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- **ASDA-A2/B2 Series AC Servo Motors & Drives**
- **DMCNET Motion Control System**

Project Manager
Winex Yang

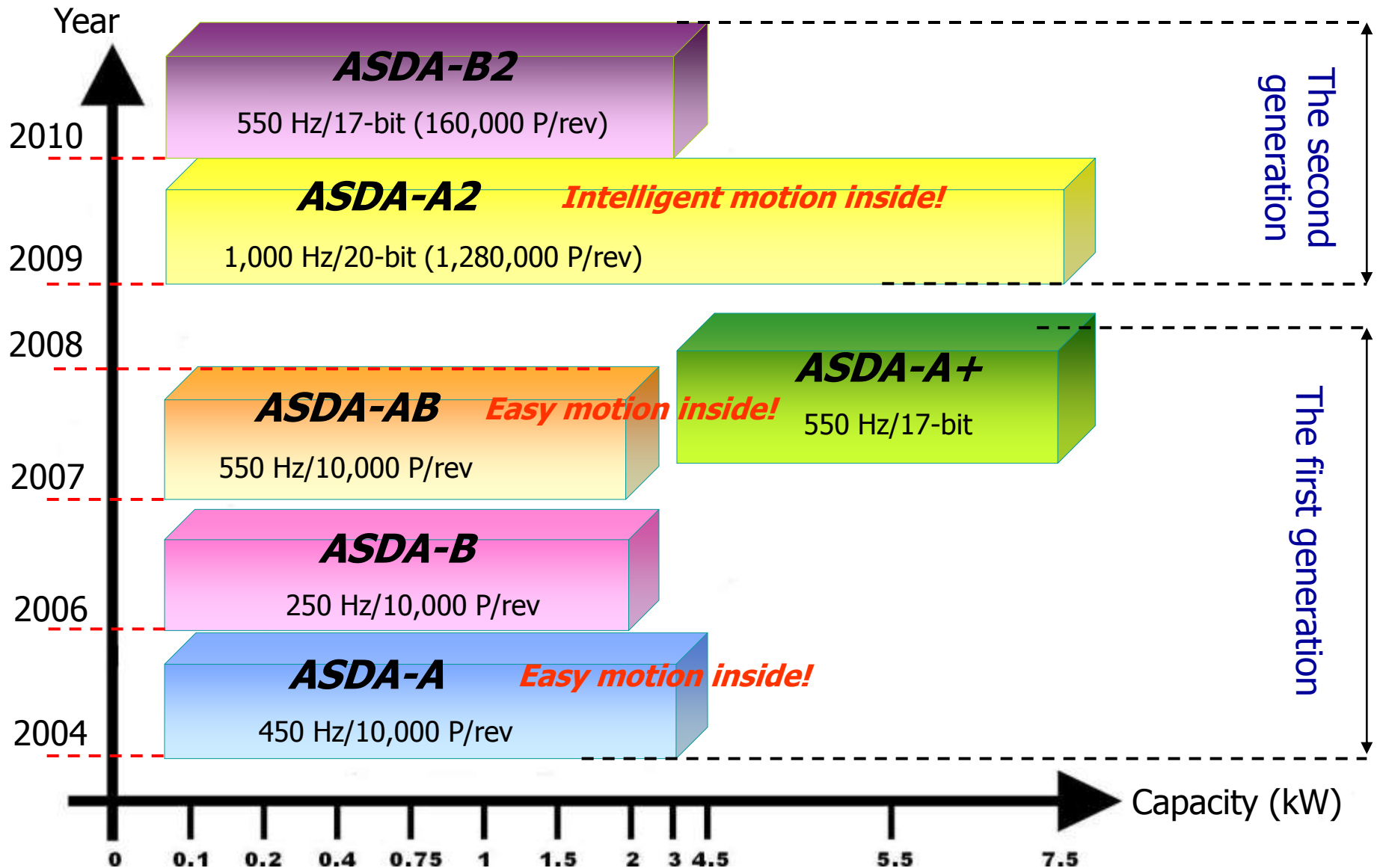
Agenda

- Development of Delta servo products
- Roadmap for new products
- Features of ASDA-A2/B2
- Market position
- Competitors
- Delta DMCNET



