technology&trends
magazine

OMRON

JUST CREATE

Just create... we automate

Smart Platform
One software, one connection, one minute

Nestlé Finland

70 million jars a year, 300,000 a day...
just normal

Not all drives are born equal...

Omron Yaskawa Motion Control for machines
that never stop...

EKATI Diamond Mine

Reliability pays off in diamonds –
zero failure at -40° C

Never fail...

CMOS technology for sub-micron accuracy

We guide your robot

High-precision 3D robot guidance with
a smart laser sensor system at Audi AG.

Advanced Industrial Automation

OMRON

Roberto Maietti
European Sales Director

Never stop, never fail, just create...

Dear readers,

Welcome to a new edition of Technology & Trends. Never stop, never fail, just create is Omron's simple yet powerful statement showing its commitment to provide:

- Highest quality motion and drives dedicated for machines that never stop.
- Most innovative inspection and detection sensors made to ensure that your product is defect free.
- Most intuitive machine control based on one software for total machine programming and configuration. One connection to access all devices and minutes to configure.

Across this issue we will see how Omron-Yaskawa drives have set standards in reliability and robustness by gaining recognition in the harshest environments due to amazingly low failure rates, how our laser sensors help robot guidance at Audi and how Smart Platform with its CX-One software helps you focussing on your core competence.

Motion, detection and inspection integrated under one automation platform – strictly for innovators.

Content

JUST CREATE...

Smart Platform

Designed to make machine automation easy, the goal of Smart Platform is to simplify the development, commissioning and maintenance of increasingly complex machines, which gives you time to create the machine of your dreams.

It enables users to mix and match their preferred solutions without the need to worry about hierarchy or other communication issues. Driven by the need to make connectivity as simple and flexible as possible, Omron's Smart Platform creates a harmonious combination of sensing, control, motion and regulation devices.

Smart Platform

ONE SOFTWARE   ONE CONNECTION   ONE MINUTE   JUST CREATE

...WE AUTOMATE

Sensor & Actuator

Switching & Regulation

Motion & Drives

Software

Total machine integration with the robustness offered by PLCs and the flexibility of the IPC. What was a dream in the eighties, a vision in the nineties is now materialising into reality.
Enabling complete machine and plant automation from one single platform without having to worry about fieldbuses, integration of various software and above all without being locked with one dominant supplier.
FDT/DTM, messaging across networks and Internet are the main contributors.
Our aim is to minimize the time and effort you spend in automation and focus your resources in creativity.
Hence our motto JUST CREATE!

Smart Platform

One software

CX-one allows you to control, visualise, position, detect and regulate from one automation suite.

One connection

No matter what device, what fieldbus and what task you are performing, one connection is all you need to give you full access to your machine.

One minute

Drag & drop, plug and work in minutes to control, visualise and maintain your machine.

... just create

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expertarea   Ask the expert

Steve Chilton
Smart Platform
Team Leader
Omron Europe

Why ONE?

The Automation industry has suffered from overuse of technical jargon such as CIM, fieldbus, flexibility, digital motion control or integration for many years, and these 'Marketing phrases' seem to mean totally different things to suppliers and users and the result is that many users now don't believe these claims from suppliers! Omron is trying to make it easy, so instead of hiding behind technical jargon Smart Platform talks about the functionality that you really want. We can prove it!

One software – With Smart Platform you only need one software 'CX-One' to program and configure your machine.
One connection – Simply connect to all of the devices on your machine from one point and access, upload and download all parameters, programs & comments or simply monitor operation and performance of the machine.
One minute – You can create or improve the performance and operation of your machine by 'one minute' configuration, drag & drop PLC programming or HMI screen auto-building.

Really one minute? Can you prove it?

Yes, indeed. For a demonstration please visit 'www.smartplatform.info' and click on 'One minute'.

Really open? Everyone claims this!

Omron understands that customers don't exclusively use Omron devices on their machines and 'CX-One' is designed to use the latest 'open' technologies to program and configure your machine. This will allow Omron configuration files to be used in 3rd party configuration software, or advanced 3rd party devices to be used in Omron systems. This open technology is FDT/DTM.

Although fully supporting such an open architecture is often seen by vendors as a great risk, this approach challenges Omron to supply you their best-in-class devices, with the best-in-industry technical support – something we have been doing for over 25 years in Europe!

Profibus within Smart Platform?

Omron's CX-Profibus software is integrated into CX-One and uses the latest truly open technology 'FDT/DTM'. The profibus hardware supports messaging to allow easy configuration of devices and access to their parameters.

What is FDT/DTM?

FDT/DTM stands for Field Device Tool/ Device Type Manager. The FDT is a software container for device configuration data – and this configuration data is supplied a software component (a DTM) that is created by the device manufacturer. This DTM file contains much more advanced information than simple text based GSD or EDS files- graphical configuration, trending, and device documentation.

For further information please read the article "FDT/DTM is living up to its promises" on page 20.

CX-One – one software

CX-One covers all your requirements for complete machine automation

Programming
- CX-Programmer (PLC programming)
- CX-Simulator (PLC simulation)
- CX-Designer (HMI programming)

Motion & Drives
- CX-Motion – for motion controllers with analogue output
- CX-Position – for PTP controllers with pulse output
- CX-Motion – NCF for PTP with motion bus MLII

- CX-Motion – MCH advanced motion with motion link MLII
- CX-Drive – for inverters and servodrives

Regulation and Switching
- CX-Process for PLC process units
- CX-Thermotools for stand-alone temperature controllers

Networks
- CX-Integrator (DeviceNet + Ethernet + Controllerlink)
- CX-Profibus – all profibus modules

expertarea   Ask the expert

How do I install this software?

The installer enters only one license number and this creates a 'key' for CX-One. The installer is then free to choose which specific software to install.

At a later date, additional integrated software required can be installed without a license number if the CX-One key remains active.

How can I update the CX-One software?

Once CX-One software is installed on the PC the customer can register the software installation using the Internet. This gives the user access to free software updates for all of the softwares supplied. Also the customer can access the constantly updated Function Block and Smart Active Part libraries. Notification can either be via e-mail or automatic checking at scheduled intervals.

Minimum batch size: ONE!

LCIA stands for "Low Cost Intelligent Automation" and was pioneered by Omron in the 1990's to meet an increasing demand for manufacturing flexibility. LCIA is now a standard production technique across Omron manufacturing sites world-wide.

The concept is a subtle mix of skills and Poka-Yoke techniques within the assembly process; Poka-Yoke is Japanese for failure prevention.

LCIA cells are U-shaped and the operator is in a standing position. The number of operators in the line can be increased as the demand gets higher, so resources can be tailored to meet demand without having to add extra lines.

