



“Ever experienced 20G acceleration in a split second?”

LINEAR MOTORS

DIRECT LINEAR DRIVE

WHEN SPEED REALLY MATTERS



COVER STORY

- ◆ Direct linear drive - when speed really matters
- ◆ Omron's linear drive technology in the printing industry

NEW PRODUCTS

- ◆ Motion goes fully digital
- ◆ Smart ZX sensor platform expansion
- ◆ New CJ1 and CS1 PLCs with high-speed function block processing

APPLICATIONS

- ◆ Piper Heidsieck: Omron keeps the champagne flowing!
- ◆ Robot positioning at Volkswagen Sachsen GmbH

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Editorial



Roberto Maietti
European Sales Director

Quality versus quantity

The past is what has shaped our present, so in order to predict what might happen tomorrow we have to study the world of today. We can also apply this line of thinking to Industrial Automation, where significant changes have been happening over the years. Just 20 years ago the world was running a race to increase quantity in production. The winner was the person who could maximize production. Quantity was the magic word: more products launched in the market increased the possibility of business. Back then no one was optimizing stock, no one was producing on demand. The critical issues were speed, complexity and performance. The products offered were able to satisfy all these needs, and the technology focused on high functionality and fast cycle times to guarantee fast operations.

Many changes in our society modified our habits and needs, which in turn made rapid and significant changes in production methods.

The focus switched from big quantities with limited differentiation, to a much wider product range with high levels of differentiation, offering more product choice. Quality became the key factor for success.

This move, from quantity to quality, had a major impact in all production methodology and consequently machines requested different features and performances. Simply producing was not enough; the quality level of the final products needed to be checked. Machine concepts changed and the distributed intelligence and tractability became increasingly important. Products were much more complex and the set-up of the machines needed to be modified quickly to guarantee minimum lot production. In this way, customers could order what they needed and the manufacturer could produce on demand.

When quantity was the key priority the quality was checked, typically at the end of the production lines. Now that quality is the only priority, all checks are done at multiple stages along the production lines. Looking to the future, I see a change from the product quality to the quality of life. That means a new way of benefiting from technology. Automation will increasingly influence our lifestyles. A positive influence could be guaranteed by heavy involvement of manufacturers in selecting right materials. That means using safe components and technologies, and integrating these technologies with biology to ensure that maximum attention is given to safeguarding people's health. Omron wants to contribute to the development of society by acting as a leader in technology, health care, and safeguarding the environment. This approach will significantly change our lives, and we strongly believe that this has to be our mission in this new century.

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Wegalaan 67-69, NL-2132 JD Hoofddorp • The Netherlands

Tel: +31 (0) 23 568 13 00 • Fax: +31 (0) 23 568 13 88

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Direct linear drive – when speed really matters

From 0 to 100 km/h in just 5 seconds: who wouldn't like to accelerate their car like that just once? Or even better, who doesn't have a secret desire to feel the 1.3G acceleration of a Formula 1 racing car run through their body? These values may seem very much like a dream to us, but they present no great challenge to a direct drive unit. We are talking about acceleration values reaching 20G, which is the same as going from 0 to 100km/h in 0.2 seconds! Even the most daring jet pilot would feel the sweat on his forehead at the thought of accelerating with such force. The fact of the matter is – that really is fast! - By Stefan Spiekermann

Direct linear drives are not something we encounter on a daily basis, but they do help to make things a lot easier for us. They can be found, for example, in the production of mobile telephones, cars and newspapers, to mention just a few. Even in the clothing industry, linear drives play a significant part in the production process.

Dynamic shortfalls in conventional linear systems

Until now, different types of conventional linear systems driven by rotating servomotors have almost always provided linear drive motion. The rotational motion was converted to linear motion by gears, toothed racks, belts or circulating ball spindles. In the past, these enabled multiple applications to be achieved without difficulty. These days, such systems often reach their engineering limits in terms of dynamics and precision. Conventional linear

drive units with rotating transmissions already reached their limit in the extremely varied processes of the semiconductor industry more than 10 years ago. This meant that special positioning processes could no longer be achieved with the necessary precision and speed.

Requirements for improved precision and dynamics in product manufacturing went hand in hand with the miniaturisation of semiconductor components.

Miniaturisation sets new standards

Let us consider the mobile telephones of just a decade ago. They were almost all as big as a paperback and, in spite of the impressive size, their technical capabilities were very limited. The current trend in mobile telephones is towards multimedia communications systems the size of a cigarette packet that include cameras and LCDs. It is true to say that the

micrometer precision of the bonded installation of these cameras must have given many experienced engineers a few headaches. The use of a high-precision direct drive unit ensured micrometer-precise application of the adhesive and was the ideal solution to the problem.

Corresponds to twice the acceleration of a rocket...

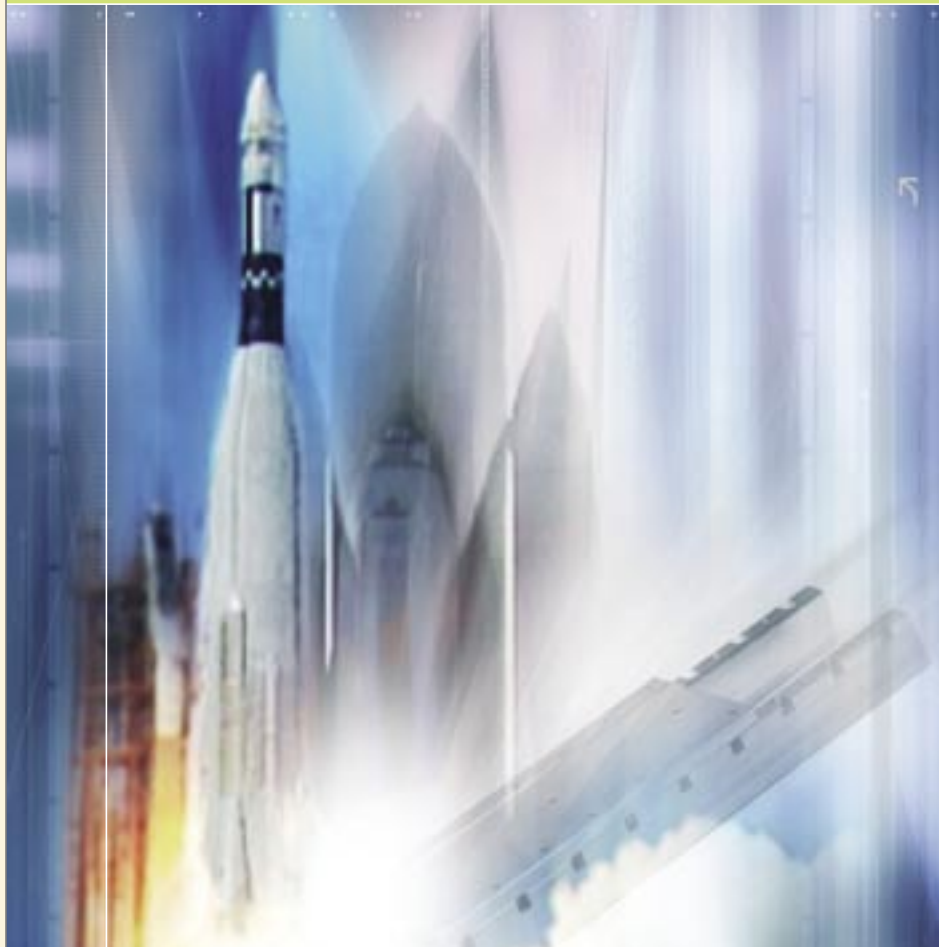
At first sight, the size of a car gives no indication of the intense integration work the design engineers have to carry out when building the control electronics. Cost pressures constantly increase, but no user wants to miss out on electronic 'accessories' like ABS, ESP, ASR etc. This means that components have to fit even more tightly, and this results in ever finer and increasingly precise manufacturing processes.

