Advantech PAC Solutions

Integrating Control, Information Processing and Networking in a Single Controller



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- Programmable Automation Controllers
- PC-based Controllers
- Remote I/O Systems
- SoftLogic Software
- SCADA Software



Enabling an Intelligent Planet

Advantech PACs -Integrating Control, Information Processing and Networking in a Single Controller

Over the years automation controllers have evolved to provide ever increasing control options. Today's Programmable Automation Controllers (PACs) deliver control across multiple production layers, transmitting data to software applications and helping improve decision-making on all levels. Recent advancements in controller technology allow better flexibility, information processing, network capabilities, and improved scalability. Advantech PACs provide state-of-the-art solutions for variety of industrial automation applications, from Machine Automation to SCADA.



Real-time I/O Control Suitable for Multiple Domain Applications

Currently most PC-based controllers face one major challenge, especially DIN-rail PAC systems, which is real-time I/O control. Performance is severely hampered when I/O points increase because the access time also increases, which impacts control precision as well.

Food and beverage companies face shorter production runs on a wide range of products for different vendors, while automotive companies are dealing with changes in customer preference, aggressive competition and rising fuel costs. These industries require a mix of discrete, batch, process and motion control solution. In the past, these applications had forced engineers to use multiple controllers: a PLC for discrete control, a motion controller for multi-axis control, and a distributed control system or loop controller for process applications, which has proven time consuming and costly. Advantech PACs feature the ability to handle all these tasks with a single control system.

The result is shortened development time through reusable programming tools, lower maintenance costs through reduced parts, better information sharing among applications, and fewer personnel support throughout the plant.

Information Processing and Networking Capabilities

Advantech's PAC series not only provide excellent real-time I/O control, but also another key benefit for automation applications: information processing. With the ability to perform field operations, data exchanges and valuable information collection, this series is able to execute efficient decision-making. Information processing includes data logging and analysis with storage devices like SD or CF cards, recipe management for batch control, and database exchanges through SQL and OPC. Furthermore, implementing Human Machine Interface (HMI) software enables local operation.

This improves control system networking tremendously, allowing the network to share a common protocol at the device level, control level, and information level. It provides the ability to move information from the device level to executives at the enterprise resource planning (ERP) level without new protocols or drivers.

Advantech PACs feature a PC-based architecture, delivering significant networking benefits for manufacturers by USB, RS-232, RS-422/485 and Ethernet interfaces. Users can connect to field devices through serial or USB interface to satisfy any kind of application. The Ethernet interface allows users to effectively manage I/O control and information flow throughout the manufacturing and IT enterprise. Leveraging the high computing power of Advantech PACs also allows networks to communicate seamlessly on the factory floor with other common sets of IT capabilities like video, data and telephones. Easy access to such information is critical to making decisions about the capacity of an enterprise.

Scalability

In the past, many PLCs required users to learn different programming software and specify networks depending on the size and complexity of the application. Advantech PACs, ranging from ADAM-5000 series, APAX-5000 series to APAX-6000 series, allow users to more closely match the controller to application needs without compromising functionality or learning a new control system. Such scalability reduces the headaches and high cost associated with system redesign, lack of program re-use, and re-training.

Software

Advantech PACs support software to satisfy both PC-based and PLC-based programmers. The C/C++ and .NET class library can satisfy programmers familiar with high level programming languages like C or Microsoft Visual Studio .NET, while PLC-based users can leverage KW Software Multiprog, which supports IEC-61131-3 compliant PLC programming languages. These flexible programming capabilities take PLC operations to the next level in many areas, such as communication, information processing, enterprise level database integration, and user interface development.

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Overview

Advantech's New Generation PAC -APAX Series

APAX series, the new PAC solution from Advantech, integrates control, information processing and networking in a single platform. By leveraging the latest automation technology, APAX series offers a unique system architecture, providing dual controllers for different tasks, same I/O with changeable controllers, and flexible I/O expansion with deterministic performance. All these features make Advantech's PAC system more reliable, scalable and flexible, satisfying various complicated control and automation applications.



Dual Controllers for Different Tasks



One controller focuses on I/O processing, while another controller can execute other tasks such as HMI/SCADA, database, recipe, image processing, etc. This architecture ensures system reliability since I/O processing won't be affected by other tasks.

Changeable Controllers and Couplers



APAX I/O modules can combine different controllers or couplers to satisfy different applications. Using different couplers, I/O modules can link to various real-time Ethernet and fieldbus systems. It saves investment in I/O and offers scalability for future needs.

Flexible Expansion Topology



All APAX I/O modules are inserted on the backplane. Through the expansion port and Ethernet cable, different backplanes can be connected. This decentralized architecture retains high-speed data transfers, so the distributed I/O modules provide real-time performance. Almost any topology, such as line, tree or star, can be easily established. The hot swap capability is also available for remote expansion I/O modules. Features

Flexible System Architectures -Optimized Solutions



To simplify the system configuration, Advantech's APAX series provides an easy and flexible way to setup different functions and configurations. There are multiple APAX series system combinations that can be selected to develop reliable control systems as detailed below.

High Performance Controller

Delivers fast computation, high throughput, powerful functionality and rich connectivity like an industrial PC.



3 Remote I/O System

 Links APAX-5000 I/O modules to different real-time Ethernet or fieldbus systems through couplers, making it a remote I/O system.



Ompact Controller

 Combines PLC features (compact size, cost-effectiveness and reliability) with PC technology (local display, storage and network connectivity).



Backup System

If the primary controller fails, the secondary controller will automatically take over control tasks.



Sedundant System

With the data synchronization, the secondary controller can take over the control tasks at the same position which primary fails within a very short time. Depending on customers request, the power supply can be separated to increase the availability.





Versatile APAX Modules -Unlimited Possibilities

CPU



Intel[®] Core i7 CPU



Intel[®] Atom™ 1.66 GHz CPU



APAX-5620 Marvel XScale CPU with CAN



APAX-5522 Marvel XScale CPU with wide temperature



UL 508 Certified Power Supply for APAX-5570/5580



UL 508 Certified Power Supply for APAX **Expansion Module**



Modbus/TCP Coupler PROFITNET Coupler Ethernet/IP Coupler

PAC - APAX Series

System Selections

Application Ready High Performance PACs



Advantech's APAX-6572 and APAX-5580 series offers several high performance controllers with Intel Atom and Core i7 processors. These controllers benefit from the high throughput, openness, flexibility and connectivity brought by PC-based architectures. Contributed by excellent heat dissipation technology with no hard disks, they deliver great system reliability. Various peripheral interfaces such as LAN, USB, DVI, audio, RS-232, RS-422/485, etc, are provided. These high performance PAC controllers are suitable for many complex control applications.

Robust, Compact PACs



APAX-5520/5620 series controllers offer a compact size without fans. These controllers have no rotating parts, helping further increase system reliability. APAX-5520/5620 features a VGA interface, enabling local displays, and its RS-485 and LAN ports offer communication ability with Modbus protocol. Internal CF slot and battery backup RAM can be used for data storage. These features make APAX-5520/5620 as compact and robust as a PLC, but with enhanced displays, connectivity, and storage.

Scalable Systems with Remote I/O



For different fieldbus or real-time Ethernet networks, such as Modbus, Ethernet/IP, Profinet etc, APAX series offers different kinds of couplers for communication. Any controller or computer in the same network can access APAX I/O modules through the coupler. Not having to change I/O modules for different fieldbus or real-time Ethernet networks helps ensuring current I/O modules' investment for future demands. These couplers feature daisy-chain design, making installation easier.

Reliable Control System with Backup Technology



The APAX series delivers system backup functionality to significantly decrease the risk that the system will fail when the controller crashes. To leverage this, two controllers with the same control program are installed in one system. After both controllers' backup function is enabled, APAX system will automatically delegate one controller as the master controller.

The master controller will run the control program to execute the control process, while another controller (the backup controller) is put on standby. The master controller periodically sends live messages to the backup controller. If the backup controller does not receive a message from the master controller, it will automatically become the master controller and restart the control process.

If the master controller is switched, it means there was an error happening on the previous master controller. Therefore, engineers can repair or change the previous master controller and re-enable it as the backup controller. Then if the new master controller fails, the new backup controller will automatically take over the control once again. This mechanism ensures the control system will continuously run the control process.

System Diagram



System Selections

High Availability System with Smart Redundant Technology



Redundancy is the preferred solution for industrial automation applications that simply cannot tolerate downtime, but traditional redundant automation systems based on PLCs are very expensive and complex. A better solution is a redundant PC-based automation system as it cuts costs, simplifies implementation and adds features.