Using LCIA techniques, Omron maximises the productivity to stay competitive in 'high-wages' countries. In addition, the investment in LCIA lines is low compared to conventional automation.

The built-in intelligence in the assembly line gives direct feedback to the operator, which reduces human failures to zero defects. LCIA allows the ultimate flexibility to handle both extremely small batch sizes with quick changeover time as well as peak demands.

For more information contact us at http://lcia.europe.omron.com or come and see it live in our production plants in 's-Hertogenbosch/The Netherlands or Nufringen/Germany.

By Bram Kale, Special IO DG&E Manager

Pre-assembly   Assembly

Packing   Testing
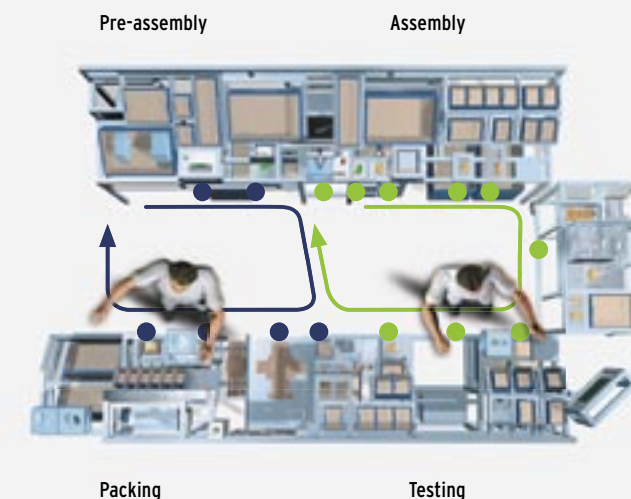
Fibre manufacturing and test laboratory in the south of Germany

Omron's fibre optic portfolio is designed to cover almost all industrial application requirements. With this in mind, and the possibility to react fast to the request of our European customers, Omron establised its new fibre manufacturing and test laboratory in Nufringen, near Stuttgart.

Omron fibres combine excellent sensing performance with easy handling. With the E32 series Omron offers a comprehensive range of fibre optic

sensors to cover all automation tasks, whether it's for basic object detection, positioning, colour analysis or high-accuracy sensing. Omron is a leading player in fibre technology, with many years' experience in producing fibre optic solutions for all industrial needs.

Everything – from head size, sensing distance, mounting and beam size up to special heat- and chemical-resistant materials – is available in this range to best suit your application. The E32 series provides an optimum solution

for each sensing problem. In addition, Omron provides customised fibre solutions that are manufactured in Germany, which can be designed to suit your individual requirements.

By Udo Füger, Product Marketing Manager AOS

If you would like to know more about Omron's fibre optic portfolio, please request our fibre selection guide at your local office or download it at www.europe.omron.com.
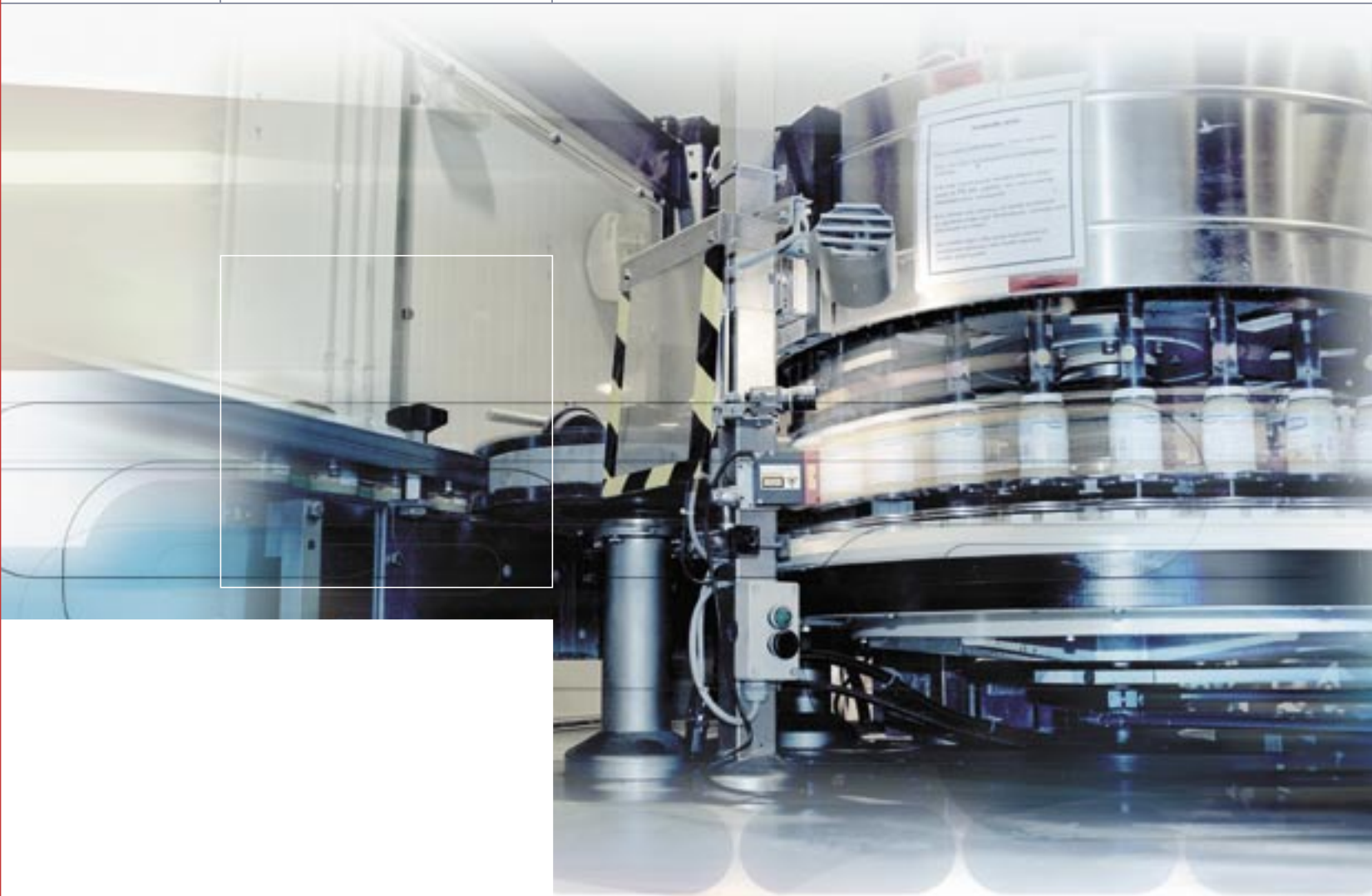
70 million jars a year, 300,000 a day... just normal

Nestlé Finland is a subsidiary of the worldwide food company Nestlé S.A. of Switzerland. The company has being operating in Finland since 1973 and has over 140 employees. At present almost half of Nestlé Finland's sales come from products made at the Turku baby-food plant. Juha Elonen, Maintenance Technician at this plant, tells us how Omron automation technology is used extensively to monitor and manage the production of around 200 baby food products. By Petri Sajari

The production is basically divided into four parts: the cooking stage, filling the jars, autoclave and packaging. Nestlé Turku produce approximately 70 million jars of baby food a year. Around 300,000 jars roll off the line each day. There are three shifts five days a week. Reaching these sorts of production levels means that the production process must run seamlessly from the cooking stage right up to the packaging process. "We use Omron PLCs to take care of all the production automation from start to finish, so they play a key role in our processes!" Juha Elonen said.

