ADLINK EtherCAT Solution



High-Performance, Time-Deterministic
Control with Flexible, Easy Development

ADLINK TECHNOLOGY INC.

Vol. S151-2
www.adlinktech.com

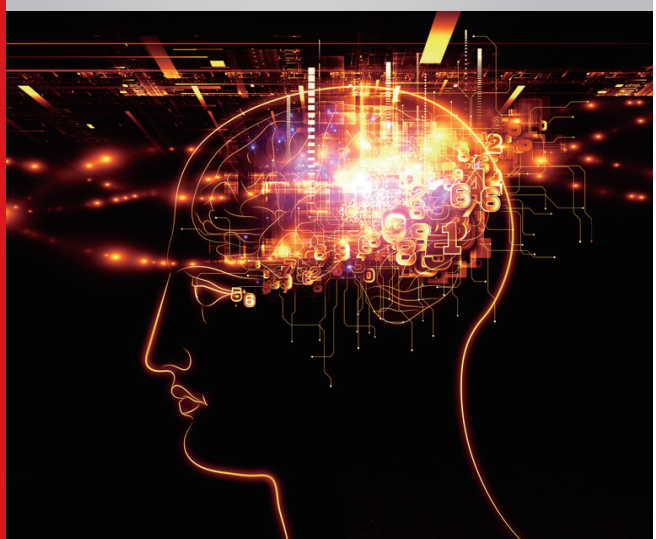
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High Performance



Assured Interoperability



Intelligent Management

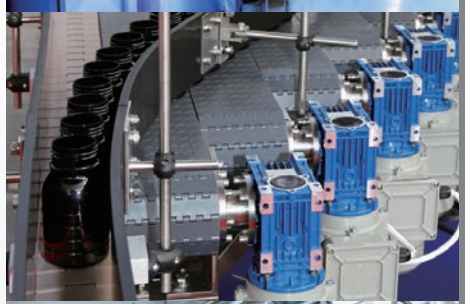


Rugged & Reliable

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High-Performance, Time-Deterministic Control with Flexible, Easy Development

Introduction

Currently, automation technologies prefer Ethernet use at the field level, with various approaches promising high bandwidth, low costs, simplified vertical integration, standard component use from office sectors, and minimal configuration and diagnostic efforts, all combined with preferred real-time capability. EtherCAT takes a different route by combining advantages of fieldbus technology with otherwise significant advantages of Ethernet function. Available bandwidth is almost fully utilized and expense reduced to a simple ASIC connection in the EtherCAT device.

EtherCAT requires no IP addresses, and its automatic configuration enables high-performance machine control, capable of exchanging multiple distributed signals with cycle times significantly below 100 µs. Further supported is a variety of connection topology methodologies, including star, tree, and ring types. As a result, EtherCAT offers unified, powerful communication for the entire automation sector.

