performance.

Increasing productivity of backend semiconductor packaging inspection machines

The semiconductor industry has some of the most demanding applications, requiring a combination of extreme accuracy and precision combined with high throughput. Keeping up with innovations in packaging, the challenges to achieve this drastically increase. The fast-paced progress towards greater densities and finer dimensions are pushing the limits of vision systems. Advantech suggested an intelligent GigE Vision frame grabber, DSP-based multi-axis motion control card and compact modularized system for direct integration in space-constrained machine to accomplish high-precision, high productivity IC packaging inspection. The solution adopts an industrial grade computer to combine PCIE-1174, four-channel intelligent GigE Vision frame grabber with include a dedicated FPGA (Field Programmable Gate Array) to reconstruct images before transmitting them in real time to the host PC via DMA (Direct Memory Access). This then frees up the host PC's processor and ensures there is no frame or packet loss during image acquisition.

MIC-7500

PCI-1245

PCIE-1174

Servo Motor

GigE Camera
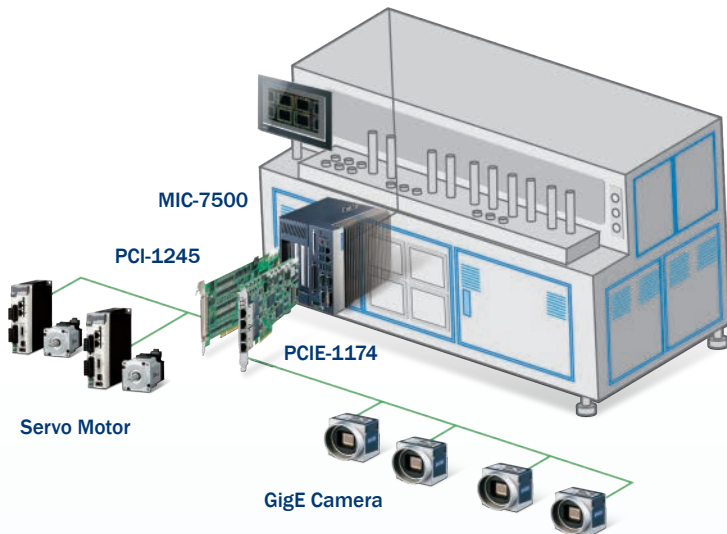
Model Name	Description
PCIE-1174	4-port PCI Express Intelligent GigE Vision Frame Grabber
PCI-1245	DSP-based 4-axis Stepping and Servo Motor Control Universal PCI Card
PCI-1756	64-ch Isolated Digital I/O PCI Card
MIC-7500 + MIC-75M13	Intel 6th Generation Core i Processor Compact System; i-Module with 1x PCIEx8, 1x PCI slots
FPM-7211W	21.5" Full HD Industrial Monitor with PCT Touch, Direct-VGA and DVI Ports

Improve fabric quality in textile industry

Ethernet

PCIE-1172   **UNO-3283G**

Textile manufacturing is a very complex process. Weaving is the most basic process which involves interlacing a set of vertical threads (called the warp) with a set of horizontal threads (called the weft).

The new optical web inspection system can detect the warp thread break less one second and ease of use and maintenance. Accordingly, Advantech suggested the UNO-3283G, an Intel i7 Fanless Automation Computer with 2 x GbE, 2 x mPCIe, HDMI, DVI-I, and PCIE-1172, two channel intelligent GigE Vision frame grabber with include a dedicated FPGA (Field Programmable Gate Array) to reconstruct images before transmitting them in real time to the host PC via DMA (Direct Memory Access). This then frees up the host PC's processor and ensures there is no frame or packe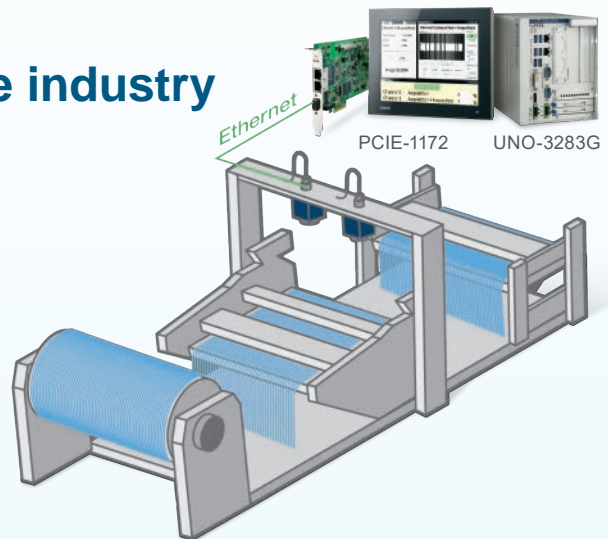t loss during image acquisition. To further aid installation and maintenance, this series also includes the use of PoE(Power over Ethernet) and Ad Hoc protocol which, like DHCP, doesn't require a specific IP address and enables System Integrators (SI) to simply plug the camera in and go.