Omron automation technology has been used in Turku since 1987, and over the years it has been applied to more areas. Juha Elonen: "We started to use Omron products because they suit our needs precisely. If only other technologies were as advanced as Omron's automation

"Omron is used in Turku since 1987..."

technology, we would be able to further increase production levels!"

Omron PLCs, programmable terminals and inverters control the process at all stages. "We use industrial automation products due mainly to their perform-ance and trouble-free integration. The ease with which they can be integrated is one of the key reasons for using them. When an Omron product is installed, you can be sure it will work."

To maintain the very high standards of quality control at the Turku plant they are currently introducing a data acqui-sition system to provide valuable infor-mation on all stages of the food manu-facturing process. Omron SCADA soft-ware will also be used to retrieve this information. This new data acquisition system will play a very important part in quality monitoring.

"We use Omron's products due mainly to their performance and trouble-free integration..."

Ford Motor Company grants Yaskawa drives GREEN status

Ford Motor Company has awarded the highest status level to Yaskawa Electric Corporation under the guidelines of Ford's new Reliability and Maintainability (R&M) program. Yaskawa Electric is the first Tier II control supplier to achieve this status.

During Ford's audit, Yaskawa Electric demonstrated routine use of such tools as "Root Cause Analysis", vendor problem identification/resolution capabilities and well-managed product improvement methodologies for existing and new designs. These systems ensure a uniform product of increasingly high quality.

Plant visits were made and will continue as Yaskawa and Ford personnel review performance of products, some of which were installed 14 years ago. Local record keeping shows that hundreds of Yaskawa products have been in service with virtually no failures.

Over 20 million drives installed worldwide, with a quarter in Europe alone, Omron-Yaskawa are a market reference in reliability. The latter is not some quantifiable parameter that one can just mention in the specification sheet. It is rather a rigorous process built in every stage of the product life cycle. We hope that this paper shows that not all drives are born equal. By Antonio Farras, Manager OYMC Europe

OMRON

Not all drives are born equal...

Failure rate for drives

Market standard

Omron-Yaskawa

5% / 3% / 1% — 1 year — 5 year

Deming Application Award says: Quality above Industry standard

Yaskawa has grown to be a leader in the motion industry primarily through references from our current customers. They talk about us for one main reason; because we create products and solutions that work better and last longer.

Yaskawa products are designed to exceed industry standards for reliability. Products are designed to a calculated Mean Time Between Failure (MTBF) which is above industry standard, for use as a base figure. The field tested MTBF is far greater than calculated MTBF! Continuously setting sights higher, and working to achieve these goals, are what make Yaskawa a valuable business partner for your company.

Our dedication to total quality control standards enabled us to surpass the most rigorous ISO certification standards and achieve the most prestigious quality award in the world, the Deming Application Prize. Yaskawa is the first company specializing in industrial electronic equipment to receive the prize.

Defining reliability

Reliability is technically termed as 'able to satisfy the required functions during the specified time at specified conditions'. In Yaskawa's quality assurance book it is expanded to cover user environment and usage conditions. Therefore it is termed as 'able to satisfy the required functions during the specified time under the customer usage environment and maintenance conditions'. Therefore reliability is not a mere "tick the box" exercise – it is a key element in total customer satisfaction.

Reliability built into the total product life cycle

Product reliability is a process that embraces the total product life cycle from new product planning to final service and repairs. Identifying strategic markets and understanding the environment in which they operate is key.

For instance whereas a lift operates at typically 50,000 power cycles a year, an injection moulding machine would perform 500,000 cycles a year. Designing one standard inverter for both markets means that the IGBTs have to sustain 500,000 cycles a year. Meaning 10 times higher than their standard usage specification.

It is normal practice that the real performance tests of the drive are much more severe than the publicized ones.

Development

Identifying critical parts in the unit such as power stages and establishing a stringent incoming inspection test plays a key role in subsequent reliability performance of the drive. New component validation is also an important aspect. Development time is now significantly reduced thanks to CAE/CAD and thermal modelling. Automatic regression test in firmware development allows testing of new versions by ensuring ZERO knock-on effect on the rest of the program. Typically firmware tests takes two thirds of the time it took to develop it.

Production

Part incoming inspection, in-line Automatic Optical Inspection and Kaizen activities ensures optimum reliability of the end-product. A final inspection reject in the production line is typically less than 0.1 %.

Service & repairs

While product reliability is vital, it is equally important for customers to repair quickly. Hence Mean Time To Repair (MTTR) is a key service indicator. In Europe, the Omron European Repair Centre and the Yaskawa Engineering Centre work closely together to guarantee a 5-day turnaround time.

Omron-Yaskawa also offer a global repair service that ensures a 24-hour site intervention.
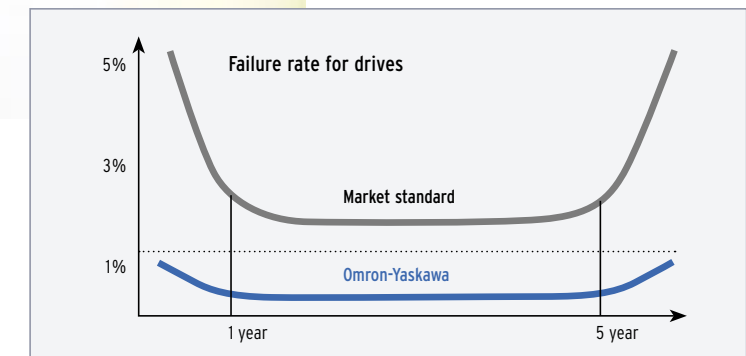
"We only have one chance to get it right first time."

Mark Leeson

Technical Director
Gainsborough Craftsmen Ltd.

"Improving production yield is key, our machines contribute to that continuously."

Petri Väinölä

President and Chief Executive Officer
Cencorp Oyj

"We meet the demand for reliable plastic."

Glenn Dimmock

Managing Director
Oasys Technologies Ltd.

