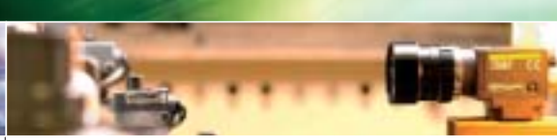
04/2003

technology trends magazine

TRENDS IN MOTION CONTROL

Modern bus technology creates homogeneous automation system



Advanced Industrial Automation

OMRON

Content

Masthead

technologytrends is the customer magazine of OMRON EUROPE B.V.
Frequency: 2 issues per year
Publisher: OMRON EUROPE B.V.
Wegalaan 67-69, NL-2132 JD Hoofddorp • The Netherlands
Tel: +31 (0) 23 568 13 00 • Fax: +31 (0) 23 568 13 88
www.europe.omron.com
Editorial office: Sabina Dautbegovic

Editorial

With this issue of "technologytrends" we want to get you into the mood for the forthcoming Hannover Fair 2003, which is of special significance this year. In addition to a range of new products from the automation technology sectors, one of the main focuses of this fair will be propulsive engineering – and with good reason. At a special press conference under the title "Intelligent automation meets demanding mechatronics", Omron will announce the joint venture with Yaskawa.

The Automation industry is undergoing enormous change. There's a fast-moving trend towards standardising communication mediums that will undoubtedly force unification across the industrial world. This is all good news for customers of automation related technologies who should see product costs being driven down and safety and health regulations being enforced. "technologytrends" features an interview with Automation & Drives Business Unit Manager Faouzi Grebici who discusses Omron's role in this new trend and how the company is adapting to meet future challenges.

Production processes are also undergoing change. The complexity of some processes and the demand for flexibility means that automation products need to be precisely in tune with one another for optimum efficiency. "technologytrends" outlines the benefits of multiple-axis continuous path control using a high-speed bus link, and introduces Omron's CS1W-MCH as a good example of precision and harmony when used in combination with a Mechatrolink II high-speed field bus.

Our third feature story also has a harmonious flair to it with the recent announcement of Omron's joint venture with Yaskawa. In fact both of these companies have been closely working together for over a decade.

Now, through the Omron Yaskawa Motion Control (OYMC) BV, Omron's excellent sales networks and Yaskawa's impressive technology capabilities will be combined to ensure the best possible support and services for customers everywhere.

As usual we bring you the latest of Omron's product introductions, which in this issue includes the CS1W-MCH Motion Controller, the E3Z Series of Photoelectric Sensors, and Omron's Screw-Less Clamp solutions.

We have also included some application articles that show how our latest products and technologies benefit Omron's customers in practical ways.

More information on these products can be found on our new web-site at www.europe.omron.com.

Earth Simulator

In 1997 a team of Japanese engineers dared to imagine a computer so powerful that it could keep track of everything in the world at once — steaming rain forests in Bolivia, factories in Mexico belching smoke, the jet stream, the Gulf Stream, the works. What's more, they dared to build it. On March 11, 2002, when they switched it on, the engineers did something no mere mortal had ever done before: they created the Earth.

Or at least the next best thing. The Earth Simulator, the most powerful supercomputer ever built, was designed for a single purpose: to create a virtual twin of our home planet. Before the Earth Simulator arrived, the fastest computer in the world was an American military machine that can perform 7.2 trillion calculations per second. The Earth Simulator runs at more than 35 trillion calculations per second, almost five times faster. In fact, it's as powerful as the next 12 fastest supercomputers in the world put together. Located at a vast, newly built facility in Yokohama, the Earth Simulator is the size of four tennis courts. The price tag? Around $350 million.

It was worth every penny. By plugging real-life climate data from satellites and ocean buoys into the Earth Simulator, researchers can create a computer model of the entire planet, then scroll it forward in time to see what will happen to our environment. Scientists have already completed a forecast of global ocean temperatures for the next 50 years, and a full set of climate predictions will be ready by year's end. That kind of concrete data could revolutionise environmental science. By digitally cloning the Earth, we might just be able to save it.

www.earthsimulator.com

Mr. Faouzi Grebici, Manager of the Automation & Drives (A&D) Business Unit (BU) Omron Europe, introduces the BU to Technology-Trends and discusses automation trends – including Omron's new Smart and Seamless Technology concept – and how the company is adapting to meet future challenges.

Smart & Seamless Technology

TT: What can you tell us briefly about A&D Business Unit?

FG: Omron's Automation & Drives business currently employs 220 people in marketing, development and manufacturing. A&D's business is worth around € 250 Million in Europe, through its sales of products ranging from control systems, automation software, drives, motion control and Human/Machine Interface (HMI). Our objective is to support effectively our 18 national sales companies.

TT: How do you see the evolution and trends of the automation industry?

FG: Automation is fast and challenging! We're already well into the information age. I see communication mediums undergoing a higher degree of standardisation, and this will force unification across the industrial world. This in turn will drive costs down, and stringent safety and health regulations will result in a natural convergence between the consumer and industrial worlds.

Figure 1: Smart & Seamless Technology

TT: How do you see Omron shaping up to the new challenges?

FG: Omron has over 50 years experience in industrial automation and is one of the most established technology suppliers for machine automation. We should however not be just meeting standards – we should be playing an active role in setting them! Our strategy is to supply smart solutions for machine automation on a global scale. Our approach is to focus on ease of use, with a high degree of integration between our devices so that customers can build their machines in an almost 'program-less' way. This is the basis of Seamless and Smart Technology.

TT: What actually is Smart & Seamless Technology?

FG: Smart & Seamless Technology, or SST, is best described in fig. 1/3. When looking at most automation architectures one can invariably see the same pyramidal approach. This is based on a highly rigid system requiring programming interfaces between various layers (fig. 2). The SST approach is to look at the system architecture as an information highway, where different field networks are feeding into each other seamlessly.

Devices like sensors, vision, drives or motion controllers are plugged effortlessly into the automation architecture. They are recognised and information is automatically routed to and from them. Metaphorically speaking this is democracy at work right down to the devices!

TT: What about software?

FG: The same degree of transparency and integration applies here. The user should be able to open his project from one software centre and access all the devices from one point. The devices will eventually become smarter but offering electronic data sheets, maintenance and diagnosis capability. This allows the user to write his control program almost independently from the hardware.

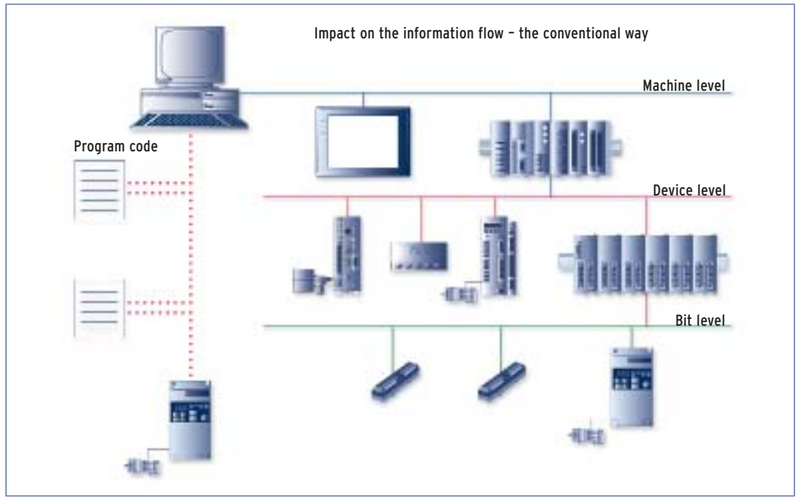


Figure 2:
Impact of the information flow - the conventional way: Interfacing from one communication layer to another is done by manualy defined routing tables.

TT: That's fine for customers who buy only from Omron, but what about those who are looking for a specific field device?

FG: That's a valid point. However, the beauty of SST is that all the SST features like electronic data sheets, flexible software and maintenance features are supported within the device. Therefore, if required, they can be applied to a 3rd party controller.