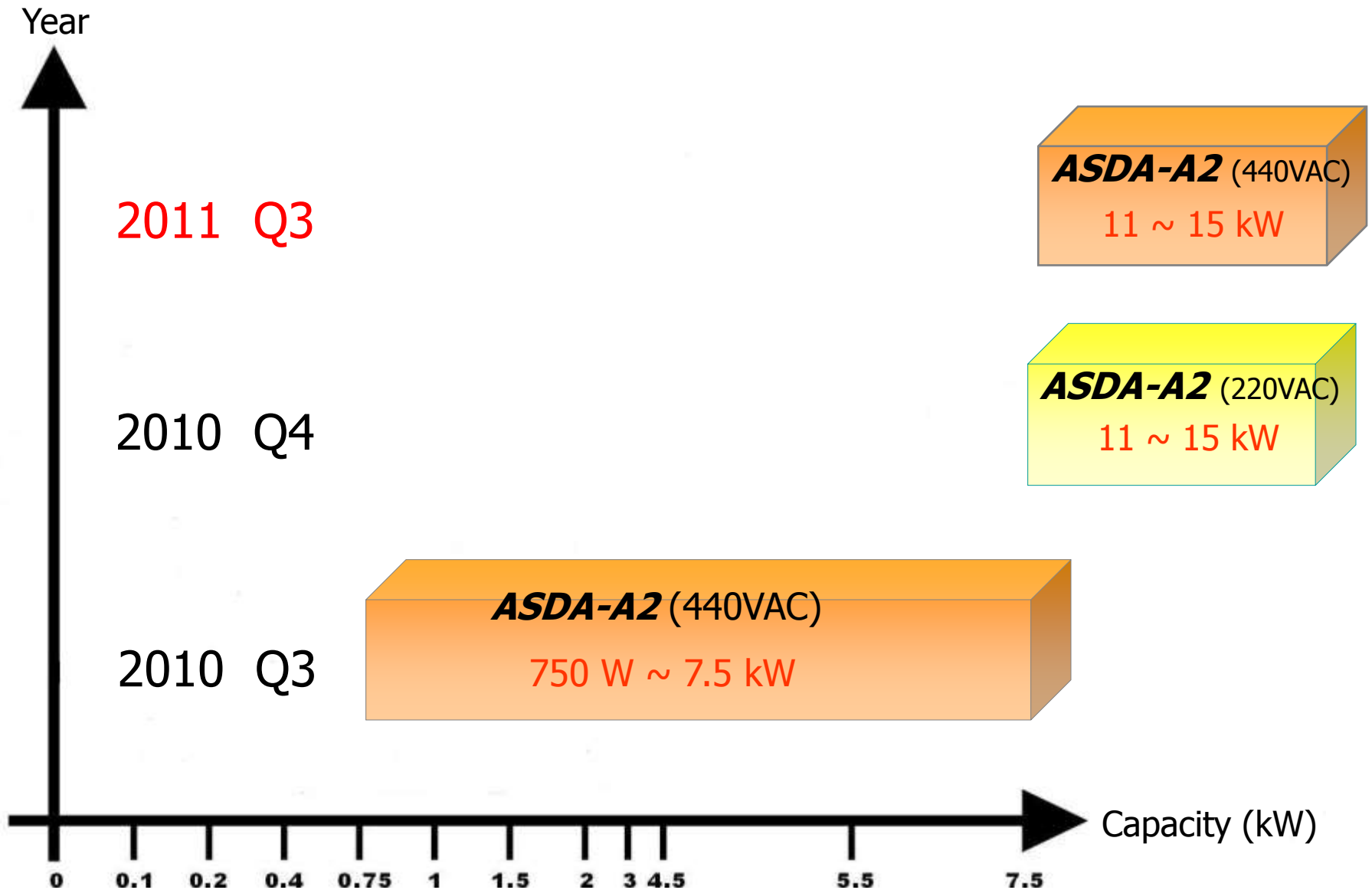


Development of Servo Products – 220VAC





Roadmap for ASDA-A2 - 220V & 440V



Features of ASDA-A2 (1)

Drive with Motion Control inside!



Field controller



Pure servo



Drive + motion controller

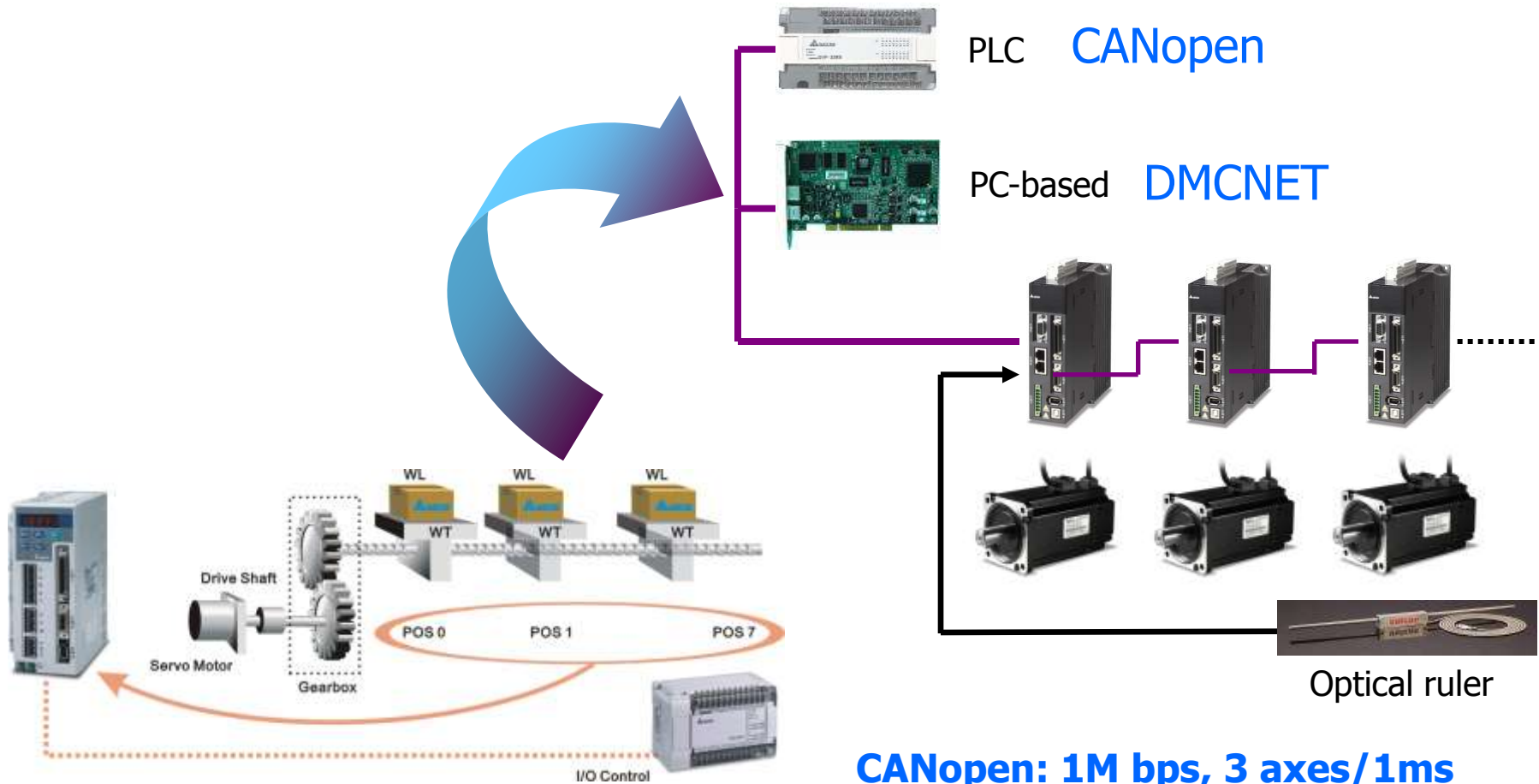
- *Electronic cam*
- *Flying rotary cut*
- *Flying saw*
- *Internal PR mode (64 sets of procedures)*
- *Gantry*
- *35 sets of homing search models*
- *Data Capture & Data Compare*



PLC

Features of ASDA-A2 (2)

High-speed Network Structure (full closed-loop)



Internal I/O + Modbus RTU / Pulse IF

CANopen: 1M bps, 3 axes/1ms
DMCNET: 20M bps, 12 axes/1ms

Features of ASDA-A2 (3)

High Resolution & Large Capacity Servo Motors!