The area around the EKATI Diamond Mine was traditionally known as "e'kati" by the Dogrib and Dene peoples of the Northwest Territories. EKATI means "fat lake" and refers to the white quartz rock which is found in abundance in the area. The white quartz veins that run through the rock are said to look like caribou fat, which is seen as a symbol of great value to the aboriginal people in northern Canada.

Reliability pays off in diamonds –
zero failure at -40° C

BHP Billiton, the world's largest diversified resources company relies on Yaskawa frequency inverters in their EKATI Diamond Mine, located 200 km south of the Arctic Circle. Commissioned in 1998, it is Canada's first diamond mine where 7% by value of the world's diamonds are extracted. Access is by air only except for three months in the winter when an ice road is open for heavy transportation of critical supplies.

Extreme conditions

Conditions are harsh; temperatures can drop to below -40° C for long periods during winter. The tough environment is demanding on people, machinery and logistics. Mining and processing are continuous round-the-clock operations, 365 days a year. A single day's lost production is marked in terms of millions of dollars, so reliability is critical for maintaining a successful and profitable operation.

BHP Billiton Diamonds Inc. uses Yaskawa VFD inverters. These inverters are renowned for their reliability and offer a Mean Time Between Failure (MTBF) of 28 years. The 600 V class variable frequency inverters were supplied by Vector Drive Systems Inc., a Yaskawa integrator and distributor with many years' experience in the mining sector.

More than 200 Yaskawa 380 V inverters have already proven their reliability in harsh mining conditions. In 1994, inverters were installed in a large copper mine in Chile, and since then they have operated for over 5 million hours at an elevation of 3,000 metres without any failures.

Reliability versus risk of downtime

Since the initial purchase of over 3900 kW of inverters in 1997, BHP Billiton Diamonds Inc. production has thrived, and process expansions through to 2004 have added over 2800 kW of Yaskawa G5 VFD inverters. In 2002, BHP Billiton established Canada's first underground diamond mine. Yaskawa's highly reliable modular version inverters were installed for use in critical heating and fresh air systems.

Their precise and reliable control of the fans is essential for employees' well-being and provides critical energy savings. The mine's location means that fuel deliveries are difficult and

"Over 5 million hours at an elevation of 3,000 meters without any failures."

expensive – site power costs average 17 cents/kW hour, so fuel conservation is of paramount importance.

In 2005, BHP Billiton Diamonds Inc. are planning to install twin 375 kW Yaskawa G5 modular drive systems on their new underground conveying system. This is another crucial production element operating at extreme limits, and reliability is once

again a key element. Each of two conveyors will have dual 500 hp motors, as master-follower operating in a closed-loop vector control method and connected to a common DC bus. The Yaskawa converter is rated for 1800 A and is power connected as 600 V-Delta/ 600 V-Y for simple harmonic attenuation.

In early 2006, the mine will install twin 600hp rated Yaskawa G5 modular VFDs in their primary roll-crushing/scrubbing area, which is at the start of the entire diamond recovery process.

By Roberto Sanders, Motion & Drives Specialist, OYMC Europe

NT3S HMI series – Small, powerful, flexible, economic...

The Omron NT3S terminal is designed to replace mechanical pushbuttons and lamps or text-based function key terminals by offering extra functionality, without increasing overall costs.

The NT3S-series offers powerful, free programmable functionality on a small touch screen based user interface.

DeviceNet safety offers more than a safe network

DeviceNet is an innovative industrial network system that enables a wide range of devices to be easily networked and managed remotely.

Everything can be seamlessly integrated into DeviceNet, making it one of the best industrial fieldbuses around.

As a founding member of DeviceNet and specialist for machine safety, Omron is one of the few companies with expertise to combine innovative bus technology and safety to a seamless solution up to safety category 4 (EN 954-1) and SIL 3 (IEC 61508).

The E5_N series brings new dimensions to temperature control

Based on the success of the new E5CN series, Omron has introduced upgrades of the larger E5AN and E5EN temperature controllers.

Each model's back-lit LCD display gives better resolution and sharper digits with a wide viewing angle. Large digits makes the displayed values easier to

COLOUR CHANGE DISPLAY

read from greater distances. Furthermore, a 3-colour PV display provides green, red and orange characters for clear recognition of the process status. And because the display has 11 segments, the parameter text is easier to read.

K8 series – A complete product for your monitoring requirements!

Omron's K8 series of monitoring products provides you with first-class quality products, all in compact 22.5 mm wide DIN-rail housing! This new monitoring range can be split into models for single-phase current and voltage control, three-phase voltage control and conductive level control.

Designed for use worldwide, they are based on a line of monitoring products that has already given Omron an established and leading market share, especially in Japan.

Easy vision – teach & go

Omron's new ZFV smart vision sensor is an image-processing system in a sensor format. It consists of two separate components, a camera head with an integrated light source and a processing unit.

Parameter settings and lighting control are available at the touch of a button. A "smart" user interface allows parameter setting using a few buttons and the built-in colour LCD monitor.

During operation, the display gives direct feedback showing results and images in real time. Easy vision – teach & go, for applications which can be solved in minutes – not hours or days.

Features at a glance
- Brilliant colour display.
- Real time result and image display.
- Intuitive user interface.
- One button teach – teach and go.
- Up to seven inspection tools.
- Adjustable inspection area and distance.
- Integrated, adjustable LED light.
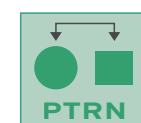- Up to 250 inspections per second.

The ZFV verifies the correct position of the cap to secure proper closure of the bottle.
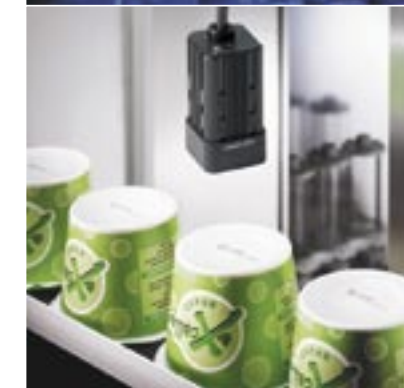
Verifying the printed article information in a high-speed packaging line.
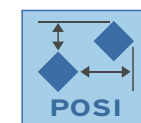
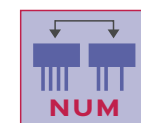| AREA	PTRN	BRGT	CHAR
Area	Pattern/Search	Brightness/defect	Character

POSI	NUM	WID
Position	Edge count	Width

If you would like to know more about Omron's latest products, please see our Product News magazine or have a look at www.europe.omron.com.

CMOS technology for sub-micron accuracy

Achieving micro-meter accuracy sampled in micro-seconds and almost Independent of the shape, texture and colour of the object is indeed a major undertaking. The new smart sensor ZS-L combines CMOS image capture technology and laser light beam to meet this challenge.