TT: What's the difference between Omron's SST and, say, TIA from Siemens or Control Logix from RA?

FG: I don't think we should talk about differences. It is more a convergence of technology to meet market needs in terms of information sharing, but approached from a different angle. At Omron we focus on lower control overheads and faster machine cycle times. The Smart & Seamless approach is from the bottom up, so device-centric, focusing on speed and ease of use. Current approaches are mostly 'server'-centric, which focus on optimising information flow at plant level. Other major strengths of Omron lie in maintenance and quality control. Therefore one can expect that Smart & Seamless Technology will be strongly enforcing these aspects.

TT: How advanced is Omron in this project?

FG: The CJ1, the CS1, the DRT2 remote I/O family and the NS touch panels are already operating under this platform. Software-wise we are completing FB/ST, and the CX server DI, which sits on all future Omron software will be ready this summer. Next phase will see the integration of vision and advanced sensors.

TT: Finally, how do you see the next 3 years?

FG: We have managed to come out unscathed through 2 years of quasi-recession in Europe. Our performance in fact has been outstanding, since we managed to grow. We have a unique identity and our SST concept will offer unique advantages to our customers. I am very confident about the future.

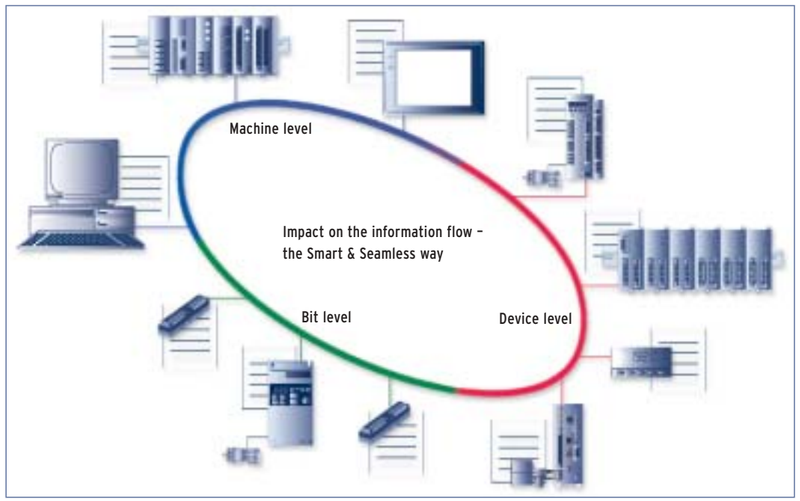


Figure 3:
The Smart & Seamless Technology allows the devices to communicate seamlessly through an information highway.

Solar Tower

An Australian company wants to pioneer a new way of getting energy from the sun. All it needs to do is build the tallest man-made structure in history — a 3,000-foot concrete chimney — in the outback.

Solar panels typically convert solar energy directly into electricity. But the facility planned by Melbourne-based Enviro-Mission would use heated air to power turbines that supply the electricity. The hot air would come from 7.5 square miles of glass or plastic around the chimney's base — a giant greenhouse. As the air is warmed, it would rise towards the chimney. The result: a continuous flow that, on its way up, would spin the turbines' propellers.

The company estimates that the suction would create a 35-mph updraft that could power 32 turbines, generating up to 200 megawatts of electricity, or enough to supply 200,000 homes. The plant would keep working at night by a system of tubes filled with warm water. These tubes, heated by sunlight during the day, would continue to heat the air under the glass after dark and keep the power plant working.

The concept was tried over seven years in a much smaller prototype in Spain. But to be truly efficient, its designers say, scale is of the essence. A 3,000-foot tower wouldn't come cheap: the giant structure will cost an estimated $670 million. The company argues that an expected life span of 100 years, combined with low maintenance costs and the absence of pollution, will make the endeavour worthwhile. The Australian government is expected to endorse the construction, but so far has offered no money.

www.environmission.com.au

Smart automation meets fine Mechatronics

Omron Yaskawa Motion Control - the logical partnership

For 70 years Omron has been a leading manufacturer of technologically advanced industrial automation products and supplier of application expertise. The company is a major player in machine automation through its smart technologies and its complete portfolio of integrated products. It has over 50 regional offices in 18 European countries, with an extensive, competent network that makes Omron one of the most customer-oriented companies around.

Like Omron, Yaskawa Electric Corporation has always provided leading-edge technologies in the fields of electrical motors and drives, as well as factory automation control products, Mechatronics, and robots. Yaskawa is also a major player in this industry, and its current business network includes offices in 24 countries, including Japan, along with production bases in six countries across three continents. Its ability to develop high-performance, compact products, combined with a no-compromise approach to reliability, has made Yaskawa one of the most respected leaders in the inverter and servo business.

For over a decade both of these companies have worked together in the marketing of machine automation products. Now Omron and Yaskawa have combined resources to provide their customers with the best of both worlds – smart technologies with unrivalled reliability. Under this joint venture Omron Yaskawa Motion Control (OYMC) BV will be responsible for handling the product management and European marketing strategy.

Omron's National Sales Companies will continue to handle local sales and marketing, and Yaskawa Europe will focus on global customers requiring special products. Together, these two companies can offer a better and more integrated approach to motion-automation solutions. In addition, the synergy created by combining Omron's excellent sales networks and Yaskawa's undoubted technology capabilities will ensure the best support and services for its customers.

A comprehensive range of advanced motion control products
OYMC's range of motion controllers is designed to cover the most demanding application needs, from the easiest point-to-point positioning to the most demanding movement profile. Controllers can be integrated in the PLC for centralised control applications, and can also be located on the servo drive for a decentralised approach.

Servo systems up to 50kW
OYMC's servo systems offer an extensive range of compact drives and motors that are highly reliable, highly dynamic, and offering high precision and high performance. Features like online auto-tuning, motor identification as well as openness to popular field-buses are standard features.

Inverters up to 400 kW
The OYMC range of inverters has been designed with reliability, ease-of-use, performance and functionality in mind, providing cost-effective solutions for everything from simple speed control up to sophisticated flux and torque control applications. Configuration software and an extensive range of option cards (i.e. Devicenet, Profibus, CanOpen, Interbus-S, and position synchronisation) are also available.

A solid history in customer service and support
Between them Omron and Yaskawa have impeccable references when it comes to drives and control products. With over 1,000,000 pieces installed in Europe and over 5,000,000 world-wide, OYMC has already established a solid leadership position in semiconductors, cranes, lifts and robotics. What's more, the synergy created by the OYMC joint venture means that customers benefit from enhanced service and support, wherever they are.

500 field engineers for continuous support
With Omron's European sales network and Yaskawa's technology capabilities, OYMC can offer solutions to any motion control requirements. Over 52 regional offices and 500 sales and technical engineers are on hand to ensure that OYMC provides one of the best customer support networks around.

Five-day door-to-door express repair service
Co-ordinated stock and sales centres mean more product availability, faster delivery and improved after-sales service. OYMC repair is fully integrated with the much-acclaimed Omron five-day express repair service. In the unlikely event that a product breaks down, OYMC can have it repaired and shipped back to a customer within a maximum of 5 days.

Digital Sound Projector

The Pioneer Digital Sound Projector (PDSP-1) uses 254 small speakers to produce genuine high-quality multi-channel surround sound from only one slim loudspeaker panel. The effect is equivalent to 5.1 sound, which produces 2 front and 2 rear channels, plus a centre channel/subwoofer. The loudspeaker panel is only 5 inches thick, to boot. While the audio technology is itself impressive, the system also eliminates the cost of individual speakers and even a receiver. The PDSP-1 contains the audio processing logic usually found within home audio receivers.