Our PC-based automation system simply requires the purchase of an extra power supply and CPU, along with an extra configuration step to select the redundant option.

Applications that required high availability, advanced data handling and superior communication capabilities are a good fit for PC-based redundancy. Also, in remote unman station, some unexpected situation would cause the top-level emergency and cost a high expense on emergency repairing. The redundancy system can not only lower the emergency level but also trigger the regular maintenance service or self healing process to keep the system at high availability.

System Diagram



Real-time Local Bus



APAX I/O local bus adopts real-time I/O access methodology to ensure deterministic control with real-time performance. Contributed by the dedicated Digital Signal Processor (DSP) which handles I/O data process without controller's CPU resource, the I/O scan rate can be maintained within 1 ms, offering time deterministic I/O. The I/O processing is running on the back-end, and controller's CPU and DSP can share data through built-in dual port RAM. All these deliver real-time performance regardless of the number of I/O points. Programmers can concentrate on their application program development, and APAX system can perform real-time I/O access automatically.

User-friendly Designs



Hot Swappable, High Density I/O Modules

APAX I/O modules can communicate and obtain power through backplanes. APAX I/O modules are hot swappable, allowing them removed from or inserted on the backplane, even when the system is powered-on. Operator can replace specific I/O modules without shutting down the whole system. This significantly saves system maintenance costs.



Clamp Type Terminal Blocks

All APAX I/O modules offer detachable clamp type terminal blocks for I/O wiring. Compared to traditional screw type terminal blocks, clamp type terminal blocks can save installation time (up to 75%), and doesn't require the connection to be checked or retightened. They also have higher resistance to shock and vibration.



Easily Identifiable Modules

The front-side ID switch enables operator to change the module ID number. The power LED not only displays module power status, but also performs self diagnostic functionality. All digital modules offer channel status LED. Inserting the terminal block on the wrong module may cause module damaged. Matching the terminal block and front label with the same color can prevent from this.



Writable Labels with Wiring Information

For all I/O modules, a pluggable label gives operators the ability to write important notes on it, like channel information. The opposite side shows the wiring diagram, so operators can refer to it for wiring. This label provides convenience for maintenance and operation.

PAC - APAX Series

Selection Guide

APAX-5000 Controllers









System		APAX-5580	APAX-6572	APAX-5520/5620	APAX-5522				
CPU		APAX-5580 Intel Core i7 4650U, 1.7 GHz	Intel Atom D510 1.66 GHz Marvel XScale PXA270 520 MHz		Marvel XScale PXA270 520 MHz				
Memory		4G DDR3 DRAM	2 GB DDR2 DRAM	Flash 32 MB, SDRAM 64MB	Flash 32 MB, SDRAM 64MB				
Storage		2 x SD card slot	1 x CF slot (internal)	1 x CF slot	1 x CF slot (internal)				
Local Display		VGA	VGA	VGA	-				
USB Ports		4 x USB 2.0	4 x USB 2.0 1 x USB 1.1		-				
Audio		-	Mic in, Line in, Line out	-	-				
Cooling System		Fanless	Fanless	Fanless	Fanless				
Power Input		18 ~ 30 V _{DC}	9 ~ 36 V _{DC}	18 ~ 30 V _{DC}	$18 \sim 30 V_{\text{DC}}$				
Diagnostics LED		Power, Battery, Run, Error	Power, IDE, LAN, Serial	Power, Battery, Run, Error	Power, Battery, Run, Error				
Real-time Clock			Ye	es					
Watchdog Timer			Ye	es					
Control Software		C/C++ library and .NET class library for C and .NET programming environment	C/C++ library and .NET class library for C and .NET programming environment KW IEC 61131-3 SoftLogic programming tool		C/C++ library and .NET class library for C and .NET programming environment KW IEC 61131-3 SoftLogic programming tool C/C++ library in embedded Linux RT				
Local Real-time I/	O Modules	32 (max.)*							
Digital I/O Points		768 (max.)							
Analog I/O points		192 (max.)							
	LAN Ports	2	3	1/2	2				
(Ethernet)	Speed	10/100/10	000 Mbps	10/100 Mbps	10/100 Mbps				
(Ethernet)	Protocol		Modbu	us/TCP					
	COM 1	RS-232	RS-232/422/485	RS-485	RS-232				
	COM 2	-	RS-232/422/485	RS-485 APAX-5620 only	RS-232				
Communication (Serial)	COM 3	-	-	-	-				
(00110.)	CAN Bus	-	- 2 APAX-5620 only		-				
	Protocol		Modbus/RTU, CANopen (AF						
Isolation	Communication	-	-	2500 $V_{\rm DC}$ (RS-485)/ 2500 $V_{\rm DC}$ (CAN & RS-485)	-				
	Operating Temperature (when mounted vertically)	-20 ~ 60°C	-10 ~ 50°C	-10 ~ 55°C	-20 ~ 70°C				
	Storage Temperature	-40 ~ 70°C							
Environment	Relative Humidity		0 ~ 95 % (nor	n-condensing)					
	Vibration Protection	IEC 60068-2-64/2-6: 2 Grms @ 5 ~ 500 Hz (Random, operating) 2 G @ 5 ~ 500 Hz (Sine, non-operating)	IEC 60068-2-64: 2 Grms @ 5 ~ 500 Hz (Random, operating)	IEC 60068-2-64/60068-2-6: 1 Grms @ 5 ~ 500 Hz (Random, operating) 2 G @ 5 ~ 500 Hz (Sine, non-operating)	IEC 60068-2-64/60068-2-6: 1 Grms @ 5 ~ 500 Hz (Random, operating) 2 G @ 5 ~ 500 Hz (Sine, non-operating)				
	Shock Protection	IEC 60068-2-27: 30 G @ wall mount	IEC 60068-2-27: 50 G @ wall mount	IEC 60068-2-27: 20 G @ wall mount	IEC 60068-2-27: 20 G @ wall mount				
Power Supply Module (Optional)		APAX-5343	PWR-244	APAX-5343E	APAX-5343E				

*APAX DI/O modules can use ID numbers 0 ~ 31, while AI/O modules and counter modules can only use ID numbers 0 ~ 15

APAX-5000 I/O Modules









PAC -
- APAX
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Module Nam	ne	APAX-5013	APAX-5017	APAX-5017H	APAX-5018	APAX-5028		
Description		8-ch RTD Module	12-ch Al Module	12-ch High Speed Al Module	12-ch Thermocouple Module	8-ch AO Module		
	Al Channels	8	12	12	12	-		
	Input Type*	RTD (2-wire or 3-wire)	V, mV, mA	V, mV, mA	V, mV, mA, Thermocouple	-		
	Sampling Rate (Samples/second)	50 Hz filter: 8 (Total**) 60 Hz filter: 10 (Total**)	12/120 (Total**)	1000 (per channel)	12 (Total**)	-		
	Input Resolution	16-bit	16-bit (voltage) 14 ~ 15-bit (current)	12-bit	16-bit (voltage) 14 ~ 15-bit (current, thermocouple)	-		
Analog	Input Accuracy	± 0.1 % of FSR	±0.1 % of FSR (Voltage) ±0.2 % of FSR (Current)	±0.1 % of FSR (Voltage) ±0.2 % of FSR (Current)	±0.1 % of FSR (Voltage) ±0.2 % of FSR (Current)	-		
mpar	Voltage Input	-	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V	0 ~ 500 mV, ±10 V, 0 ~ 10 V	±50 mV, ±100 mV, ±500 mV, ±1 V, ±2.5 V	-		
	Current Input	-	±20 mA, 0 ~ 20 mA, 4 ~ 20 mA	0 ~ 20 mA, 4 ~ 20 mA	±20 mA, 0 ~ 20 mA, 4 ~ 20 mA	-		
	Direct Sensor Input	RTD (Pt-100, Pt-200, Pt-500, Pt-1000, Balco, Ni 518)	-	-	Thermocouple (Type J, K, T, E, R, S, B)	-		
	Wire Burnout Detection	All RTD range	4 ~ 20 mA	4 ~ 20 mA	4 ~ 20 mA and all Thermocouple range	-		
	AO Channels	-	-	-	-	8		
	Output Type*	-	-	-	-	V, mA		
	Output Resolution	-	-	-	-	14-bit		
	Output Accuracy	-	-	-	-	± 0.1 % of FSR		
Analog	Output Slew Rate	-	-	-	-	0.7 V _{DC} /µs (per channel)		
Output	Voltage Output	-	-	-	-	±2.5 V, ±5 V, ±10 V, 0 ~ 2.5 V, 0 ~ 5 V, 0 ~ 10 V		
	Current Output	-	-	-	-	0 ~ 20 mA, 4 ~ 20 mA		
	Short Circuit Protection	-	-	-	-	Yes		
	Fail Safe Value	-	-	-	-	Yes		
	Weight	170 g	170 g	175 g	170 g	175 g		
	Operating Temperatrure	-10 ~ 60°C (when mounted vertically)						
	Storage Temperature	-40 ~ 85°C						
	Relative Humidity (non-condensing)	5 ~ 95%						
General	Power Consumption (typical)	2.5 W @ 24 V _{DC}	4 W @ 24 V _{DC}	3.5 W @ 24 V _{DC}	3.5 W @ 24 V _{DC}	3.5 W @ 24 V _{DC}		
	Isolation between channels and backplane			$2500 V_{DC}$				
	Power Supply Module (optional)			APAX-5343E				
user manual		online	online	online	online	online		

user manual

*Each cahnnel can be configured with different type and range **Sampling rate value depends on used channel number.