By Udo Füger, Product Marketing Manager AOS

The pressure from end-users to sub-suppliers for zero-defect performance calls for fast and accurate in-line inspection and measurement. The concept of "Quality integrated" not "Quality controlled" is now a reality in leading-edge industries such as automotive, semiconductors and electronic goods. In-line measurement is also helping manufacturers in other industries to reduce waste by optimising material size and thickness.

Introducing common measurement methods

There are a number of laser displacement sensors in the market using various technologies. However PSD, CCD and CMOS are the most popular methods. Let us give you a brief overview on how they work.

PSD (Position Sensing Detector)

Commonly used in low cost, low accuracy applications. It achieves sampling speeds in the order of micro seconds but a resolution of 1-5 µm at best. The PSD technology is not recommended for use on coloured, shiny or structured surfaces, glass, or other glossy materials.
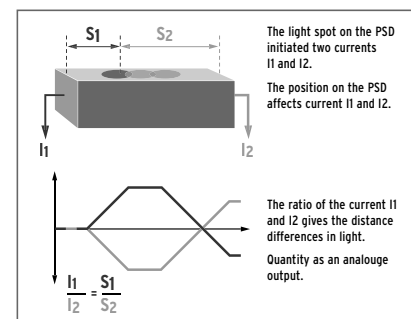
CCD (charge coupled device)

This is well-proven technology used in professional digital cameras and vision systems. It provides high picture uniformity but it is costly. It consists of tiny pixels that convert light into an analogue voltage signal. The signals are buffered, then amplified.

CMOS (complementary metal oxide semiconductor)

This consists of tiny cells that operate as light-to-volt transducers. In this case however, the amplifier for each cell is integrated. The signals are digitalised before being sent off-chip and often additional functionality is already on board. The CMOS technology is affordable and accurate enough for many applications. It is also compact and reliable since it has a higher degree of integration.
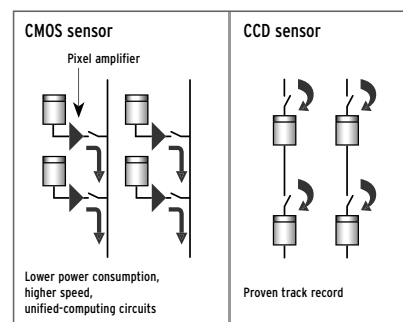
Detecting transparent objects

When a light beam hits the surface of an object, a certain amount of the light is reflected, some is transmitted through the object and the rest is absorbed.

In the case of transparent materials such as glass, we can obtain reflected light from the top surface, from the middle and from the bottom section. The PSD detector receives light from two or more different directions of reflected light. This means that we may get a measurement error from stray or secondary reflections.

CCD and CMOS technology can distinguish between the true object reflection and background reflection.
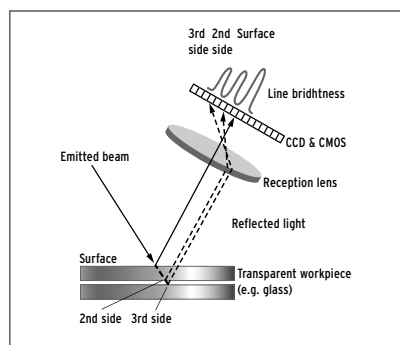
Conclusion

CMOS image sensors are very useful and cost-effective in some mid- and top-performance imaging applications. CMOS offers more integration (more functions on the chip), lower power dissipation (at the chip level), and smaller system size. It is well suited for high-volume, space-constrained applications such as automotive and electronics applications.

CMOS technology is now standard in booming consumer products like digital cameras.

ZS-L – making the best out of CMOS technology

Thanks to the features just outlined, Omron's ZS-L was designed to offer the best laser displacement in the market. Based on our wide experience in the industry and the advantages of CMOS technology, the ZS offers:

- Sampling speed of less than 110µs. This is due to the integrated charge-to-voltage transducer as well as integrated analogue-to-digital conversion.

- No anti-blooming because CMOS has natural blooming immunity due to dynamic range. Blooming occurs when an image contains dark and over-exposed sections, which leads to less contrast.

- The CMOS in Omron's ZS sensor series reaches superior dynamic range. The ratio is of a pixel saturation level to its signal threshold. This enables handling applications with different structured surfaces and with dark and bright portions. Typical examples include an extrusion of black rubber, which can contain matt and shiny surfaces, or steel that may have rust or matt portions on the same section. The ZS can measure these and similar types of surfaces and materials.

- Windowing. One unique feature of CMOS technology is its ability to read out only a portion of the image sensor by specifying a region of interest. This allows elevated frame or line rates for small regions of interest. This is an advantage for applications that require high precision in a sub-region of an image. Measuring tiny connector pins but ignoring the chip body or measuring the glass thickness but ignoring the reflections from the backside of the glass plate!
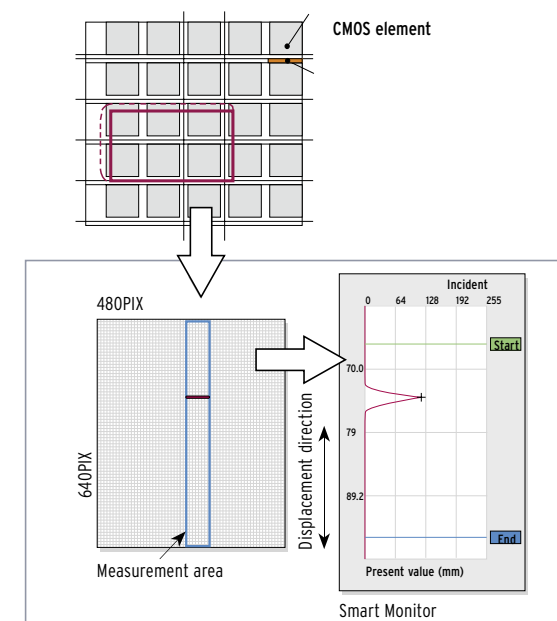
Graphical explanation of setting the region of interest Now you see what and where you are measuring!

The intensity and position on the CMOS is displayed. With Smart professional software we can see the actual measurement value as well as the quality of the signal based on the CMOS element. The advantage is that we can see the amount of reflected light on the CMOS element and any noise or background reflections that may influence the sensing performance. By activating filter functions or by reducing the amount of CMOS lines we can simply ignore surrounding reflections to always provide a stable, reliable sensing performance.