Omron products to guarantee the environment

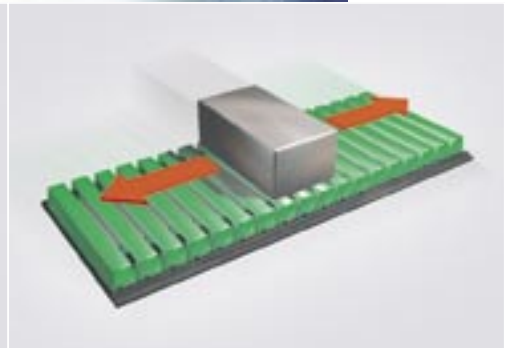
As environmental awareness increases around the world, tougher laws and regulations are being introduced by many countries. This makes the management and abolition of such harmful chemicals a critical issue for companies. In Europe, directives like RoHS, ELV and WEEE are requiring companies to develop products that use no hazardous chemicals. The RoHS directive prohibits the use of six specified hazardous substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyl – PBDE, and polybrominated diphenyl ether – OBDE).

The WEEE directive requires companies to establish systems for separating electrical and electronic equipment from normal garbage for collection and recycling. Omron is leading the way, working to develop products guaranteed to use no banned substances. In October 2003, it was decided to go beyond these legal requirements and re-evaluate the regulated chemicals used in Omron products. There are now 212 groups of these chemicals (approximately 800 substances) designated as controlled substances within Omron operations. Company-wide projects are under way to survey where these regulated chemicals have been used in parts and materials of products.

Omron established a green procurement policy and surveyed more than 1,200 suppliers in Japan, China, Malaysia, and Indonesia. Surveys of materials have now begun in North America and Europe as a global information resource is created to guarantee that there are no banned substances in any Omron products. By the end of March 2006, the Omron plan is to manufacture only environmentally guaranteed products at all Omron factories throughout the world.



The principle of the AC servomotor: the stator and the rotor rotate in the same plane.



Direct linear drive: the force is applied directly and without loss to the spot.

Direct linear drive

The direct generation of linear motion in the new linear motors means that transmission units like spindle/nut drives or belts can be dispensed with. This eliminates friction, elasticity and play, all of which impede the creation of drive units with extremely high positioning accuracy and superior dynamics. The force is applied directly and without loss to the spot where it can most effectively perform its task. The principle is the same as in an AC servomotor, in which the stator and the rotor rotate in the same plane.

System component quality is important

Efficient drive units are more than just a motor and a magnetic line. Other components are required in order to obtain the ideal drive unit for the application.

In the final analysis, a smart servo controller and the choice of a high-resolution linear transducer and read head are critical to making full use of the positioning accuracy provided by the linear drive.

Highly dynamic systems also need highly rigid and robust mechanical guides mounted on different substrates. The most suitable material must be chosen in view of the requirement for a top speed of 5m/s and 20g of acceleration, which corresponds to twice the acceleration of a rocket.

Output up by 20% due to reduced positioning times!

Without suitable driver technology, a direct drive unit stands alone and helpless. Omron's solution is the newly developed XtraDrive servo controller. With its groundbreaking patented control engineering,

this drive unit sets the trend in modern control technology. The optimised combination of the dynamic drive and a smart servo controller can increase the output of systems performing several thousand high-precision positioning processes every hour by up to 20%! This huge increase in capacity can result in savings of up to 15ms per positioning process, thanks to the virtually contouring error-free control.

Rotating transmissions reached their limit in some semiconductor processes more than 10 years ago...

Examples of applications include modern drilling machines for printed circuit boards and smart pick & place systems. For these applications, the market needs a minimum annual system capacity increase of 5%. With the Omron system, you can make a quantum leap!

Maintenance-free with several travellers on one magnetic line

How can the two basic requirements for modularity and high availability be combined in one go? The answer lies in a maintenance-free, modular and flexible drive system concept incorporating a direct linear drive. The no-contact process means that there is no friction and therefore no wear.

Costly servicing operations for component replacements and adjustments, with the resulting down times, become a thing of the past.

By operating several travellers on a line unlimited in length, it is also capable of being at any point in the installation at any time. Processed products can be removed immediately from that point by one traveller, while another already waits with the next item on the freed-up processing cell. It is not just the system manufacturer who benefits from this ingenious handling concept; the end customer also receives a highly efficient manufacturing installation for production.

Modern wafer processing machines for etching and cleaning silicon disks are currently equipped with direct drive systems. The drive system can be quickly and easily incorporated into the general system with the appropriate length and configuration according to the customer's requirements and the combination of the processing cells. Direct drive systems with several travellers are used for the installation of fully automated research laboratories in the medical sector. Cell specimens can be exchanged by 'ghostly' hands between analysing stations with logistical perfection and without collision.

Finding the right solution together

Quite often choosing a direct drive is the first decision in the development of a new production installation. In this case, the best possible system must be identified in order to meet the requirements specified for the production installation. Technical and commercial aspects must be discussed and precisely clarified. The same mind-set must exist in the partner-

ship between the machine manufacturer and the drive system supplier. Factors like output, performance, build and heat generation must be discussed and defined together.

The right drive system for the chosen application

The domains in which direct drive systems are used are very diverse and there are different variants of electric direct linear drive systems on the market. One example is the die-bonding process used on back-end areas in the semiconductor industry. The die-bonder system has to join individual microchips called 'dice' from a silicon wafer on a substrate. The miniaturised

Processes like these require absolutely accurate positioning...

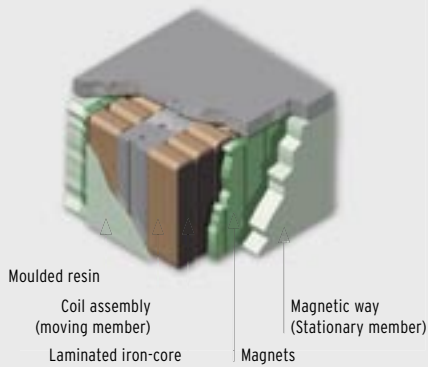
edge dimensions of these components can be as small as a few 100 microns. Processes like these require absolutely accurate positioning, often in the order of a few microns in series production. To obtain turn-around times of less than half a second, the drive units must achieve high acceleration values as well as tremendous positioning accuracy. The requirement for particle-free drive systems in the semiconductor industry is just as necessary as their maintenance-free high availability qualities.

Maximum dynamics and compact geometry

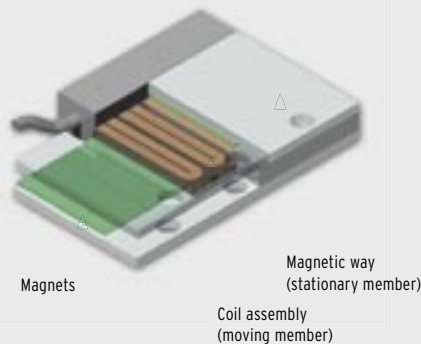
For these and similar applications, Omron can offer the non-magnetic direct drive systems



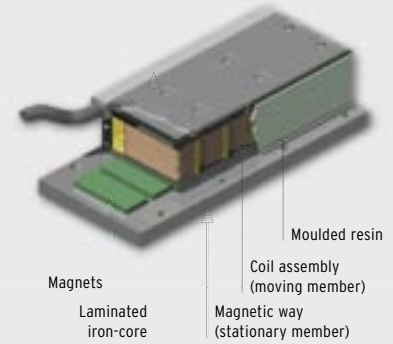
Iron-core TW linear motors with magnetic attraction cancellation.



Coreless GW linear motors construction results in zero-attraction force and zero-cogging.



Magnetic attraction force between the moving and the stationary parts can be used to increase the rigidity of the system by pre-loading the linear motor bearings.



of its SGLG Series. These very compact systems provide a range of forces between 13,5 and 1300 Newton. Their non-magnetic and therefore non-attracting design gives them very

More than just a motor and a magnetic line...

good synchronisation properties and the possibility of an overall open-cage structure. These factors go a long way to meeting the ever-increasing requirements of the semiconductor industry for compact systems. The aim of chip manufacturers is to fit more systems into smaller clean areas for production. The costs of maintaining ultra-clean production premises runs to at least several tens of thousands of Euro per square metre each year.