ASDA-A/AB/B series

Resolution: 10,000 p/rev
0.1 ~ 3.0 kW
INC encoder

ASDA-A2 series

Resolution: 20-bit (1,280,000 p/rev)
0.1 ~ 15kW
INC/ABS encoder

ASDA-B2 series

Resolution: 17-bit (160,000 p/rev)
0.1 ~ 3kW
INC/ABS encoder



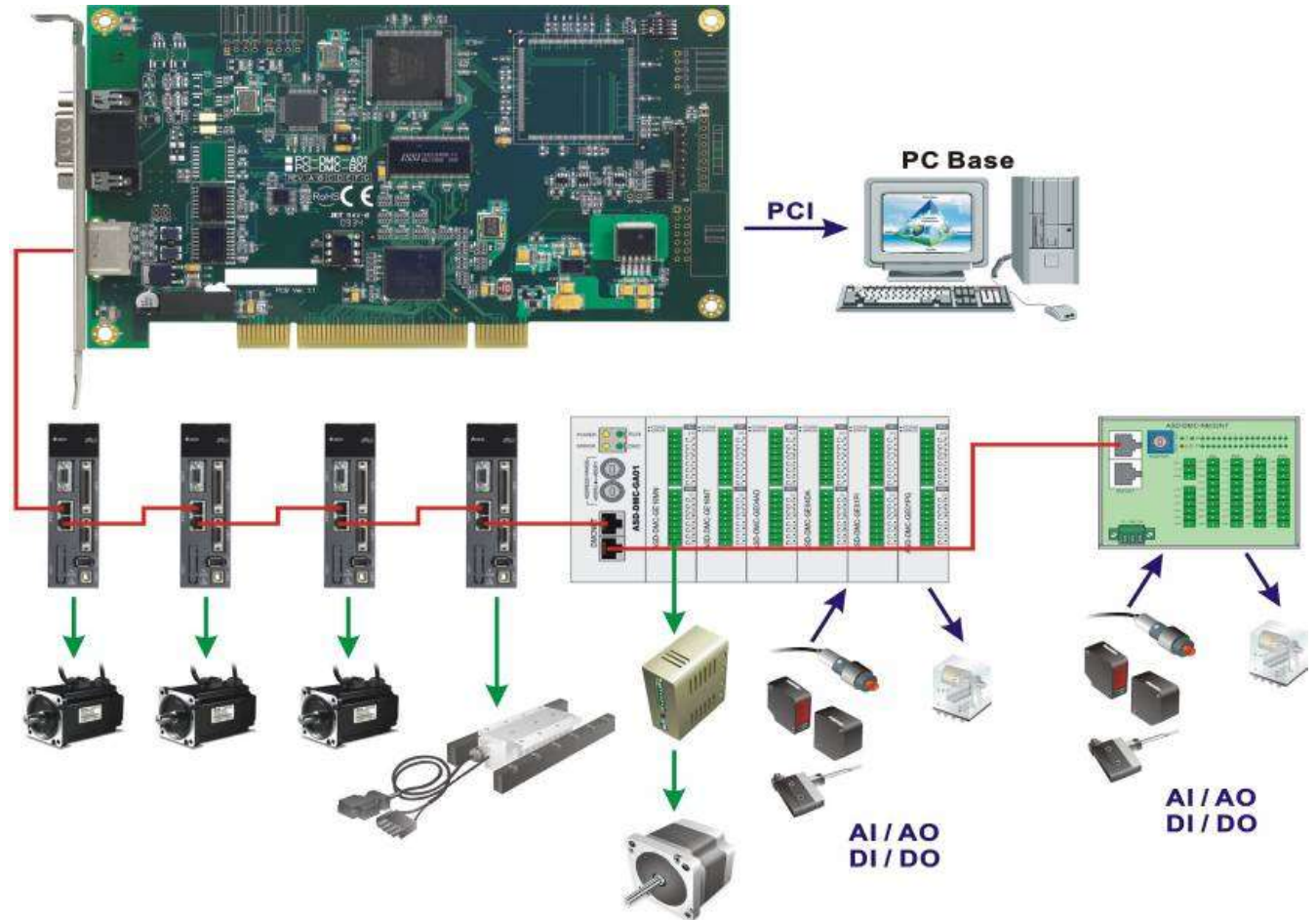
ASDA-A2 (12 axes) in DMCNET

DMCNET™
Delta Motion Control Network

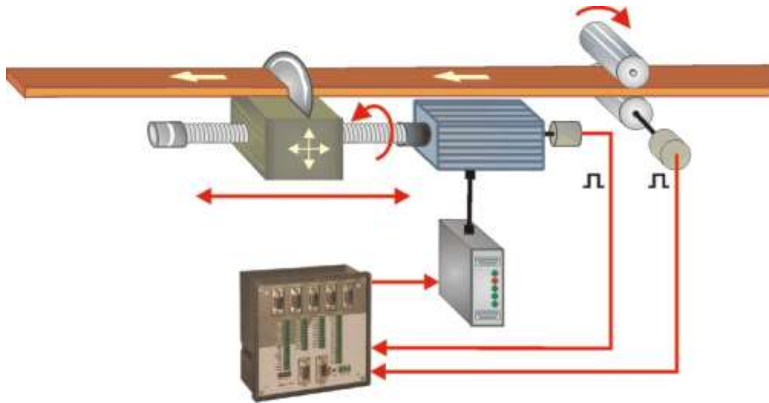
DMCNET = Delta Motion Control Network

PCI Motion Card

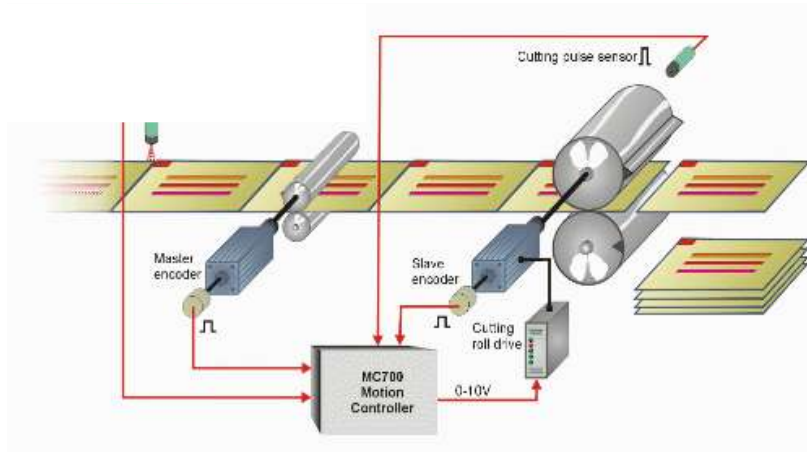
- Communication baudrate: 20M bps
- Command update rate: 12 axes/ms