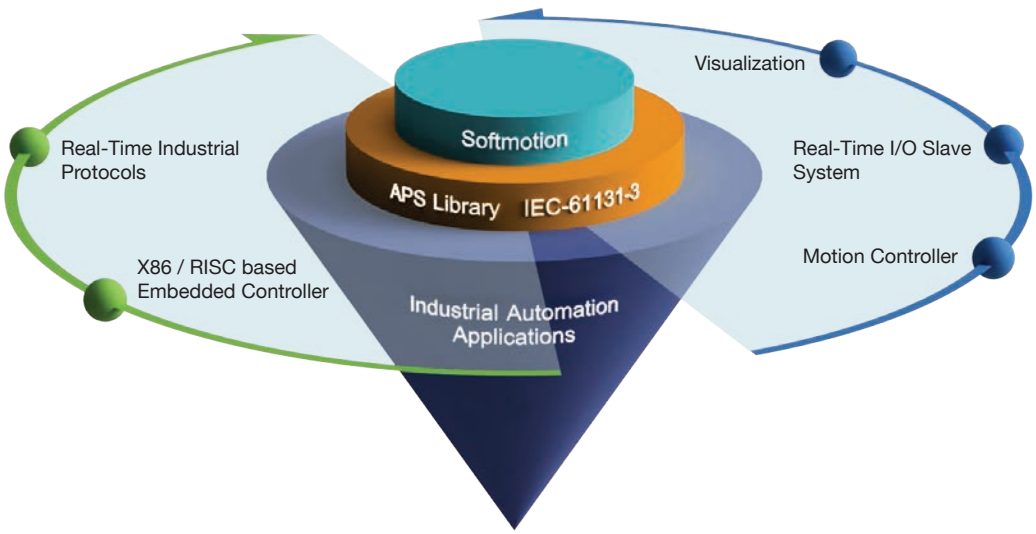


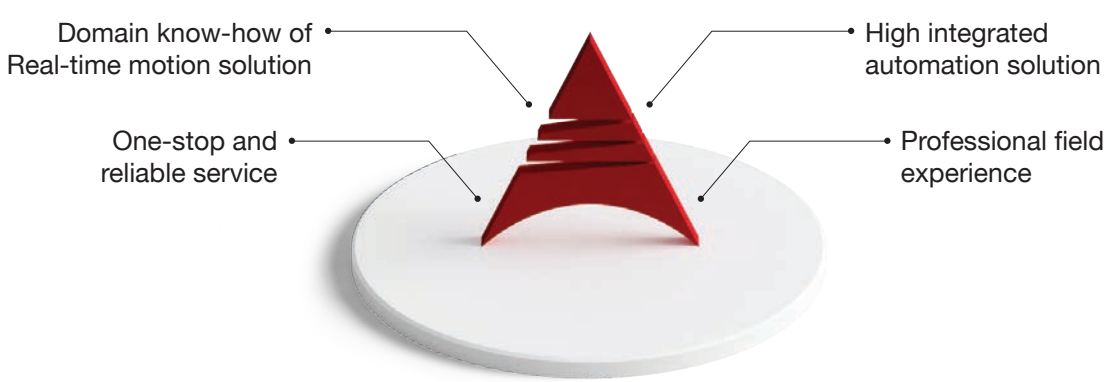
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The Automation Experts

ADLINK motion control solutions have been widely adopted, to date driving over 500,000 axes industry-wide. ADLINK's extensive field experience has driven the development of powerful, high performance motion controllers, embedded controllers, time-deterministic I/O slaves, and comprehensive, easy to use APIs. ADLINK's proven support resources help customers to overcome even the most critical challenges of industrial automation.

ADLINK motion control solutions support a wide variety of real-time industrial Ethernet-based communication and control protocols, such as EtherCAT, Mechatrolink III, and SSCNET III/H, as well as proprietary field buses, HSL and Motionnet, reducing costs while increasing throughput and accuracy. Additionally, ADLINK's one-stop service and highly integrated portfolio of off-the-shelf data acquisition cards, motion controllers, frame grabbers, and industrial computing platforms continue to meet and exceed customer requirements, supporting the setup of smart factories, further increasing productivity.