Lower costs – higher performance

In contrast to the non-magnetic designs, the magnetic attraction forces acting between the coil and the magnetic line must be taken into consideration in the magnetic systems of the SGLFW series. These magnetic forces can be up to four times the maximum force of the motor. The maximum force generated by the SGLF series is currently 2500 Newton. This gives rise to a magnetic attraction force of nearly one

ton, which has to be absorbed non-torsionally by a suitably dimensioned guide system. Magnetic systems are used in diverse domains. This is partly due to the fact that they are an affordable variant of dynamic direct drive systems. Application examples include packaging machines, welding installations, and measuring systems as well as all kinds of handling systems.

Maximum force without magnetic attraction

Limits are also set in respect of force in magnetic systems. The greater the force of the system, the higher the magnetic attraction force. The structure and the mechanical design are disproportionately cumbersome, which often means high costs and investment.

The unique engineering of the magnetic motors of the SGLT series is based on the requirements of applications which require several kN of compression and tensile force, but where high magnetic forces are not permitted. The traveller in this system is located between two adjacent, permanently magnetised rails. This configuration cancels out the two opposing magnetic fields, and only the traveller load acts on the guide system. These systems are used in machining centres where very high

loads must be driven at maximum dynamic levels. The lack of magnetic attraction forces also has advantages when transporting work-piece carriers that weigh tons in the automobile industry.

A glimpse of the future!

Markets are currently developing ever faster and more dynamically than in the past, in conjunction with the technology that serves these markets. Affordability and increasing capacity in the last few years are supporting the trend towards direct drive systems in linear drive system technology. Irrespective of the application or domain, Omron's wide-ranging programme of direct linear drive systems is capable of meeting virtually any challenge, however complex, with an ideal dynamic drive system. In addition, our engineers are currently working on smart systems that will in future be positioned without using linear transducers. These technological marvels are already able to achieve positioning in the few micrometers range in the laboratory. Future developments of systems with linear transducers will offer positioning in the nanometer range, which corresponds to 1/50.000 the diameter of a human hair!

Stefan Spiekermann
Industrial Specialist Linear Drives





Dynamics in printing



Spühl AG is the world leader in the field of machines producing spring interiors for the mattress and upholstered furniture industry. The company owes its success to the technological expertise and innovative spirit it has displayed since it was founded more than 125 years ago. Its most recent commercial domain of Digital Printing Systems, which we take a closer look at today, is also benefiting from these skills. Spühl AG employs more than 200 people, has its Head Office in Switzerland, and has been an independent subsidiary of the American company Leggett & Platt Inc. – which employs 33,000 people worldwide – since 1997. – By Stefan Spiekermann and Martin Reh

Since 2003, Spühl AG has been active in the commercial domain of Digital Printing Systems, developing and producing large-format ink jet printers. Printing systems like these are suitable for a wide range of applications. Base materials like paper, film, textiles, glass and wood in widths of up to 3.5m and heights of 75mm can be printed without any problem.

Examples of end products include the various types of large placards we see stretching right across the facades of high-rise buildings. Looking back to the summer Olympic Games in Athens, almost everybody will remember the brightly decorated sunshades where athletes sheltered from the blazing heat between competitive events. The materials for these sunshades were printed exclusively by Spühl AG for this event.

Foundation of the company's success – innovative products coupled with excellent customer service. In its recent development of the 'Spühl Virtu MT 25' printing system, Spühl AG decided to use a drive system designed by the Omron Group.

100% positioning and axis synchronisation...

The reason for the decision was the company's innovative and technically superior product range and the excellent partnership co-operation between Spühl AG, Omron and Regatron AG, which is a Swiss partner company of the Omron Group. Regatron itself is specialized in engineering and design-in of Omron's motion & drive technology components

to industrial applications. According to Spühl AG's Design Management, "technical support and properly defined products are essential to any successful new design".

The print line of this latest generation of 'roll-to-roll' printing machines is equipped with a magnetic direct linear drive unit from the SGLFW Series with 4 metres of magnetic line. Several Omron servo-drives are used for the material feed. The powerful combination of high-performance drive components provides a printing capacity of up to 150m² every hour.

Fast, precise dot-to-dot in a compact unit

The most important criterion for this size of print system is the micrometer-precise positioning on the base material of each dot of ink. Only 100% positioning and axis synchronisation will produce a brilliant piece of printing.



The print line of the latest generation of 'roll-to-roll' printing machines is equipped with a magnetic direct linear drive unit from the SGLFW Series with 4 metres of magnetic line.

Another aspect was the high acceleration rate of the almost 100kg print head at its printing speed of about 3m/sec. Every centimetre used to generate acceleration is lost as far as productive motion is concerned. In other words: the better the acceleration of the drive system, the more efficient and compact the installation.

“no drive system other than the direct linear drive is flexible enough...”

When the design engineers considered these process-related major requirements for precision, speed and dynamic acceleration, they very quickly decided on a direct linear drive system supplied by Omron. This was considered to be the only way of reliably achieving these extremely high standards on a line of 4 metres and more. The general performance

of the drive system with its 5m/sec. output and acceleration reaching 20g will allow the design engineers at Spühl AG to view the future with confidence.

Competitive advantage due to lower costs and versatility

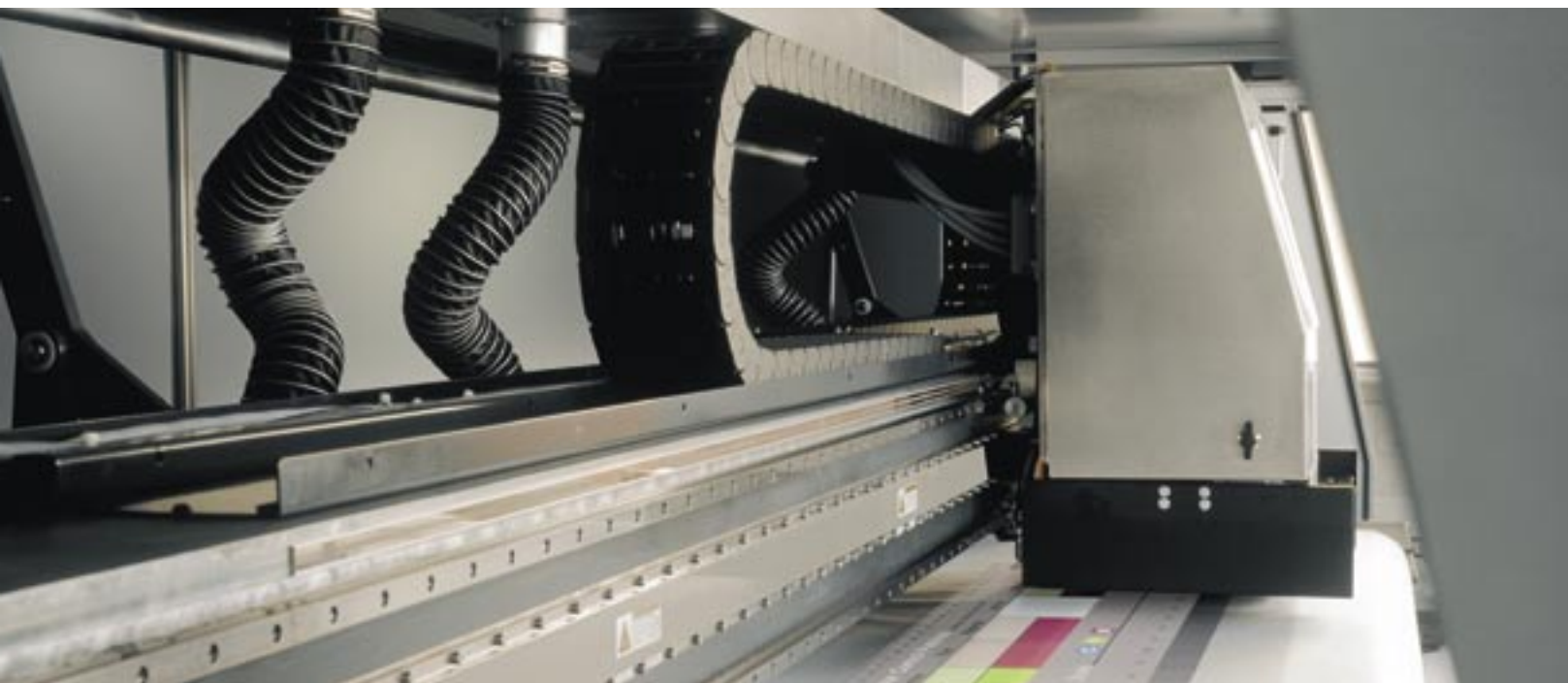
Other positive aspects were revealed to the designers during the development phase. Cost-intensive and resource-blocking construction work was reduced in comparison to conventional spindle drives. This created a definite competitive advantage. The response to customers' special requirements is quick and flexible. According to Spühl AG Mechanical Development Department, “no drive system other than the direct linear drive is flexible enough to be integrated as quickly and easily into a newly designed machine. The system is not just a time-saver, it has also prevented a few headaches during the planning phase”.

