

Advantech EtherCAT Solutions

• Real Time • Precision • Simplicity • Integration

- Product Portfolio
- Application Cases



EtherCAT®

ADVANTECH

Enabling an Intelligent Planet

www.advantech.com

Powerful embedded motion control software SoftMotion Core

■ Advantech EtherCAT Solution Features



Real Time

- Up to 64 synchronized axes control and communication cycle time = 250us (min.)
- High speed I/O communication cycle time = 200us



Precision

- Embedded RTOS, satisfying real-time motion control requirements



Simplicity

- Dedicated API that satisfies rapid development requirements
- Powerful SoftMotion functions designed specifically for vertical industry applications

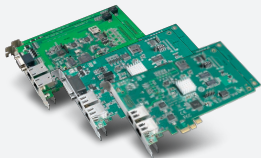


Integration

- Supports 3rd party EtherCAT servo/stepping motors
- Connect EtherCAT slaves automatically, without ESI files

■ EtherCAT Product Offerings

Master



- Supports up to 64 axes synchronized control
- Powerful embedded SoftMotion engine
- Basic script language for deterministic control

Motion Slaves



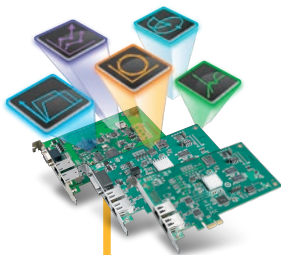
- 4/8-axis EtherCAT to pulse module connecting to pulse-type servo/stepping motors

I/O Slaves



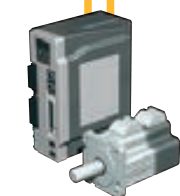
- 16DIO / 32DI / 32DO / 32DIO / 8AI / 4AO modules
- Terminal board (DIN-Rail)
- Compact design

■ Structure

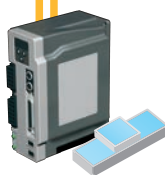


EtherCAT®

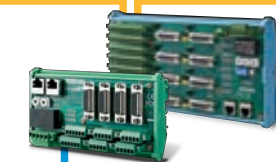
PCI-1203/PCIE-1203/PCIE-1203L
EtherCAT Universal PCI/PCIE Master Card