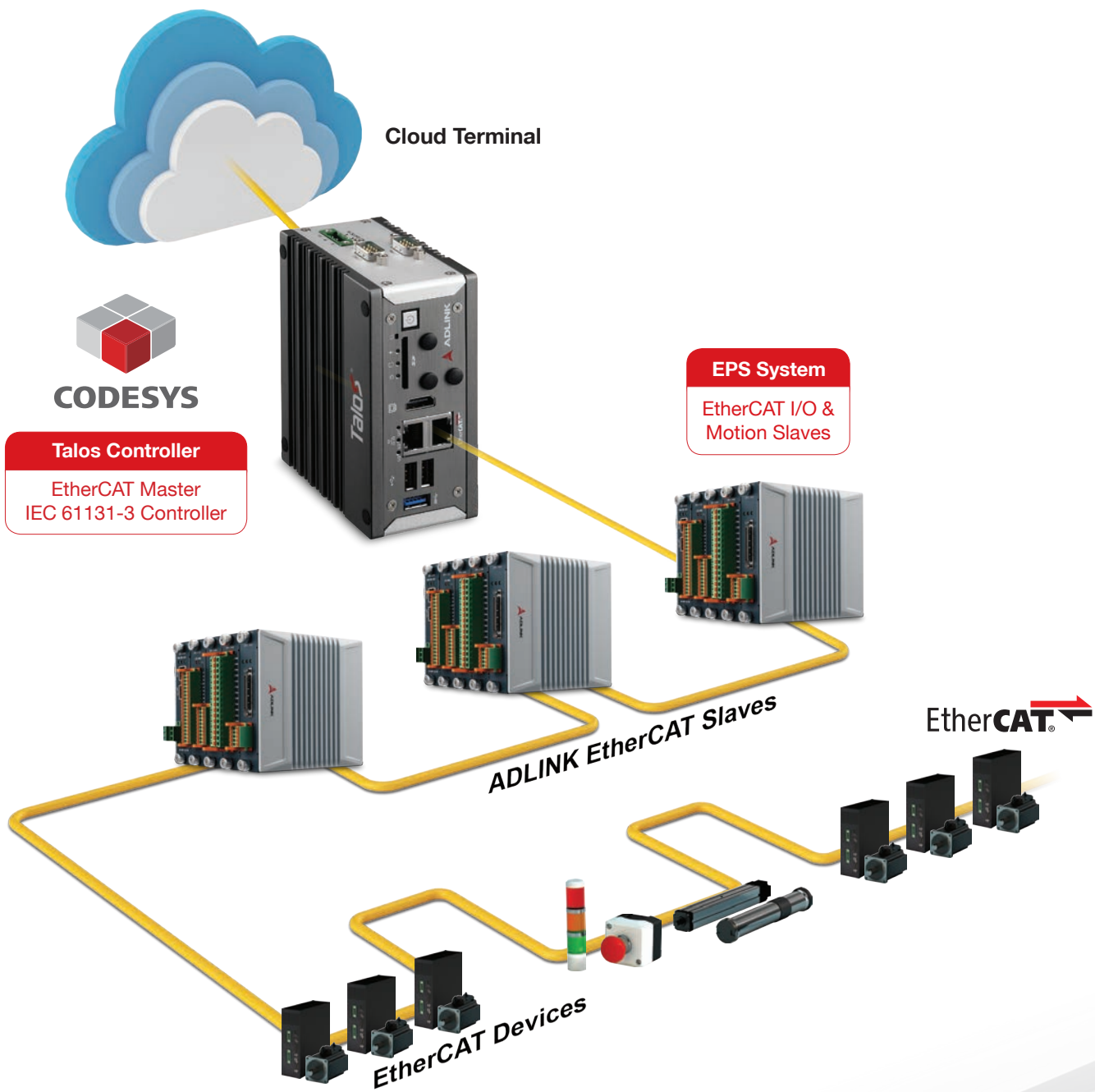




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ADLINK EtherCAT Overview

ADLINK EtherCAT solution consists of an IEC 61131-3-compliant automation controller and time-deterministic I/O and motion control system, defining a new category of EtherCAT solutions in realizing time-deterministic control over automatic process with high performance, easy development, rugged construction, space efficiency and minimal total cost of ownership. The ADLINK solutions integrate hardware and software elements, all dedicated to fast and high performance EtherCAT applications with many ready-to-use features to speed development, deployment and expansion of IoT-based smart factories.

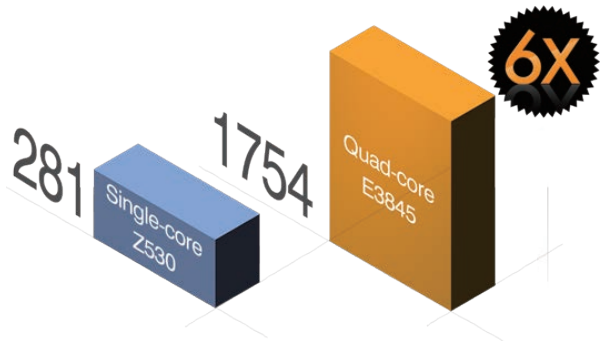


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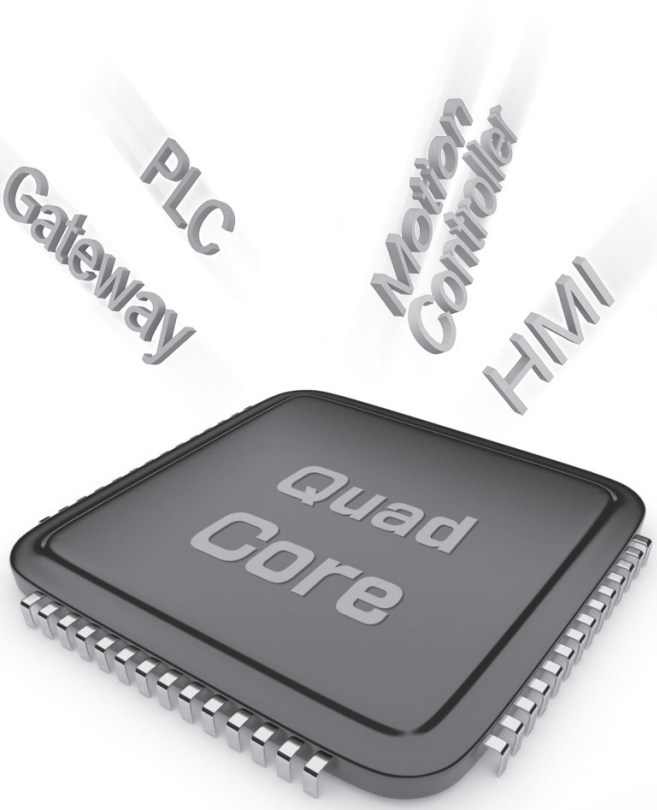
High Performance

Quad core processor

Intel® Atom™ processor E3845 at 1.91GHz dramatically improves the performance of existing EtherCAT master control. The high end processor provides up to 6 times the computing power of conventional single-core EtherCAT master controllers, maximizing supported I/O for time-deterministic control.