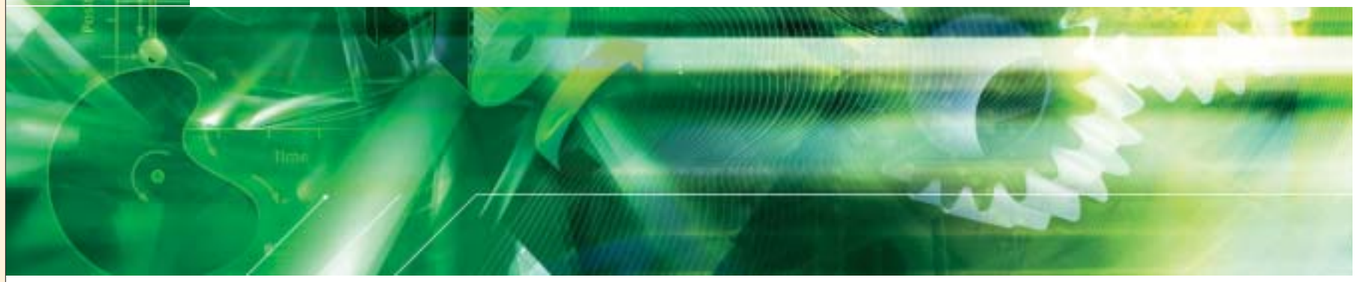
www.pioneer-eur.com

The easiest way to get your entire music collection on the road

Automotive MP3 players would be much more popular if loading them with music wasn't such a pain. Kenwood's Music Keg is the smartest solution we've seen: Its 10GB cartridges hold approximately 2,500 songs. Every time you sync with your PC via a USB cradle, new music you've downloaded is automatically copied to the Keg. It works with any car stereo, operating like a CD changer.

www.kenwoodusa.com

Modern bus technology creates homogen eous automation system



Modern production processes have a very high degree of complexity. This is characterised by the sheer number of production processes that overlap in terms of time and process optimisation; processes which are directly dependent on each another. Automation components that are perfectly and precisely in tune and that function reliably are required for such a complex system to work correctly. But what does this mean for the total installation or for the individual machine integrated into the process?

The answer can be found by looking at four basic requirements: maximum productivity, flexibility, 100% cost efficiency and optimal service friendliness. These basic requirements are closely linked to one another. For the end-user, cost-efficient production means minimum standstills and retooling times. At the same time there is a requirement for a constantly increasing product variety with ever smaller batch sizes. This means that many different products should be produced on one installation while the greatest efficiency and quality is maintained.

Examples of this are modern packaging or printing machines where, in many cases, relatively small batches of very different products are produced. This can only work flexibly, effectively and cost-efficiently if the retooling times are reduced to a minimum. The automation concept must have a universal nature from process visualisation right up to the actuators. It is only by introducing a universal concept that product related formulations or machine settings can be assigned to all the components by the virtual push of a button.

Standstill times can also occur when transferring from one production stage to the next and the continuous flow of material is interrupted, for example loading, unloading, cutting off, pasting or printing. Another problem with such processes is the necessity of stopping and starting the entire installation, or at least a part of it, for retooling. The associated energy consumption is not insignificant! Modern electronic solutions allow the heavy mechanisms used for material flow to continue operating efficiently, thus conserving energy, while allowing the lighter dynamic tools (flying saws, rotating knifes) to be synchronised.

For reasons of cost-efficiency and low production costs, machines manufacturers strive to ensure that as little storage space as possible is needed and that the production process is as transparent as possible. To achieve this, modern machines are built modularly. Individual machine components are created which are largely electrically identical but differ in terms of software. It is now obvious what the advantages of this concept are for the end-user. A modular machine is not only more efficient with regard to the acquisition costs (you buy only the components you require) but the flexibility of production is also greatly increased. A modern paper-folding machine, for example, consists of a large number of identical modular folding stations which are put together in sequence and connected electrically.

Efficient and flexible individual actuators

To respond to these trends, modern automation concepts transport energy via electrical paths with little loss and only transform this energy into mechanical energy where it is required. The old propulsion sequence (vertical shaft, crank drive, cam plate) is dispensed with and replaced by a large number of individual actuators which communicate with one another. Continuous path controls are used to guarantee the process-conditional relationships between the axes despite asynchronous mechanical operation. The advantage of replacing mechanical solutions with electronic continuous path control is obvious:

- Direct propulsion means no additional masses have to be moved (crank drives, cam plates, vertical shafts) resulting in greater dynamism with less energy.
- High precision leads to consistent results; no mechanical motion; reduced mass spring systems.
- Reduced mechanical loss gives a higher degree of efficiency.
- Switching off individual axis as required saves energy.
- No limitation to the variety of movement because of mechanical sliding or other rotating parts.
- Very high degree of flexibility and short retooling times.

High-speed bus dynamic axis communication

In the last few years communication has invaded industry with almost unbelievable speed. The world is now a huge electronic network. Information can be retrieved online from any location and previously unimaginable volumes of data are now sent to the far corners of the world. The same trend will continue in industry with the same explosive force for the next few years. It is therefore no surprise that bus technology is now an accepted part of motive power engineering and motion control, taking its place alongside networked control structures, production lines and factory workshops.

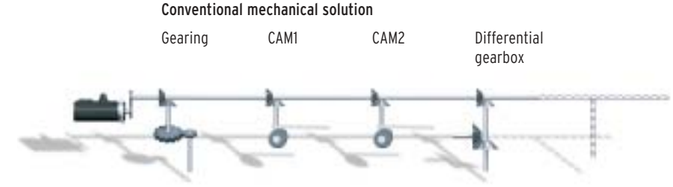
In a modern automation system, the sensitive power electronics connect the computer-bound, intelligent system section with the mechanical actuators. Modern continuous path control systems have now brought the power electronics to the data highway. Direct access via a control structure that reaches as far as the actuator is only one advantage of this system. Dreams of worldwide system monitoring via the internet, commissioning and diagnostics from the office, exchange of components by non-trained personnel and therefore a homogenous automation system, have at long last been made real as a result of these control systems.

A modern continuous path control concept, such as CS1W-MCH, works with a powerful central computer to calculate the necessary motion sequences in an n- dimensional space. The positions obtained are sent via a high-performance bus system to the servo systems in a fixed time-slot pattern (0.5 to 3 ms depending on the number of axes). The servo axes send back the actual positions to the controller in the same time-slot pattern so any path corrections can be carried out immediately. The positioning servo loop is handled in the servo system and works independently of the bus.

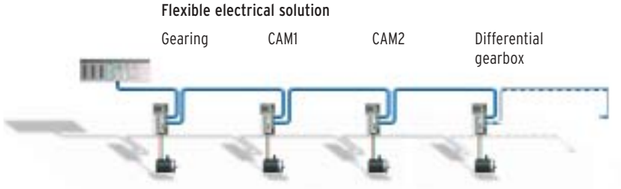
The entire system works with the precision and harmony of a symphony orchestra. Every musician plays his own instrument perfectly, synchronised by the experienced hand of the conductor – decentralised intelligence with central management.

The open field bus system Mechatrolink II, specifically adapted for the field of motion control, forms the basis for this extremely efficient motion control concept. The standard topology of this linear bus system connects up to 30 servo axes (slaves) one after another with a central continuous path controller (master). With a data transfer rate of 10 Mbit/s, interpolations, electronic transmission or cam actuation can now be achieved. Because Mechatrolink II is an open field bus system there are also opportunities to integrate other units such as digital and analogue entry/exit systems, frequency inverters, counting devices, encoders, etc. into the bus typology.

Conventional mechanical solution



Flexible electrical solution



CS1W-MCH – Motion control over high-speed motion link

With Omron's new CS1W-MCH motion control unit, today's manufacturers have the speed, accuracy and flexibility they need for their motion control systems. CS1W-MCH is a PLC-based advanced motion control unit that offers control of up to 30 axes. Its dedicated MechatroLink-II high-speed motion bus provides instant communications between the motion controller and the servo drives. And its powerful processor handles the multiple tasks and all of their parallel programs every system cycle.