Example: Using 6 channels on APAX-5017, sampling rate for each used channel will be 12/6 = 2 samples/second.

PAC - APAX Series

Selection Guide

APAX-5000 I/O Modules

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Module Name		APAX-5040	APAX-5045	APAX-5046/ APAX-5046SO	APAX-5060	APAX-5080	APAX-5082
Description		24-ch DI Module	24-ch DI/O Module	24-ch/20-ch DO Module	12-ch Relay Module	4/8-ch Counter Module	8-ch Pulse Width Modulation Module
	DI Channels	24	12	-	-	4	6
	Input Type	Sink or Source Load	Sink or Source Load	-	-	Source Load	Sink or Source Load (Wet Contact)
	Rated Input Voltage	$24 V_{DC}$	$24 V_{DC}$	-	-	$24 V_{DC}$	-
Digital Input	Input Voltage Range (signal "0")	$-5 \sim 5 V_{DC}$	$-5 \sim 5 V_{DC}$	-	-	$0 \sim 3 V_{\text{DC}}$	$-5 \sim 5 V_{DC}$
	Input Voltage Range (signal "1")	$15 \sim 30 V_{DC}$ -15 ~ -30 V_{DC}	15 ~ 30 V_{DC} -15 ~ -30 V_{DC}	-	-	$10 \sim 30 \; V_{\rm DC}$	$15 \sim 30 V_{DC}$ -15 ~ -30 V_{DC}
	Rated Input Current	4.4 mA (typical)	4.4 mA (typical)	-	-	10 mA (typical)	7.3 mA
	Input Filter	3 ms	3 ms	-	-	3 ms	3 ms
	Over Voltage Protection	Yes	Yes	-	-	Yes	-
	Channels	-	-	-	-	4 or 8 (depends on mode)	8
Counter Input/ Pulse Width Output	Rated Input Voltage	-	-	-	-	$24 V_{DC}$	Output Voltage Range: 8 ~ 35 V _{DC}
	Input Voltage Range (signal "0")	-	-	-	-	$0 \sim 3 V_{\text{DC}}$	-
	Input Voltage Range (signal "1")	-	-	-	-	$10 \sim 30 \; V_{\text{DC}}$	-
	Current	-	-	-	-	Rated Input Current (signal *1): 5 ~ 15 mA (typical)	Normal Output Current: 0.5A (per channel)
	Counting Range	-	-	-	-	32-bit + 1-bit overflow/underflow	-
	Counter Frequency	-	-	-	-	Counter Frequency: 1 MHz (max.)	Pulse Frequency: 0 ~ 30kHz
	Counter Gate and Alarm Function	-	-	-		Yes	-
	Over Voltage Protection	-	-	-	-	Yes	-
	DO Channels	-	12	24/20	12	4	6
	Output Type	-	Sink	Sink / Source	Relay (Form A, SPST)	Sink	Sink
	Rated Output Voltage	-	$24 V_{DC}$	$24 V_{DC}$	$250 \ V_{\text{AC}}, \ 30 \ V_{\text{DC}}$	$24 V_{DC}$	$8 \sim 35 V_{DC}$
Digital Output	Rated Output Current (signal "1")	-	0.5 A	0.5A / 1A	5 A	0.5 A	0.5 A (per channel)
	Short Circuit Protection	-	Yes	Yes	-	Yes	-
	Thermal Shutdown Protection	-	Yes	Yes	-	Yes	-
	Weight	160 g	165 g	165 g	195 g	170 g	165 g
	Operating Temperatrure			-10 ~ 60°C (when	mounted vertically)		
	Storage Temperature			-40 ~ 85°C			-40 ~ 70° C
	Relative Humidity (non- condensing)			5 ~	95%		
General	Power Consumption (typical)	2 W @ 24 V _{DC}	2.5 W @ 24 V _{DC}	2.5 W @ 24 V _{DC}	2 W @ 24 V _{DC}	2.5 W @ 24 V _{DC}	2.5 W @ 24 V _{DC}
	Isolation between channels and backplane			250	0 V _{DC}		
	Channel Status LED			Yes (per	channel)		
	Fail Safe Value	-	Yes (DO channel)	Yes	Yes	Yes (DO channel)	Yes
	Power Supply Module			APAX	-5343E		

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Overview

ADAM-5000 Series



The ADAM-5000 series are suitable for basic and midlevel applications, and are designed to acquire data, and to monitor & control processes through multichannel I/O modules. Each system consists of two modular components, the system kernel (main unit) and the I/O modules. Each system is capable of handling 4 to 8 I/O modules.

Depending on the layout and the number of I/O points required, you can configure an optimum system to suit your applications.

7-slot PAC

ADAM-5560KW is designed to control tasks which need industrial PC computing performance with a PLC form factor and I/O module design.



PC-based Controllers

ADAM-5510 series offers 2 kinds of options, one is Ethernet-based and the other is RS-485 based.

Ethernet based



Note: Advantech also provides optional SoftLogic controller modules

Remote I/O Systems

Based on popular fieldbus data communication structure such as RS-485 & Modbus, ADAM-5000 series offers two different DA&C systems that allow field I/O devices to easily connect to PC network applications.



Selection Guide

ADAM-5000 Controllers

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		FRANK			
System	ADAM-5510	ADAM-5510E	ADAM-5510/TCP	ADAM-5510E/TCP	ADAM-5560CE/KW
Description	4-slot PC-based Controller with RS-485 (ADAM-5510M)	8-slot PC-based Controller with RS-485	4-slot PC-based Controller with Ethernet (ADAM-5510/TCP)	8-slot PC-based Controller with Ethernet (ADAM-5510E/TCP)	7-slot PC-based Controller with Intel Atom CPU (ADAM-5560CE)
	4-slot SoftLogic Controller with RS-485 (ADAM-5510KW)	(ADAM-5510E)	4-slot SoftLogic Controller with Ethernet (ADAM-5510KW/TCP)	8-slot SoftLogic Controller with Ethernet (ADAM-5510EKW/TP)	7-slot Micro PAC with Intel Atom CPU (ADAM-5560KW)
CPU		80	0188		Intel Atom Z510P
RAM		64	0 KB		1 GB DDR2 SDRAM
Flash ROM		25	6 KB		-
Flash Memory		25	6 KB		-
Flash Disk		1			
05		ROM	N-DO2		WINCE 5.0
Control Software	.NET Class Libraries (ADAM-5510M) KW MultiProg (ADAM-5510KW)	.NET Class Libraries (ADAM-5510E)	.NET Class Libraries (ADAM-5510/TCP) KW MultiProg (ADAM-5510KW/TCP)	.NET Class Libraries (ADAM-5510E/TCP) KW MulitProg (ADAM-5510EKW/TP)	eVC and .NE.I Class Libraries (ADAM-5560CE) KW MulitProg and ProConOS (ADAM-5560KW)
Real-time Clock			Yes		
Watchdog Timer			Yes		
COM1	RS-232	RS-232/485	RS-232	RS-232/RS-485	RS-232/485
COM2	RS-485				
COM3 (Programming)		RS-232 (T	X, RX, GND)		RS-232/485
COM4	4	0	RS-232/485	0	7
I/U SIOIS	4	ö	4	8	17\\\/
			+ V V		17 VV
ISOIALION					0 500 \/
Communication		2,500 V⊳⊂ (C	COM2 RS-485)		(COM2 RS-485) 1,500 Voc (COM1, COM3, COM4 RS-485)
Communication Power			3,000 VDC		
I/O Module			3,000 VDC		
Diagnosis					
Status Display		Power, CPU, Com	munication, Batterv		Power, User Defined
Self Test		.,,	Yes, while on		
Software Diagnosis			Yes		
Communication					
Network	RS-23	32/485	Etherne	t (RJ-45)	Ethernet (2 x RJ-45)
Speeds	1,200 bps ~	- 115.2 kbps	10/100) Mbps	10/100 Mbps
Max. Distance	4,000 fee	et (1.2 km)	150	0 m	150 m
Data Format	N, 8	, 1, 1	-	-	-
Max. Nodes	32	32	256 for Ethernet, 32 for RS-485	256 for Ethernet, 32 for RS-485	256 for Ethernet, 32 for RS-485
Protocols	User Defined, Modbus/RTU	User Defined, Modbus/RTU	User Defined, Modbus/RTU, Modbus/TCP	User Defined, Modbus/RTU, Modbus/TCP	Modbus/RTU, Modbus TCP
Remote I/O			Modbus Device		
Power Requirements			+10 ~ +30 Vpc		
Environment					
Operating Temperature		-10 ~ 70°C	c (14 ~ 158°F)		0 ~ 55°C (32 ~ 131°F)
Storage Temperature			-25 ~ 85°C (-13 ~ 185°F)	
	5~95%				