Performance: Passmark CPU Mark Score comparison



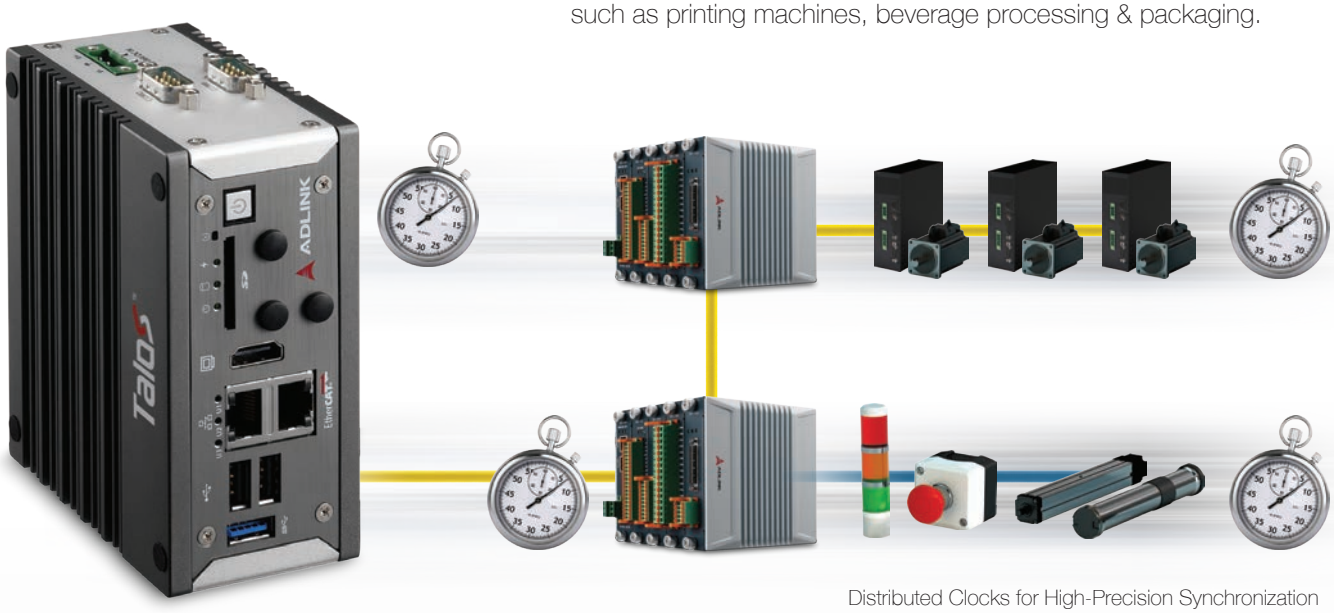
Multitask processing ability

Industrial automation systems comprise HMI, motion controllers, PLC, I/O, and communication gateways, with each subsystem requiring unique controller types. ADLINK's EtherCAT master controller, Talos-3012, equipped with quad-core Intel® Atom™ processor E3845, enables simultaneous multitask processing for HMI, motion control, PLC and gateway operations.

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Time-Deterministic control

EtherCAT reaches new dimensions in network performance, with update time for 1000 I/Os only 30 µs, including I/O cycle time. ADLINK's Talos series of EtherCAT controllers supports up to 64 axes and 10,000 I/Os for time-deterministic control. What's more, EPS slave systems support DC (distributed clock) to guarantee synchronization of each slave, and the MDP (multiple device profile) features precise local I/O synchronization for critical applications such as printing machines, beverage processing & packaging.

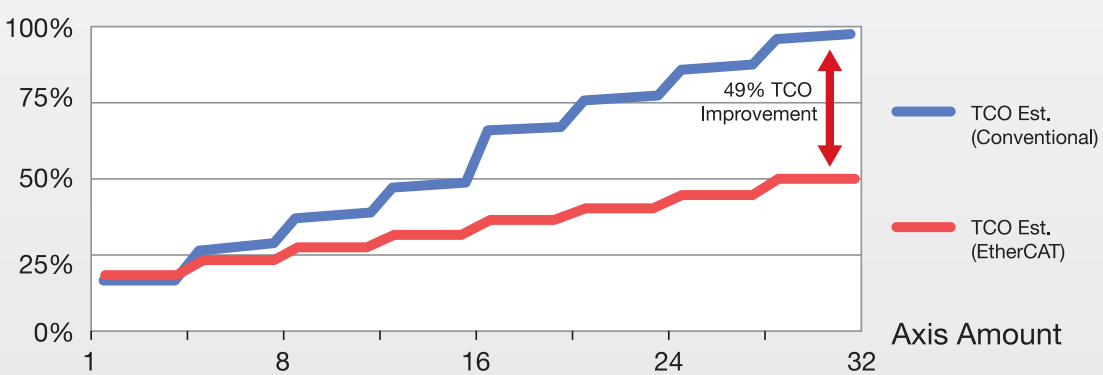


Distributed Clocks for High-Precision Synchronization

Lower TCO

ADLINK's EtherCAT solution reduces TCO by up to 49% while switching the configuration from conventional IPC (OS included), motion cards and I/O cards, to ADLINK's new EtherCAT solution of master controller, motion kernel runtime, and various functional ADLINK EPS slave modules.

* Servo motor is not included.