Maintenance-free process stability

It is not just the manufacturer who benefits from this technology; the customer also gains great production advantages with the direct drive used with this type of system. The maintenance-free, no-adjustment drive system means that costly downtimes for servicing work are a thing of the past. Drive unit wear can have serious consequences in printing applications. The print area lies beneath the drive axis and falls of dirt particles can permanently damage and spoil the quality of the end product as the colours dry.

Direct drive systems offer the ability to operate above the product, without any kind of risk. Process optimisations necessitated by mechanical play in converter shafts are dispensed with completely. Once a process has been initiated, it will continue consistently in 24-hour production at maximum output.

Omron's direct linear drive technology moves the latest generation of large-format ink jet printers with an almost 100kg print head and a printing speed of about 3m/sec.



Motion goes fully digital

The market is changing, and technology is changing with it. To ensure Omron remains at the forefront of offering the best motion control solutions to the user, we now introduce a series of controllers on all control architectures including PLC-based, Stand-alone and PC-based. The benefits are clear. A user can be confident that he is choosing a stable, flexible and reliable motion controller that suits his needs, not the other way around.

This whole motion controller series works with a common digital motion bus Mechatrolink. Increasingly, these bus systems are replacing traditional analogue and pulse technology as they offer numerous benefits:

- Ease of installation; because the digital bus Mechatrolink uses pre-configured cables, connection between the motion controller and servo axes really is plug and go. No more complex terminations and wiring, thus reducing costs in terms of installation and greatly simplifying commissioning and fault finding.
- Information handling; via the Mechatrolink connections, the user can very simply obtain valuable application data including status, torque, current and faults. Information such as this is vital in reducing initial machine development time, commissioning and machine downtime.
- Reliability; by moving away from a high number of wires and connections, the reliability of the system is improved.

Importantly, these motion controllers form part of Omron's overall Automation product range. The motion control becomes an integrated part of the application, able to share information between areas of a machine or factory.

CJ1W-NCF71 – PLC-based solution for point-to point positioning

- Position control is directly controlled by the ladder program in PLC CPU
- Up to 16 axes are controlled from one NCF unit
- Position, speed and torque control modes are available
- Simple access to the whole system from one point



CJ1/CS1-MCH71 – PLC-based solution for advanced motion control

- The motion controller is fully integrated in the PLC system CJ1 and CS1
- One MCH unit controls up to 30 axes over the bus
- Multi tasking programming using basic type language
- Axes synchronisation, electronic CAMs, torque control



MP2300 & MP2200 – stand-alone solution for advanced motion control

- Flexible solution that easily integrates into existing system
- Network connectivity available for DeviceNet, Profibus, Ethernet
- Self configuration of network nodes for an easy set-up
- The MP2300 controller can control up to 48 axes
- The MP2200 controller can handle up to 256 axes
- Functions include axes synchronisation, electronic CAMs, torque control



MP2100 – PC-based solution for advanced motion control

- Motion APIs are available for customised control applications. Motion commands can be input from either the PC application or the MP2100 program
- Self configuration of network nodes for easy set-up
- The MP2100 controller can control up to 16 axes and the MP2100M controller can handle up to 32 axes. Functions include axes synchronisation, electronic CAMs, torque control



Varispeed G7 - introducing the new global standard: 3-level control



Even with long motor cables, 3-level control ensures greater plant uptime due to:

- Reduced voltage spikes, avoiding insulation breakdown
- Reduced bearing corrosion caused by shaft voltages
- Lower electrical noise, silent operation
- 150% torque even at speeds as low as 0.3Hz in open loop
- Very precise torque control

Omron is proud to announce the Varispeed G7, the first general-purpose inverter in the world to feature the 3-level control method. The new control technique solves the problem of micro-surges, and makes it possible to use the

Varispeed G7 on existing motors. The high performance and functionality provided by current vector control means powerful and high-precision operation for a diverse range of equipment and machinery.

The Varispeed G7 not only lowers your initial cost, but will dramatically slash your running costs through energy-saving control performance.

CJ1M-CPU1-ETN - Ethernet integrated

Omron's smallest modular PLC offers an economical way to connect to 100 Mbit/s Ethernet networks for seamless and smart distributed control.



Ethernet for all: Communication over Industrial Ethernet networks has so far been restricted to high-end PLC models. Omron lowers the threshold for truly distributed control using 100 Mbit/s Ethernet with the introduction of 3 new CPU models in the CJ1M-range.

The 100BASE-TX Ethernet interface integrated in the new CJ1M CPUs adds a high-speed, reliable network connection to the existing 2 serial ports. You can connect the PLC to Ethernet networks, whilst retaining the possibility to make serial data links to existing peripheral devices.

Speed and transparency: up to 255 nodes can be linked using secure connection-based TCP/IP data communication with Omron's proven industrial FINS protocol on Ethernet. Compared to conventional serial connections, the Ethernet interface greatly increases communication speed for PLC programming, commissioning and monitoring.

CJ1 is a key component in Omron's Smart Platform concept. The transparent message routing built into the CJ1 system provides direct access to devices connected to the PLC by serial data links, Controller Link

or DeviceNet networks. No PLC programming is required to transfer data between Ethernet and any other network.

Easy access and set-up: the FTP server functions provide simple access to data stored on a standard CompactFlash Card which can be used in any CJ1 CPU. Programs, settings or log files can easily be transferred to or from PCs across Ethernet networks. Configuration of the CPU's Ethernet functions can be done with CX-Programmer, or through the unit's built-in web server with HTML set-up pages.



CX-Programmer 5.0 - easy programming with powerful results

Reduce your programming and testing time but increase your machine flexibility.

CX-Programmer V5 saves you time and money

The new version of this popular software now adds some key new features when used with the latest Omron CS1/CJ1version3 PLCs to allow even faster and easier programming – enabling you to reduce your programming and testing time while increasing your machine functionality.

These new function blocks are developed and pre-tested by Omron and can be drag-and-dropped into your application to give your machine and add the inputs and outputs! So you can offer the added functionality your customers demand, but without the need for complex programming and testing.

Additional programming languages

Ladder programming still remains the easiest language for many people to use, but some users prefer 'Structured Text' language - similar to 'Basic' - since it allows complex math functionality to be created easily.

Compatibility

This version of CX-Programmer adds powerful new functionality but still continues to support all PLCs from the existing Omron range. CX-Programmer also offers file compatibility with all older software packages from Omron, allowing older program or data files to be simply opened or converted into CX-Programmer, which reduces the total cost of using Omron products.

NSJ5 - PLC and HMI become one

The NSJ5 is all you need to build your automation solution. This Omron product is the next step in panel-less automation created for applications that require visualisation, control and open network connection with little space!



With the functionality of this product, which includes a fast and powerful PLC, a 5.7" touch-screen, and open Network connections, you are able to configure, debug, monitor and maintain your complete automation solution. This functionality is incorporated in a single compact housing! The NSJ5 is a key part of the Omron Smart Platform concept.