Controller Support Table

Туре		PAC			PC-based Controller		
		ADAM-5560KW	ADAM-5510KW ADAM-5510EKW	ADAM-5510KW/TCP ADAM-5510EKW/TP	ADAM-5560CE	ADAM-5510/TCP ADAM-5510E/TCP	ADAM-5510M ADAM-5510E
Function	I/O Module	7-slot Micro PAC with Intel Atom CPU	4/8-slot Softlogic Controller w/ RS-485	4/8-slot Softlogic Controller w/ Ethernet	7-slot PC-based Controller with Intel Atom CPU	4/8-slot PC-based Controller with Ethernet	4/8-slot PC-based Controller with RS-485
	ADAM-5013	٠	٠	٠	٠	٠	٠
	ADAM-5017	٠	٠	٠	٠	٠	٠
Analog	ADAM-5017H	-	-	-	٠	٠	٠
Input (AI)	ADAM-5017P	٠	-	-	٠	٠	٠
	ADAM-5017UH	٠	-	-	٠	٠	٠
	ADAM-5018P	٠	-	-	٠	٠	٠
Analog Output (AO)	ADAM-5024	٠	٠	٠	٠	٠	٠
Digital Input (DI)	ADAM-5051S	٠	٠	•	٠	٠	٠
	ADAM-5053S	٠	-	-	٠	-	-
	ADAM-5056S	٠	٠	٠	٠	٠	٠
Digital Output	ADAM-5056SO	٠	٠	٠	٠	٠	٠
(00)	ADAM-5057S	٠	-	-	٠	-	-
	ADAM-5050	٠	٠	٠	٠	٠	٠
Digital I/O	ADAM-5055S	٠	٠	٠	٠	٠	٠
Belay	ADAM-5060	٠	٠	٠	٠	٠	٠
Output	ADAM-5069	٠	٠	٠	٠	٠	٠
Counter/	ADAM-5080	-	٠	٠	-	٠	٠
Frequency	ADAM-5081	٠	-	-	٠	٠	٠
	ADAM-5090	-	٠	٠	-	٠	٠
Comm.	ADAM-5091	٠	-	-	٠	-	-
	ADAM-5095	٠	-	-	٠	-	-
SD/USB	ADAM-5030	•	-	-	•	_	-

Selection Guide

ADAM-5000 Remote I/O Systems



System	ADAM-5000/485	ADAM-5000E	ADAM-5000L/TCP	ADAM-5000/TCP			
Description	4-slot Distributed DA&C System for RS-485	8-slot Distributed DA&C System for RS-485	4-slot Distributed DA&C System for Ethernet	8-slot Distributed DA&C System for Ethernet			
CPU	80188	80188	RISC	RISC			
RAM	-	-	4 1	MB			
Flash ROM (User AP)	-	-	512	2 KB			
OS	-	-	Real-ti	me OS			
Control Software		.NET Clas	ss Libraries				
Watchdog Timer		Ye	es				
COM1/COM2)	RS-485	RS-485	RS-485	(Modbus)			
COM3 (Programming)	TX, R>	K, GND	-	-			
I/O Slots	4	8	4	4			
Power Consumption	3	W	4.0 W	5.0 W			
Isolation							
Communication	2,500 Vbc	3,000 VDC	RS-485: 1,500 V⊳c Ethernet: 3,000 V⊳c				
Communication Power		3,00	0 Vdc				
I/O Module		3,00	0 Vdc				
Diagnosis							
Status Display	Power, CPU, C	Communication	Power, CPU, Error Diag	nostic, Communication			
Self Test		Yes, w	hile on				
Software Diagnosis		Ye	es				
Communication							
Interface	RS-232/485 (2-wire)	RS-232/485 (2-wire)	Ethe	ernet			
Speeds (bps)	1,200, 2,400, 4,800, 9,600, 192 K, 38.4 K, 57.6 K, 115.2 K	1,200, 2,400, 4,800, 9,600, 19.2 K, 38.4 K, 57.6 K, 115.2K	10 M,	100 M			
Max. Distance	4,000 feet (1.2 km)	4,000 feet (1.2 km)	100 m with	out repeater			
Data Format	Advantech protocol: N, 8, 1 Modbus protocol: N, 8, 1 N, 8, 2 E, 8, 1 O, 8, 1	Advantech protocol: N, 8, 1 Modbus protocol: N, 8, 1 N, 8, 2 E, 8, 1	TCP/IP				
Max. Nodes	128	128	Depend on	IP address			
Protocols	ADAM ASCII/Modbus Protocol	ADAM ASCII/Modbus Protocol	Modbus/TCP				
Remote I/O	-	-	20 nodes Modbus devices				
Power Requirements		+10 ~ +	⊦30 Voc				
Environment							
Operating Temperature		-10 ~ 70°C	(14 ~ 158°F)				
Storage Temperature		-25 ~ 85°C ((-13 ~ 185°F)				
Humidity	5 ~ 95%						

Remote I/O System Support Table

Remote I/O System			ADAM-5000/485	ADAM-5000E	ADAM-5000L/TCP	ADAM-5000/TCP
Function	I/O Module	Description	4-slot Distributed DA&C for RS-485	8-slot Distributed DA&C for RS-485	4-slot Distributed DA&C for Ethernet	8-slot Distributed DA&C for Ethernet
	ADAM-5013	3-ch RTD Input	•	٠	٠	٠
	ADAM-5017	8-ch Al	٠	٠	٠	٠
Analog Input (Al)	ADAM-5017P	8-ch Al w/ Independent Input Range	٠	٠	٠	٠
	ADAM-5017H	8-ch high Speed (1K) Al	٠	٠	٠	٠
	ADAM-5017UH	8-ch Ultra high Speed (200K) Al	٠	٠	٠	٠
	ADAM-5018	7-ch Thermocouple Input	٠	٠	٠	٠
	ADAM-5018P	7-ch Thermocouple Input w/ Independent Input Range	٠	٠	٠	٠
Analog Output (AO)	ADAM-5024	4-ch AO	٠	٠	٠	٠
	ADAM-5051	16-ch DI	٠	٠	٠	٠
Digital	ADAM-5051D	16-ch DI w/ LED	٠	٠	٠	٠
Input (DI)	ADAM-5051S	16-ch Isolated DI w/ LED	•	٠	٠	٠
	ADAM-5052	8-ch Isolated DI w/ LED	٠	٠	٠	٠
	ADAM-5056	16-ch DO	•	٠	٠	٠
Digital	ADAM-5056D	16-ch DO w/ LED	٠	٠	٠	٠
Output (DO)	ADAM-5056S	16-ch Isolated DO w/ LED	٠	٠	٠	٠
	ADAM-5056SO	16-ch Source Type Isolated DO w/ LED	٠	٠	٠	٠
	ADAM-5050	16-ch Universal Digital I/O	٠	٠	٠	٠
Digital I/O	ADAM-5055S	16-ch Isolated Digital I/O w/ LED	٠	٠	٠	٠
Deley	ADAM-5060	6-ch Relay Output	٠	٠	٠	٠
Output	ADAM-5069	8-ch Power Relay Output w/ LED	٠	٠	٠	٠
Counter/	ADAM-5080	4-ch Counter/Frequency	٠	٠	•	٠
Frequency	ADAM-5081	4-ch High Speed Counter/ Frequency	٠	٠	٠	٠