EtherCAT
servo/stepping
motors



EtherCAT
linear motors



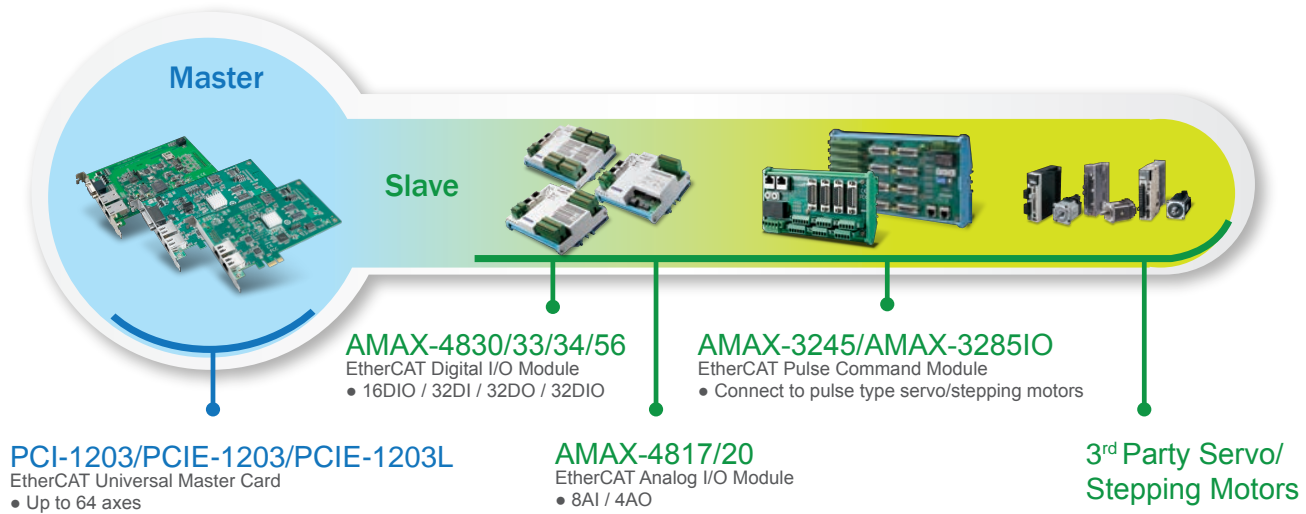
AMAX-3245/3285IO
EtherCAT pulse
module

Pulse Type Servo Motors



AMAX-4830/33/34/56/17/20
EtherCAT remote I/O module