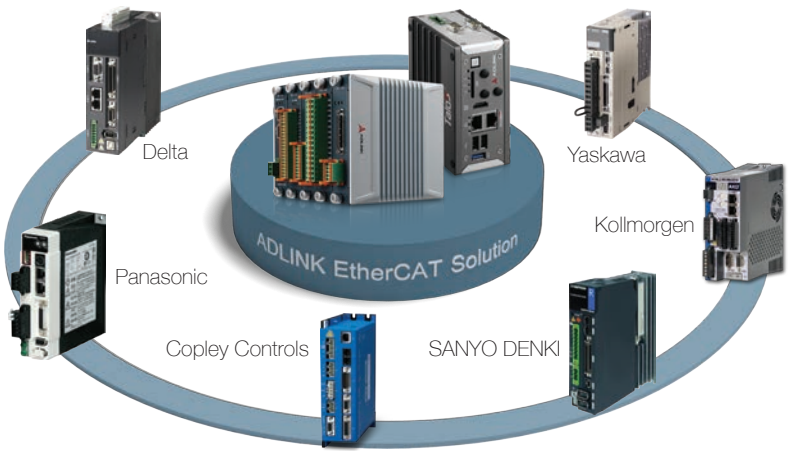
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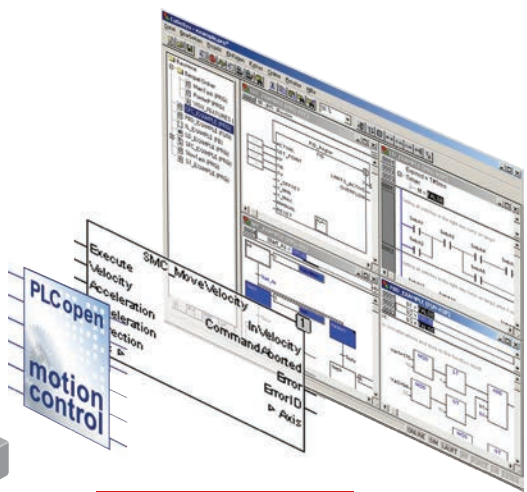
Assured Interoperability

Highly compatible with a wide variety of 3rd party EtherCAT system elements

ADLINK's EtherCAT solution has been verified for interoperability with a variety of EtherCAT servo drives and 3rd party EtherCAT products, providing the flexibility to select whichever EtherCAT elements are required.

In addition, ADLINK's Talos series of EtherCAT master controllers and EPS series of EtherCAT slave systems both support COE, FOE, EOE and AOE, fully utilizing EtherCAT benefits.





CODESYS

IEC 61131-3

Ease of development

ADLINK's Talos series provides a complete IEC 61131-3 edition environment supporting 5 common PLC syntaxes, and powered by ADLINK softmotion, with the application-oriented function and API providing ease of use and shortening development time.

Easy recognition across EtherCAT systems

ADLINK's easy-to-use software utility, LinkMasterPro™ enables automatic EPS module recognition across EtherCAT systems and generates corresponding (ESI) XML files with selected slave assembly. LinkMasterPro not only assists in EtherCAT configuration but also evaluates the functionality of every single EPS system. With its Auto-slave-detection function, system configuration has never been easier.

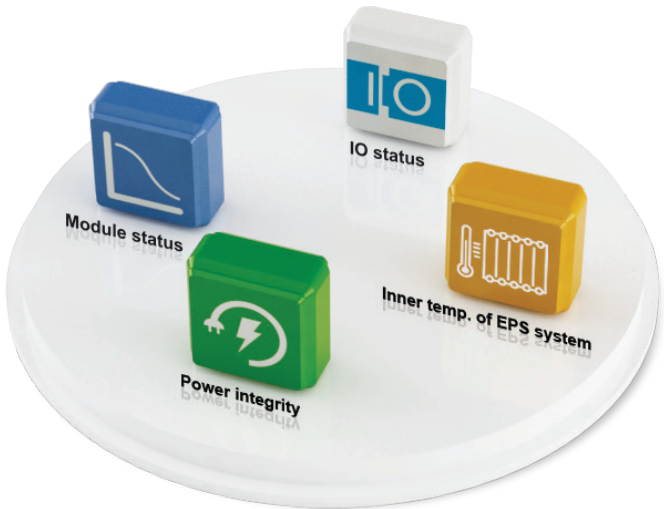


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Intelligent Management and Robust Design

Self-diagnostic function protects user assets

ADLINK's EPS slave systems feature new RISC processor, allowing users to monitor the status of EPS modules and systems including overheating detection, low power detection, slave health reporting, error handling, and usage cycle of relay switching, as well as motion control status for general purpose motor drive control. All information can be retrieved for review via software or displayed by dedicated indicators, allowing the status of a single module to be monitored.



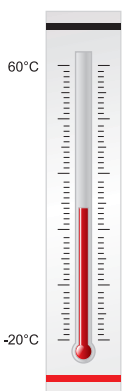


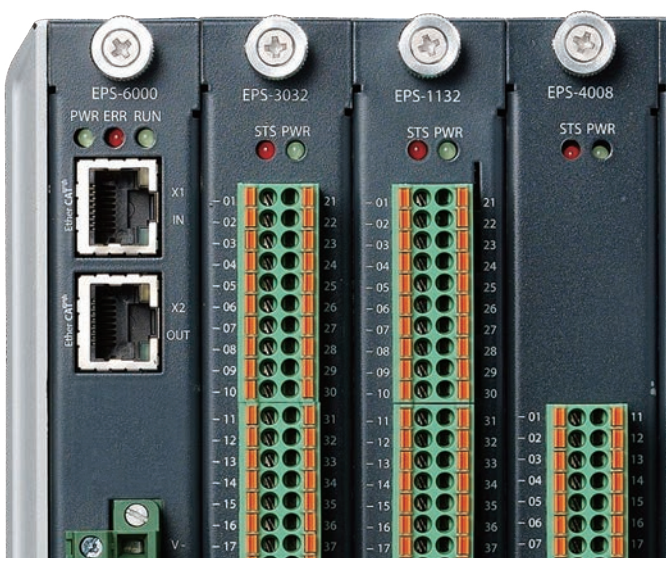
Easy maintenance, reduced MTTR

The EPS slave system significantly eases system maintenance. Each slave module is hot-swappable, allowing replacement with no need to power the system down, reducing MTTR (Mean-Time-to-Repair), and the quick-removable connector minimizes rewiring efforts.

