



New Technologies for PC-Based Measurement and Automation

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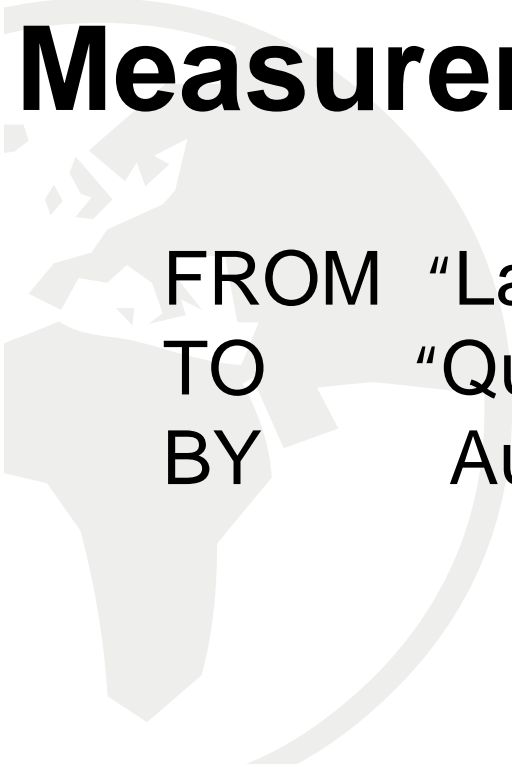


Agenda

- ❑ PC- Based Automation / Vision / Measurement
- ❑ PAC (Programmable Automatic Controller) and Automation
 - PC-based controller
 - Distributed I/O
 - Distributed Motion
- ❑ Compact Vision system and PAC
 - Image Capture
 - Interface
 - Computing Vision System
- ❑ PC/PXI Based Measurement Development
 - PXI and Modular Instruments
 - PXI : A successful Platform fro various applications
- ❑ Summary

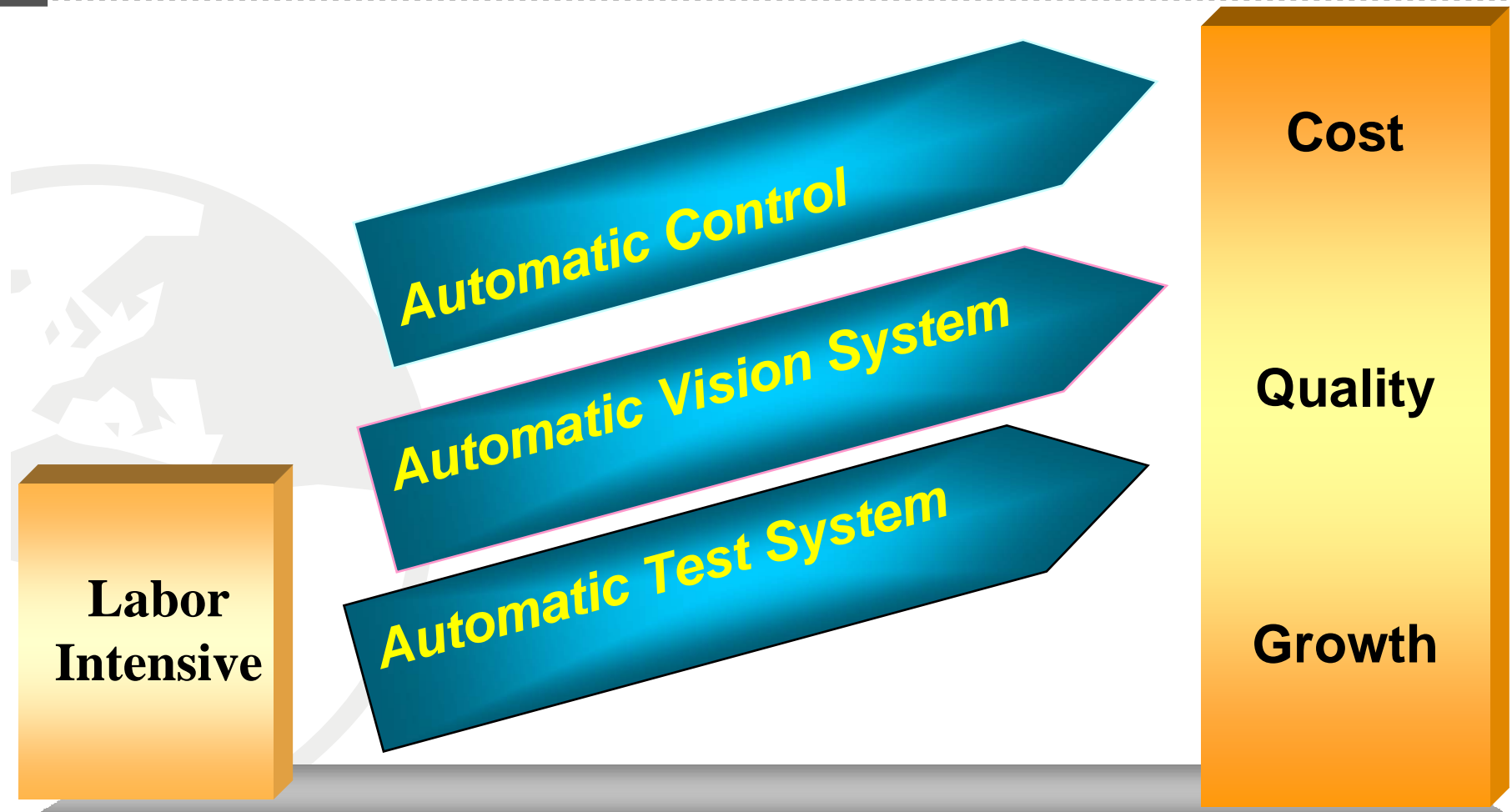


New Technology for PC-Based Measurement and Automation



FROM "Labor Intensive "
TO "Quality and Competitiveness "
BY Automated Machine and Test System

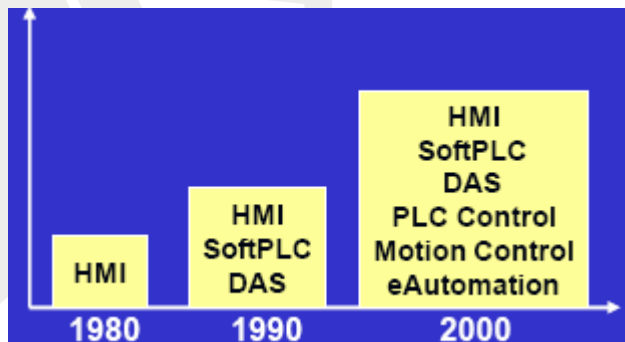
From Labor intensive to Quality and Growth



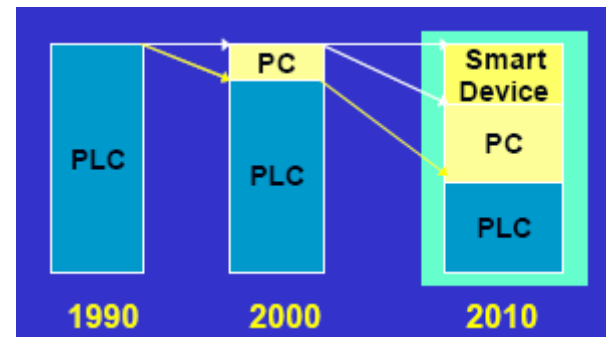
PC-based Controller in Automation

- ❑ PC-based Controller is Open Architecture
 - PC has integrated many functionalities in Automation field since 1980
- ❑ From Siemens Forecast
 - PC-based controller will dominate 30% automation market until 2010