MechatroLink-II high-speed motion link
This high-speed interface replaces the costly discrete wiring required with traditional systems. Just one MechatroLink-II cable eliminates the need for about 15 for each axis, which simplifies wiring, and reduces the cost and time needed for installation. It also means that maintenance and troubleshooting are minimised.

With a frequency of 10 MHz, the MechatroLink-II link provides communication cycle times of 0.5 ms for 4 axes, to 4 ms for 30 axes, ensuring fast, precise motion control.

Multi-tasking
With CS1W-MCH you can have up to eight different motion program tasks running simultaneously, and every program accepts up to eight parallel branches. All the branches in all tasks will be executed every system cycle.

Operates using BASIC language
The motion program is written in a simple-to-use BASIC language, making the system easy to design, install and commission. The CS1W-MCH can be used in applications involving cam curve creation, gearing and synchronising axes.

Easy information management system
Using Omron's MCH-Tool you can create programs, read and write system parameters and servo parameters, positional data and cam data, and download or upload these to the CS1W-MCH unit, seamlessly.
You can also access the entire system from one point – all you need is a laptop and Omron's software package to program the system!

The CS1W-MCH fits perfectly into the Omron's renowned W-series servo driver, bringing enhanced functionality to this servo driver.

The CS1W-MCH motion controller is the perfect solution for satisfying all your complex motion application requirements, including packaging, electronics, converting, food processing, textiles - in fact any multi-axes application is solved and integrated perfectly in a complete factory line.

Key features

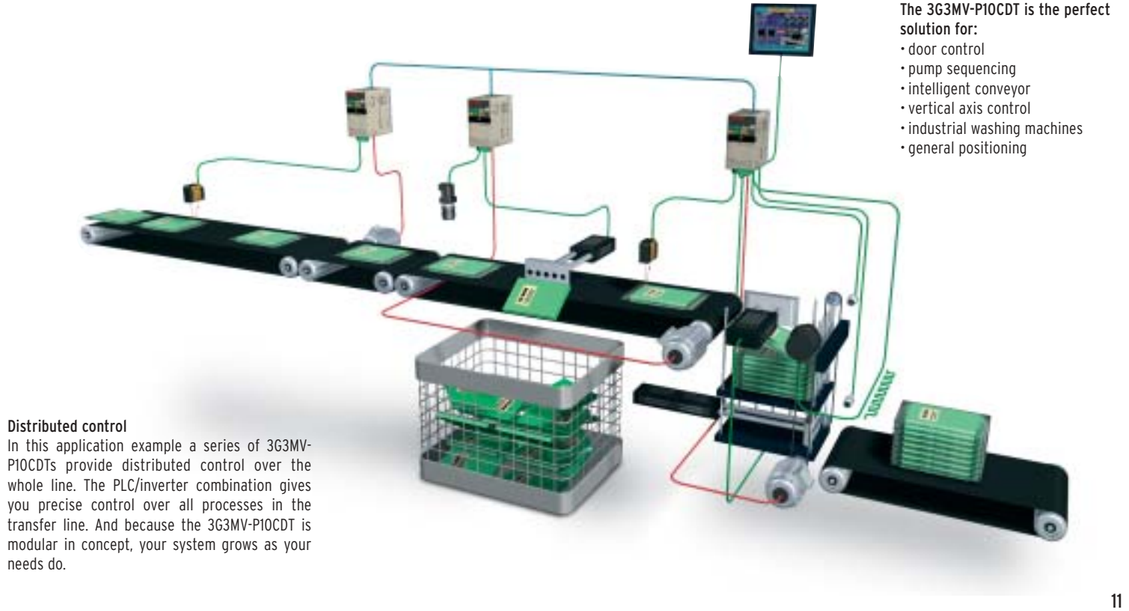
- PLC-based motion controller
- Complete digital control of drives via MechatroLink-II
- Controls a total of 32 axes
- Simplified wiring saves cost and design time
- Real multi-tasking and parallel programming
- Simple to develop and modify using BASIC
- Access to the complete system from one point
- Linear and circular interpolation
- Electronic axes synchronisation
- Electronic CAM profiles
- One hardware registration per axis
- Dedicated inputs / outputs on the controller
- All features of the W-Series are available

PLC + Drive in one – Integrated intelligence for enhanced control

With Omron's combined frequency inverter and PLC option board 3G3MV-P10CDT, you can bring more intelligence to your system by enhancing the speed and positioning control of your application. The PLC option board offers the features of an Omron PLC embedded in an MV inverter. This inverter-based architecture provides wireless installation and seamless access to the inverter parameters and analogue/ digital inputs and outputs. Standard Omron tools are used for programming and commissioning.

Key features

- Fully featured Omron PLC embedded into the inverter
- Complete control of inverter parameters
- Real-time clock and calendar available
- Mechatronics functions (counter, PID, filter etc.)
- Programmed using the standard Omron PLC software
- Direct connection to MV inverter via Dual Port RAM
- Encoder Input, Interrupt inputs and Pulse outputs
- Control of inverter hardware (analog input, digital I/O)
- Single-point programming
- RS-422/485 serial port available



The 3G3MV-P10CDT is the perfect solution for:
- door control
- pump sequencing
- intelligent conveyor
- vertical axis control
- industrial washing machines
- general positioning

Distributed control
In this application example a series of 3G3MV-P10CDTs provide distributed control over the whole line. The PLC/inverter combination gives you precise control over all processes in the transfer line. And because the 3G3MV-P10CDT is modular in concept, your system grows as your needs do.

S8VS – compact DIN rail power supply with 7-segment display

Omron's S8VS power supply series is currently the ONLY power supply family available in Europe with an LED display. Machine builders for the packaging, automotive and textile industries can now enjoy the obvious benefits that the S8VS brings, including ease of installation and maintenance, less panel space requirements and therefore less costs.

Ultra-compact dimensions, unique LED display!

Omron's S8VS power supply series features a unique 3-digit, 7-segment LED display that provides information on output voltage, output current and output peak current for faster, easier diagnostics. Its ultracompact size requires less panel space than competitors' models. It has a built-in run-time monitor that indicates the total operation time of the power supply. Its DIN rail click-on system makes installation a very easy process. And it is available in a variety of power ratings from 60 W to 240 W!

Screw-Less Clamp solutions – for faster, more reliable wiring

Screw-Less Clamp (SLC) technology offers an effective, time-saving, no-compromise wiring solution in industrial environments. The technology drastically reduces wiring time, eliminates routine maintenance and provides a very reliable connection. And Omron is the first manufacturer to use this SLC technology in standard sockets for a whole range of industrial products!

Unique 1-2-3 step wiring process!

1. Insert the screwdriver. This presses the springs together and the opening is pushed upwards.
2. Insert the wire (any wire with a cross-section of 0.2 to 1.5 mm² can be inserted)
3. Withdraw the screwdriver. The springs tension and the opening moves downward, tightly clamping the wire.

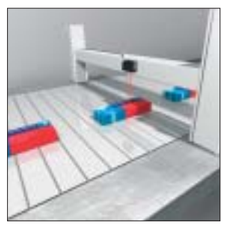
This procedure takes less than half the conventional wiring time, and is much more reliable!

E3Z Series – one family, multiple application solutions

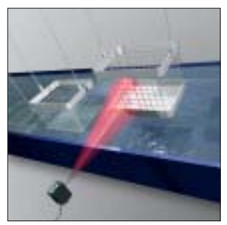
Omron's E3Z series of photoelectric sensors is designed to provide basic object detection, positioning or high-resolution sensing. The main benefit of this series is that it has a model for almost any application. There are sensors with background and foreground suppression, reflective and energetic reflective sensors, as well as through-beam sensors. There are even special variants for precision detection and transparent materials detection.

Same standard miniature housing – multiple application possibilities!