All the advantages you want

This product saves you a lot of space in your panel, because the PLC units are inside the NSJ5. You don't need to wire the connection between the PLC and the screen and you don't need a power supply or I/O cards. Just place your remote I/O DeviceNet units in the field or connect other optional intelligent devices like servos or temperature controllers. This way you are able to use a smaller panel that saves you money.

Another big advantage of using the NSJ5 is the development time saved by making use of our Smart Active Parts in combination with the connected devices. With these pre-programmed Smart Active Parts you are able to present the operator the right information at the right time about any connected device without programming a single line in the PLC.

This also means reduced downtime of the production line when there is a problem. You are able to pinpoint the exact location and cause of the problem and you may even be able to solve it with the help of the Smart Active Parts. This means increased production capacity and it will again save you money!



New CJ1 and CS1 PLCs with high-speed function block processing

Although from the outside there is little visible change, the internal architecture of all CJ1 and CS1 CPU units has been upgraded significantly with the introduction of Version 3 hardware and firmware.

PLC programming with user-definable function blocks, in accordance with the PLC programming standard IEC 61131-3, can help to reduce engineering effort in machine development, commissioning and maintenance. However, in most competitors' PLCs the use of such function blocks is optional, at extra cost for hardware and/or software. Also, it often has a negative effect on the performance of the PLC due to additional overhead in transferring data to and from the function blocks.

With the new CJ1 and CS1 CPUs it is possible to have the best of both worlds. By developing a new PLC core component, which handles program block invocation in hardware, Omron has created a PLC range that offers the same high performance as before, even when programmed using IEC-compatible Structured Text function blocks.

Also, all Ver.3.0 CPUs now have extra memory built in as standard: use of memory cards is optional for data storage on all CPU models, but not necessary for normal operation. From the program information stored in the PLC memory, the full PLC program including function blocks and user comments can be reconstructed; a unique feature that can be of vital importance when troubleshooting machines in the field.

The new Version 3 PLC architecture is the core of Omron's Smart Platform concept. With an ever-expanding library of pre-tested function blocks, PLC programming becomes a drag-and-drop operation.

Simplicity and clarity in communication to operators



Six Sigma, TQM, Lean Manufacturing, TPM, Kaizen: “Give operators more responsibility and involvement in the process they are working with”; that’s what most of the quality programs claim. But what is the risk in allowing less skilled personnel to influence the processes and machine settings?

Machine builders throughout Europe are addressing the changing needs of their customers by designing a new generation of machines that can maintain themselves autonomously, tune themselves to a consistent level of quality, and foresee problems that may occur in the process. Introducing such growing complexity into machines of course also makes it important to have simplicity and clarity in communication to operators, technicians and factory management.

Human Machine Interface – a core topic in machine automation

The Human Machine Interface (HMI) is being used not only as an operator display and data-setting terminal, but also as a maintenance tool for the complete control system. This new tool can be easily programmed to guide the operator intuitively to the right area and enable him to fine-tune the process within pre-defined limits. By setting those limits the operator can influence the process with the minimum of risk.

Factory engineers also use the HMI to access, monitor and parameterise each device on the machine in the same intuitive way. It’s even possible to present the live images of, for example, an Omron vision sensor and program it via the screen. With an HMI, an operator has maximum control of the machine’s inspection and quality control systems. It puts the operator right in the heart of the machine.

No matter the circumstances

Since the HMI functionality has become increasingly necessary to operate the machine to its maximum efficiency, customers are demanding product quality and reliability, and that’s why they come to Omron. For over a decade, Omron has been a global supplier of HMI solutions, with over 500.000 pieces of HMI sold to date.

Omron uses an operation system for its NS-series that guarantees 24-hour operation (OS-9), something other operating systems simply cannot do. Omron offers the longest backlight life in the industry for its display products. And Omron stands by its high-quality products by giving customers a 3-year warranty period, a unique statement in the industrial market.

How fast and flexible can a programmer be!

A major benefit of the HMI is its quick and easy programming. Designers can build a user

interface that helps to simplify the complex systems inside the machine without losing functionality. And Omron engineers have designed complete pre-programmed visualisation objects with embedded communication codes that can be simply dragged-and-dropped into the screen for easier, faster programming.

Those objects - Omron calls them Smart Active Parts - not only act like the original control element (a temperature controller for example) but they can also be parameterised like the original product. It means that all the information that is available in a machine from products like sensors, motion controllers and PLCs to temperature controllers and vision systems can be easily presented, monitored, adjusted and reviewed directly on an Omron NS Series touch screen.

The only thing that needs to be set on a Smart Active Part is the network and node number of the corresponding device. This technology from Omron also supports the growing demands from machine builders to reconfigure machines to meet the specific needs of a factory. With the software architecture of the Omron NS-series it’s again very easy to modify existing templates to the wish of your customers.



Ask our experts: Smart Active what???



Maickel van Haren,
product manager HMI

**Do you also have an Omron Frequency inverter in your machine?
Wouldn't it be great if you could monitor and parameterise the inverter from your HMI
without any extra costs and by a few clicks in your programming package?
With the NS Series and Smart Active Parts you can!**

Smart Active Parts (SAPs) are pre-programmed pieces of visualisation software with embedded communication code. These parts are called smart and active because they automatically communicate with the Omron devices in your machine and can be used to configure, commission, operate and maintain these devices.

Everyone claims easy programming – prove it
And that is exactly what we do! There are four simple steps to using a Smart Active Part that can save programmers hours of work:

1. Create a new project.
2. Select the Smart Active Parts library from the menu of NS designer.
3. Choose from the extensive library of pre-tested Smart Active Parts and click on the use button.
4. Finally, double click the component on the screen and set the address of the component you want to control.

When you download your project to the NS, the Smart Active Part will automatically communicate with the drive(s) connected to the NS. On the NS you are then able to set every parameter in the drive through

an intuitive graphical interface. This easy way of developing your project saves you a lot of time and effort!

The SAPs use the Omron FINS protocol commands to send information to and receive information from devices anywhere in your configuration. This can be directly from an NS series or through a PLC and multiple networks.

Still not convinced? I challenge you to visit the website I created: ns.europe.omron.com. Even if you have never programmed before, you'll find this as easy as it can get.

Maickel van Haren

Test how it works on ns.europe.omron.com. Within 5 minutes you will have designed your own interface, even if you have never programmed before!

Smart ZX sensor platform expansion



Omron continues to expand the smart ZX platform with the new amplifier ZX-LDAxxN and the smart monitor software V3.0. To increase the flexibility in sensing and control tasks, the platform concept allows you to combine different sensing technologies into one platform, as now there are ZX-laser sensors, ZX-inductive sensors and ZX-contact sensors.

A wide variety of interchangeable sensor heads can be easily connected to an amplifier. Simply select the sensor head that fits your application, this gives you more flexibility in sensing performance.

The ZX amplifiers feature a host of remarkable functions, including diverse calculation and controlling functions, which allow you to measure and control the application by high/pass/low or linear output. This saves you money because there is no need for PLC and PC programming, so time-consuming jobs are eliminated. With Omron's Plug & Play concept there is no need to re-adjust or calibrate the

sensor head to the controller. Simply connect and control!

For multipoint calculation several amplifiers can be easily connected together to one solution platform to solve special evenness calculation or, for example, to measure the thickness (A-B) using a laser sensor for the object surface and the inductive sensor for the reference metal roller surface.

The new Smart Monitor Software V3 can be used to configure the sensor via PC for easy parameter setting. For detailed signal analysis the individual signal can be charted



Modular plug & play concept

- Developed to meet your measurement needs
- The modular concept allows different sensing technologies to be added and combined into one platform
- The built-in controller allows the application to be measured and controlled independent of any PLC
- Provides digital I/Os and analogue outputs
- Easy operation due to multifunctional display and teaching functions
- Covers all of your measurement requirements and takes the costly and time-consuming process out of selecting the best sensor heads for the job



Sensing plug & play concept

- A wide variety of interchangeable sensor heads, including laser, inductive and contact types, can be easily connected to an amplifier
- Simply select the sensor head that fits your application based on material and accuracy
- An easy exchange of sensor heads reduces installation time and saves maintenance costs



New software concept

- PC-controlled communication and parameter setting by smart monitor software offers the advantage of an easy parameter setting and system set-up
- Easy data visualisation and logging for SPC purposes
- Signal analysis for detailed verification



and displayed to judge the sensing performance.