PC in Automation Field



Platform Transformation



Trend in Automation Market

- PAC Combines PC and PLC

- ❑ PLC Lacks Vision Solution
- ❑ PAC is PC-based to Integrate **I/O, Motion, Vision & HMI**
- ❑ PAC is Flexible to Integrate Variety of Functions than PLC. **Higher C/P** Value than Traditional PLC
- ❑ **Distributed & Faster** Bus is the Future Trend



PLC in the Past



PC-based Recently

PAC, PC, PLC Comparison

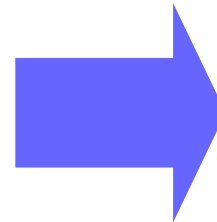
	PLC	PAC	PC
Storage	RAM, EEPROM	RAM, EEPROM, Compact Flash	RAM, Hard Drive
OS	Closed, Real-time	Embedded, Real-time	Versatile
Application	Automation, Relay Control, Timer Control, Counter Control, Sensor & Actuator Control	Automation, Vision Inspection, Numerical Analysis	Automation, Vision Inspection, Numerical Analysis
Advantages	<ol style="list-style-type: none"> 1. Small Size 2. Easy to Maintain, High Reliability 3. Suitable for tough industrial environment 4. Modulized Design 	<ol style="list-style-type: none"> 1. Compact Size 2. Memory is cost-effective 3. AD/DA, Motion Control Module are cost-effective than PLC 4. High Ethernet Connectivity 5. Easy to Link to Database 6. Multi-tasking & Treading 7. Easy to Integrate Vision Solution 8. High Reliability 	<ol style="list-style-type: none"> 1. Memory is cost-effective 2. AD/DA, Motion Control Module are cost-effective than PLC 3. High Ethernet Connectivity 4. Easy to Link to Database 5. Multi-tasking & Threading 6. Easy to Integrate Vision Solution
Drawbacks	<ol style="list-style-type: none"> 1. Storage is limited and expensive 2. Lack of vision solution. Need IPC to realize. 3. CPU Low Calculation Power 		<ol style="list-style-type: none"> 1. Size is bigger 2. Low reliability

Distributed I/O in Automation

❑ Fast Fieldbus Instead of PCI

- Compact size PC-based controller
- Save wires & cost
- Flexible configuration

Save 20% at least from customer experience



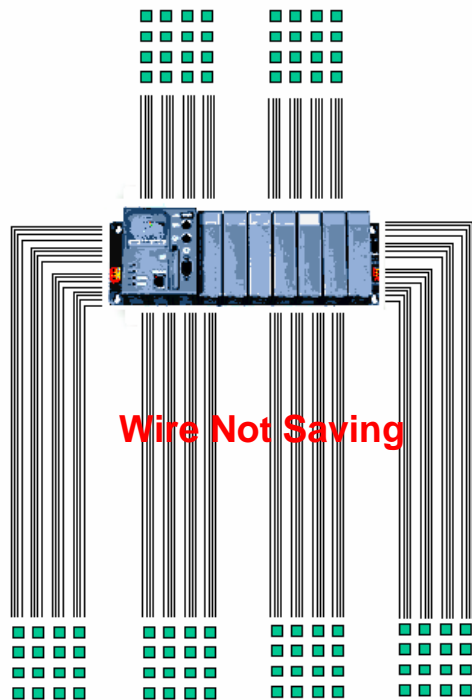
Fieldbus – HSL & Motionnet bus

To other distributed device

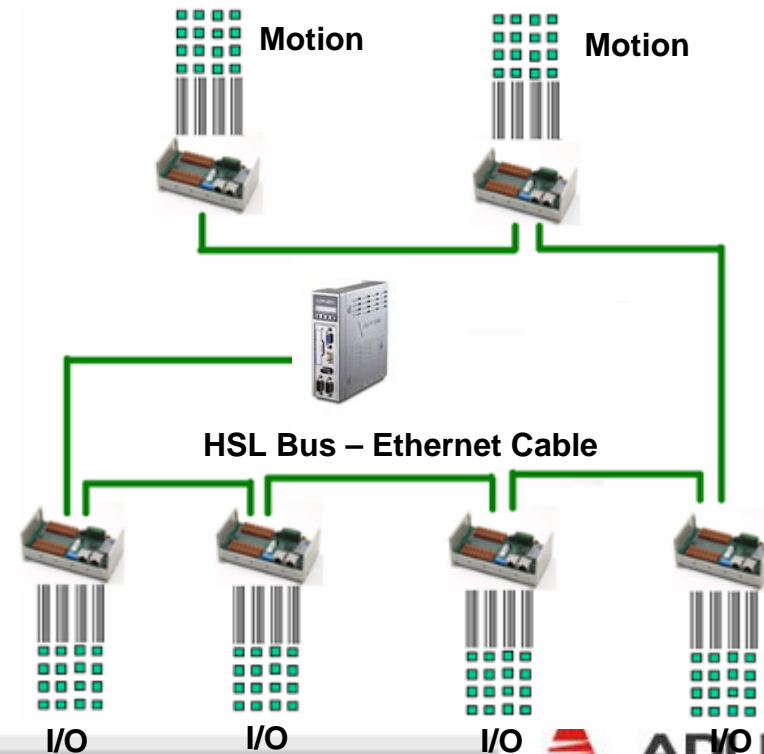


Distributed I/O in Automation

- ❑ Save Wires & Flexible Configuration
- ❑ Easy maintenance
- ❑ Lower total cost of ownership



VS.