Robust Design

ADLINK's EtherCAT products feature compact construction with fanless design, operable at -20°C to 60°C, with integral IP31-rated metal housing for withstanding harsh operating conditions.





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ADLINK Softmotion

ADLINK Softmotion provides dependable motion control, based on an efficient algorithmic kernel, featuring basic motion functions such as point-to-point and interpolation, but also variant vertical functionality for AOI, laser cutting, and semiconductor management, and even robotic control. High precision and speed, together with enhanced synchronous motion control, make ADLINK Softmotion a key player in reduction of operational complexity and development period for a wide variety of industrial applications. Compatible with numerous I/O connection types, Softmotion delivers maximum synchronization between motion and I/O control, vastly improving application throughput. Additionally, program download allows execution of multiple deterministic control flows within a secured time period.

ADLINK's customizability is further powered by its exclusive Softmotion utility, making it a clear leader in the EtherCAT solution market.



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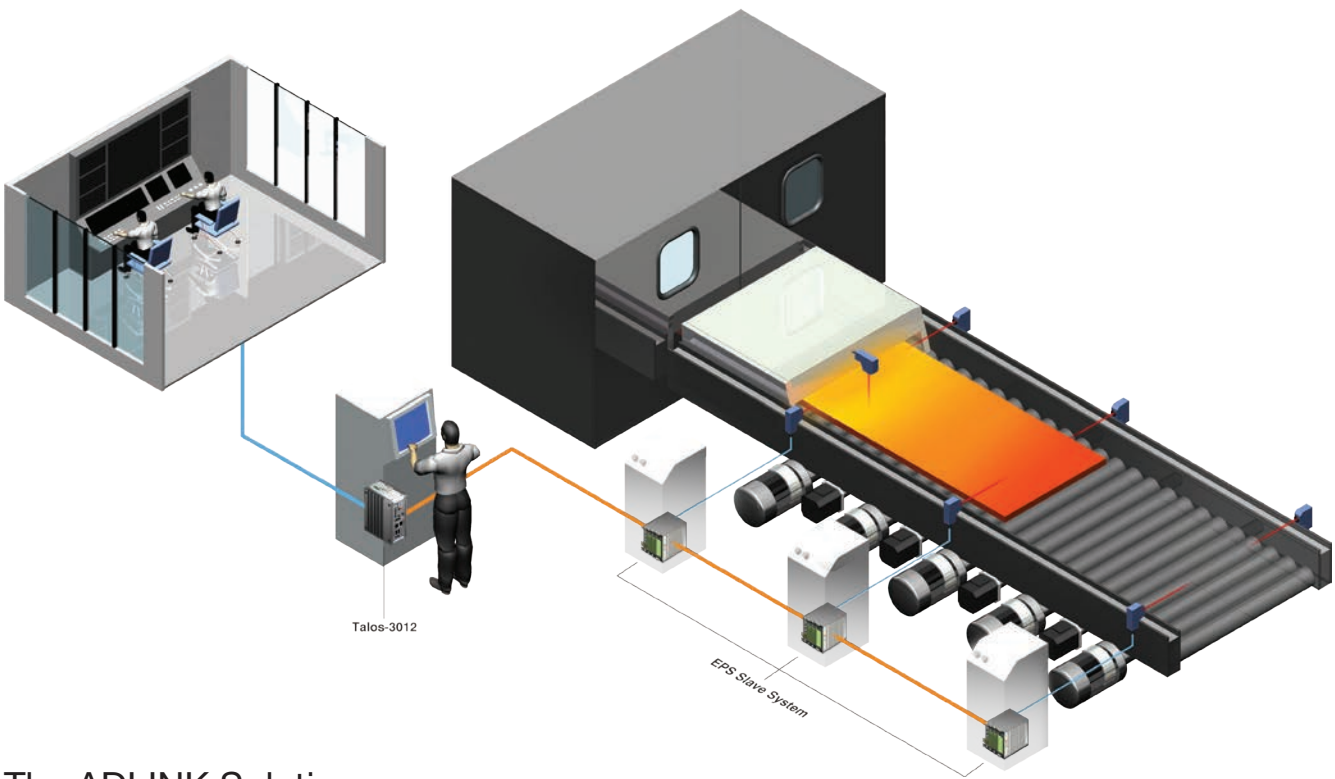


Applications

Distributed Real-Time EtherCAT System for Demanding Industrial Automation Environments

Challenges in Metalwork/Steelworks

In iron and steel foundry environments, conditions are demanding, with dramatic variations in temperature, heavy contamination, high conveyor speeds, and constant threats from vibration and impact sources.