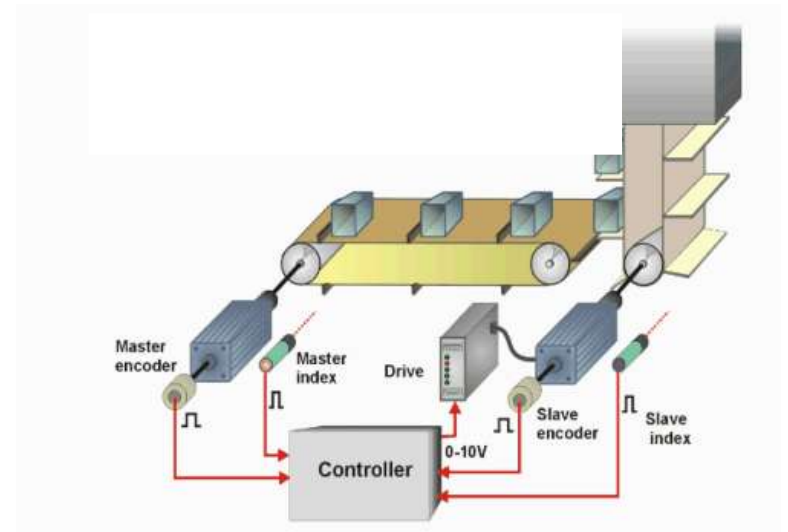
Applications for Electronic Cam



Flying saw



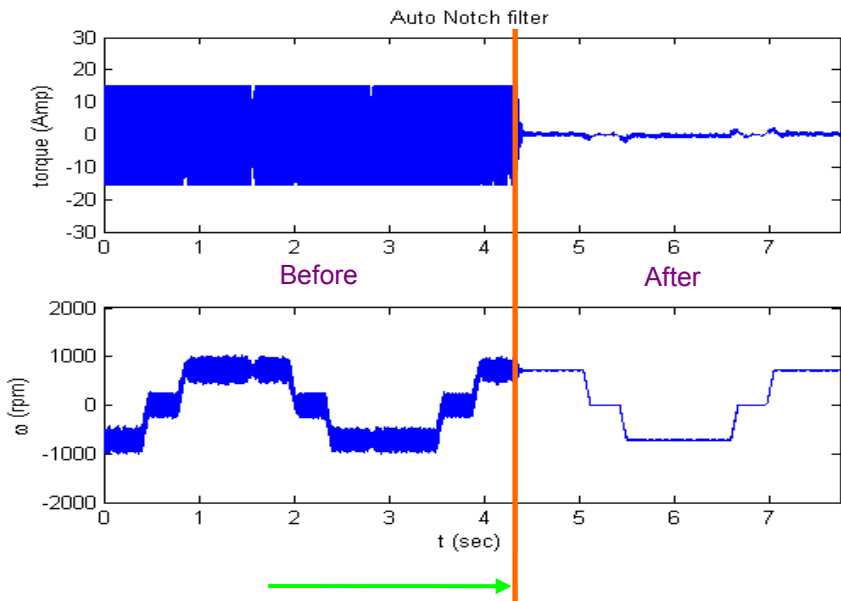
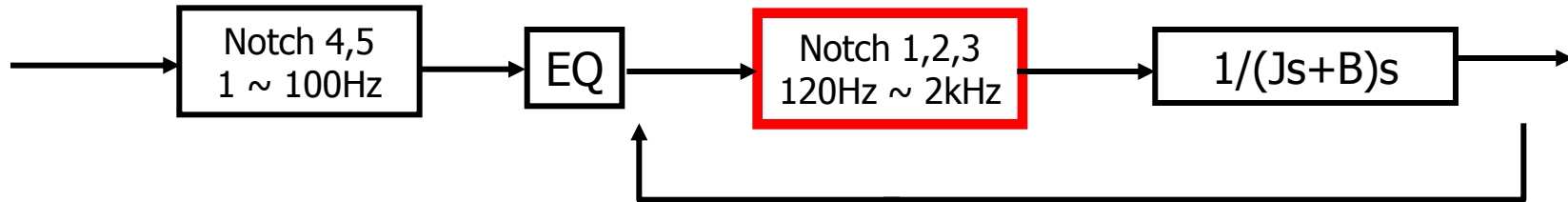
Rotary cut