Platform concept: scalability and flexibility
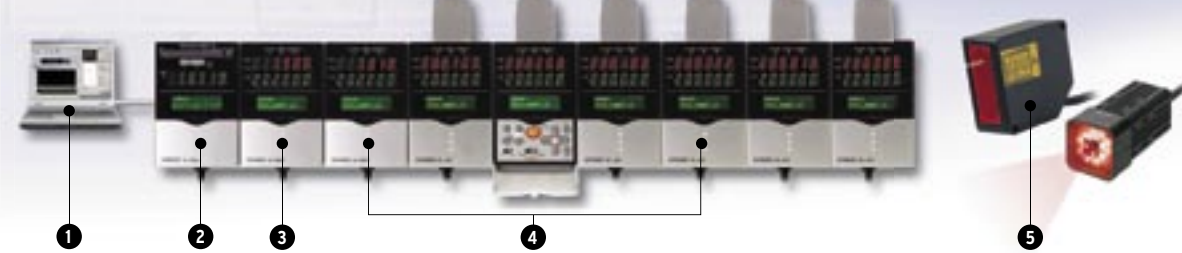
1: Monitor SmartMonitor Professional PC-based user software ZS-SW11E – for set up and monitoring.

2: Record Data storage unit ZS-DSU – ideal for ZS series data logging.

3: Control Multi-calculation-controller ZS-MDC – enables logical operation and processing for up to 9 gang-mounted controllers.

4: Operate Sensor controllers ZS-LDC – enable maximum sensing performance with fully digital processing.

5: See Sensor heads ZS-LD – advanced laser CMOS sensing technology with high speed, high resolution, packed into smallest IP67 housing.

More flexibility through scalability

The ZS-L platform allows up to nine sensors to be mounted side by side, sharing one USB 2.0 port for configuration and for high-speed multi-processing (with the ZS-MDC multi-processor). This makes it ideal for multi-point inspection such as surface flatness or material thickness.

Fast & accurate

The ZS-L is able to achieve accuracy of 0.25 µm with a linearity of 0.1 % FS at sampling time of 110 µs. High-speed sampling is achieved, thanks to:
1. Digital signal transfer from sensor head to the controller via LVDS interface.
2. Internal digital high-speed sensor bus.

Detection capability from black rubber to transparent glass

Thanks to the superb dynamic sensing range the application possibilities and potential solutions are huge.
Special algorithms are implemented to measure all kinds of diffuse and regular reflection surfaces. The application portfolio ranges from black rubber, where the light is practically absorbed, to plastic surfaces where there is more light penetration, right up to shiny surfaces and transparent materials. The ZS-L is particularly effective at accurately measuring glass thickness and gaps between glass plates, since CMOS technology can distinguish between main and background reflections.

Interfacing to host controllers

Besides its excellent measurement performance, the ZS-L can also interface to a host controller in various ways:
• 4 digital I/Os to indicate high/pass/low/enable and busy.
• 4 external inputs for trigger, bank setting, laser off and zero reset input.
• Analogue output signal current (4-20 mA) and voltage (-10 to + 10 V).
• Serial interface RS-232 with 115200 bps and USB 2.0 port with 12 Mbps where the unit can be configured and measurement data transferred.

Operation and set-up

The unit can be operated and configured via an intuitive built-in user interface or via PC-Smart tool.
• The user interface allows all parameters to be set up and changed directly on the controller by using the interactive user-guided menu, or simply by using the teach function.
• PC-Smart is a very user-friendly tool for all settings including advanced functionality with signal monitoring

and data logging for detailed process analysis. Threshold values are changed by simple drag & drop.
• Without any calibration or set-up, the ZS-L can operate in stand-alone mode by showing the actual µm value.

Easy to install and maintain

Installing and maintaining the ZS-L saves you time and money. When installing or replacing a sensor head, the controller detects the new head automatically and the system amplifier-sensor is auto-calibrated. You simply choose the sensor head that best suits your application.

Three arguments for using the ZS-L

• Higher throughput: higher accuracy and higher sampling speed provides your process quality without compromising on speed.
• Higher flexibility allows you to scale up your application thanks to the platform concept.
• Highest return: simple to operate, simple to maintain and highly interactive allowing basic operator skill.
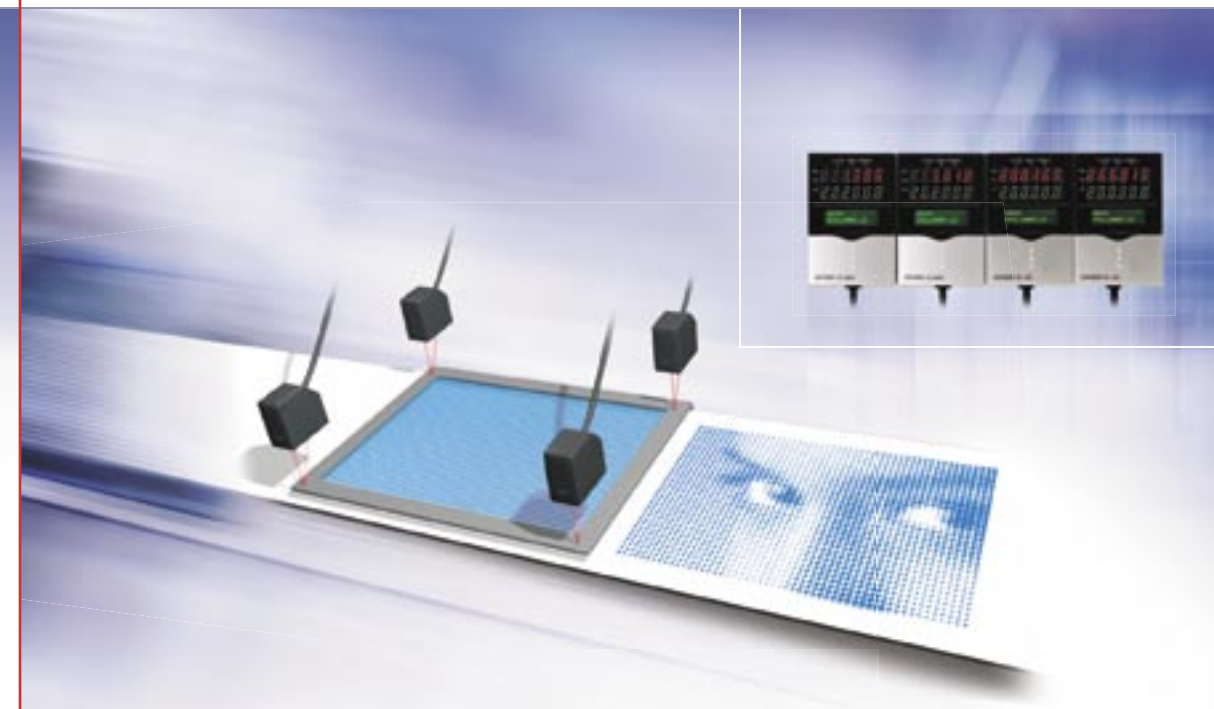
Zero defect inspection assured!