Selection Guide

ADAM-5000 I/O Modules



Module		ADAM- 5013	ADAM- 5017	ADAM- 5017P	ADAM- 5017H	ADAM- 5017UH	ADAM- 5018	ADAM- 5018P	ADAM- 5024	ADAM- 5050	ADAM-5051/ ADAM-5051D/ ADAM-5051S	ADAM- 5052	ADAM- 5053S
	Resolution	16 bit	16 bit	16 bit	12-bit	12 bit	16 bit	16 bit	-	-	-	-	-
Analog Input (Al)	Input Channel	3	8	8	8	8	7	7	-	-	-	-	-
	Sampling Rate	10	10	10	100 (depending on the performance of client server and controller)	200K	10	10	-	-	-	-	-
	Voltage Input	-	±150 mV ±500 mV ±1 V ±5 V ±10 V	±150 mV ±500 mV ±15 V ±10 V ±5 V ±1 V 0 ~ 150 mV 0 ~ 150 mV 0 ~ 1 V 0 ~ 5 V 0 ~ 10 V 0 ~ 15 V	±250 mV, ±500 mV, ±1 V, ±5 V, ±10 V, 0 ~ 500 mV, 0 ~ 1 V, 0 ~ 5 V, 0 ~ 10 V	±10 V 0 ~ 10 V	±15 mV ±50 mV ±100 mV ±500 mV ±1 V ±2.5 V	±15 mV ±50 mV ±100 mV ±500 mV ±1 V ±2.5 V	-	-	-	-	-
	Current Input	-	±20 mA	±20 mA, 4 ~20 mA	0 ~ 20 mA, 4 ~ 20 mA	0 ~ 20 mA 4 ~ 20 mA	±20 mA	4 ~ 20 mA	-	-	-	-	
	Direct Sensor Input	Pt or Ni RTD	-	-	-	-	J, K, T, E, R, S, B	J, K, T, E,R, S, B	-	-	-	-	-
	Resolution	-	-	-	-	-	-	-	12 bit	-	-	-	-
Analog	Voltage Output	-	-	-	-	-	-	-	0 ~ 10 V	-	-	-	-
Output (AO)	Current Output	-	-	-	-	-	-	-	0 ~ 20 mA 4 ~ 20 mA	-	-	-	
Digital I/O	Digital Input Channels	-	-	-	-	-	-	-	-	16 DI/O (bit-wise	16/ 16 with LED/ 16 with LED	-	32
	Digital Output Channels	-	-	-	-	-	-	-	-	selectable)	-	8	-
Isolation		3,000 Vdc	3,000 Vdc	3,000 Vpc	3,000 VDC	3,000 VDC	3,000 Vpc	3,000 Vpc	3,000 Vpc	-	2,500 Vbc (5051S)	5,000 Vrms	2,500 Vdc

Module		ADAM- 5055S	ADAM- 5056/ ADAM- 5056D	ADAM- 5056S/ ADAM- 5056SO	ADAM- 5057S	ADAM- 5060	ADAM- 5069	ADAM- 5080	ADAM- 5081	ADAM- 5090/ ADAM- 5091	ADAM- 5095
Digital I/O	Digital Input Channels	8 w/LED	-	-	-	-	-	-	-	-	-
	Digital Output Channels	8 w/LED	16 w/LED (5056D)	16 w/LED	32	6 relay (2 form A/ 4 form C)	8 power relay (form A)	-	-	-	-
	Channels	-	-	-	-	-	-	4	8	-	-
Counter (32-bit)	Input Frequency	-	-	-	-	-	-	5000 Hz (max)	5 Hz ~ 1 MHz max. (frequency mode) 1 MHz max. (counter mode)	-	-
	Mode	-	-	-	-	-	-	Frequency, Up/Down Counter, Bi- direction Counter	Frequency, Up/Down, Bi- direction, up, A/B Phase, Counter	-	-
001414	Channels	-	-	-	-	-	-	-	-	4	2
CONNIN.	Туре	-	-	-	-	-	-	-	-	RS-232	CAN
Isolation		2,500 Vpc	-	2,500 Vpc	2,500 Vpc	-	4,000 VRMS	1,000 VRMS	2,500 Vpc	-	1,000 VDC

ADAM-5000/TCP support GCL function

GCL (Graphic Condition Logic) gives Ethernet I/O modules simple control ability. Users can define the control logic rules through graphical configuration environment in ADAM.NET Utility, and download defined logic rules to ADAM Ethernet based I/O. Now ADAM-5000/TCP can also support this function.

Through this function, ADAM-5000/TCP has the ability to execute the simple logic rules automatically just like a standalone controller.

For each ADAM-5000/TCP, 32 logic rules can be defined. In the configuration environment of ADAM.NET Utility, 4 graphic icons show the 4 stages of one logic rule: Input, Logic, Execution and Output. (Refer to figure below). Users can simply click on each icon and one dialog window will pop-up for user to configure each stage. After completing all configurations, users can click one button to download the defined logic rules to the specific Ethernet I/O module.



SoftLogic Programming Software



KW MULTIPROG IEC-61131-3 SoftLogic Control Software

Key Features:

- Online program download
- Intuitive programming with a clear project structure
- Cross-compiling: FBD, LD and IL can be cross-compiled to each other

Introduction:

Advantech's PAC solution leverages KW Multiprog and ProConOS as the development tool and SoftLogic control kernel. Users can easily leverage the control know-how into different control platforms to meet versatile automation projects needs.

Multiprog supports all IEC 61131-3 programming languages. Depending on the task handled, your experience and company standards, you may choose one of the five standardized programming languages. You can easily achieve real-time performance without additional programing. Advantech's long-term experience in the automation industry guarantees you a sophisticated software product.

IEC-61131-3 Programming Languages

• Instruction List (IL) • Structured Text (ST)



• Sequential Function Chart (SFC)



 Function Block Diagram (FBD)



• Ladder Diagram (LD)



Support Batch Control Function Blocks

KW Multiprog also supports Batch control function blocks which shall be applicable in IEC 61131-3 languages.



PC-based Programming Software



C/C++ and .NET Class Libraries API for VC/C++ and .NET development environment

Key Features:

- Complete PC-based open platform
- Multiple built-in libraries for industrial tasks to shorten development time
- Various C/C++ and .NET examples for reference

Introduction:

APAX-5000 series offers a complete PC-based open platform with Application Programming Interface (API). With C/C++ libraries and .NET class libraries provided by Advantech, programmers can develop their own programs for industrial control and automation tasks, involving I/O control, communication, SQL and scheduling. Plenty of C/C++ and .NET examples save programmer learning time, helping save programmers' development and effort to shorten time to market.

HMI/SCADA Software



Web-browser Client to View and Control



Using a standard Web browser, users can view and control automation equipment used in industrial, manufacturing, process and building automation systems. Data is displayed to users in real-time with dynamically updated graphics using full-motion animation.

Advantech WebAccess Browser-based HMI/SCADA Software

Key Features:

- View, control, configure system remotely over Intranet or Internet using ordinary Web browser
- Supports vector-based graphics
- Use the open standard programming TCL, JScript or VB script

Introduction:

Advantech WebAccess is browser-based software package for human-machine interfaces (HMI) and supervisory control and data acquisition (SCADA). All the features found in conventional HMI and SCADA software packages are available in an ordinary browser including Animated Graphics Displays, Real-time Data Control, Trends, Alarms and Logs. WebAccess is based on standard Internet architecture, its basic components include SCADA Node, Project Node, Client and Thin Client.

Historical and Real-time Trending, Data Logging and Centralized Logs



Each tag is logged to a separate file on the SCADA node, and user can view the real-time and historical data from the historical trend. Besides, new tags can be added to a historical trend display without losing history of other tags. Real-time data, alarms and events from all nodes are logged to central ODBC database.

Scheduler and Report



The Scheduler provides control and changes setpoint status based on time and date. Lights, fans, and HVAC equipment are turned on and off based on the time, day of week and date. The Scheduler is also used in process control and manufacturing applications. All these schedule configurations can be modified remotely through Internet.