Synchronous control



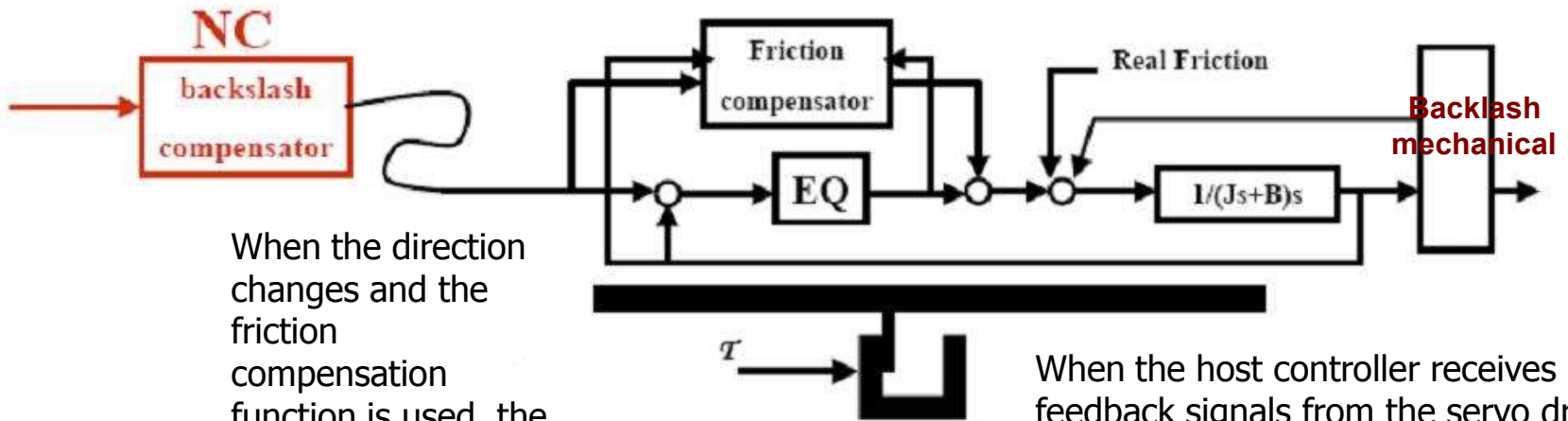
High Frequency Resonance Suppression



Built-in auto high frequency resonance suppression:

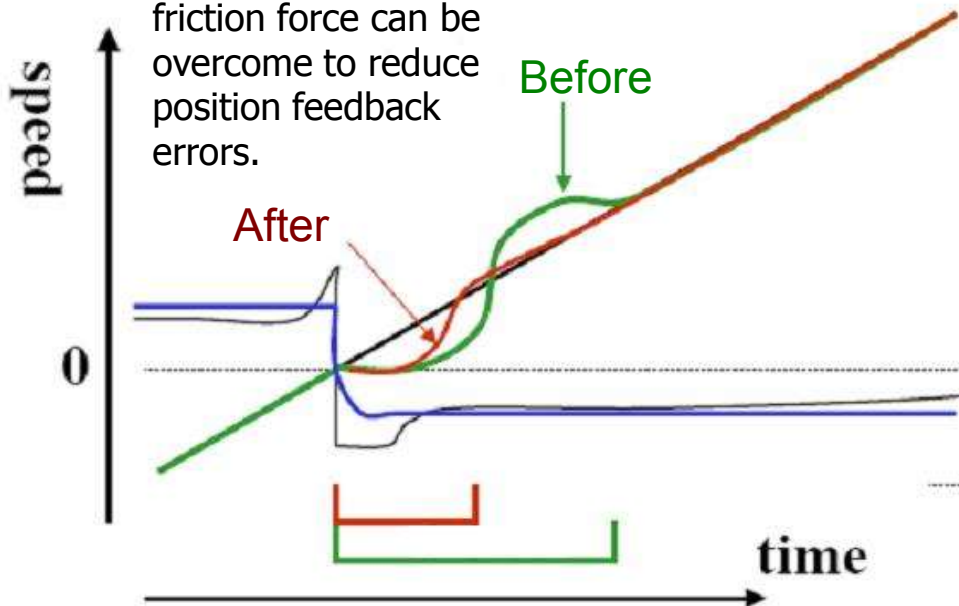
2 auto and 1 manual notch filters are provided to suppress mechanical resonances.

Friction Compensation

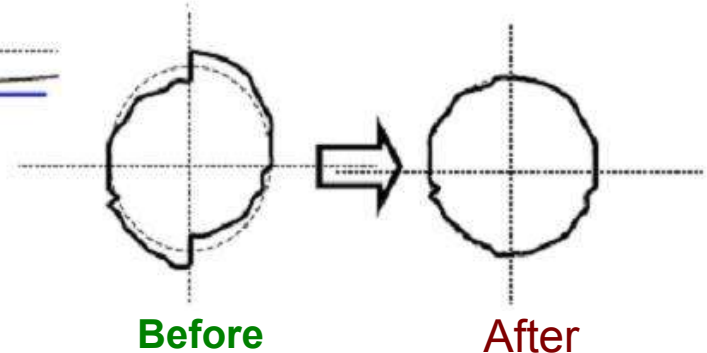


When the direction changes and the friction compensation function is used, the friction force can be overcome to reduce position feedback errors.

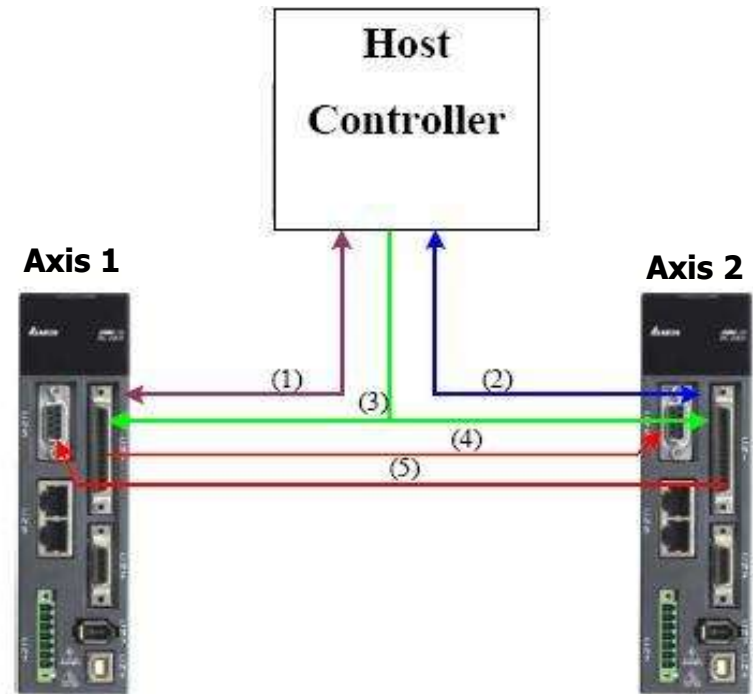
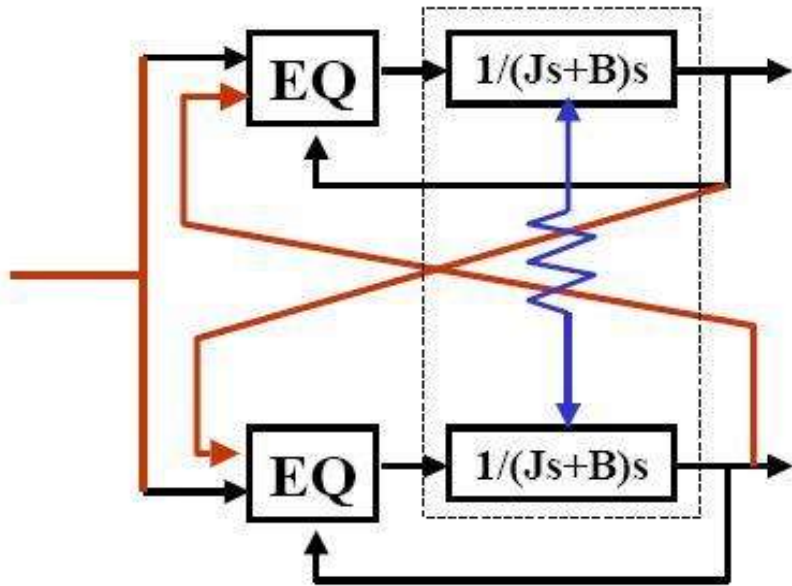
When the host controller receives feedback signals from the servo drive, it will start to perform internal calculations and command the servo drive to adjust the values for backlash and time constant.