Model Name	Description
PCIE-1172	2-port PCI Express Intelligent GigE Vision Frame Grabber
UNO-3283G	Intel i7 Fanless Automation Computer with 2 x GbE, 2 x mPCIe, HDMI, DVI-I
FPM-7151T	15" XGA Industrial Monitor with Resistive Touchscreen, Direct-VGA/DP and Wide Operating Temperature Range

# Increase efficiency of pick and place vision guidance robotic

As production costs and time to market pressure keep increasing, manufacturers are compelled to adopt ever more automated equipment to replace traditional workers and manual processes. Automated visual inspection equipment is one of the most widely applied examples at present. Our customer needed a simple and convenient way to develop inspection equipment for high speed production that would help manufacturers improve efficiency. Tire tread failure/limitation inspection process ensures product quality and safety.

AIIS-3410

PoE

Camera
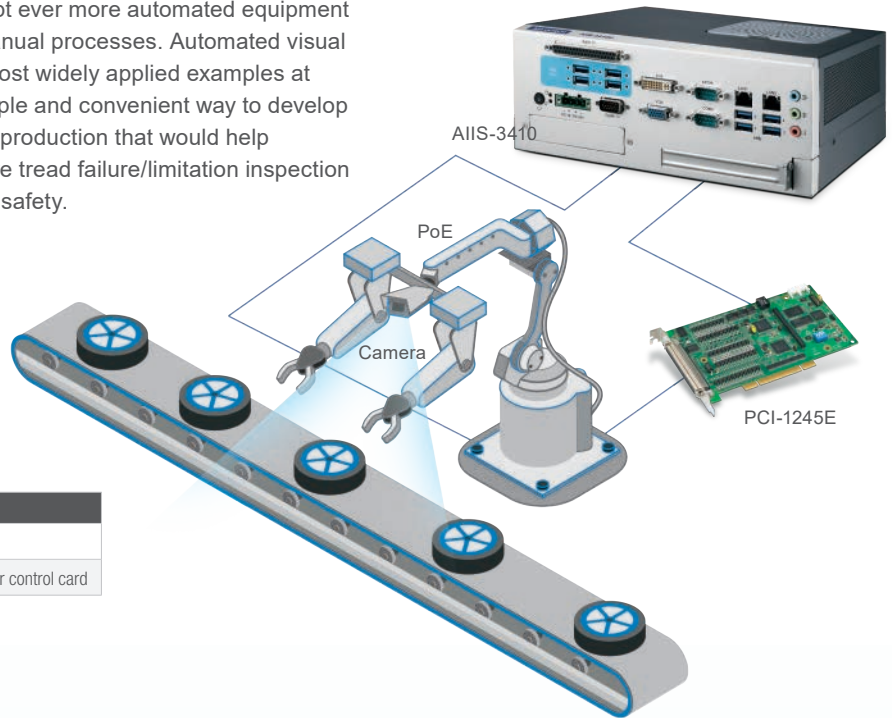
PCI-1245E

Model Name	Description
AIIS-3410	Compact vision system
PCI-1245E	4-axis universal PCI servo motor control card

Precise inspection in high speed production line

Awareness of food safety has been mushrooming recently, and with consumers paying more attention to ingredients, places of origin, and other details when they purchase foodstuffs. Clear and accurate labeling applied to beverage/ foods during processing facilitates consumers make informed choices and consumer behavior. The food industry has implemented automated production for many years, with well-evolved procedures for filling, labeling, and shipping. A current challenge for System Integrators involves helping assist food manufacturers with the rapid checking of trademarks and labels on existing, high-speed, automated production lines.