EPCOS

EPCOS is a world-leading manufacturer of passive electronic components. Headquartered in Palo Alto, California, the company caters to leading-edge technology markets like automotive, industrial and consumer electronics, and relies on Omron sensing technology in its manufacturing processes. In fact, by using Omron's ZS-L sensor series, EPCOS has improved production quality and saved 15 minutes per sieve change. By Thomas Schick, Omron Electronics, Austria

EPCOS manufactures over 40,000 products, comprising a range of passive electronic components whose extent is unique in the market. Everything from surface acoustic wave components, capacitors and ceramic components to ferrites and inductors is available, all offering unrivalled performance for electronics applications. With such a product range, EPCOS can fulfil its customers' product requirements and solutions from a single source.

0.01 mm accuracy required

EPCOS uses Omron's ZS-LD80 sensor and ZS-LDC41 sensor controller to check the position of a screen process sieve, which must be accurate to within 0.01 mm. This sieve is mounted into a mounting frame, and the frame is then installed into the machine. The ZS sensor is used to measure the position of all 4 corners of the sieve to ensure that

it is perfectly flat, and this is done by placing 4 sensor heads at each corner. Standard displacement sensors could not possibly measure directly on the frame, because it isn't straight enough.

The displayed measurement results are checked by an engineer, who can adjust the position of the sieve manually. In the past, engineers only checked the printing quality and then corrected the sieve position case by case, which was very time-consuming. Today however, the engineer simply uses the ZS measurement values to place the sieve, which really speeds up the process.

Problems with conventional sensors

Using conventional sensors for this process would be almost totally ineffective, since the object can have different colours, and some of the objects are made of semi-transparent material.

Benefits of using Omron's ZS-L

EPCOS set out to improve the quality of its production and to reduce the number of bad parts. In the past this was done through a series of manual checks. By using the ZS-L series however, EPCOS improved their process and achieved a saving of 15 minutes per sieve change.

Key factor for the customer to use ZS-L

Thanks to its excellent dynamic sensing range, the ZS-L can measure on all different surfaces, regardless of the colour and type of material. The ZS-L takes just minutes to install and set up.

A big advantage is the ZS-controller with its large, integrated display, which provides easy-to-read measurement results for the engineer. The ZS also works independently from any PLC or PC. It's simply plug & play!

John van Hooijdonk

Marketing Manager Automation
Systems at Omron Europe,
and representative of Omron
in the Executive Committee of the FDT Group.

*FDT/DTM = Field Device Tool/Device Type Manager

The FDT/DTM technology has come a long way since 2002 when an enthusiastic group of companies took up the challenge to develop and promote it. The list of companies that support FDT has been growing since then, including some major players in our industry as Siemens, Omron and, more recently, Rockwell Automation.

FDT/DTM* is living up to its promises

Complementary technologies

While most existing bus systems use text-based files to define information about devices on the network, DTMs basically are small programs that describe more than communication only and contain device information as well.

This can cover different kind of functions as visualizing graphically the required and actual process values; offline configuration and parameterization, or updating the firmware. This is needed to manage the growing intelligence located in devices in the field.

For instance: an inverter can have more than 100 parameters, and even 'simple' product as I/O modules offer the possibility for parameters stored in the I/O device. To utilise the full potential of such devices, all this data needs to be managed, without forcing the user to develop large programs to do so. DTMs enable this. In such cases a text file for configuration such as GSD or EDS-files are sufficient.

Several (system)suppliers are thus creating DTMs that can interpret a GSD or EDS–files. This enables users to mix their legacy automation solution with

the latest (FDT/DTM) technology to fully exploit the potential of certain devices the customer uses, and needs for his application.

Entering factory automation

As mentioned, the development of the FDT/DTM has come a long way since 2002, but the end of the road is not in sight yet. Also in the years to come the technology will continue to enhance. Support for new networks will be added and the number of DTMs will grow substantially. Guidelines on style will become available and interoperability tests and certification is established.

Initially FDT/DTM technology was only implemented to use with Profibus & Hart. Last year Fieldbus Foundation was added, and presently several project groups are active to enhance the specification to be able to cover CIPbased networks (DeviceNet, ControlNet and Ethernet/IP), AS-Interface, Interbus and ProfiNet.
The addition of these networks to this technology clearly demonstrates that FDT/DTM is not limited to process automation anymore, but enters the discrete factory automation as well. The entire industry will benefit from FDT technology.

A truly open system

This growth of activities is thanks to the fact that the industrial automation community has started to realize that FDT/DTM is not a replacement for existing bus systems. It is not networking hardware, but a configuration tool solution, providing true "plug and play" within the automation industry.

Devices can be configured, visualized, controlled and serviced in a central and easy to follow application, without compromising on unique features of any specific device.

Any device, from any vendor, and regardless on which network can thus be approached using the FDT/DTM technology. Managed from one and the same software tool, even in the same project. This is the true promise of open systems.

Protect your investment with FDT/DTM Omron's "ONE Tool" concept

While the proliferation of fieldbuses and software in the industrial automation world made wiring and device configuration easier, it also made it difficult for end-users and machine builders to keep track of all the upgrades and compatibility between various products on various fieldbusses. As a global player committed to support equally popular fieldbuses, Omron believes that FDT/DTM is the most suitable technology to seriously address this issue.

The classical dilemma - Profibus or DeviceNet?

This is a typical headache that highlights the difficulty of customers operating globally. Both fieldbuses use different

configuration tools. Such configuration is achieved via GSD or EDS files. These technologies are OK if you just want to configure the network interface, but do not address the need to programm or configure a device, or are looking for maintenance data.

ONE Tool concept

Omron found that FDT/DTM specifications fulfill the need of the "One Tool" concept, which allows "Plug & Work" automation that Omron is committed to. FDT/DTM neatly describes the separation between fieldbus dependent functions and the common parts. The fieldbus dependent part is described in an annex that has to be added per fieldbus. It is also very easy to add your own network by defining the communication XML diagrams.

CX-Profibus supports DTM and GSD files

Most of the current Profibus-DP slave devices are supplied with a GSD (Generic Slave Device) file. Omron's CX-Profibus uses DTMs for configuration and diagnostics, so to be able to support devices that do not yet come with a DTM, Omron has developed a special Generic Slave DTM. The Generic Slave DTM reads the existing GSD file and converts it into a DTM that is supported in CX-Profibus. This DTM then provides the user interface to display the device's information as defined in the GSD. Additionally, the DTM provides a diagnostics interface to the user.

For the full article, please visit the News & Events section on www.europe.omron.com.