The host controller does not provide the friction compensation function, but the servo drive does.



Gantry Structure



- Host sends DI/O signal to Axis 1.
- Host sends DI/O signal to Axis 2.
- Host sends pulse commands to Axis 1 & 2.
- Axis 1 encoder signals are sent to Axis 2 as the position reference command.
- Axis 2 encoder signals are sent to Axis 1 as the position reference command.

ASDA-B2: Product Position

Second Generation 17-bit General Purpose Servo!

- ASDA-B2 is expected to replace ASDA-B and general purpose Japanese brand servos (13/17-bit).
- Pure servos and high-level stepping motors.
- ASDA-B2 series has 17-bit high resolution and 500Hz frequency response.
- Satisfies **90% of mid- and entry-level applications**, e.g. food processing, packing, plastic/textile machinery.





Comparison of Delta Servos (1)

Feature	ASDA-B	ASDA-A/AB	ASDA-B2	ASDA-A2
Input phase	220V	220V	220V	220V/440V
Encoder resolution	10,000 P/rev	10,000 P/rev	17-bit (160,000 P/rev)	20-bit (1,280,000 P/rev)
Output capacity	0.1 ~ 2 kW	0.1 ~ 3 kW	0.1 ~ 3 kW	0.1 ~ 15 kW (220V) 0.75 ~ 15 kW (440V)
Max input pulse frequency	200Kpps (Open Collector) 500Kpps (Line Receiver)	200Kpps (Open Collector) 500Kpps (Line Receiver)	200Kpps (Open Collector) 500K/4Mpps (Line Receiver)	200Kpps (Open Collector) 500K/4Mpps (Line Receiver)
ABS encoder	None	None	Optional	Optional
A/D input	2	2	2	2
D/A output	0	2	2	1



Comparison of Delta Servos (2)

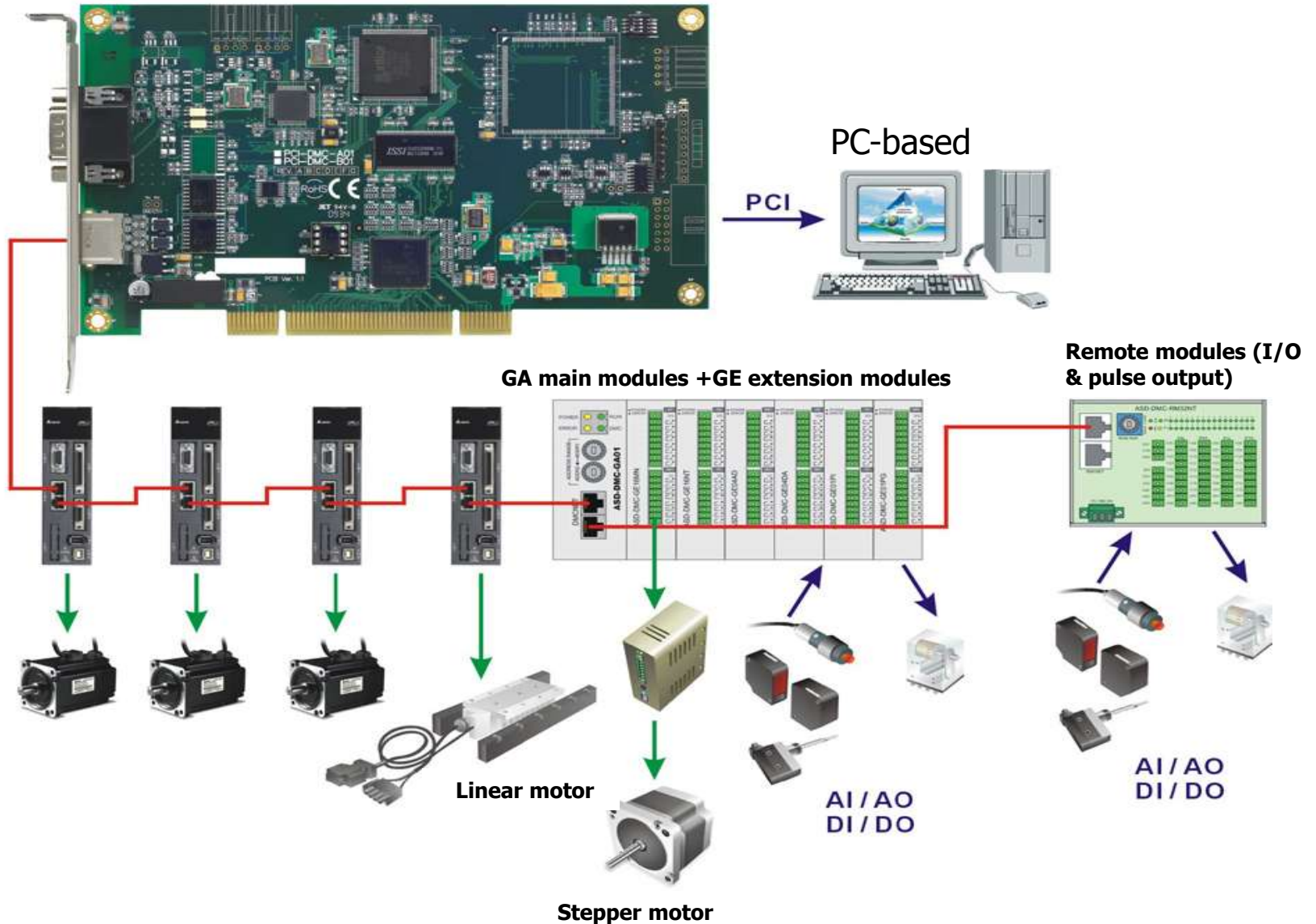
Feature	ASDA-B	ASDA-A/AB	ASDA-B2	ASDA-A2
Frequency response	250 Hz	450 Hz	550 Hz	1,000 Hz
Digital input	6	8	9	8 (+6)
Digital output	3	5	6	5
Communication interfaces	Modbus RS-232/485	Modbus RS-232/ RS-422/485	Modbus RS-232/ RS-422/485	USB 1.1 Modbus RS-485 CANopen DMCNET
Full closed-loop	None	None	None	Yes
Internal position mode	None	Yes	None	Yes
Electronic gear ratio	Yes	Yes	Yes	Yes
Electronic cam	None	None	None	Yes