A special data logging function is implemented to log data for SPC purposes based on a trigger event. During the production process for example, data on faulty products can be logged and transferred to a host system to improve the production performance.

The smart monitor software V3 is for the following ZX amplifiers: ZX-LDAxx-N, ZX-EDAxx, ZX-TDAxx.



Communication concept

- Smart communication modules guarantee quick and easy system set-up from a PC or PLC
- The standard interface protocol allows the smart platform to be integrated into the HMI concept

ZFV – The scalable smart vision sensor



The new versatile smart vision sensors are compatible with a broad range of applications. The included LCD display provides smart set-up and immediate operation feedback. A scalable concept along with multiple inspection tools allows the adoption to growing application requirements.

One-touch settings

One-push teaching is a result of Omron's commitment to easier automatic setting. Parameter settings and lighting control are available at the touch of a button.

A "smart" user interface

Parameter setting is done using a few buttons and the built-in colour LCD monitor. Operation menus and icons guide you through a simple set-up process. During operation, the display gives direct feedback showing results and images in real time. No need to connect an external device for set-up and operation viewing. It is built in – it's just there when you need it.

Scalable

Is one controller not enough to solve your application? Just add controllers by connecting them side by side to expand the functionality. Up to 5 controllers with or without cameras can be connected together to perform multiple inspections on your workpiece – due to the parallel processing system, adding controllers does not increase the processing time.

Single or multi function version

Depending on your application needs, you have the choice between a single or multiple

function controller. The multi-function version comes with 5 additional processing tools such as area, edge counting, width measurement, character, defect or position tools. The search tool is even able to detect rotated objects!

High-speed digital image transfer

Superior image quality is guaranteed thanks to the digital image transfer (LVDS) between camera and controller. Advanced algorithms allow cycle times down to 4ms. The camera head comes with integrated lighting which can be adjusted automatically or manually. If your application requires a special external light source – just switch off the internal light.

Adjustable detection area and distance

There is no need to buy a dedicated head for a single operating distance and field of view. The focus adjustment function eliminates the need to change the head for different working distances and sizes of workpieces. This enables sensing within the optimum detection area for the workpiece size. A guide light enables easy targeting and sensor head installation.

S8VS Micro - size is everything

The S8VS Micro is the ideal solution for manufacturers who want a compact and cost-effective solution for compact machines that require low power. Typical applications include powering PCBs, PLCs, HMIs and sensors in factory automation systems.

What makes the S8VS Micro unique is that it provides 100% power within its rated operational range of -10°C to 60°C. This feature enables the power supply to operate well in panels that are

located externally and which could be subject to harsh conditions. The S8VS Micro can furthermore be DIN-rail mounted or mounted directly onto the machine panel, either vertically or horizontally, for maximum installation flexibility.

The S8VS Micro incorporates innovative metal-frame circuit board technology that enables it to provide a higher power density per cm³ than almost any other power supply. The discrete components used in this technology dissipate

very little heat, so no conventional heat sinks are required.

The S8VS Micro conforms not only to conventional standards (VDE, CE, cULus), but also to EMI Class B, IP20, UL Class 2 and Class I / Division 2. It can therefore be used virtually anywhere in the world. The S8VS Micro series extends Omron's popular S8VS range of switch-mode power supplies even further, and covers most market requirements.

MYS Series - versatile plug-in relay that sets the standard!

The MYS relay series from Omron is already setting new standards in performance and reliability. Over 500 million of these mini power relays have rolled off the production line since first been introduced. Built to Omron's renowned quality and reliability, this truly versatile relay has become an actual standard, bringing enhanced features and flexibility for more user-friendly installation, commissioning and operation.

Because Omron's MYS relays offer unrivalled reliability and performance, they are first choice among relay users. Three relay types are available, in both 2-pole and 4-pole changeover contact arrangements, as well as AC and DC coil voltages. All models feature a mechanical indicator, and a nameplate onto which identification data can be added. The mainstream and

full-featured models have an LED indicator. In addition, the full-featured relays have a two-way action test button for manual testing, which is also colour-coded.

The MYS relays are built to Omron's own high quality and environmentally friendly standards, so a long, reliable working life is guaranteed.

They meet all relevant international standards, including UL, CSA, VDE, LR and CE. In addition, with the MYS plug-in relay, users have the choice of screw terminal or Screw-Less Clamp (SLC) terminal sockets for maximum installation flexibility.

ES1B - the cost-effective, contact-less way to temperature sensing



Omron's ES1B is an infrared thermosensor that provides an accurate, stable and cost-effective way to measure the temperature of objects. It produces an output signal that is proportional to the temperature of the object. The unit behaves just like a standard K type thermocouple, which enables it to operate with any temperature controller or alarm unit.

Compared to some passive IR sensors, Omron's ES1B is more sensitive. Despite the fact that the stated 'field of view' is the same (1:1), the ES1B can be mounted up to 40% further away from the measured object to generate the same output.

Four thermosensor models are available, each being calibrated for a specific temperature range: 10-70°C, 60-120°C, 115-165°C and

140-260°C. Each model gives reproducibility to within 1% of its range. Designed to Omron's high-quality standards, the ES1B has a silicon-based cable that is resistant to dust and water. This thermosensor is ideal for handling applications that include baking, packaging, sealing and laminating.

The ES1B is an alternative replacement for standard thermocouples. While the operating

principle of temperature measurement is similar for both, the ES1B has no contact with the object whose temperature it measures.

Once the ES1B and instrument combination is calibrated, the reproducible signal is always available and not only provides stable, real time temperature measurement, it also reduces downtime of the machine. This is what makes the ES1B very cost effective.

PRT1-SCU11 - linking standard instrumentation to Profibus

Profibus is the fastest growing field bus in Europe. What makes this European standard even more interesting is that China has adopted it as an industrial standard as well. This has led to the development of many Profibus-based master and slave devices, particularly in the advanced range of such products.



As Profibus establishes itself, the need for compatible products is growing. Using Profibus with existing products would of course be the ideal scenario, but integrating a Profibus connection in such products would be cost prohibitive. One solution is to develop an intelligent Profibus gateway. By doing so, many standard instruments like temperature controllers, digital panel meters, timers, counters and servo drives

could be connected to a single Profibus point. And unlike a standard gateway, which can only handle the hardware conversion, an intelligent gateway can also handle all protocol conversions where the only data needed in the master is the unit's node and parameter address.

Many companies have investigated providing Profibus-compatible products at an affordable

price, and one solution is Omron's intelligent Profibus gateway (PRT1-SCU11). All Compoway F-equipped products like temperature controllers and digital panel meters can be connected to this gateway. The gateway can also be set up for use in Hostlink mode, enabling Omron's servo drives to be connected. And by developing function blocks, configuring is a simple drag-and-drop procedure.

Omron trends

Ultra-compact control MEMS

As devices in the measuring/communications market continue to shrink in size and transmit data at increasingly higher speeds in a shift to higher frequencies, the demand for the same characteristics grows more intense in the key components that comprise these devices. This demand has prompted research and development at Omron that uses MEMS technology to downsize and accelerate relays, switches and other control devices.

Omron has applied its highly efficient actuator (EAGLE) and high-frequency, low-loss structure (HF structure) to develop the world's smallest Micro-Machined Relays. With superior high-speed characteristics (insertion loss: -0.5 dB at 2 GHz, isolation: -45 dB at 2 GHz) and virtually no deterioration of performance in switching tests of one million cycles, these relays are now on the verge of industrialisation. Meanwhile, Omron has launched research and development aimed at further reducing size and increasing transmission speed, which is revolutionising the size and speed of relays.

Ultra-compact sensing MEMS



As with trends in electronic equipment everywhere, demands for miniaturisation have been placed on sensors for detecting gas and fluid pressure, which are incorporated into air conditioners and electronic sphygmomanometers.