AIIS-5410

USB

Monitor

USB Camera

USB Camera

USB Camera

USB Camera
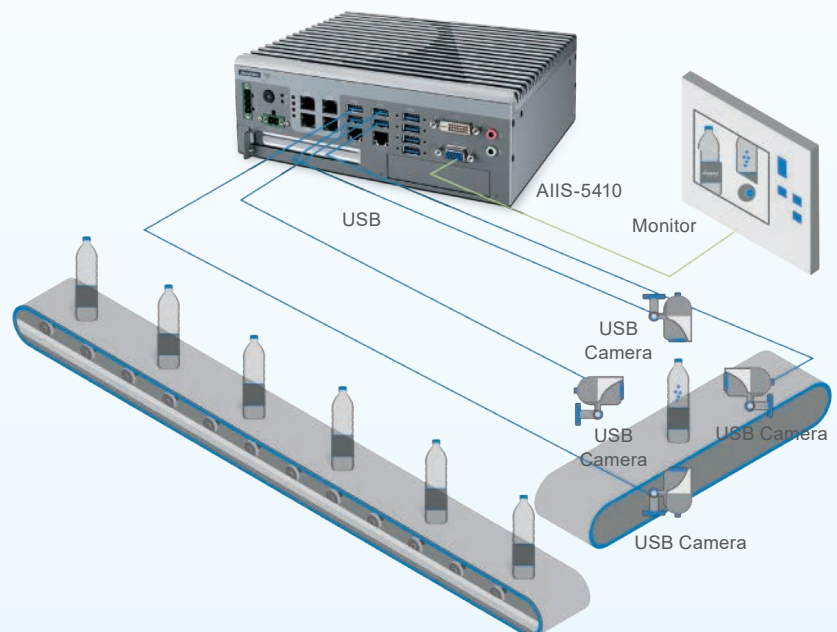
Model Name	Description
AIIS-5410	anless vision system

Implement the product traceability in food & beverage

As the market demand for food safety increases, traceability is getting more attention in the food and beverage industry as well as the packaging industry. One of the world's leading providers of beverage containers would like to identify the bar codes, characters and num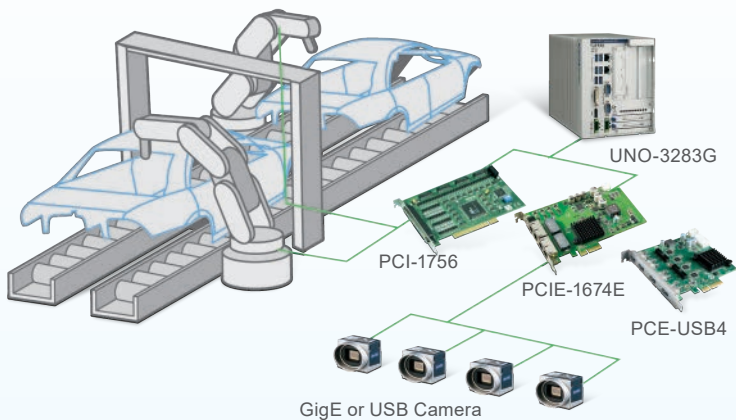bers on the ink-jet printing labels at a 7 unit per second run rate. Advantech provided the multiple camera, PC-based automated optical identification system to identify the bar code, data code, and the character on the beverage container, the system consists of AIIS-3400, compact vision system supports Intel® 6th generation Core i CPU, 4-CH camera interface for GigE, PoE or USB 3.0; Inspector Express, a graphical user interface machine vision application software specifically designed to simplify the design and deployment of automated inspection on the factory floor; QCAM-GM0640-120CE, 0.3 Megapixel industrial camera, features with the PoE (Power over Ethernet) to simplify installation and maintenance.

GigE, PoE or USB Camera

Inspector Software

AIIS-3400
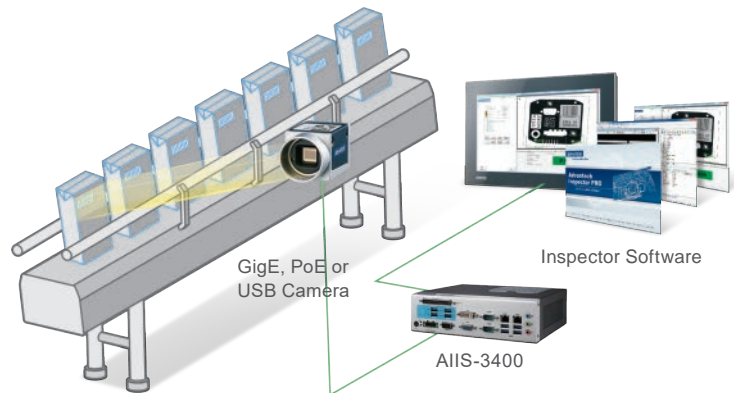
Vision system and robotics ensure finished product quality in automotive industry