Competitors

Company	Delta	M company	P company	Y company
Type	ASDA-A2	3- □ A	4 /5	III / V
Frequency response	1,000 Hz	2.1 kHz	1 kHz/2 kHz	600 Hz/1.6 kHz
Max. input pulse frequency	Line receiver: 4Mpps Line driver: 500kpps Open collector: 200kpps	Line receiver: 1Mpps Open collector: 200kpps	Line receiver: 2Mpps Line driver: 500kpps Open collector: 200kpps	Line driver: 1Mpps Open collector: 200kpps
Output capacity	0.1 ~ 15 kW	0.1 ~ 7 kW	0.1 ~ 4.5 kW	0.05 ~ 5kW
Encoder resolution	20-bit (128,000,000)	18-bit	10,000 P/rev 17-bit	17-bit/20-bit
Communication interface	CANopen (1Mbps) Modbus (RS-485/RS-232) DMCNET	(J3- SSCNET III)	RS-485/RS-232	None (SGDS- □ □ □12 has MECHATROLINK II/III)
Built-in DC24V	Yes	Yes	None	None

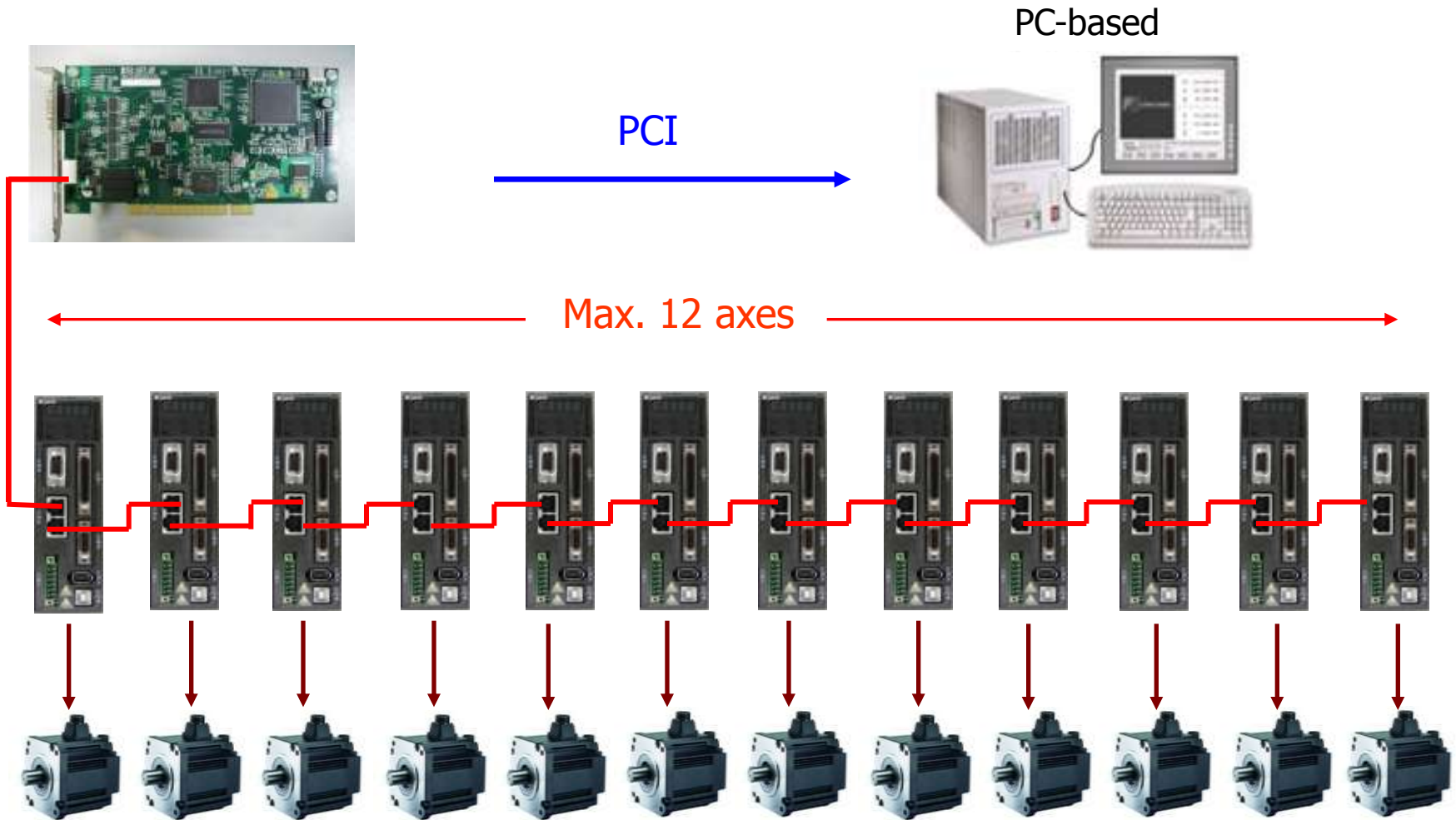
- System structure
- System strengths
- Pulse motion card vs. Delta communication motion card
- Delta DMCNET vs. Japanese brands
- Delta servo motors (ASDA-A2-F)
- Comparison between different servo motors