Greenhouse Control Solution Agricultural Automation

The system integrator adopted Advantech's APAX-5000 series programmable automation controllers to build the control platform, coupled with Advantech WebAccess HMI/SCADA software, to achieve cloud monitoring. The staff of the orchid field can monitor important data anytime via smart phone, iPad, and other handheld devices, and control the growth and flowering conditions.

System Requirements

PAC Systems (Programmable Automation Controller) with both PLC programming capabilities and PC functions is a better choice.

The environmental control of the Orchid greenhouse switches on and off devices like fan, shade net, cooling/heat pump, liquid flow control, water-cooling wall etc. It is controlled by a control panel of electric controllers, and is driven by a motor, to adjust the greenhouse temperature, humidity, and other environmental conditions to the set parameters.

Therefore, a PAC greenhouse environmental control system requires the following devices:

- Sensors to detect environmental conditions such as temperature and humidity inside and outside the greenhouse, sunshine, wind direction and speed etc.
- Control components to execute commands, to control fans, shades, nets, water walls, liquid flow, and other equipment.
- A control host which can analyze and compute, connecting sensors, control components, electric equipments, and office computers.
- HMI/SCADA software to input control parameters from computer, with the abilities of database analysis and remote monitoring.

Project Implementation



APAX-5620 PAC with Marvel XScale CPU, CAN, KW



APAX-5017 12-ch Analog input Module



APAX-5028 8-ch Analog Output Module



APAX-5045 24-ch Digital Input/Output Module



APAX-5002 2-slot Backplane Module



Advantech WebAccess Browser-based HMI/ SCADA Software

System Description

The Forcing Greenhouse uses an Advantech APAX-5620 programmable controller as a control host to connect the APAX-5017, APAX-5028, APAX-5045, and other I/O modules, to attach to the remote sensors and control components via cables, and to connect to expansion modules and electric controllers via a network cable. The above devices form a complete automation and control architecture. With Advantech APAX controllers and WebAccess software, the staff of the orchid farm can set the greenhouse's environment control parameters with an easy-to-use graphical interface in the computer and network environment.

Advantech's APAX-5000 series have the advantage of saving wiring costs and being of a low cost. The APAX-5620 control host connects to the office PC via a network cable, and connects to the cloud via wireless transmission. For monitoring orchid greenhouse conditions and data, the staff only needs to download and install Advantech App on a smart phone or iPad.

Conclusion

The automated greenhouse control system with Advantech APAX controllers and WebAccess software has the advantages of being low cost and high scalability. Users can easily control and monitor through a computer and network environment, and also achieve cloud monitoring. By using an automated greenhouse environmental control system, farmers can effectively control the production period and adjust their yield.



System Diagram

Water Supply System for Fish Hatch Farm Water Management Automation

By planning and building seawater supply facilities in particular production areas, clean seawater can be directed into fish farms. Coupled with advanced technology, water supply systems monitor the water supply and electrical power facilities to ensure a steady quality and quantity of water supply. Through the use of a fiber-optic network and a user-friendly interface, management staff can remotely monitor onsite conditions, ensuring that fish farms maintain in the best conditions for fish breeding.

System Requirements

The monitoring system must use redundant architecture to ensure a stable water supply for protecting the species with high economic value from death of suffocation due to water, power outages, and other issues. At the same time, one of the necessities is rugged hardware to withstand strong wind, salty and humid conditions, and huge outdoor temperature differences between day and night. Furthermore, in order to maintain transmission quality over a long distance, the project adopts an optical network to provide fast transmission rates and simultaneously reduce noise interference. The switches must also support a specific protocol to facilitate user management. The software must allow onsite management staff and local government to monitor the status of fish production area all the time, so HMI/SCADA software, with an easy-to-use user interface, is an essential feature of this project.

Project Implementation



APAX-5620 PAC with Marvel XScale CPU. CAN, KW



APAX-5028 8-ch Analog Module



APAX-5013 8 -ch RTD





(Mini-GBIC)

Output



APAX-5017 12-ch Analog input Module





8 +2 G Combo Port Gigabit Managed Redundant Industrial Ethernet Switch



System Description

To meet the requirements of Easy Control Technology, Advantech provided the APAX-5620KW programmable automation controller (PAC) with a variety of APAX digital and analog I/O modules (including the APAX-5040, APAX-5060, APAX-5017, and APAX-5028), to build a redundant system architecture for monitoring electric gate and grit removal equipment and control pumps, pressure, water level, flow, electric butterfly valve, etc. The same configuration was also used for monitoring the power generator and power distribution panel in the power system.

Advantech WebAccess HMI/SCADA software were installed in the central control room of the building. Its easy-to-use user interface provides management staff with dynamic graphics display and real-time data control. In addition, Advantech also provided the EKI-4654R and EKI-7659C industrial-grade switches, supporting the Simple Network Management Protocol (SNMP). Through these high-performance Ethernet switches, the onsite hardware devices of this project seamlessly connect with the control room monitoring system, to ensure the quality of transmission.

Conclusion

With the dwindling resources of marine fisheries, the aquaculture industry is booming. The agricultural and fishery government departments actively promote policies like reducing the over-pumping of groundwater and farming with seawater instead of fresh water. In order to ensure farming operations can run smoothly in the production area, continuous monitoring of the seawater supply is an indispensable measure. Easy control technology with sophisticated experiences in a variety of water treatment projects, coupled with Advantech complete product lines, provided a redundant mechanism and a stable solution from a single supplier. Because WebAccess HMI/SCADA software, and APAX and EKI series of hardware products can be easily implemented and maintained, with a friendly HMI interaction and other characteristics, this monitoring solution achieves optimized results.



Vessel Alarm Monitoring & Management System Marine Automation



System Requirements

The ship integrated platform management system adopts 1000Mb ring-based Ethernet or 100Mb star-based Ethernet network, using computer software system as the core to integrate the original independent monitoring alarm system, power management system, valve remote control system, water-level telemetry system, deck mechanical control systems, video monitoring system, remote wireless transmission system, and other subsystems through a reliable network. While maintaining independent subsystems, it integrates the functions of subsystems as a whole to achieve ship data sharing, in order to ensure ship information transmission for efficient control and management.

Project Implementation



ADAM-5560 7-slot Micro PAC with Atom CPU



APAX-5620 PAC with Marvel XScale CPU, CAN,

UNO-2178 Intel® Atom™ D510 Automation



ADAM-5091 4-port RS-232 Module

Advantech

WebAccess

HMI/SCADA

Software

Browser-based





EKI-7659 8+2G Combo Port **Gigabit Managed** Redundant Industrial Ethernet Switch



7" WVGA Operator Panel with WebOP Designer Software

WOP-2070



WinCE

System Description

This case study used the EKI-7659 to form a ring-based fiber-optic backbone network. APAX-5620 and ADAM-5560 were installed in cabins to control various subsystems, to monitor intelligent devices through extended serial ports and CAN ports, and to complete logic control and information and data storage in the case of communication interrupt. WOP achieved remote alarm function, and WebAccess Professional configuration software ran on UNO-2178 rugged computer platform to collect, monitor, store, and display data. The above can add redundancy based on needs.

Conclusion

Advantech PAC perfectly combines strong reliability, robust control performance, flexible I/O topology, and excellent environment adaptability. Coupled with other Advantech automation products, it forms complete integrated solutions to assist customers in easily creating ship integrated platform management systems.



APAX-5620KW Water-level Telemetry System ADAM-5560KW / ADAM-5510 Cabin Monitoring and Alarm System

Advanced Control Solution for Continuous Casting Machines Steel Process Automation

A renowned steel factory in Asia planned to improve its Distributed Control System (DCS) of high temperature furnaces process as well as addressing the problem of insufficient accuracy. However, most well-known international equipment suppliers can not provide a satisfactory solution and local maintenance because the project needed new technologies to more accurately control equipment operations.

By implementing Advantech's automated monitoring and control solution, steel factories can not only improve the manufacturing processes but can also allow users to add additional functions to the existing system so as to make sure the operation runs at high efficiency.

System Requirements

The major requirement is to enhance the billet surface quality and dynamic mold level control based on the original framework. Apart from software, the improvement of the continuous casting process needed to come with powerful and robust devices to provide reliable system operation, the models were required to: support Microsoft operating systems to easily develop customized programs; have better CPU performance to run software; offer various I/O interfaces and expandable connections to meet the required functions; have a wide operating temperature range and anti-interference ability to resist harsh industrial and high electromagnetic environments.