UNO-3283G

PCI-1756

PCIE-1674E

PCE-USB4

GigE or USB Camera

Model Name	Description
PCIE-1674E	4-port PCI Express GigE Vision Frame Grabber
QCAM-GM2500-014CE	2592 x 1944 pixel, Mono, GigE Vision Industrial Camera
PCI-1756	64-ch Isolated Digital I/O PCI Card
PCIE-USB	PCI Express x4, 4-Port USB 3.0 Expansion Card
UNO-3283G	Intel i7 Fanless Automation Computer with 2 x GbE, 2 x mPCIe, HDMI, DVI-I
FPM-7211W	121.5" Full HD Industrial Monitor with PCT Touch, Direct-VGA and DVI Ports

In the automotive industry, quality control is an extremely important part. Most of time, there are engineers to verify the interiors and exteriors, including dash board, door, seat, light, and color for the finished product quality check. In one of the largest automotive groups, there are about 100 items in the finished product check list and the client was looking for a quality check system to perform the inspection automatically. To automate the quality check of the parts in different vehicles, a flexible and extensible system had to be created, and due to numbers of characteristic, the system integrators designed the AOI (Automated Optics Inspection) system with multiple-camera and robots for high flexibility and efficiency. To satisfy this case, Advantech suggested PCIE-1674E, four channel GigE Vision frame grabber and QCAM-GM2500-014CE, 5.0 Megapixel industrial camera including PoE (Power over Ethernet) function, to simply the installation and maintenance. Besides these, there are other products to help provide the client with the desired functionality. The UNO-3283G, an Intel i7 Fanless Automation Computer with 2 x GbE, 2 x mPCIe, HDMI, DVI-I, and the PC-1756, a 64-ch Isolated Digital I/O PCI Card for digital signal path to provide the total solutions in this case.

Selection Guide

Frame Grabbers

Model Name		PCIE-1172	PCIE-1174	PCIE-1672E	PCIE-1674E
Power Requirements	Input Voltage	12 VDC direct from PCIe slot, total Max. 18W or AT/ATX system power input			
	Overload Current Protection	Present			
	Connection	AT/ATX Power Jack			
	Output PoE Power	48 VDC PoE Power output, total Max. 18W (total Max. 60W with AT/ATX system power input)			
Environment	Operating Temperature	0 ~ 50°C (32 ~ 122°F)			
	Storage Temperature	-20 ~ 80°C (-4 ~ 176°F)			
	Operating Humidity	5 ~ 95% RH			
Mechanics	Dimensions (W x D)	185 x 110 mm (7.3" x 3.9")			
GigE Vision	Compatibility	IEEE802.3af			
	Speed	1000 Mbps		10/100/1000 Mbps	
	No. of Ports	2	4	2	4
	Port Connector	8-pin RJ45			
	Bus Interface	PCI Express® x 4			
	Jumbo Frame	9KB			
	GigE Vision Offload Engine	√	√	-	-
Safety	ESD	8KV (air), 4KV (contact)			
	EFT	2 KV			
	Surge Protection	1 KV			
	Isolation Protection	2.5 KV			
Digital Input/ Output	No. of Channels	2 input and output	4 input and output	-	-
	Input/Output range	0-30V opto-isolated		-	-
	Max. frequency	1KHz		-	-
	Digital input interrupt	Falling and rising edge, normal and invert		-	-

Digital I/O Cards

Model Name	PCIe-1730
TTL DI/O	16/16
Isolated DI Channels	16
Isolation Voltage	2,500 VDC
Input Range	10~30 VDC
Isolated DO Channels	16
Isolation Voltage	2,500 VDC
Output Range	5~40 VDC

Model Name	PCE-USB4
I/O	4 x USB 3.0
Dimensions	118 x 111 mm
Bus	PCIe
Supply Current	1500mA per port

Embedded Machine Vision System

Ruggedized		AIIS-1200U/P	AIIS-5410
Camera interface	Port	2	4
	Technology	USB/PoE	PoE
System Chipset	CPU	Intel Celeron N3160	Intel Core i7-6822EQ/i5-6442EQ
	Maximum Speed	1.6GHz	2.0GHz/1.9GHz
Memory	Technology/Max. Capacity	on-board 8GB DDR3	Dual-channel DDR4 at 1866/2133 MHz (non ECC) up to 32GB
Graphic		VGA + Display	VGA + DVI
Ethernet	Interface	Inetl 1210-IT, 10/100/1000 Mpbs	Intel i210IT, 10/100/100 Mbps
Storage		Internal 2.5" HDD Bay/m-SATA	Internal 2.5" HDD Bay /m-SATA/Cfast
Front I/O		2 x USB 3.0/2 x COM/ 1xRJ45	8 x USB 3.0/Remote Power/2xRJ 45/Audio Jack
Rear I/O	GPIO	2 x USB 3.0/ 8bit GPIO/ Remote Power	8 bit GPIO/2 x COM
Power supply		ATX/AT 9-36V	ATX/AT 9-36V
Expansion		x	PCIEx8 or PCI
Dimension	W x H x D	137 x 58 x 118 mm	235 x 88 x 188 mm
	Weight	1.1 kg	2.9 kg