Distributed Motion in Automation

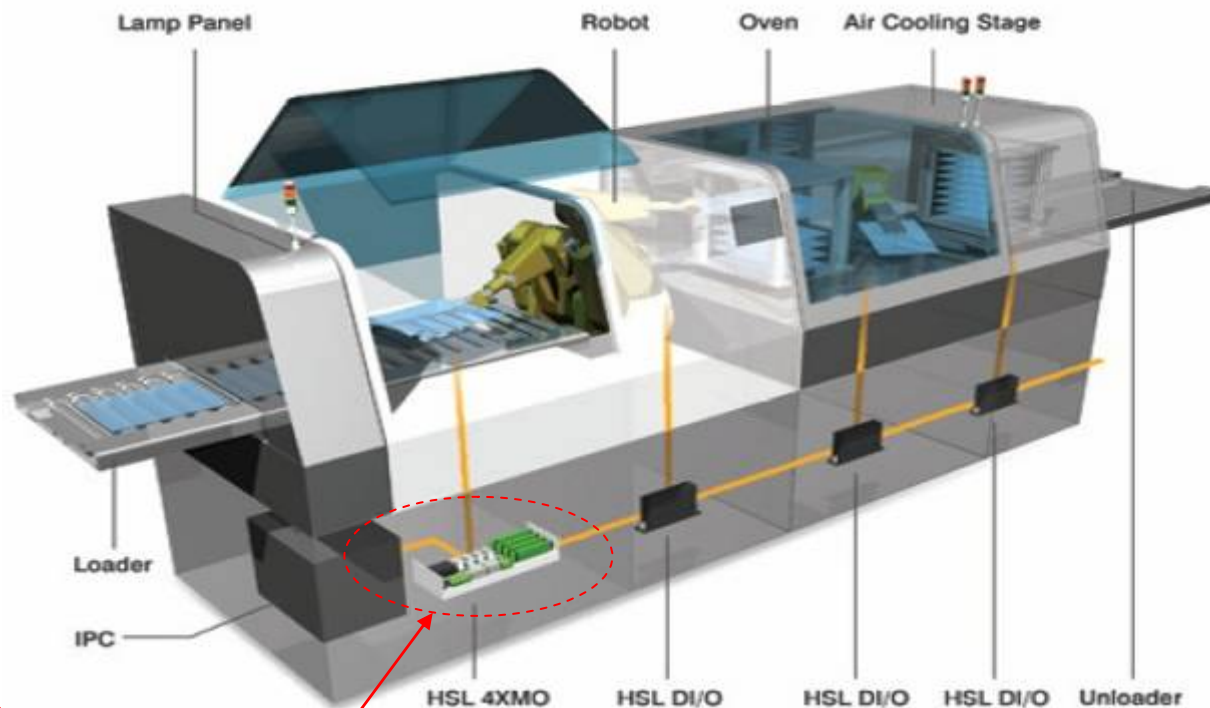
❑ ADLINK HSL Bus Motion Solution

- Meet multiple axes control purpose up to 60 axes
- One bus to integrate I/O & Motion together



HSL-4XMO

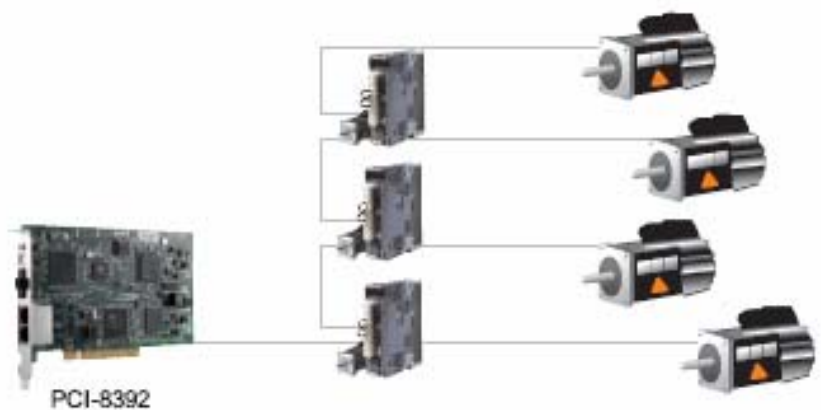
Advanced 4-axis pulse train controller



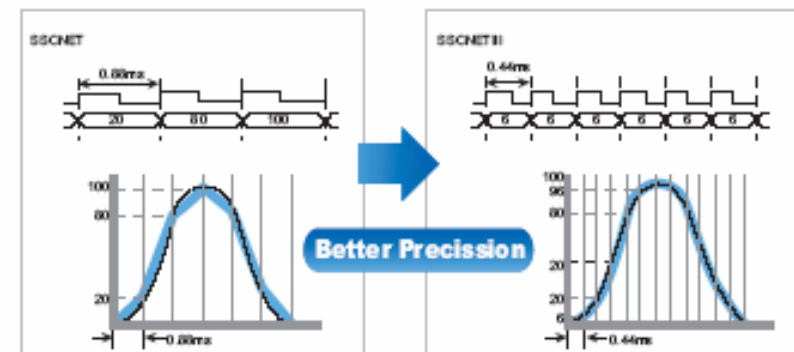
Distributed Motion in Automation

❑ ADLINK SSCNET Motion Solution

- Servo serial to reduce wiring effort
- Meet high speed & high resolution (18-bit) control simultaneously
- Best synchronization performance



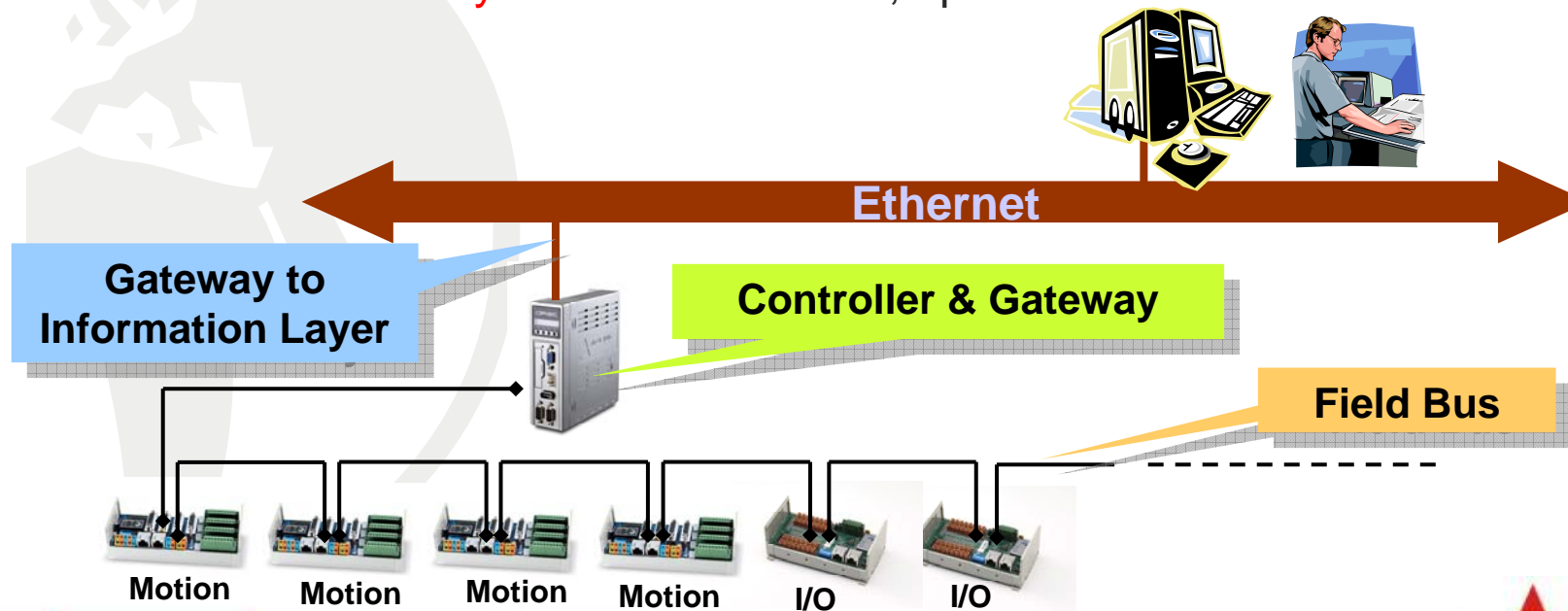
... up to 16 axes in
SSCNET III network



Source: Mitsubishi Electric Corporation

Distributed PAC Concept

- ❑ DPAC = **D**istributed **P**rogrammable **A**utomation **C**ontroller
 - **D**istributed control by Field Bus
- ❑ Concept
 - **Single Controller** with **Time-deterministic & Fast Field Bus** to control I/O, motion, even vision
 - **Gateway Server** to Ethernet, uplink to central information server



DPAC-3000 Solution

- Integrate I/O, Motion with HSL & Motionnet bus for MA/FA application

- ❑ Programming Automation Controller with Distributed Module
 - Save wiring
 - Support multiple I/O & motion
 - HSL bus scanning cycle time: 945us at maximum (under 12Mbps)

Uplink to Ethernet

USB 2.0 CCD

Panel as HMI (Human Interface)