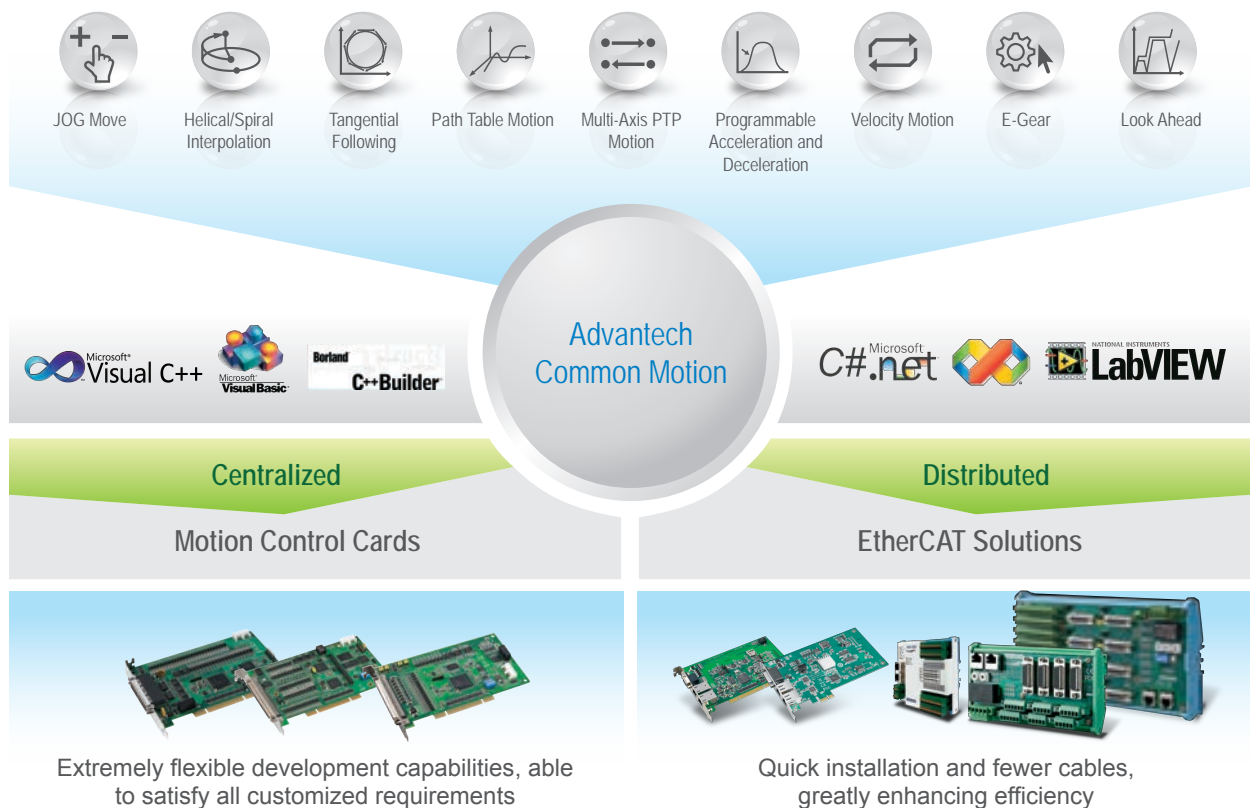
EtherCAT Solution Introduction



■ Advantech Common Motion Software Tool Supports EtherCAT

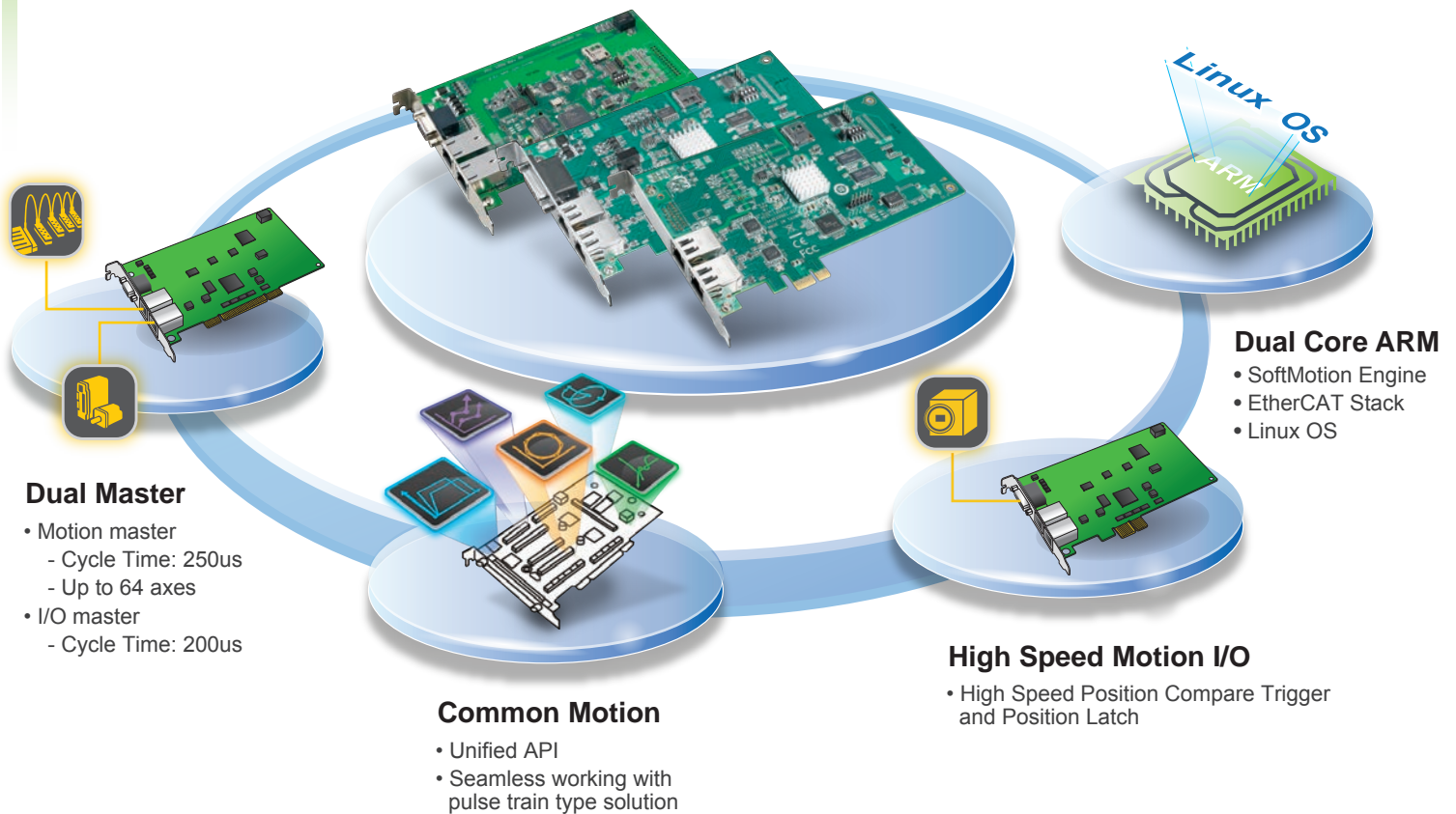
SoftMotion technology, a solution for all types of motion control