Omron has been working on electrostatic pressure and acceleration sensors since long before this demand arose. These sensors detect the minute change in electrostatic capacity between a moving electrode and a fixed electrode as it changes under pressure. Conventional sensors could not be physically miniaturized without sacrificing sensitivity. Omron solved the problem by employing a specially developed donut diaphragm structure to attain the high output linearity necessary for accurate detection. At one-tenth (2.5 mm²) the size of conventional products, it offers the world's highest sensitivity in an ultra small package.

Application: Robot positioning at VW Sachsen GmbH



Robot positioning at Volkswagen Sachsen GmbH

Until a few years ago, robot positioning using industrial image processing systems could only be achieved through complex and costly PC-based systems. However, image processing sensors are increasingly being used even in this technically demanding area of industrial image processing. - By Uwe Kloß - Manager European Automotive Team



The Mosel plant, which belongs to Volkswagen Sachsen GmbH, employs 6,200 people and has a capacity of approximately 1,150 vehicles per day, making it one of the most advanced automobile factories in Europe. Since 1990 over 2 million Golfs and Passat saloons have been produced at Mosel. Below are some robot positioning applications which have been produced by our systems partner "Schönherr Elektronik" at the Mosel plant in the last few years.

Robot control in the sealing of engine bulkhead panels in Passat saloons

In Hall 3 at the "engine bulkhead sealing" station (this bulkhead is a panel which separates the engine compartment from the vehicle cockpit), a Fanuc robot applies the sealant to the welds of the bulkhead using the flatstream process. This process differs from the spray technology previously used in that there is significantly less overspray.

The process is as follows: the EDP-coated car bodies arrive at the station by means of an overhead carrier system and are then

positioned at the station by means of a lifting platform. Subsequently, the positions of 3 car body features are determined. This task is performed by three F150 intelligent vision sensors from Omron installed in the station. The co-ordinates are passed by the F150 controller to a CS1 series PLC where the data is prepared and forwarded to the Fanuc robot controller. On the basis of the values that are calculated from this, the robot brings the spray head into the correct position and starts to apply the sealant.

Robot control for the underseal of the Passat saloon and the new Golf

Before being painted, the EDP-coated Golf and Passat saloon car bodies pass through the UBS stations on lines 1 and 2 where all the welds of the car underbody and the wheel arches are sealed, in each case by two Fanuc robots using the flatstream process.

Here also the car bodies arrive at the UBS stations by means of an overhead carrier system. In each case, three F150 intelligent



At the VW plant in Mosel F150 image processing systems are used for robot control in the painting and final assembly stages. Three cameras determine the position of the car body at any one time and forward these to a Fanuc robot which then applies the sealant in the correct position.



vision sensors determine the co-ordinates of three vehicle features and transmit these to a CS1 series PLC, which in turn processes the data and passes it to the Fanuc robot controller.

With this data, both of the robots then go head first into the correct positions on the underbody and the wheel arches, which then have the sealant applied to them exactly where it's needed.

Since the car bodies then go directly to be painted, it is very important that the underbody is sealed in the required areas. Without robot control and with the resulting inaccuracies in the application of the sealant, there would be unsealed areas on the vehicle floor and hence early corrosion damage in the future.

Robot control when stamping the vehicle identification number in the new Golf

To stamp the vehicle identification numbers or VIN numbers on the cars, in Hall 4 of the Mosel plant the stamping units are positioned

at three points in the vehicle interior and engine compartment.

The process is as follows: two painted car bodies enter the dual station so that the VIN numbers can be stamped on them. Subsequently, at the two stations, the position data for the relevant car body is determined with the aid of three F150 intelligent vision sensors and this is transmitted to a CS1 series PLC. This processes the data accordingly and transfers it to the relevant Fanuc robot.

With the positioning data, the robot consecutively approaches the two stamping positions in the vehicle interior, followed by the one in the engine compartment, where it stamps the VIN numbers in exactly the right position. The massive stamping head means that

precise positioning of the robot when stamping the VIN is particularly important.

Whether the stamping in question is in the engine compartment, where it is on a very small and precisely defined area, or in the vehicle interior, where the robot has to position the stamping head through the open passenger door very accurately, Omron's F150 intelligent vision sensor provides the precise position data for the vehicle body, thereby ensuring the correct positioning of the robot.





Development of Omron Eco-Products

In 2002 Omron set out an environmental vision “Green Omron 21”. This established the belief that there was a critical role for Omron to play in reducing the environmental burden of products and in helping society make the change from one of mass production, mass consumption, and mass waste, to one of sustainable development. That is why Omron is doing everything possible to develop environmentally friendly Eco-Products. Omron considers the 4Rs of – reject, reduce, re-use, and recycle – in creating Eco-Products, products making effective use of resources to help prevent global warming and pollution.

REJECT: Avoid regulated chemicals and those harmful to health

REDUCE: Reduce environmental burden

RE-USE: Re-use products, parts, and packaging materials

RECYCLE: Recover and recycle resources

Eco-Products and the Eco-Mark®

In creating Omron Eco-Products, assessments are established to help ensure that products exert minimal burden on the environment at all stages: manufacture, distribution, use, maintenance, collection, waste, and recycling. Factors to be considered are based on environmental burden reduction factors: resource efficiency, energy efficiency, recycling, re-use, and non-inclusion of regulated chemicals. These assessment factors are used to set targets for environmental burden reduction at the product planning stage. Omron engineers then look for specific ways to achieve these targets in the product design and development stages, in the process creating Omron Eco-Products. Products that satisfy the highest standards of environmental burden reduction are certified as Eco-label products and display a special Omron Eco-mark, in accordance with environmental standards (based on ISO14021).



Omron keeps the champagne flowing!



P&C Heidsieck is part of the Rémy-Cointreau Group, and deals with Omron as a customer on a regular basis. Mr. Frédéric Georges is the Maintenance Manager of the production lines at the Reims factory. In this interview he tells us what he expects today from his suppliers, and what he thinks about Omron.

Technology & Trends (TT): What does PIPER expect from its technical equipment suppliers?

Frédéric Georges, Maintenance Manager (FG): For us, the most important thing is quick and efficient after-sales service, some assistance when required for repairs, the possibility to talk to a real technician, and, of course, user-friendly equipment. We have our own maintenance technicians, so we need to be able to get help over the phone occasionally and, if the problem is big, to have one of the supplier’s engineers coming to our plant. Most of the time we can localise and repair the breakdown ourselves. Often it is only a card that needs replacing, so we keep a few of them in stock.

TT: Tell us how you work with Omron

FG: I appreciate the fact that we can call Omron directly when necessary. When purchasing

Omron’s equipment we are always dealing with very competent engineers, either via an equipment manufacturer, a distributor, or directly through Omron. It is reassuring to talk directly to technicians who know our application. For instance, the equipment manufacturer we work with on our vision system is in close contact with Omron, so when we call Omron we are quickly connected to the person who is aware of our installation. For us, this saves precious time.

TT: Do you work with many suppliers?

FG: As far as automation is concerned, since 1992 we standardised one supplier for PLCs and frequency converters. Before that, we depended on equipment manufacturers, who pushed their own automation systems’ suppliers on us, and we always found it difficult to get all the equipment to work together and still provide high-quality maintenance.



We then chose Omron because they were very competitive and had tools that were easy to maintain and repair. You know, we can't change a PLC every time a relay burns out!

Whenever we select a new supplier, we look to the system they can offer us, and the ease with which their equipment can be maintained. Our main considerations are standard equipment and components, and the facility for repairs. Omron has already integrated computing software in its PLCs, whereas competitors have been selling systems where you had to change everything when switching over to new equipment. With Omron, newer versions of software will support existing Omron equipment, which makes it future-proof. When one invests in equipment it is reassuring to know that tomorrow it will still be useable. I notice that other manufacturers are now doing the same as Omron.

TT: We suppose that the technical parameters are important when choosing a supplier?

FG: Yes, of course! We chose Omron for our automation requirements because their equipment had the best response times and excellent file transfer ratio. Today we are fully satisfied with our choice. When we compare with other equivalent systems we have on site, Omron is still significantly the best in data exchange speed and information transfer.