VGA

RS-485 with Auto Flow control. Without converter, users can connect NuDAM module directly

HSL Bus – Ethernet Cable

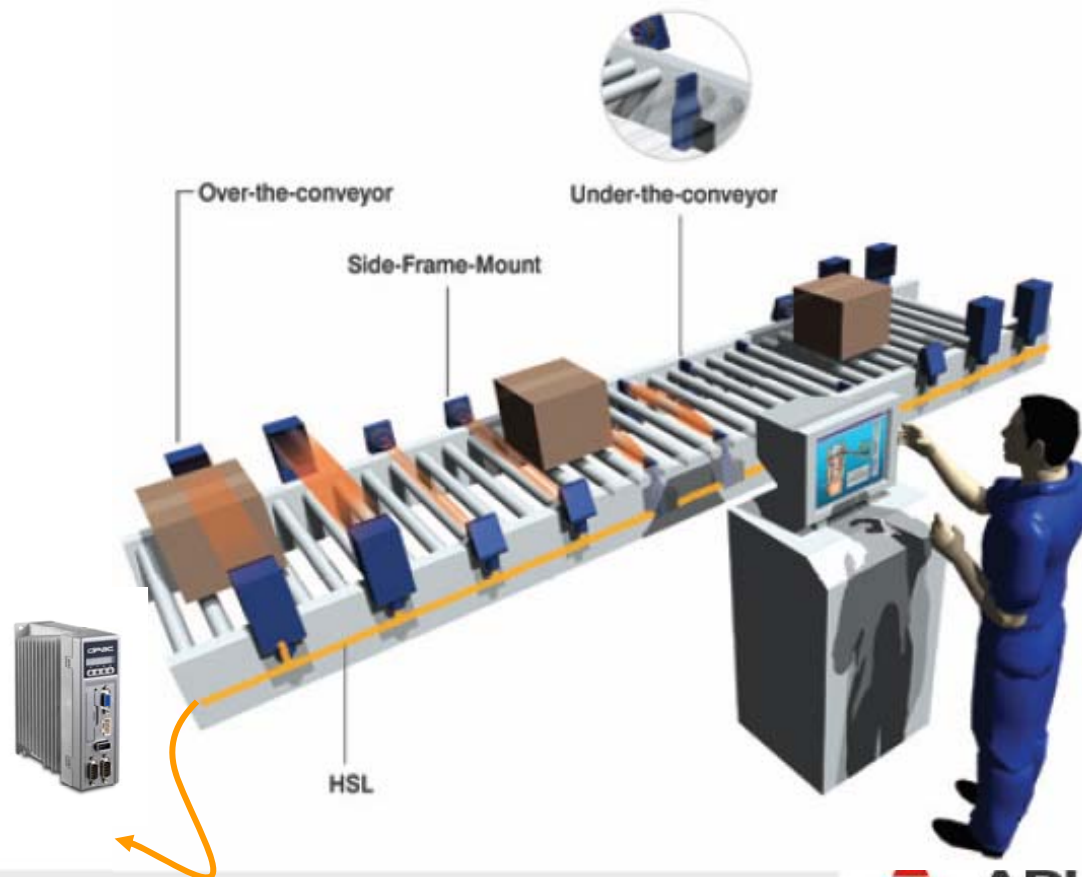
Maximum: 63 IDs / Cycle time : 945us (Max)

DPAC Application (1/3)

□ Goods Conveyor

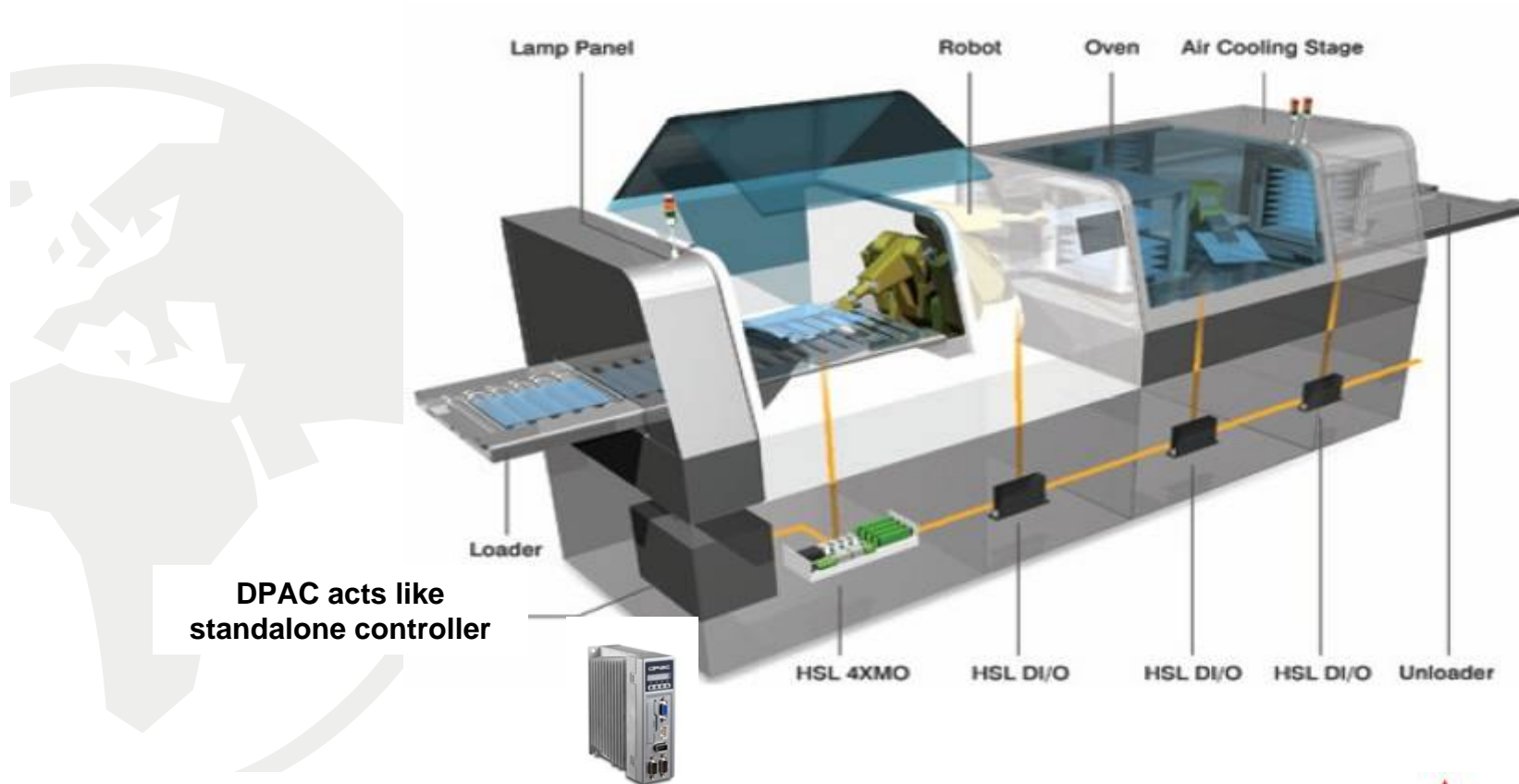


Good Conveyor Management



DPAC Application (2/3)