The ADLINK Solution

High-speed deterministic response time of conveyor sensor signals is required for precise control conveyor control. ADLINK offers a complete EtherCAT solution in which the Talos EtherCAT master controller not only governs time-deterministic EPS EtherCAT slaves to control common digital I/O devices, the analog I/O for measurement usage, but also connects EtherCAT type servos directly. ADLINK Softmotion, embedded in the Talos controller, benefits the user by managing complicated motion functions with simple and intuitive function blocks. ADLINK's EtherCAT products are fully operable in -20 to 60°C (-4°F to 140°F) environments and can withstand up to 50 G shock and 5 G vibration, fully supporting deployment in demanding conditions.

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Applications

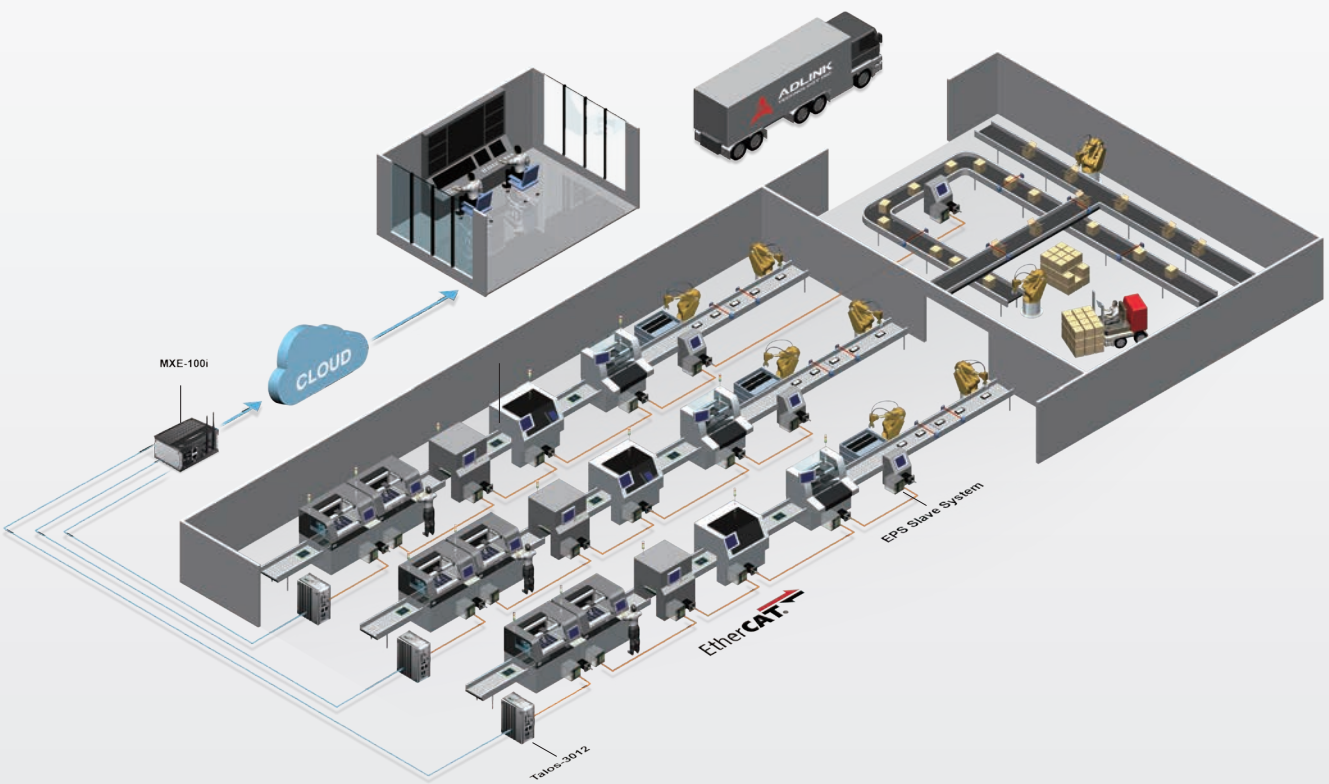
Smart Factory based on ADLINK's EtherCAT Solution

Challenge for Industrial Automation

An automatic manufacturing process plant may contain a large number of distributed slave systems and I/O points with different standard protocols, so deployment of time-deterministic control systems and monitoring module status is critical, to discover potential problems in a timely manner to prevent system failure, all with no increase in system hardware requirements.

The ADLINK Solution

ADLINK EtherCAT solutions support most topologies and deliver impressive network performance, with update time for 1000 I/Os only 30μs, including I/O cycle time. The Talos master controller can support 64 axes and 10,000 I/Os in a single system and synchronize all the elements with a distributed clock in slave systems, achieving time-deterministic control with simple wiring. ADLINK's EtherCAT solution also provides intelligent system monitoring to remotely monitor module status, including inner temperature, usage cycle of relay switching, and motion control status for general purpose motor drive control. All information can be retrieved for review via software, or displayed by dedicated indicators, allowing the status of a single module to be monitored.