Compact Machine Vision System

Ruggedized		AIIS-3400U/P	AIIS-3410U/P
Camera interface	Port	4	4
	Technology	USB/PoE	
System Chipset	CPU	Intel® 6th generation Core i CPU (LGA1151)	
	Maximum Speed	based on CPU	
Memory	Technology/Max. Capacity	Dual Channel DDR4 1866/2133 MHz (non-ECC), up 32GB	
Graphic		VGA + DVI	
Ethernet	Interface	LAN1: Intel i219LM, LAN2: Intel I210at, 10/100/1000 Mbps	
Storage		Internal 2.5" HDD Bay/Cfast	
Front I/O		4 x USB 3.0/ 2 x COM/ 2x RJ45/ 8 bit GPIO	
Rear I/O	GPIO	Remote Power	
Power supply		ATX/AT 9-36V	
Expansion		PCIEx8 or PCI	
Dimension	W x H x D	230 x 70 x 175 mm	240 x 97 x 190 mm
	Weight	1.8 kg	2.4 kg

Configurable System

Model Name		UNO-3283G	MIC-7500 + MIC-75M40	AIMC-3421
System Hardware	CPU	Intel Core i7-6822EQ	Intel Core i7-6822EQ/i5-6442EQ/i3-6110EQ	Intel Core i7-4790S/i5-4590S/i3-4360
	Memory	Built-in 8GB memory	Built-in 4GB memory, update to 32GB	Max. 16GB
	Graphic	Intel® HD Graphics 100 series	Intel® HD Graphics 530	Intel® HD Graphics 4600
	Expansion Slot	1 x PCIe x 16, 1 x PCI, 2 x mPCIe	1 x PCIe x 8, 3 x PCIe x 4	1 x PCIe x 16, 1 x PCIe x 4, 1 x PCI
	Storage	CFast: support 2 x CFast slots	HDD: support 1 x 2.5" HDD CFast: support 1 x CFast slot SSD: 1 x internal mSATA (Mini-PCIE interface)	HDD: support 1 x 3.5" HDD
I/O Interface	Display	1 x DVI-I, 1 x HDMI	1 x VGA, 1 x DVI	1 x VGA
	USB	6 x USB 3.0	8 x USB 3.0, 1 x USB 2.0 (internal)	4 x USB 2.0 compliant (2 in front, 1 in rear, 1 internal)
	Serial	RS-232/422/485 x 2	RS-232/422/485 x 2	RS-232 x 2
	Audio	1 x Line-Out, 1 x Mic-in	1 x Line-Out, 1 x Mic-in	PS/2: 1
Environment	Operating Temperature	-10 ~ 60°C	-20 ~ 60°C with 0.7m/S air flow and SSD	0 ~ 40°C
	Vibration	3 Grms @ 5 ~ 500 Hz, random, 1 hr/axis	3 Grms @ 5 ~ 500 Hz, random, 1 hr/axis	1 Grms @ 5 ~ 500 Hz, random, 1 hr/axis, 3 axes
General	Dimensions (W x H x D)	142 x 177 x 238 mm	119 x 192 x 230 mm	150 x 222 x 270 mm

USB DIO Module

Model Name	USB-4750	USB-4761
TTL DI/O	-	-
Isolated DI Channels	16	8
Isolation Voltage	2,500 VDC	2,500 VDC
Input Range	5~60 VDC	5~30 VDC
Isolated DO Channels	16	Relay output: 8
Isolation Voltage	2,500 VDC	-
Output Range	5~40 VDC	-
Isolated Counter	2	-

USB 3.0 Hub

Model Name	USB-4630
Ports	1 x Upstream (Type B)4 x Downstream (Type A)
Power Consumption	760 mW (no load)
Dimensions	132 x 80 x 32 mm
Bus	USB 3.0 SuperSpeedCompatible to USB 2.0 Full-speed
Supply Current	500 mA max. per channel
Transfer Speed	5 Gbps shared by all downstream ports
DC Power Input	10 ~ 30 VDC