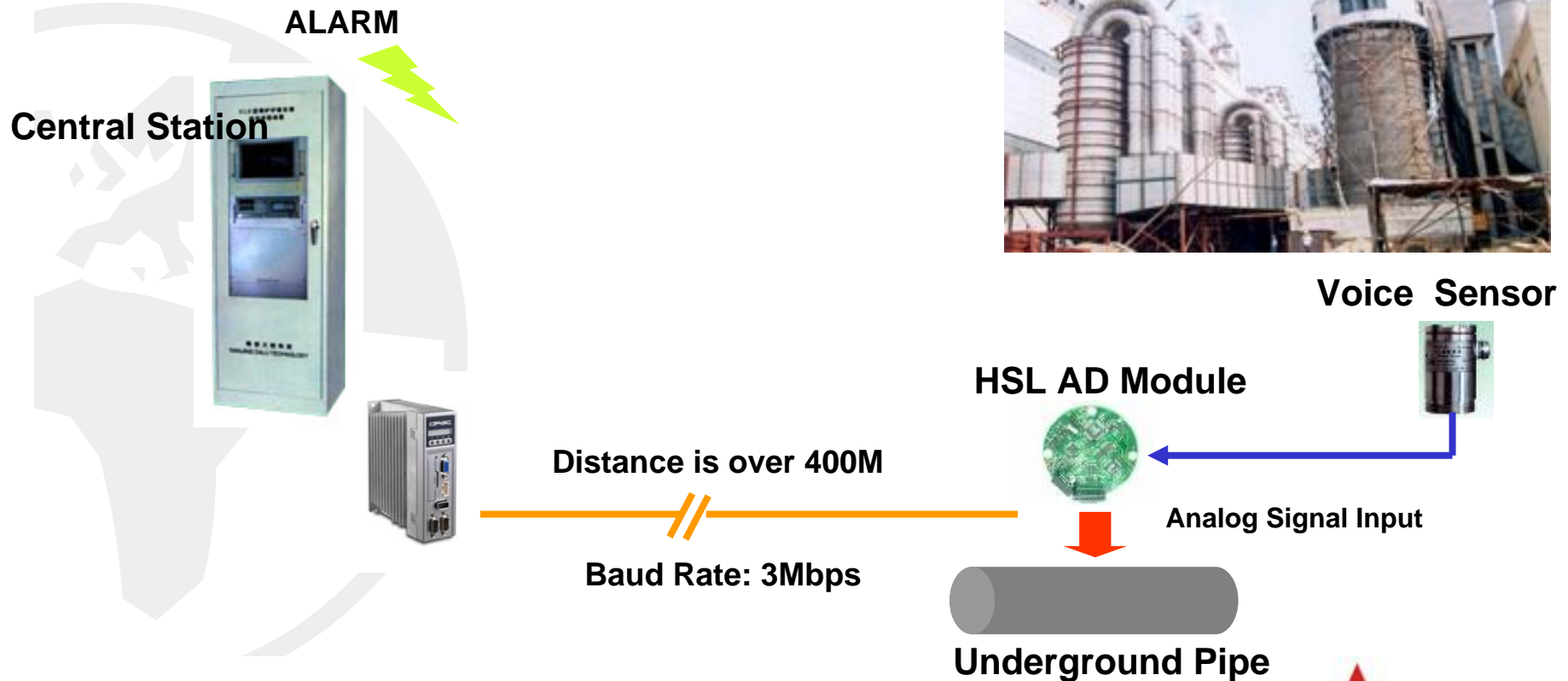
Machine Automation



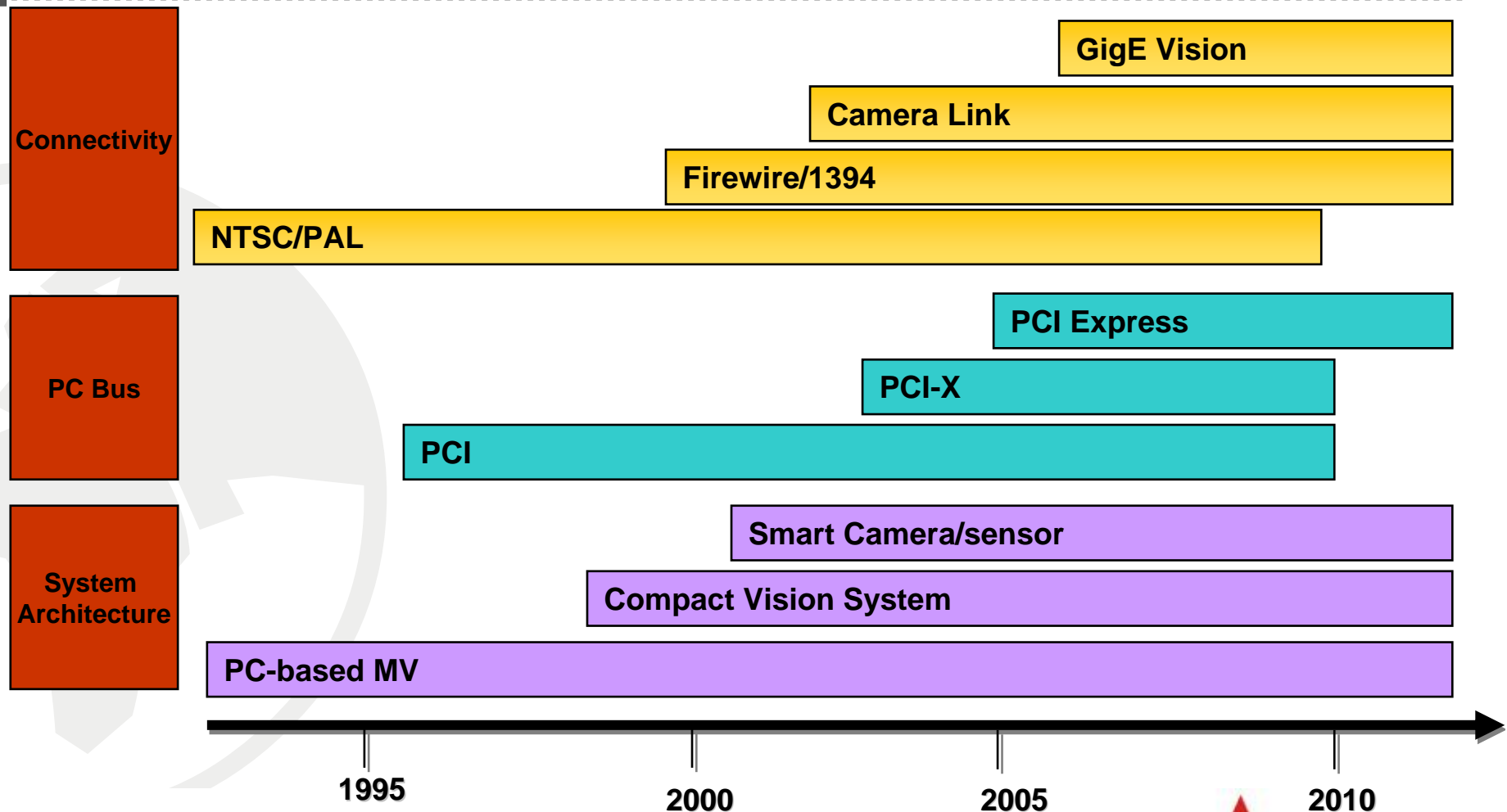
DPAC acts like
standalone controller

DPAC Application (3/3)