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Talos-3012

EtherCAT master controller

The ADLINK Talos-3012 EtherCAT master controller, based on the quad-core Intel® Atom™ processor E3845 1.9 GHz, with IEC 61131-3 compliant syntaxes, delivers reliable control for multiple axes and versatile I/O control supporting specialized real-time applications. The Talos-3012 supports up to 64-axis motion control and 10k points within determined cycle times, and is verified for interoperability with various EtherCAT servo drives and 3rd party EtherCAT products. The compact size and wide operating temperature support Talos-3012 installation anywhere in the control cabinet in even the most extreme operating environments.



- Powered by ADLINK Softmotion
- Supports IEC 61131-3-compliant programming environment
- Minimal control cycle time as low as 250 µs
- Motion control of up to 64 axes and up to 10.000 I/O points of control
- Supports EtherCAT COE, FOE as well as EOE protocols
- Code executable when host Windows system crashed
- Built-in SD socket for logging manufacturing data
- 3 user-defined indicators for CTR diagnostic
- Rugged, compact construction with fanless design at -20°C to 60°C

Processor		Intel® Atom™ Processor E3845 1.9 GHz
Controllable Motion Axis		16/32/64
Controllable I/O Points		Up to 10,000 points
Control Cycle Time		250 us (min.)
Memory	RAM (Program & Data Memory)	2GB DDR3
	Retain Memory	Configurable on SD card
	Storage (Date Usage)	16 GB SSD / SD Card
Field Bus Connectivity		I for EtherCAT
Ethernet Connectivity		I GbE
System Indicators		3 User-defined
Programming Environment		CoDesys v3
		IEC 61131-3-Compliant
Supply Voltage		9-32 VDC wide-range DC input
Environment Certificate		Vibration: 5 Grms, 5-500Hz
		Shock: 50G, Half Sine II ms duration
		EMC: EN 550111 class A
Operating Temperature		-20° C~60° C (-4°F to 140°F)
Dimension		120 (W) x 100 (D) x 55 (H) mm (4.68" x 3.9" x 2.17")

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EPS Series

EtherCAT slave system and modules



ADLINK's EPS slave system features modular design for flexible high channel density, rugged construction, easy maintenance, and intelligent performance, compatible with 3rd party EtherCAT products. Precise time-deterministic control enables I/O synchronization for critical applications, and FPGA and RISC processor allow users to fully monitor status of EPS modules and systems, including operating temperature and usage cycle of relay switching, as well as motion control status for general purpose motor drive control. In addition, the ADLINK EtherCAT configurator enables auto-scan and configuration across EtherCAT systems. The EPS' unique structural and electronic design supports hot-swappable function, reducing repair time, and the rugged construction and operating temperature range of -20°C to 60°C allow operation in the harshest environments.



	EPS-9905 with EPS-6000
Installed Slots	5 (max.)
Protection Type	IP31
Hot Swap	Yes
Operating Temp.	-20~60° C
Dimension (mm)	130 (L) x 110 (W) x 105 (H)
Weight (estimated)	< 1,000 gram
Power Consumption	6.6W
Supply Voltage	24Vdc (Â±10%)
Environment Certificate	Vibration: 5 Grms, 5-500Hz Shock: 50G, Half Sine 11 ms duration EMC: EN 55011 class A

	EPS-1132	EPS-2032
I/O Type	Digital Input	Digital Output
Channel	32	32
Hot Swap	Yes	
Input / Output Type	Sinking	Sourcing
Input Range (by Voltage/Current)	IEC 61131-2 Type 1/3, 2.3mA	--
Sampling Rate	<1ms	4KHz
Resolution	--	--
Output Current Capacity	--	300mA / ch
Connector Type	Phoenix Contact DFMC	

	EPS-2308	EPS-3216	EPS-3032	EPS-3504	EPS-4008	EPS-7002
I/O Type	Relay Output	Analog Input	Analog Input	Terminal Input	Analog Output	Motion Control
Channel	8	16	32	4	8	2
Hot Swap	Yes					
Input / Output Type	Relay	Differential	Single-ended / Differential	RTD	Single-ended	Pulse-Train
Input Range (by Voltage/Current)	--	0~20mA	+/- 10V	RTD (PT100,500, 1000)	± 10V	PUS/DIR: 4MHz ENC: 20MHz
Sampling Rate	5ms	100KHz	100KHz	5-20Hz	100KHz	--
Resolution	--	16 bit	16 bit	24bit	16 bit	32 bit
Output Current Capacity	AC: 125V @ 0.5A DC: 30V @ 2A	--	--	--	5mA	--
Connector Type	Phoenix Contact DFMC					SCSI VHDCI 68p



EPS-9905



EPS-6000



EPS-1132/ 2032/ 2308/ 3216/ 3032/ 7002



EPS-3504/ 4008

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ADLINK is a Premier member of the Intel® Internet of Things Solutions Alliance. From modular components to market-ready systems, Intel and the 250+ global member companies of the Intel IoT Solutions Alliance provide scalable, interoperable solutions that accelerate deployment of intelligent devices and end-to-end analytics. Learn more at: intel.com/IoTSolutionsAlliance.

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