Project Implementation



APAX-5620 PAC with Marvel XScale CPU,

CAN. WinCE



APAX-5017H

Speed Analog

input Module

12-ch High

APAX-5343E Power Supply for APAX Expansion Module

APAX-5017

12-ch Analog

Input Module

System Description

Advantech proposed the TPC-1571 Touch Panel Computer, embedded in the electrical cabinet, to be used as the HMI for users to communicate with the APAX-5571XPE Programmable Automation Controller (PAC) and a variety of APAX-5000 I/O modules (APAX-5017H, APAX-5028, APAX-5040 and APAX-5046). The APAX models are to be used as a compensator in order to provide the stabilization of the molten steel in the mold of a continuous casting machine.

As for the second subsystem, the APAX-5620 RISC-based controller is responsible for executing hydraulic cylinder control tasks by connecting to different APAX-5000 I/O modules (APAX-5017, APAX-5040, APAX-5046 and APAX-5343E). By providing a CAN bus communication interface, the APAX-5620 can monitor the steel's thickness via a CANopen sensor. Advantech's controller and modules support wider operating temperatures to ensure that devices would not be damaged by high temperatures since the control box has to be installed next to the machine and the field temperature is often above 50°C.

Conclusion

In order to ensure the competitive edge of the steel plant, production routes have to be optimized by constantly improving manufacturing technologies. Advantech offers a cost-effective solution to control and monitor steel manufacturing process through comprehensive product lines with excellent features. The customer has selected Advantech as the tier-one supplier due to the excellent results to effectively improve the quality of the steel billet. Meanwhile our technical support and global services also enable customers to promote this solution to other countries with more advantages.



Expressway Tunnel Monitoring System Transportation Automation

This expressway tunnel monitoring system utilizes a distributed network control architecture, including Ethernet switches, a zone controller and a local controller. The ultra-compact and high cost-performance controller greatly simplifies system architecture and connection.



System Requirements

Tunnels can be classified into four categories by length: short tunnels (L<250m), middle long tunnels (250m<L<1000m), long tunnels (1000m<L<3000m) and super long tunnels (L>3000m). The longer the tunnel, the more monitoring devices are needed. According to the sub-systems, the tunnel monitoring system can be divided into: the lighting system, a ventilating system, traffic guidance system, CCTV system, fire alarm system, fire control system, emergency telephone system, broadcasting system, and additional tertiary tasks. The tunnel monitoring system can be classified into four groups by device: testing devices, controlling devices, display devices and communication devices. Testing devices include fire-alarm probes, vehicle detectors, COVI, visibility sensors, and wind sensors. Controlling devices include a traffic area controller, illuminated area controller, and ventilated area. Display devices include a computer workstation, large-scale monitor, and solar alarm. Finally the communication devices include switches, hubs, serial signal transmission equipment, optical transmitter and receiver.

Project Implementation



EKI-7659C 8+2G Combo Port Gigabit Managed Redundant Industrial Ethernet Switch



APAX-5343EAPAX-5520KWPower Supply forMicro PAC withAPAX ExpansionMarvel XScaleModulesCPU



20KWAPAX-5017with12-ch AnalogaleInput Module



APAX-5018 12-ch Thermocouple Input Module



Input Module

APAX-5060 12-ch Relay

Output Module

System Description

The zone controllers are used to collect information from field testing devices, process the information and send the information to the local control center. Control commands from the local control center are then sent to the zone controllers in order to directly control the corresponding devices. If the connection between the local control center and zone controllers is broken, the zone controllers can independently control field devices. Therefore, the zone controllers must be highly reliable. Advantech PAC is used as tunnel monitoring zone controller (APAX-5520KW). It supports backup functionality. Each controller offers serial port to communicate with other industrial devices. APAX high-performance I/O modules could meet signal processing commands of monitoring system. Every module is stacked and provides multiple functionality and program capacity, and is easy to detach and maintain.

Conclusion

APAX-5520KW can be simply used as the backup zone controller, concentrating on I/O process. In this way, it will not be disturbed by any other task and will achieve the most efficient and real-time control capability. APAX-5570XPE/5571XPE installed at central control room can process other tasks, such as HMI/SCADA, process, database, data log and communication with other systems. This architecture ensures system reliability, because APAX-5520KW could continuously implement I/O tasks without disturbing by other tasks running on APAX-5570XPE/5571XPE.



Security Facility Monitoring Solution Telecom Facility Automation



System Requirements

Because air defense concerns people's lives and property, security and warning networks must cover the most of a country's cities and towns, this new system adopted a multi-layer framework to control the air-raid sirens. The total number of alarm station site is over 1000, and includes a Main Control Center, Regional Control Center, Civil Defense Control Center and Alarm Station. Despite the equipment being on standby in peacetime, authorities have to be confident that each center or station is working normally. Therefore the facilities and the operating environment in the machine room have to be remotely monitored all the time.

Project Implementation



USB-4604 4-port RS232 to USB



APAX-5570 PACs with Intel® Celeron® M CPU



APAX-5520CE Micro PAC with Marvel XScale CPU



APAX-5017 12-ch Analog Input Module



APAX-5040 24-ch Digital Input Module



APAX-5060 12-ch Relay Output Module

System Description

Advantech implemented a modular design to leverage the functionality of a range of APAX series products. The APAX-5570, PC-based Controller with Intel Celeron M CPU, is used as a compact controller to monitor the conditions of various facilities in the Main Control Center (including temperature, humidity, fire smoke detector, air-conditioning, dehumidifier, UPS, CCTV, and UHF/VHF wireless device) by inserting an APAX-5520 into an APAX-5570 it operates as a Backup controller. In this architecture, the APAX-5520 focuses on the input/ output control and monitoring for APAX-5000 IO modules, featuring real-time control performance; the APAX-5570 is in charge of other tasks which needs higher computing ability for databases and communication. Such dual CPU architecture can ensure system reliability so if one of them has anything wrong, the other can take over.

The APAX-5520 can also be used as a standalone controller by using a range of integrated diverse communication interfaces or digital/ analog IO modules to transmit telemetry data to a master system and by receiving commands from the master supervisory system to control connected objects. As a Remote Terminal Unit (RTU) with excellent integration ability, the APAX-5520, through its low power consumption, fanless mechanism, and high degree of interface connectivity is suitable for simple warning stations or remote areas.

Conclusion

Compared to the old system, without any equipment status monitoring functions, adding Advantech's real-time monitoring system enables proper management for each station and control center by collecting a diverse range of information and remotely controlling numerous devices. For this air-raid siren control system, there are more than a thousand hosts (ACP and APAX) and a variety of modules to be applied. Thanks to Advantech's modular design, the monitoring system can be integrated with any other devices as a powerful backup platform but also can be used for distributed deployment as an independent controller to satisfy the needs of different stations while achieving the space-saving and high-efficiency goal.



Traffic Control System Railway Signaling

The project has been realized by a leading Italian company in Civil Engineering and Network Engineering sectors, and at the cutting-edge in the innovative service development and solutions in the Telecommunications, Transport, Energy and Technological markets. This company has 4000 worldwide employees and an international presence; it has implemented projects almost in all the continents, from Europe to Latin America, from the Middle East to Africa, and in order to meet the need for international presence in a globalized market today operate also in Libya, Arab Emirates and Saudi Arabia.

System Requirements

When assessing the various companies for this project our customer had several requirements that needed to be met. For their trackside control they required that the modules were flexible enough to adapt to the different needs and requirements of the various sites; fail-safe modules were essential to ensure that their wouldn't be the possibility of a failure anywhere on the network; state-of-the-art devices were required so that they could be programmed quickly using the most up to date languages. Advantech's solution was to fully integrate their products with the customer's existing black box, called ACEI. ACEI (Central Electrically Controlled Shunting) is a system of centralized control of switches, signals, level crossings, maneuvering signals and everything required for the operation of the railway station and signals are sent from the monitoring equipment to the ACEI and through the APAX modules back to the control room where the data is displayed.