All of these sensors are designed with operating and installation convenience in mind. Built in small plastic housings with a thickness of just 10 mm, each E3Z sensor is excellently suited for installation in narrow spaces. Despite their small size, these sensors out perform any equivalent sensor on the market, and thanks to their high outputs and power reserves, they can easily replace larger sensors!



Small packages can be detected on a conveyor belt with the E3Z-LS using background suppression.



The E3Z-D, with a diffuse IR wide beam characteristic, is ideal for detecting structured surfaces.

E2A Proximity Sensors – double distance as standard

Omron's E2A series of proximity sensors is designed to provide highly reliable detection of ferrous metal objects. What's unique about these sensors is their construction; Omron has developed a fully automated process that enables these sensors to be produced in a modular way, and which guarantees the highest level of reliability available. And because these sensors are modular in design, Omron can satisfy customer application requirements faster and cost-effectively!

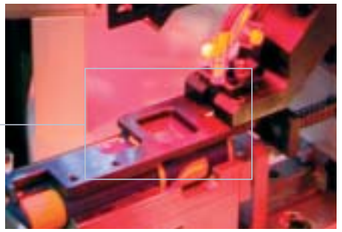
Best-in-class sensors, modular for total solutions!

Housed in metal cylinders, the E2A sensors are available in a full range of standard sizes (M8, M12, M18 and M30, both long and short-barrelled) and with a full range of standard connections (pre-wired, M8 and M12 connectors). Their tough construction and reliability make these sensors ideal for use in diverse applications such as automotive manufacturing, packaging process machines, commercial vehicles and materials handling.

F210 Vision System – edge code and macro programming

The F210 general-purpose vision system is designed for a wide range of quality inspection applications in automated production processes. It contains powerful algorithms that ensure the inspection performance is fast and ultra-precise. These algorithms include Edge Code technology, Fine Matching tool and QUEST OCR/OCV. A trend-monitoring feature is also available for inspection analysis.

The F210's flow-menu configuration software enables standard inspection tasks to be easily configured via the user-friendly GUI. In addition, a Macro Functions software option is available for OEMs and system integrators who wish to create their own application specific vision systems. Customized operation flows can also be created in which nearly every system function can be accessed and manipulated.



Vision system inspects function/quality of LCD display

V530-R160 2D-code reader – reading of direct marked codes

The V530-R160 2D-code reader is designed especially for reading direct marked codes on surfaces like metal, plastic and glass. Its newly developed advanced algorithms allow reliable reading of codes made from dots (pin stamped), laser edged or ink jet.

Data Matrix code directly applied to a gearbox

The print quality of these marking methods is usually anything but perfect; a reader often has to cope with highly degraded, damaged codes in any orientation. The V530-R160 2D-code reader meets these challenges in a cost-effective way. It also provides feedback for quality analysis like trend monitoring, statistics functions and image storage functions. In addition, set-up is easy, using the well-known graphical user interface of the F-Series vision systems.

D4 Series/G9SB – for highly efficient safety solutions

Omron introduces a new range of products for easier, more effective safety solutions of machines and systems. This range includes a new family of limit switches, two new families of safety-door interlock switches and a family of new safety relay units. The range completes Omron's safety product portfolio, and brings exceptional value to customers who need to meet appropriate levels of safety in the most cost-effective way possible.

D4F – unique in size and performance!
This miniature limit safety switch is available with two alternative actuators – roller lever and roller plunger – and is designed for door monitoring. Its ultra-compact size, robust metal housing and up to four contacts make it unique in size and performance. It's the ideal safety measure in combination with a safety door switch. The D4F features a moulded cable that offers a high degree of protection, and can be mounted and operated in the harshest environment.

D4GL/D4NL – twice the choice!
The main difference between the D4GL and D4NL safety-door switches is size. The D4GL is designed for applications where a slim profile is required, while the square D4NL is ideal for general-purpose applications. Both offer an impressive holding force of a minimum of 1000N that provides exceptional safety on doors. Both are available with up to 5 contacts so that you can combine appropriate safety configurations with feedback contacts to a PLC. And these switches are suitable for use in all industries.

G9SB – compact, high-performance safety relay
The G9SB monitors emergency stops, door interlocks and safety sensors. It is equipped with automatic fault detection so that the occurrence of a fault never leads to loss of the safety function. Available in two width options the G9SB is one of the smallest, high-performance safety relay units available. It supports up to safety Category 4 installations, making it ideal for use with the D4 switches. And it meets all necessary EN standards as well as UL and CSA.

Omron's Interactive Safety Guide

Available on CD-ROM and the Web, Omron's Interactive Safety Guide has been specifically developed to provide smart solutions for safety applications and help further secure the interface between human and machine.

The Interactive Safety Guide introduces current safety legislation and illustrates applications and principles with annimations. An interactive risk estimation is also included. In addition you find all Omron safety products on the CD-ROM.

This guide gives you a comfortable entrance and explanation of safety basics from scratch. For more information and support please contact your Omron safety specialists.

When designing and implementing a complex underfloor chain conveyor system Danzas, one of the world's leading automation logistics companies, chose Omron's professional Automation concept – benefitting from both innovative product and comprehensive consultation and project support.

Logistics specialist Danzas benefits from a full Automation technology service

The Danzas Group, with its headquarters in Basel has a strong network in every continent; it has approximately 45,000 employees and in 2001 produced a net turnover of 9.2 billion Euro. Danzas is part of the Deutsche Post World Net Group and provides the whole range of integrated logistic services from one source.

This includes individual solutions for commerce and manufacturers of consumer goods, manufacturers of industrial goods, textile logistics, chemical logistics as well as world-wide sea and air freight, world-wide project shipping and Europe-wide road traffic. Highly qualified personnel and outstanding information and communication technology ensure that your goods arrive reliably and on time – anywhere in the world.

In association with WP-Anlagen-Systemtechnik, a specialist in automated material handling, and Elektrotechnik Thoms, an underfloor chain conveyer system was installed at Danzas in Frankfurt and commissioned in 2002. It utilises Omron modular PLCs, Radio Frequency Identification (RFID), flux-vector frequency inverters and open networks such as Ethernet and DeviceNet.

Precise motor control using flux-vector frequency inverter technology

The underfloor chain conveyer systems are used, amongst other things, for transporting trucks, rolling containers and hand pallet trucks. High throughput and constant transport over long distances are some of the major advantages of this system for material flow in production, storage and distribution processes. The system installed consists of an underfloor chain for transporting lift trucks with an integrated chain washing unit and chain oiling unit.

Along the 364 m long main chain there are 112 carriers for the lift trucks at intervals of 3.25 m, each of which can transport a load of 0.5 t. The main chain is driven by an 11 kW motor. It is controlled by a 3G3FV flux-vector frequency inverter. The delivery speed is 25.2 m/min. Channelling of the lift trucks from the main chain to the spur is automatic. Control is by means of a CPM2C-S110-DRT PLC, combined with the frequency inverter and the main control unit. The main control unit itself is connected to the carrier's central computer. 30 m long chains, with carriers at 0.25 m intervals, run in the 18 spurs, each of which is 13 m long. The maximum load per carrier is 0.5 t here too. The spur chains are driven by a 2.2 kW motor. It is controlled via the 3G3JV frequency inverter. The delivery speed here is 28.8 m/min.