TT: As Maintenance Manager, what are the specific concerns of your job?

FG: Our biggest concern is with the equipment's maintenance. The company controls the production efficiency, and we have been analysing the Synthetic Efficiency Rate (SER), which has been calculated every day for a year and a half. For a given number of hours, the line must produce a certain number of bottles. If it doesn't, the non-production time must be analysed to find where the technical problem is.

Anywhere we can reduce the time loss caused by a technical problem is a real advantage. If we can repair the equipment in 15 minutes instead of 90 minutes we get better line availability, which increases the SER. So, for us, easy access to the components, easy system intervention and overall reliability are the most important aspects. The quality of the product is a major concern for Piper. We systematically control each bottle, and we do this 10 million times a year! We must be able to count on the reliability of our control equipment.

TT: How can you control 10 million bottles?

FG: By looking at them! In fact, we have cameras checking the bottles on the production lines; they take a picture of each bottle to check if the liquid level and the turbidity are correct. They check the part of the cork that is in contact with the wine, to see if it conforms to our standards. Sometimes, the dried veins on the cork explode: this is a well-known defect of the cork and can give a bad impression to the customer when he uncorks a bottle of champagne. We certainly don't want that!

The cameras allow us to detect the splints on the cork. We are also legally obliged to control the level of each bottle. You can well imagine that 3cl missing in 10 million bottles amount to a few litres saved! Technically, the cameras are linked to a robot



that calculates the liquid level in the bottle according to the wine temperature, and, via a kick-out mechanism, ejects any defective bottles. The line doesn't stop.

The operator looks at a touch-screen that allows the setting and monitoring of such parameters like threshold and set points. If a photographed bottle is outside the set-point values it is automatically ejected. Each piece of control equipment has two or three Omron black & white greyscale cameras.

TT: Which criteria made you choose Omron?



FG: We had visited several installations already and decided that we didn't want something running on PCs. We wanted an industrial system, reliable and with easy-to-maintain standard components. In any case we weren't keen on installing PCs on our production line. We chose to work with CMP in Epernay, a company that integrates Omron solutions. The principle of industrial cameras connected directly to robots with an operating desk, was much more in line with our specification requirements. For us, in Maintenance, the objective is to have good maintainability, and to use standard equipment where possible to avoid the development of too-specific devices. When we have a broken camera, for example, we just call Omron and they send us another camera. That's why Omron equipment works so well for us; we know it well and can manage it easily too!

TT: How is the project going?

FG: The project, which contains three vision devices, has been in operation since September 2003 and is fully satisfactory. Based on this we have ordered new equipment, which will be delivered very soon.



Omron Innovation Center receives award

Omron's Keihanna Technology Innovation Center became one of the recipients of the 21st Advanced Facilities Award. The award was sponsored by Nihon Keizai Shimbun, Inc., the publisher of the largest business newspaper in Japan, the Nikkei Shimbun. The Center became the second Omron Group facility to receive this honour.

This year, 12 factories and offices were selected from among approximately 50 entries by a panel of judges comprising academic experts.

The Keihanna Technology Innovation Center was recognised for its proactive efforts to develop advanced technologies in collaboration with other research institutions, while seeking improvement for R&D efficiency by integrating Omron's R&D laboratories. With the theme "Concentration and Communication", the Center is specially designed to facilitate active communication among researchers – another factor contributing to the Center's high rating. In particular, the third floor office space is free from walls and partitions that divide departments, which allows researchers to smoothly interact and exchange information with each other. Dedicated collaborative innovation rooms are also available for use by external research institutions and high-tech venture companies.

Nikkei Advanced Facilities Award

The Nikkei Advanced Facilities Award was established to recognise the most advanced factories and offices both in and outside Japan, with the aim of contributing to the sound development of the industrial community.

www.omron.com



"We are entering a new phase of human

"Our operators should be capable of looking after their machines to a given standard; we are aiming towards autonomous maintenance. So suppliers have to be able to offer us equipment that fits in with that philosophy".

This statement of one of the world's largest consumer products companies indicates that the demands are growing for machines to be easier and intuitive to use, something we already can fulfill with our current technology. Omron views went even further; they predict a new phase, where machines adapt themselves to people, not the other way around. - By Michel Min, Corporate Communication

Omron predicts an even more drastic change

Over 30 years ago, founder Kazuma Tateisi presented his theory – The SINIC – for predicting future trends. This theory predicts a shift from industrialized society to an optimisation society starting from 2005. The SINIC Theory posits that machines will conform to the requirements of humans, not vice versa.

Recently Hisao Sakuta, president and CEO of Omron Corporation visited Europe and announced that the Omron Group strongly believes that its core competence of sensing and control technologies will significantly contribute to this new phase. Not just nice words; for the coming year, Omron is committed to increasing its R&D investment

to 8% of a 5.5 billion dollar turnover.

"Exploring new ways for Human machine interaction is an important mission for our engineers", Sakuta said, "to develop the 'best match' between human requirements and machine capabilities".

A spin-off of our experiments

A sharp Omron observer could already recognise our activities in that direction. Some years ago we introduced NeCoRo, probably the first intelligent robot cat that could communicate in the form of natural exchanges between a person and a cat. Using 15 actuators inside the body, it behaves in response to its feelings. It will get angry if someone is violent to it, and express satisfaction when stroked, cradled, and treated with lots of love.



Hisao Sakuta
President and CEO
Omron Corporation

machine interaction."



Driver support technology by sensing physical condition


Detect drivers' physical conditions (i.e. heart beat, brain waves, etc.).



Assist driver safely by detecting unexpected situations and objects out of view and providing a warning to drivers.

Machines detect operator's movements

Machines detect operator motions.



Machines adjust performance to suit operator's motions.



Based on its own physiological rhythms, it will express its desire to sleep or cuddle. Moreover, through a learning/growth function, the cat will become attached to its owner and its personality will adjust to the owner. And as it begins to remember the sound of the owner's voice and its own name, it will recognise its name when called out by the owner. For a normal consumer it's just a nice toy. But in reality it was a spin-off of experiments to create a machine that could communicate with humans, understand them and adjust itself to those individual's needs.

Machines will modify their performance and functions to adapt themselves to people

Our effort to explore technologies to harmonise machines and humans did not stop with NeCoRo the robot cat. By using Omron's core sensing and control technology in combination with artificial intelligence technology, our research centres all over the world, like the Keihanna Innovative Centre, are already experimenting with machines that identify the skill level of the operator, and adjust themselves to that level. With internal sensors of touch, sound, sight, and orientation, human

action/thoughts can be perceived, and feelings/wants are generated. In cars, for example we developed cases where we offer driver support technology by sensing the physical condition of the driver (detecting the heartbeat, brainwaves, etc.). As a result of this technology we can contribute to driver safety by detecting unexpected situations and objects out of view, and provide a warning.

Mr. Sakuta believes that machines that are built without a high regard for the people who use them are already candidates for the scrap heap of history.

Please send me information on the following new products:

- CJ1W-NCF71 – PLC-based solution for point-to-point positioning
- CJ1/CS1-MCH71 – PLC-based solution for advanced motion control
- MP2300 & MP2200 – stand-alone solution for advanced motion control
- MP2100 – PC-based solution for advanced motion control
- Varispeed G7 – introducing the new global standard: 3-level control
- CJ1M-CPU1-ETN – Ethernet integrated
- CX-Programmer 5.0 – easy programming with powerful results
- NSJ5 – PLC and HMI become one
- New CJ1 and CS1 PLCs with high-speed function block processing
- Smart ZX sensor platform expansion
- ZFV – the scalable smart vision sensor
- S8VS Micro – size is everything
- MYS Series – versatile plug-in relay that sets the standard!
- ES1B – the cost-effective, contact-less way to temperature sensing
- PRT1-SCU11 – linking standard instrumentation to Profibus

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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

Austria
Tel: +43 (0) 1 80 19 00
www.omron.at

Finland
Tel: +358 (0) 9 549 58 00
www.omron.fi

Italy
Tel: +39 02 32 681
www.omron.it

Portugal
Tel: +351 21 942 94 00
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