Aligned with PC-based control to provide the latest processors, mainstream Ethernet fieldbus, Advantech intelligent motion control product division provides flexible solutions to OEM Machine Makers and System Integrators. The core technologies are based on state-of-the-art DSP/FPGA/SoC processors, Advantech's own SoftMotion kernel for trajectory and control, EtherCAT motion bus, and a configuration utility. Advantech provides a universal software development environment, called Common Motion, in which users do their development. All Advantech motion controllers are applied in "Common Motion API" architecture. The programmer can benefit from integrating any Advantech SoftMotion controller, without large-scale changes to the application code, to save effort on application maintenance and upgrades.





EtherCAT Master Card: PCI-1203/PCIE-1203/PCIE-1203L



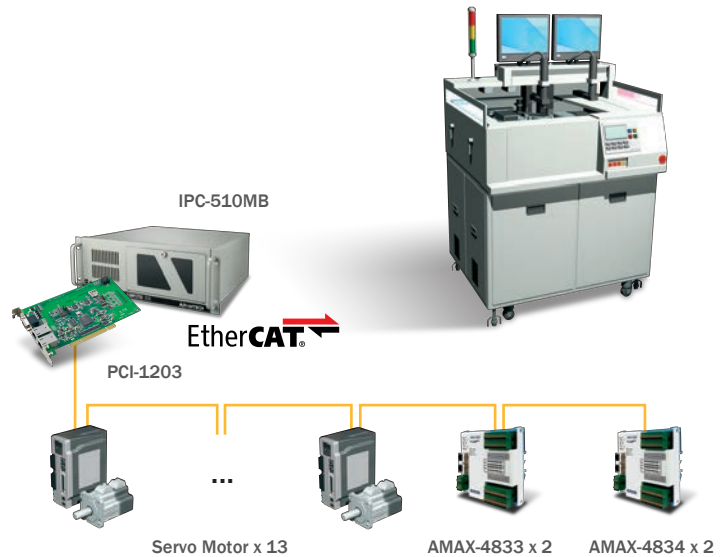
Application Cases

■ LED Chip Sorter

In back-end LED sorting process, as the blue tape that is stuck beneath the LED chip is peeled off, because the bottom pin needs to be re-positioned to the film on top to allow the LED chip that is to be sucked away to be removed by the upper suction pod. During high-speed movement, the impact strength of the upper pin may be too strong, causing the LED chip to crack. In addition, to shorten the motion cycle period, the swing arm must conduct short, high-speed movements, which involve rapid acceleration/deceleration. To ensure that the mechanism can endure these vibrations, most machines decrease the speed and consequently decrease throughput. The term Backend refers to dicing the wafer into individual chips and all the processes thereafter, such as test, assembly and packaging. The goal of inline packaging inspection equipment is to provide high precision 100% analysis while maintaining high throughput.

System Instruction

In this high speed pick & place application, to ensure that rapid pick and place processes did not cause the eject needle to damage the LED dies, PCI-1203 provided a "Torque Limit Table" function. The "Torque Limit Table" was set up preemptively, giving a location list in which the maximum torque parameter of the motor at every location was designated; maximum torque value was sent to the servo drive at every DDA cycle. PCI-1203 also provides a "PT/PVT" function to smooth the continuous trajectory and acceleration.