A CS1G PLC controls all the components centrally via Ethernet/DeviceNet

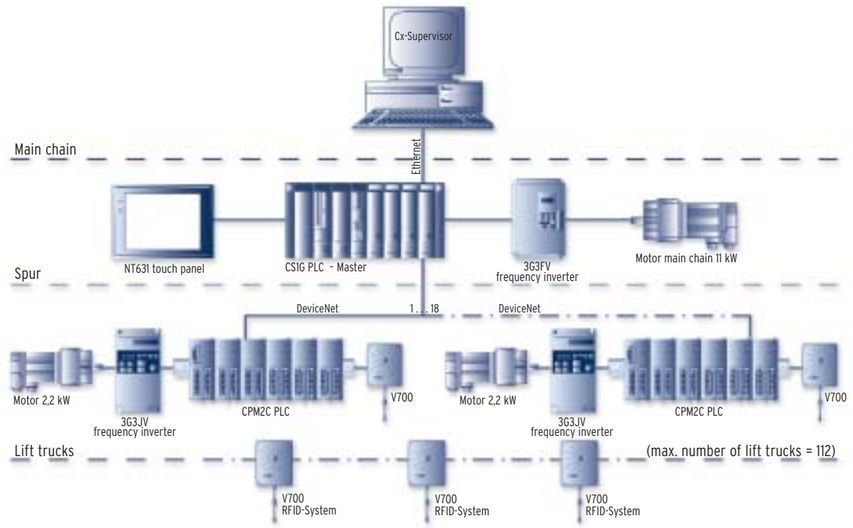
The heart of the installation is a CS1G PLC with various extensions, and as the master, takes over the task of central control of all the components. Control, operation and monitoring of the chain unit is via an NT631 operating terminal in parallel with a PC (in which the process visualisation software,CX Supervisor, is installed). The PC and the main PLC communicate via Ethernet. Using the visualisation, for example, relations such as the allocation numbers of the target spurs can easily be entered or the current situation of the installation can be observed. The status of the chains and switches, monitoring of the emergency shut-off devices, statistical assessments and outward channelling for each spur in figures and as graphics, and display of error messages are other possibilities.

The V700 controls the 'traffic' from the 18 spurs to the main chain

In order to enable clear allocation of the lift trucks, they are provided with previously programmed transponders (V700-D13P31). In front of each channelling switch into a spur there is an antenna (V700-H01) which is connected to a read-write unit (V700-CD1D-V2). Here the transponder data is read and compared with the central control. If the lift truck is intended for outward channelling, the switch opens. The lift truck leaves the main chain and is taken over by the spur chain. Each spur is controlled by a CPM2C-S110-DRT which, as a slave, is connected to the master via DeviceNet. For each outward channelling the spur chain establishes a distance which is determined by sensors and is individually adjustable.

The channelled lift trucks are then lined up behind one another in the spur to await collection. The messages 'spur almost full' and 'spur full' are actuated by the sensors in the spur and are given out via various visual and audible signals.

In order to allocate the lift trucks and packs to the correct spurs, the master PLC must communicate with the carrier's central computer. These protocol transfers take place at the I point. Here all the relevant data is compiled, combined and sent to the central computer via Ethernet. The I point takes over the weight data from the attached balance, the volume via laser measurement, the product information via a bar code scanner and the transponder data from the lift truck. The data, which is only available for a few seconds, is processed in the computer at the I point and passed on to the carrier's central computer. Here, further processing of the data is carried out and then it is returned to the I point and finally the channelling data is passed on to the master PLC, in which up to 20,000 timers are operating to monitor the pack. If the connection to the central computer's database is lost, the system continues; only the target spurs and the truck numbers have to be entered via the touch panel (NT631).



Logitech Pocket Digital

Pocket-size digitals are finally living up to the name, and Logitech's is the best of this year's bunch. The size of a credit card, and not much thicker, the tiny snapper has neither a flash nor zoom, and its 1-mega-pixel resolution is best suited for e-mailing.

With this pull-apart beauty, there's no excuse for leaving the camera at home. You might even forget which pocket you put it in.

www.logitech.com

Pen Drive Plus MP3

Pen Drive Plus MP3/Magic Star MP3 is, as the name suggests, an MP3 player. However, it can store not only MP3 format but also all kinds of data like a removable hard drive. No software is required!

Pen Drive Plus MP3 is very compact and easy to use; you simply plug it into USB port to play music or read/write data onto or from the hard drive. It carries a Lithium battery for your convenience to use as a walkman and travelling hard disk. The Pen Drive Plus MP3 plays for up to 6 hours.

www.pendrivemp3.com

Omron improves safety and quality at DELPHI

The DELPHI factory at Flers near Douai/France, a modern industrial site inaugurated in 1996, is devoted to the manufacture of automotive air conditioning compressors for numerous manufacturers such as Opel, Renault, Nissan, GM, FIAT, BMW, Isuzu, Saab and even Ferrari. The factory produces more than 2 million compressors each year.

*The technique "Poka-Yoke", translation of Japanese "avoid unintentional errors", is a technique of quality assurance allowing to avoid the unexpected errors. The Poka-Yoke is a physical device set up on the process in order to avoid any risk of defect on the product, today very much used in the automotive field.

Omron has equipped the site with safety light curtains in order to protect operators' hands in accordance with the obligations of European Directive 98/37/EC. In all, about fifty light curtains of the latest generation F3SN-A are installed on the machines, conveyors and various work bays. If a hand or object gets in the way, the photoelectric sensors of the light curtain cut the power supply to the work bay.

Safety sensor solution for safe applications

DELPHI chose Omron light curtains for their ease of implementation; according to Mr Witczak, Engineering Manager, "the compact nature of the Omron light curtains made it easier for us to install them on the existing equipment; another advantage is the rapid connection system with safety relays which simplify the wiring and eliminate the risk of errors, resulting in easier and quicker implementation."

Omron is also working with DELPHI to improve quality. The factory produces about forty compressor models; the differences are mainly on the outside of the casings so as to comply with the mounting constraints of the various vehicles. To achieve zero defects it is essential that at the crucial stages of assembly, each compressor conforms to the model being manufactured.

Omron vision system F150 detects the slightest error

Since August 2001, 3 monochrome F150 cameras and 3 associated controllers have been installed. "Each part is photographed and the image is processed using a software package which then outputs either a 'Good' result or a 'No Good' result; if there is a problem, the work bay is automatically shut down and the part is examined: it's the same principle as the Poka Yoke* method", explains Mr Witczak. The Omron vision system makes it possible to detect the slightest error by continuously comparing production with the model in the controller's memory. This system replaces manual monitoring using measuring gauges, which was not entirely satisfactory.

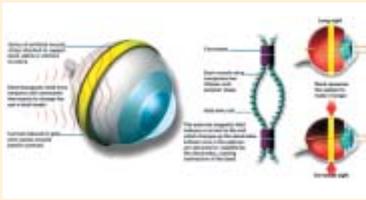
"Our main concern is having as low a client return as possible. Our pursuit of excellence has led us to achieve a current client return of less than 20 PPM (parts per million), taking the last three years into account, which is in itself a remarkable result. The installation of the Omron equipment will enable us to dip further under this threshold", adds Mr Witczak. "We are also working with Omron for a variety of other reasons: our factory is equipped with both European and Japanese software which have reverse sequential logic standards! Omron easily adapts to suit both methods without the need for additional interfacing software and also has a very extensive range of products which encompasses almost all our needs.

Last but not least Omron accompanies its clients every step of the way, whether through After-Sales, product follow-up or commercial assistance and that is something which we greatly appreciate."