Project Implementation



APAX-5570 PACs with Intel® Celeron® M CP



EKI-2528EKI-48-port Unmanaged24 FE -Industrial EthernetGBIC) ISwitchRedundSwitchSwitch



EKI-4654RAPAX-501324 FE + 2 SFP (Mini-
GBIC) Managed8-ch RTD
ModuleRedundant EthernetModule







24-ch Digital

Input/Output

Module

APAX-5080 4-ch AB Encoder Input Module

System Description

The client installed multiple APAX and EKI modules in a cabinet next to the ACEI equipment, at the periphery of each station and in each cabinet are two individual sets of APAX controllers in a redundant master/slave configuration. Data is acquired by the master controller, while slave system remains in stand-by mode so that in the event of failure the slave system seamlessly takes over operation thereby ensuring continuous system availability. Advantech's APAX modules have made the commissioning of the peripheral post more simple and reliable. This provides the operator with a simple way to locally connect - via a notebook with the railway station software - having the ability to view the data exchange and the status of the station. Tests are performed locally and the operator can directly check the correct behavior of the field feedback. As a result, the logic is somewhat simplified. The modules are hot-swappable and in the case of maintenance of a single module, the system continues to operate thereby improving the MTTR value. APAX's modularity allowed the customer to realize different devices for different plants even in the same plant. This also allows the system to be expandable and provides the possibility to add other I/O modules to make measurements in the field for example, the output current provided by an engine (diagnostic data). As a result, software reusability permits the reduction of the costs of new software development with a user friendly programming environment and plug & play functionality.

Conclusion

With their reputation for high quality and availability, Advantech devices have been used in the Italian railway signaling market for many years, thereby helping their trains run on time. Advantech's product portfolio allowed our customer to use the most convenient architecture depending on the application and a local presence allowed the client to work with local engineers to define the most effective configuration and maintain a fluid relationship at all stages of the process.



Ordering Information

ADAM Series				
Programmable Auto	omation Controller (PAC)	Digital Input		
ADAM-55560KW ADAM-5510KW ADAM-5510KW/TCP ADAM-5510EKW/TP	Micro PAC w/ GX2, KW, 7-slot 4-slot PC-based SoftLogic Controller 4-slot Ethernet-enabled SoftLogic Controller 8-slot Ethernet-enabled SoftLogic Controller	ADAM-5050 ADAM-5051 ADAM-5051D ADAM-5051S ADAM-5052 ADAM-5053S	16-ch Universal Digital Input/Output Module 16-ch Digital Input Module 16-ch Digital Input Module w/ LED 16-ch Isolated Digital Input Module w/ LED 8-ch Isolated Digital Input Module 32-ch Digital Input Module	
2C-based Controller 4DAM-5560CE 7-slot PC-based Controller w/ Atom CPU 4DAM-5510/TCP 4-slot PC-based Controller w/ Ethernet		ADAM-3920 PCL-10220	20-pin Flat Cable Wiring Board 40-pin IDC to two 20-pin IDC cable, 1 m	
ADAM-5510E/TCP ADAM-5510M	8-slot PC-based Controller w/ Ethernet 4-slot PC-based Controller w/ RS-485	Digital Output		
ADAM-5510E ADAM-5000L/TCP ADAM-5000/TCP ADAM-5000/485 ADAM-5000E	 8-slot PC-based Controller w/ RS-485 4-slot Ethernet-based Distributed DA&C System 8-slot Ethernet-based Distributed DA&C System 4-slot Distributed DA&C System for RS-485 8-slot Distributed DA&C System for RS-485 	ADAM-5056 ADAM-5056D ADAM-5056S ADAM-5056SO ADAM-5057S ADAM-3920R	16-ch Digital Output Module 16-ch Digital Output Module w/ LED 16-ch Sink Type Iso. DO Module w/ LED 16-ch Source Type Iso. DO Module w/ LED 32-ch Digital Output Module 20-pin Flat Cable Wiring Relay Board	
Communication		PCL-10220	40-pin IDC to two 20-pin IDC cable, 1 m	
ADAM-5090 ADAM-5091 ADAM-5095	4-port RS-232 Module 4-port RS-232 Module w/ Share Interrupt 2-port CAN Module w/ Isolation Protection (for ADAM-5560CE only)	ADAM-5060 ADAM-5068 ADAM-5069	6-ch Relay Output Module 8-ch Relay Output Module 8-ch Power Relay Output Module w/ LED	
		Digital Input/Output	ut	
Analog Input	3-ch RTD Input Module	ADAM-5055S	16-ch Isolated Digital I/O Module w/ LED	
ADAM-5017	8-ch Analog Input Module	Counter/Frequenc	ÿ	
ADAM-5017P ADAM-5017UH ADAM-5018	8-ch Analog Input Module w/ Ind. Input Range 8-ch Ultra High Speed Analog Input Module 7-ch Thermocouple Input Module	ADAM-5080 ADAM-5081	4-ch Counter/Frequency Module 4-ch High Speed Counter/Frequency Module	
ADAM-5018P	7-ch Thermo. Input Module w/ Ind. Input Range	Specific Modules		
Analog Output		ADAM-5030	2xSD, 2xUSB Storage Module	
ADAM-5024	4-ch Analog Output Module	Power Supply		
		PWR-242 PWR-243	DIN-rail Power Supply Panel Mount Power Supply	

PWR-244

Panel Mount Power Supply

00111101101
APAX-6572
PAC softlogic option (

Controller

PAC softlogic option (for	CTOS only)
SQF-P10S2-8G-ETE	Suggested CF 8G CF NR, DMA (-40 ~ 85°C)
2070012262	WinCE image with KW support for APAX-6572
201000007	License Agreement for KW ProConOS Embedde
PC-base controller option	n (for CTOS only)
SQF-P10S2-16G-ETE	Suggested CF 16G CF NR, DMA (-40 ~ 85°C)
2070012263	WES2009 MUI for APAX-6572
APAX-5520CE	PAC with Marvel XScale CPU, WinCE
APAX-5520KW	PAC with Marvel XScale CPU, KW
APAX-5620CE	PAC with Marvel XScale CPU, CAN, WinCE
APAX-5620KW	PAC with Marvel XScale CPU, CAN, KW
APAX-5522PELX	IEC-61850 certified PAC, Linux RT
Communication and (Coupler
APAX-5090P	4-port RS-232/422/485 Comm. Module
APAX-5095P	2-port CANopen Module
APAX-5070	Modbus/TCP Communication Coupler
APAX-5071	Profinet Communication Coupler
APAX-5072	Ethernet/IP Communication Coupler
Analog Input	
APAX-5013	8-ch RTD Module
APAX-5017	12-ch Analog Input Module
APAX-5018	12-ch Thermocouple Input Module
APAX-5017H	12-ch High Speed Analog Input Module
Analog Output	
APAX-5028	8-ch Analog Output Module
Digital Input	
APAX-5040	24-ch Digital Input Module
Digital Output	
APAX-5046	24-ch Digital Output Module
APAX-5060	12-ch Relay Output Module

PAC with Intel Atom D510 CPU

Digital Input/Output

APAX-5045 24-ch Digital Input/Output Module

Counter/Frequency

APAX-50804/8-ch High Speed Counter ModuleAPAX-50828-ch Pulse Width Modulation Module

Power SupplyAPAX-5343Power Supply for APAX-5570/5580 Series APAX-5343EAPAX-5343EPower Supply for APAX Expansion ModuleBackplaneAPAX-50011-slot Backplane Module APAX-5002APAX-50022-slot Backplane Module with RJ-45 portAPAX-5002L2-slot Backplane Module 4-slot Backplane ModuleAPAX-5004L4-slot Backplane ModuleAPAX-5004L4-slot Backplane Module1654006958For APAX-5013, APAX-5017, APAX-5017H, APAX-5017PE 16540069571654006956For APAX-5046, APAX-5046SO, APAX-5060, APAX-5060PE1654006935For APAX-5040, APAX-5040PE, APAX-5080 16540069351654006935For APAX-5045Blank SlotY5A5570004		
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	Y5A5570004	APAX Blank Slot

Software

KW Multiprog

MPROG-PRO535E KW Multiprog Pro v5.35

Advantech WebAccess

WA-P71-U075E WebAccess V7.1 Software with 75 tags WA-P71-U300E WebAccess V7.1 Software with 300 tags WA-P71-U600E WebAccess V7.1 Software with 600 tags WA-P71-U15HE WebAccess V7.1 Software with 1,500 tags WA-P71-U50HE WebAccess V7.1 Software with 5,000 tags WA-P71-U20KE WebAccess V7.1 Software with 20,000 tags WA-P71-U64KE WebAccess V7.1 Software with 64,000 tags WA-P72-U075E WebAccess V7.2 Software with 75 tags WA-P72-U300E WebAccess V7.2 Software with 300 tags WA-P72-U600E WebAccess V7.2 Software with 600 tags WA-P72-U15HE WebAccess V7.2 Software with 1,500 tags WA-P72-U50HE WebAccess V7.2 Software with 5,000 tags WA-P72-U20KE WebAccess V7.2 Software with 20,000 tags WA-P72-U64KE WebAccess V7.2 Software with 64,000 tags

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