Conclusion

In this case, the "Torque Limit Table" functions enabled the equipment motion cycle to be greatly shortened (Period = 0.15 sec/chip; UPH = 24,000ea/hr); the "PT/PVT" function fulfilled the user-defined S-curve according to the machine's characteristics, and vibration suppression was also achieved. In addition, the PCI-1203 also supports 13-axis synchronized control. All machine behavior can be efficiently developed using Advantech's powerful and flexible SoftMotion API.

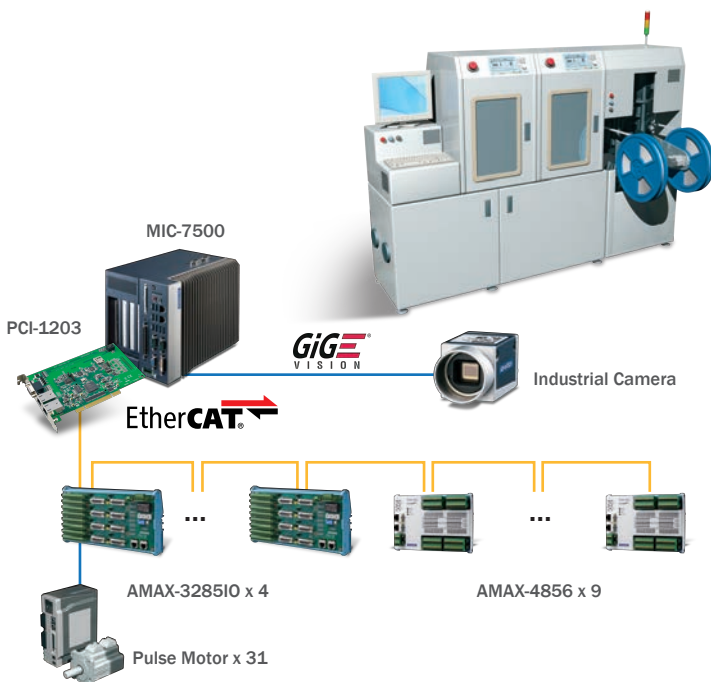
■ Integrated IC Packaging Machine

To deal with faster and more powerful chip technology, semiconductor process linewidth technology has continued to evolve down to the nano level, and the backend of semiconductor processes also needs to provide a shorter production cycle, in order to increase production throughput per unit of time. With the diversification of semiconductor end products, including flash memories, logic chips, analog chips etc., the backend of a semiconductor process has to integrate multiple processes into a single machine, reducing the variety of machines required on the production line and thereby greatly shortening the production cycle. The integrated machine itself also has to be able to provide for faster production, complemented with optical inspection to decrease the rate and cost of manual errors, which is also a very important factor. Due to limited space, the size of the machine itself is not allowed to increase due to integrated functions, so the setup of the control is a key factor to be considered. Not only does it affect the time and cost of on-site setup, but also influences the maintenance effort required. Multi-axis synchronized motion control complemented with optical inspection can be used for a vendor's integrated applications, from laser inscription, to inspection, to packaging.

System Instruction

PCI-1203 provides accurate, 31-axis, synchronized motion control by connecting pulse-type servo drives/motors through AMAX-3285IO. PCI-1203 is also equipped with error protection in gantry motion. The AMAX-4856, an 32DI/32DO industrial EtherCAT slave module, satisfies high density I/O requirements.

Advantech vision solutions including vision software and industrial camera s realize high accuracy vision inspection and positioning on highly efficient computing platform MIC-7500 series.



Conclusion

In this case, the PCI-1203 supports synchronized control for 31 axes (including 2 gantry axis controls) along with huge I/O control, sufficiently demonstrating the high-speed/high accuracy control capabilities of the PCI-1203. The AMAX-3285IO connects EtherCAT master and pulse-type servo/stepping motors and provides high-speed compare trigger and position latch functions. Advantech M.V.P. (Motion, Vision, Platform) provides a powerful SoftMotion API, complete vision product portfolio, and a highly efficient computing platform to satisfy rapid development requirements.

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