□ Factory Automation



Trend of Machine Vision



Comparison

	GigE	Camera Link	FireWire
Type of standard	Commercial	Commercial	Consumer
Connection type	Point-to-point or LAN	Point-to-point	Peer-to-peer
Bandwidth	<1000 Mbps	Base: 2.040 Mbps Med: 4.080 Mbps Full: 6.120 Mbps	<800 Mbps (but only 512 Mbps for image data)
Topology	Link	Link	Bus
Cabling	RJ-45, Cat-5 (4 x twisted pair)	MDR-26-pin for Camera Link	4/6-pin STP
PC interface	GigE NIC	PCI frame grabber	PCI card
Data transfer type	Dedicated	Dedicated	Asynchronous/isochronous
Streaming video	Continuous	Continuous	Burst
Distance	<100 m	<10 m	<4.5 m (full bandwidth)
Max. with switches	no limit	no limit	72 m
Max. with fiber optics	no limit	no limit	200 m
Max. # of cameras	Unlimited	1	63
Network control	Yes	No	Yes
I/O control	RS-232 or GPIO	Yes	Yes
Real-time signaling	No	Yes	No
Line-scan support	Yes	Yes	Limited
Windows driver	Native or proprietary	Proprietary	Native

Camera Link



Camera Link 是連接攝像機與影像採集卡的標準

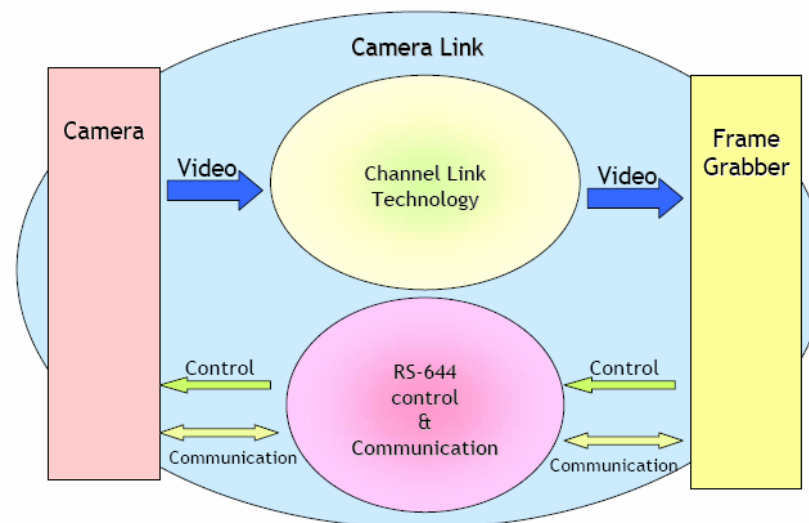
□ 特性

- 標準接頭，線材，信號（由LVDS，Channel link）
- 大幅減少非標準品的維護費用
- 高資料傳輸能力

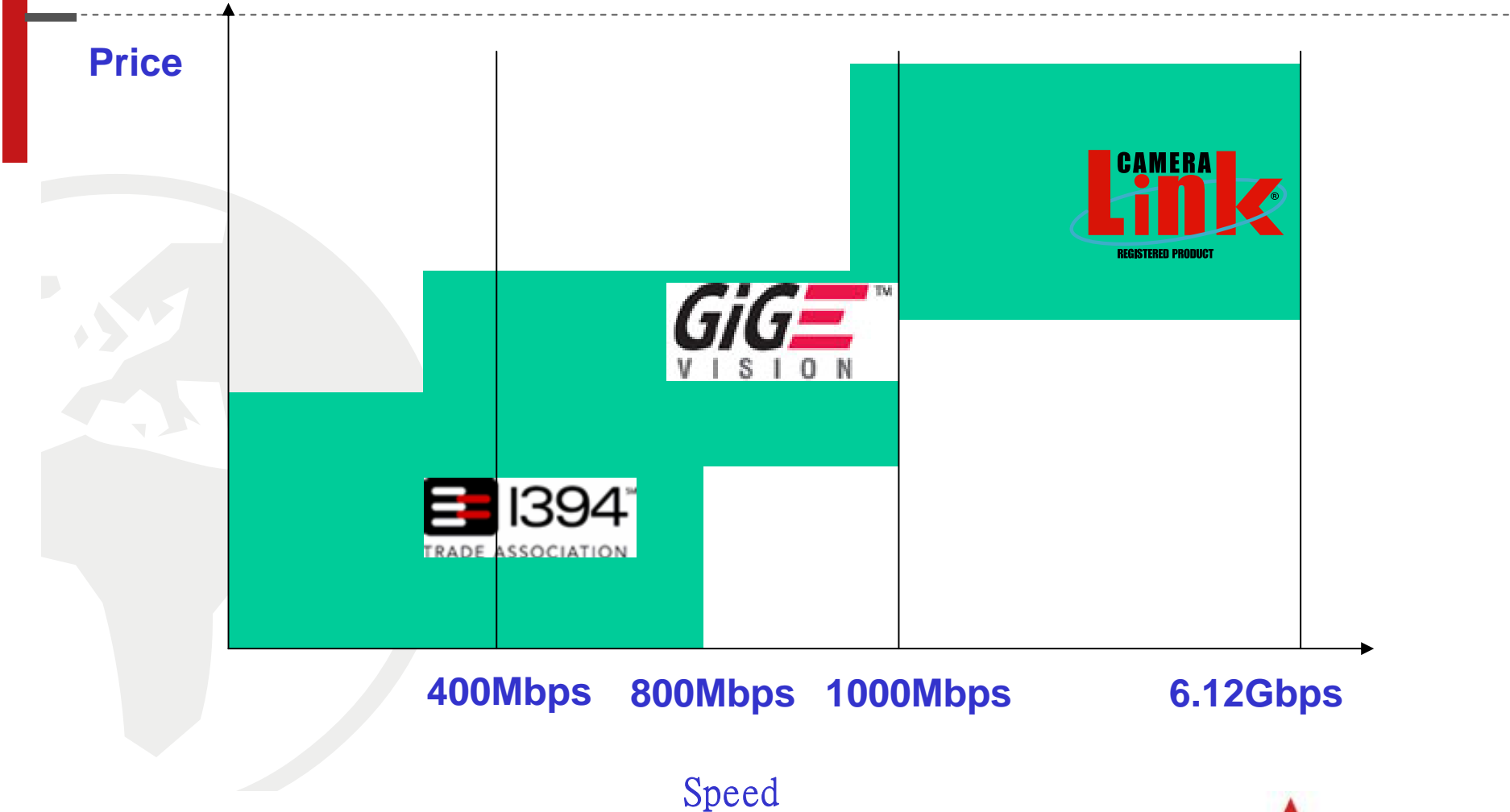
□ 標準新增部份: *Power over Camera Link*



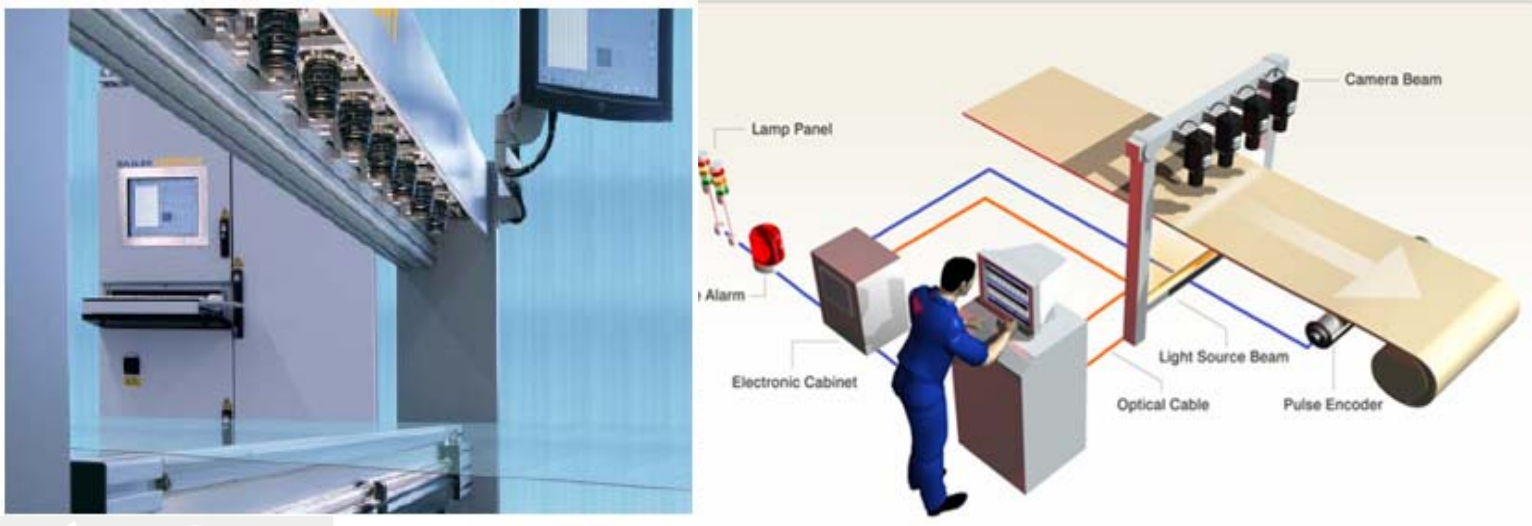
高性能, 較高價格



Price vs. Speed

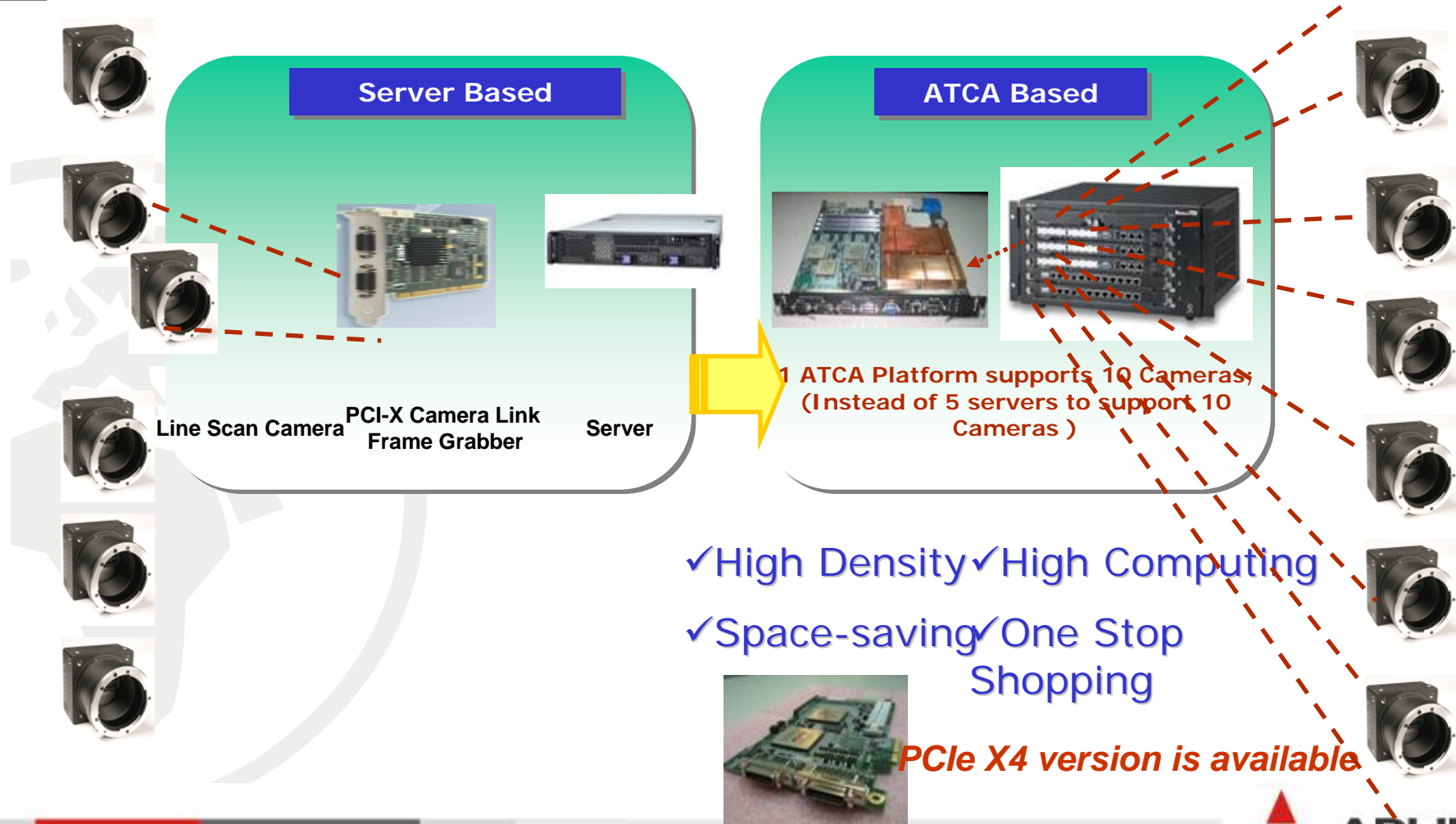


Full Camera Link vision boards with preprocessing unit (1/2)



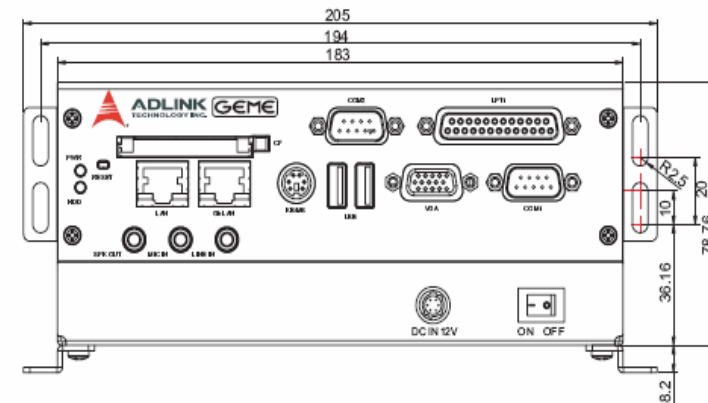
- **High density systems**
- **High computing power**
- **Compact Size**
- **FPGA-based image Pre-processing core.**
- **Redundant System**
- **One stop shopping - System Integration & Service**

Full Camera Link vision boards with preprocessing unit (2/2)



Compact Vision System

- ❑ GEME-12000 is powered by ETX-GLX800 (Low Power Consumption AMD Geode[®] LX800), and EBC-P400D
- ❑ Total Fanless, fully sealed, ultra-compact, rugged, and front side access
- ❑ Operating systems
 - Windows[®] XP/XP Embedded, Windows CE.NET 5.0