A completely new kind of electric guitar pickup

For the first time in half a century, there's a completely new kind of electric guitar pickup: LightWave Systems' optical pick-up uses infrared light to cast the string's shadow onto photo-detectors. As the string vibrates, the shadow does too, producing a signal that's turned into sound. The bass strings on our test electro-acoustic rumbled, its high strings wept — both with no feedback or distortion.

www.lightwave-systems.com

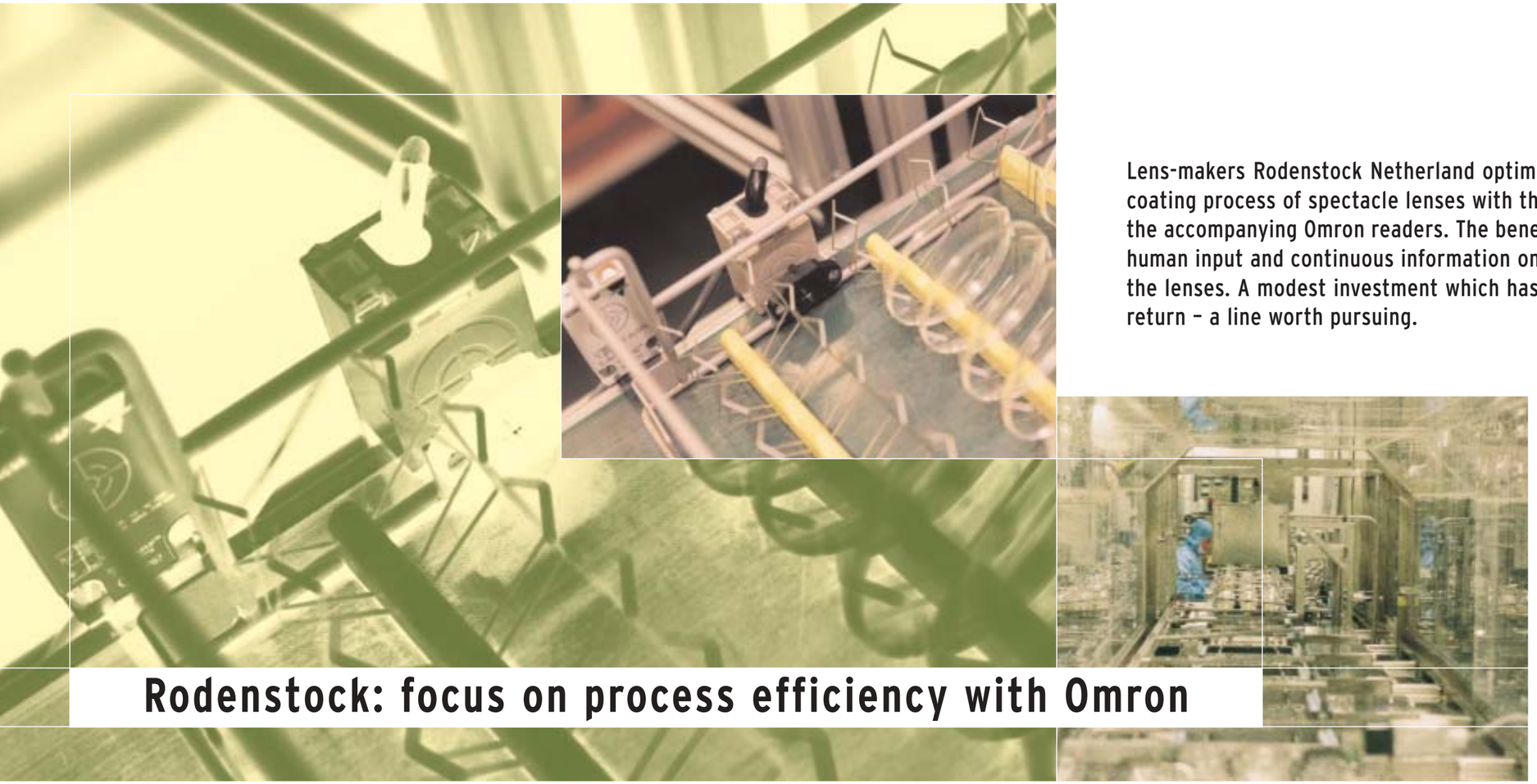


Eyeball squeezing could correct sight

A light tap on the side of your head could one day restore your eyesight, scientists believe. The tap would tighten a band of artificial muscle wrapped round your eyeballs, changing their shape and bringing blurry images into focus. While the idea has a high 'yuk' factor, the people behind it are confident it will be a safe and effective way to improve vision.

Mohsen Shahinpoor and his team at the University of New Mexico call their artificial muscle a "smart eye band". It will be stitched to the sclera, the tough white outer part of the eyeball, and activated by an electromagnet in a hearing-aid-sized unit fitted behind one ear.

www.unm.edu



Rodenstock: focus on process efficiency with Omron

Lens-makers Rodenstock Netherland optimised the run-up to the coating process of spectacle lenses with the aid of RFID tags and the accompanying Omron readers. The benefits: fewer faults, less human input and continuous information on the process status of the lenses. A modest investment which has rapidly shown a huge return – a line worth pursuing.

Rodenstock Netherland is a leading supplier of spectacle lenses and frames. The Groningen based company is part of the international Rodenstock Group, which, with a turnover in excess of a thousand million guilders and 6,000 employees, is one of the largest lens suppliers in the world.

The Dutch division has a leading-edge production unit for the manufacture of spectacle lenses. Thanks to a highly effective investment programme and an in-house R&D department it is the most advanced and innovative production unit in the Rodenstock Group where production is highly automated – technically, mechanically and logistically. All lenses look alike, so it is important to make sure that the different pairs of lenses remain recognisable to man and machine during the production process. “We were looking for a way of increasing the reliability of product identification by the logistical process,” relates Harold Hollander, the engineer responsible for the automation of Rodenstock production. “Up to that point we had been using bar-code stickers, but they were not reliable in all stages of the coating preparation. The stickers would come loose or get damaged and become unreadable, particularly in the cleaning line.

The idea of a solution based on RFID tags came up incidentally, when an Omron representative showed them to us. We had never thought of it ourselves, but on further reflection it looked promising. The tags are resistant to high temperatures and to the chemical solutions used in the cleaning process. To begin with we just put tags on the racks for the specials as an experiment.”

300 degrees Celsius

The tags are the size of a dress stud and consist of a high-quality plastic moulding in which the actual chip – the size of pinhead – is housed. “Initially we had our doubts as to whether the tags would come through the cleaning line unscathed,” says Harold Hollander. “It works with widely divergent temperatures, from 20 to 80 degrees Celsius, and some baths contain a caustic solution, which could attack the plastic. As well as that, the trays pass through a series of ultrasonic baths and we were afraid that the frequencies (40 kHz upwards) could erase the data from the chip. For these reasons we ran a number of tests and the tags came through without any problems. The tags have now passed through the experimental stages and Rodenstock is preparing to furnish all 5000 trays with tags in the near future. The investment is relatively small and the rewards are great both in functionality and in terms of costs,” says Harold Hollander.

“At the moment the tags are only programmed once,” explains Pier Nijenhuis, system designer at Rodenstock. “Shortly we are going to write to the tags at each stage in the process, so that we can have current status information throughout production. The bar-code stickers will disappear completely. Also, we can still continue to read the tags during production using a simple hand scanner, and print out an order form at the end of the process.” It is really easy to integrate the system into the other IT systems that Rodenstock uses, and even communication with the corresponding PLCs is simple, according to Nijenhuis. “At the moment we use Visual Basic, but you can also use other programming languages, thanks to the ASCII interface. Omron delivered a total package based on open standards. Tags, PLCs, readers and software integrate seamlessly so there have been no problems with implementation. The risk of logistical errors during production will soon be negligible. It is all much more efficient and simple.”

Omron-Trends

Next Generation Optical Waveguides “SPICA”

Omron Corporation started out 2002 by announcing a new business for replicated optical waveguides (SPICA: Stacked Polymer optical IC/Advanced), the key devices for optical communications.