DMCNET System Structure (1)



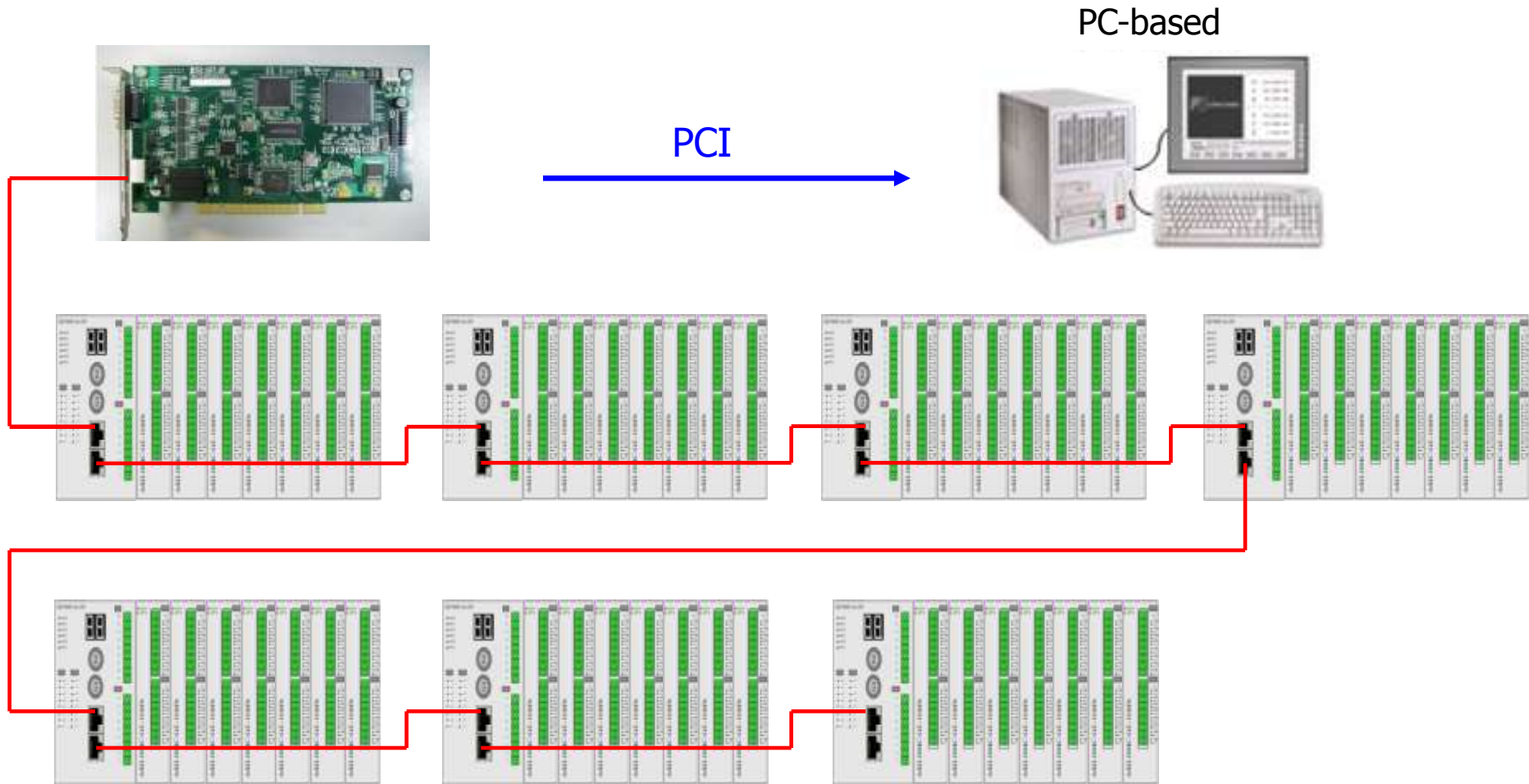
DMCNET System Structure (2)

○ The Pure Motion NET Structure

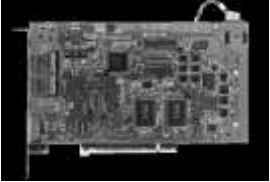



DMCNET System Structure (3)

○ The Pure I/O NET Structure



Comparison of Motion Cards

	 General motion card	 Delta PCI-DMC-A01
CPU	No (Need CPU resources from PC)	Yes (Motion card includes TI DSP)
Cabling problem & maintenance working time	Very long cabling & maintenance time, high cost. Noise often makes the system unstable	Saves cabling & maintenance cost to almost zero; no noise problems to digitalize signals
Command cycle time	No (no fixed cycle time)	Yes (1ms/fixed cycle time)
Motion mode	Velocity/position mode cannot be changed at any time	Velocity/position/torque mode can be changed at any time, can do complex trace algorithms
2 axes or 3 axes of synchronized interpolation	No	Yes (4 groups x 3 axes of interpolation)
Special motion functions	No	Yes (3 axes of helix interpolation)
Data transfer rate	1 ~ 6.5 M/s	10 M/s

- High speed : 10 Mbps communication speed
- Cable distance: 30m
- Highly reliable network structure (redundancy)
- The highest communication efficiency (time slot function)
- Fixed command cycle time: 1ms (12 axes synchronization)
- Max. connection nodes: 12
- Versatile connectable devices: Motion Net (A2-F), I/O Net, stepper motors, linear motors .
- Changing modes at the same time: Velocity, Position, Torque



Delta DMCNET vs. Japanese Brands

	Delta DMCNET	Mitsubishi SSCNET II	Yaskawa Mechatrolink II	Fuji SX Bus
Transmission speed (Mbps)	10	5.6	10	25
Communication cycle (ms)	1	0.888	1	1
Communication distance (m)	30	30	50	20
Max. linked axes	12	6	30	6
Redundancy	Yes	No	No	No
Extension I/O modules	Yes	No	Yes	Yes
Price level	Inexpensive	General	Expensive	General



Q & A