ESKIMO

Fanless Automation and Vision PAC - PCI and PCIe capacity

- ❑ Eskimo provides 2 ~ 6 PCI/PCIe slots to accommodate I/O cards in the following combination
 - 2x PCI
 - 3x PCI + 1x PCI Express
 - 5x PCI + 1x PCI Express
- ❑ **Eskimo is world's first fanless computer which provides PCI Express slot**



PXI and Modular Instruments

- PXI is very successful Platform in major applications with high growth rate**
- PCI Express and PXI Express offer great bandwidth for high speed measurement and digital imaging.**
- Most update CPU Performance increase the measurement performance**
- Most of test systems are built in hybrid interfaces**

Fastest PXI Core 2 Dual Controller : to be released

New-generation 3U PXI controller for hybrid ATE

- ❑ CPU and memory are soldered on PCB
 - Great reliability in vibrating environment
- ❑ Plenty I/O interface
 - **GPIO on-board** for GPIO instruments
 - 2x GbE
 - One for LXI instruments
 - One for LAN connection
 - 4x USB 2.0 port for USB instruments and devices
 - 2x COM and AC97 audio
 - 965 Chip Set



PXI-3910

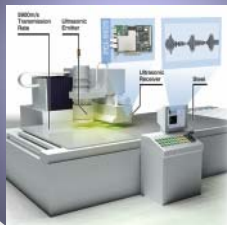
3U PXI Celeron M 373 1.0 GHz System
Controller with DVI-I/Dual GbE/GPIB

PXI-3920

3U PXI Pentium M 760 2.0 GHz System
Controller with DVI-I/Dual GbE/GPIB

PXI : A successful Automated Test Systems in kinds of Applications.

X-Ray Inspection



Ultrasonic Acquisition



PXI System & Controller
DAQ & DIO & AO
Digitizer
High Speed DIO
DAQPilot



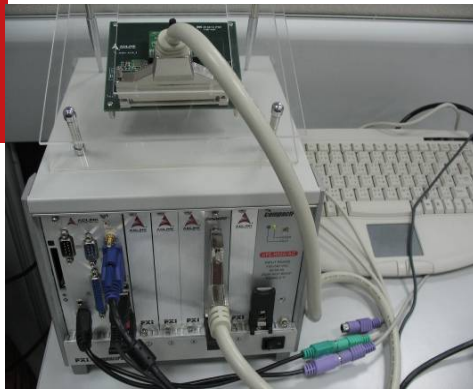
Cellophane Mobile Test



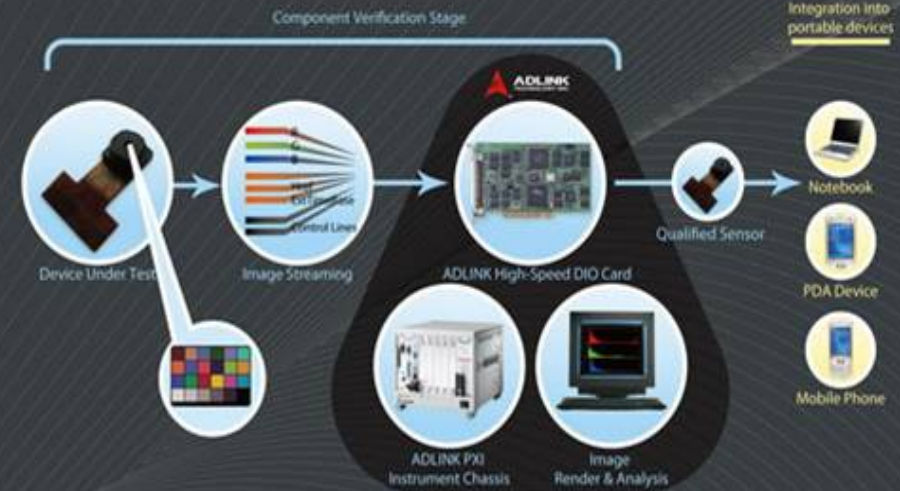
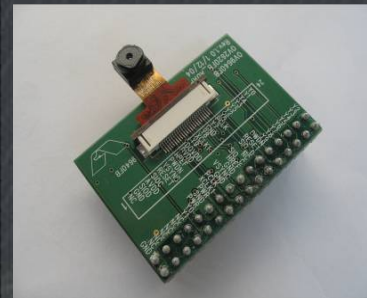
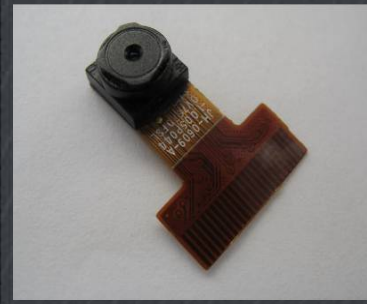
Nondestructive Testing



CMOS image sensor Verification by High Speed DIO cPCI-7300/PCI-7300



Using ADLINK High-Speed DIO Card to Reduce the Cost of Verifying your CMOS Image Sensors for Portable Devices



- Features
- Smoothly streams the entire image without data loss for sequential analyses and image rendering
 - Cost-effective single testing system for multiple CMOS sensor brands
 - Powerful DIO functions enable more flexibility on testing than frame capturing cards




PXI Based LED Automatic Testing System

- ❑ **Application:** LED test system
 - Migration of existing test system to PXI platform

- ❑ **Solution:** **PXI-3710/PXI-3800**



PAC from ADLINK Measurement and Automation

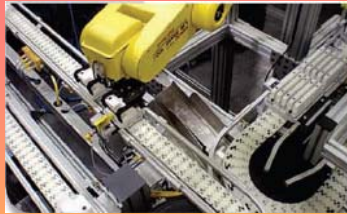
	IAP	IBB
Automation (PAC)		<ul style="list-style-type: none"> -Motion cards -PCI DIO & AIO cards -Distributed I/O & motion -SoftPLC
Measurement (Modular Instrument)		<ul style="list-style-type: none"> - General Purpose DAQ - High-speed Digitizer - Analog output - 24-bit high resolution DAQ
Digital Imaging (CVS)		<ul style="list-style-type: none"> - High Speed DIO (50/100M) - CameraLink cards - GigE / Firewire.b cards - eVision library

Summary

- ❑ **PAC (Programmable Automatic Controller) offer dedicated function, compact-size, higher computing power for automation control and vision system**
- ❑ **Distribution IO is a tend for machinery automation and deterministic Ethernet**
- ❑ **PCI Express is the key interface for Vision and Measurement applications in 3-5 years.**
- ❑ **PXI is a high growth market for automated measurement**
- ❑ **System Integrators are few.**

ADLINK : PC Based Measurement and Automation Leader in Asia

Target Application



Factory Automation



TFT/LCD



Medical



RD in Military & Government, education

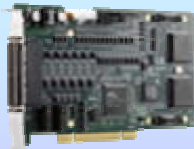


Electronics & Semiconductor

Software

SW support: VB, VC, LabVIEW™, MATLAB®, Linux, Windows®
API & Utility: PACwiz, DAQPilot, DAQMaster, ViewCreator, Motion Creator
eVision, CoDesys

Building Blocks



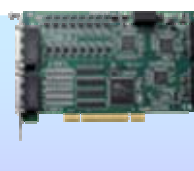
Motion Cards



Filebus Control



Frame Grabber



High-speed DIO



DAQ



Digitizer



GPIB & Interface

Application Platforms



DPAC



Eskimo / Fanless controller



GEME/ CVS



PXI system