SPICA is a revolutionary optical signal propagating device (waveguide) capable of combining/splitting, multiplexing/demultiplexing, and modulating the signal or switching the line. Unlike a conventional semi-conductor process using glass, this waveguide manufacturing technique relies on optical waveguide replication technology (fine pattern replication technology) using plastic, resulting in large scale production that is both cheaper and requires less time. Compared to the mainstream glass optical waveguide, this waveguide manufacturing operation takes 65% less time and costs are reduced by a staggering 90%.

www.omron.com

High-brighness LED

Omron Corporation has begun marketing a high-brightness DR-LED (Double Reflection-Light Emitting Diode). The most important feature of the DR-LED is Omron’s proprietary Double Reflection structure, which uses an internal mirror to re-reflect all the reflected light generated at the package interface and emits it outside. The utilization efficiency of light emitted from the chip is over twice that of conventional LED’s. Moreover, to pull out the same brightness from the same chip requires just half the energy as that used on a conventional LED.

www.omron.com

Digital Camera Station

Omron Corporation will launch a new service business enabling users to conveniently create print seals from images taken by camera equipped mobile phones. Using this service, pictures taken by mobile phones can be turned into prints quickly and effortlessly. The user simply connects the mobile phone with Omron's new seal print machine via a cable and the data is transmitted into the machine. Compared with services that utilise data transmitted through mail, this service has no unnecessary transmission fees and print quality is not affected by the image data compression of transmitted mail.

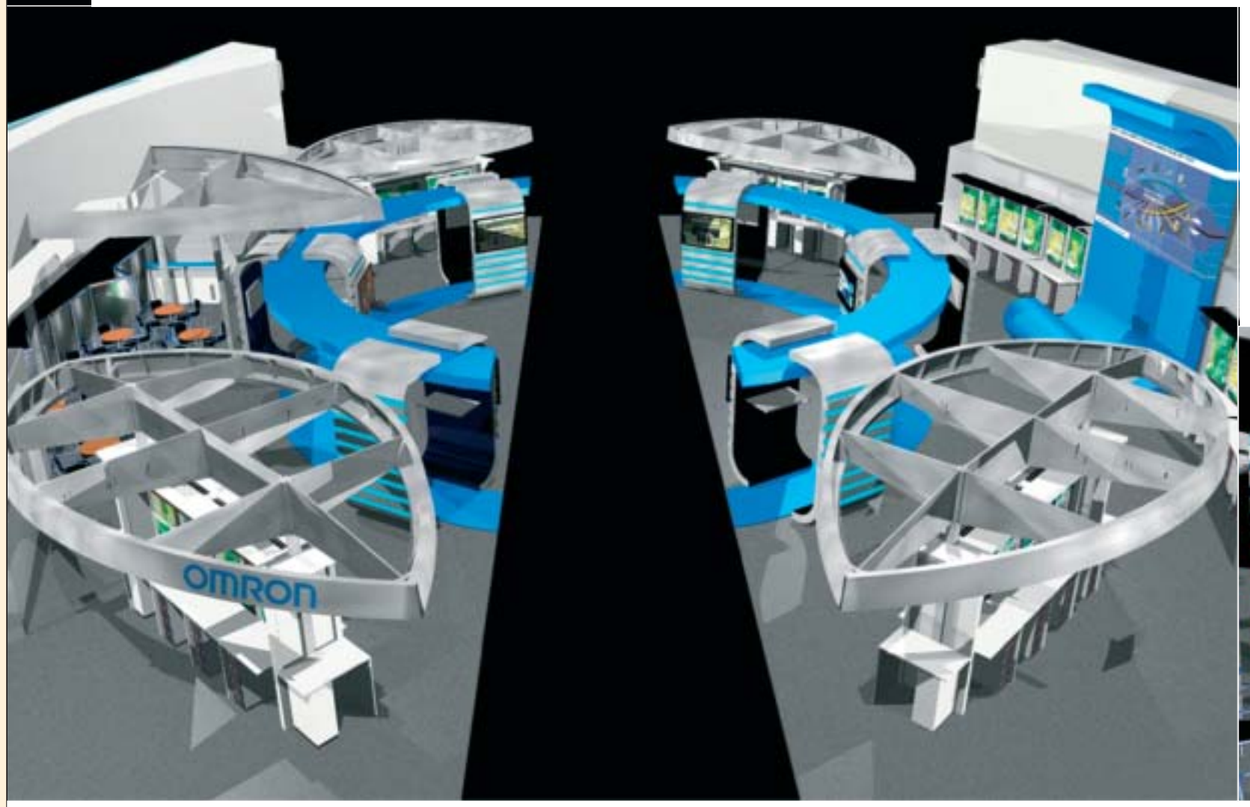
www.omron.com

Carmioni for car protection

The vehicle disturbance surveillance & notification device series Carmoni is powered with Omron's proprietary sound pressure sensor, ensuring accurate detection of vehicle break-ins or attacks. Carmoni 100 is a stand-alone type, sensing disturbances all around the vehicle and scaring off the attacker with sounds and lights as soon as a disturbance is detected. Carmoni 200 combines this capability with a communication function, intimidating the attacker while simultaneously transmitting information of the disturbance to the car owner's remote.

www.omron.com

Omron to set new milestone at the Hannover Fair 2003 with "Smart & Seamless Technology"



7.–12. APRIL 2003
HANNOVER MESSE

At last year's Hanover fair Omron presented the 'Sensing Tomorrow' concept, in which we gave you an overview of new automation technologies. This year we are going to launch a new way into automation – Smart & Seamless. We think that automation technologies of the future can be this simple, flexible and revolutionary.

The Smart & Seamless Technology translates into innovative process components with their own intelligence, which simultaneously deal with your task efficiently, and in a way that's compatible with your environment. In our multimedia presentation, we would like to demonstrate for you the advantages of Smart & Seamless Technology. Enjoy the presentation and experience this innovative concept for yourself!

Product highlights at Hannover Fair 2003
Particular manufacturing tasks, even simple routines, require particular solutions. We think that the new range of products we are presenting this year is equal to any of your manufacturing requirements!

Here's a sample of what we're presenting:

- PLC functionality for the 3G3MV frequency inverter option board
- 32-axis motion controller CS1W-MCH71
- Linear mechanism with the highest precision
- Mechatronic Link option for OMNUC W -JUSP-NS115
- DeviceNet Safety – a new vision becomes a project
- The new generation of modular 4 lead temperature regulators in DIN format
- High precision 1- or 2-dimensional laser distance sensors for the electronics field
- Proximity switches with modular design
- Quantifying proximity sensors with uniform intensification platform
- Code reader for direct prints (pin stamp, laser)
- Cost-effective high-speed image processing systems
- Tracking and tracing solutions in production logistics
- Combination circuit components with maintenance prediction functions

Competence centres for core industries
This year we have selected five main industries in which there will be particular requirements for automation components. These are:

- Automobile
- Packaging and electronics
- Production
- Distribution logistics
- Control box production.

If you are involved in any of these areas we would like to present you with solutions that we have already developed in collaboration with large key customers.
Have a great day at the Hanover Fair, and we look forward to seeing you in our spacious, eye-catching booth!

Your Hannover Fair team

Visit our product presentations in the Congress Centrum (CC)

Time	Place	Speaker	Subject
Monday 07.04.2003 12:00 hrs	CC Frankfurt	Bruno Moser	High technology sensor solutions for the semiconductor FAB of tomorrow
Tuesday 08.04.2003 13:00 hrs	CC Frankfurt	Uwe Kloß	Laser profile sensors in the automobile industry – highly precise measurement, best fit mountings and weld inspection
Wednesday 09.04.2003 15:15 hrs	CC Heidelberg	Mathias Schneidler	Highly dynamic control of 32 axes: CS1W-MCH is a flexible motion control concept – not only for packaging machines

Omron Industrial Automation technologies support the way the world lives and works

It is very likely that their effect will have touched your life in some way over the past 24 hours. You'll find Omron automation products everywhere: in cash machines, traffic lights and petrol pumps, in hospitals and surgeries and, of course in factories all over the world, helping to make the products you use every day.

Advanced Industrial Automation

Whatever industry you are in,
Omron can help make you more efficient,
more reliable, more competitive and more profitable.
Just ask any Omron customer!

OMRON EUROPE B.V.
Wegalaan 67-69 • NL-2132 JD • Hoofddorp • The Netherlands
Tel: +31 (0) 23 568 13 00 • Fax: +31 (0) 23 568 13 88
www.eu.omron.com

OMRON