Rene Heijma, Industrial Network Specialist, Omron Europe

Colophon & Contact

We guide your robot

Multi-dimensional measurement of the position of a component is a sensitive topic in the pre-assembly and final-assembly areas of car production. Nowadays, this is mainly done using sophisticated image processing systems.
However, the limitations of these systems are soon reached when difficult surfaces and contours are encountered. New smart laser sensor systems provide completely new possibilities.

The renowned carmaker, Audi AG, currently has its largest plant at Ingolstadt, employing a workforce of about 33,000. With a production capacity of approximately 2,200 cars a day, it produces about 1,400 of the A4 model and about 800 of the A3 model. In addition, it manufactures various body components for other series.

With their state-of-the-art production facilities, the Audi plant ranks as one of the truly high-tech sites in the car manufacturing industry.

At the start of 2004, Omron incorporated a system for 3D robot correction and for adhesive bead monitoring in the cockpit pre-assembly section for the new A3.

Precise determination of the positioning of A3 cockpits using smart laser sensors

This application forms part of the last station at the end of the cockpit pre-assembly line prior to the installation of the cockpit in the vehicle. The cockpit, which is guided in on a hanger of an overhead conveyor system, is fixed in place pneumatically at the station so that it can then be measured with a Z550 laser profile sensor. For this purpose, the robot positions the Z550 laser profile sensor approx. 200 mm in front of defined points on the black mounting plate of the cockpit and scans specific features at a total of 3 points.

A CS1-series PLC connected to the sensor system records the measured values and, based on them, determines the position of the mounting plate in the space. The corrections, which are calculated from this, such as linear shifts and rotations around the axes, are communicated to the robot. These values then enable the robot to position the adhesive application nozzle on the mounting plate of the cockpit to an accuracy of approx. ± 0.4 mm.
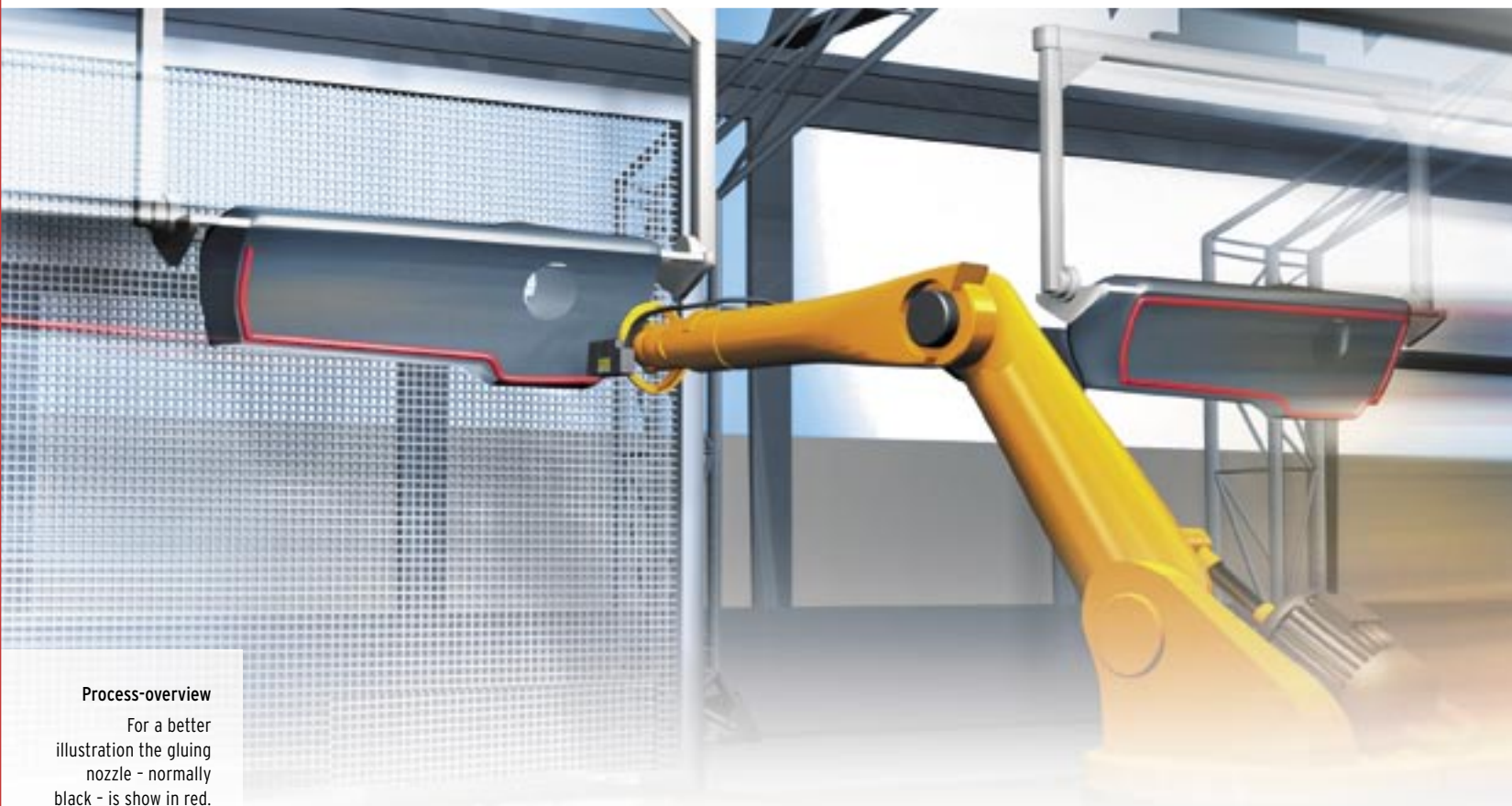
Uwe Kloß

Key Account Manager Automotive
Omron Europe

Today's automotive industry is truly global; it's also very dynamic, which is why we must be able to react quickly and individually to local market needs. Like the automotive industry itself, Omron operates on a global scale, with regional branches, production facilities, sales offices and advice centres throughout the world. We offer a borderless team that can provide our automotive customers with the specialized support they need, no matter where in the world they are.

High-precision 3D robot guidance with a laser sensor system from Omron

Step 1

Robot is scanning by means of a Z550 laserprofile sensor, 3 holes of the cockpit mounting plate.

Step 2

The Z550 data is recorded by the CS1-PLC, the correction data for the robot is calculated.

Step 3

The correction data is transmitted to the robot.

Step 4

The robot is positioning the adhesive nozzle at the correct position and starts the application process. During the process, the height of the adhesive bead is measured by a Z300 laser sensor and recorded at the control station.

Process-overview

For a better illustration the gluing nozzle – normally black – is show in red.

In-line tolerance compensation without any loss of time and quality

In the past, the mounting plate was not measured. As a result, the bead of adhesive was applied relatively imprecisely on account of the tolerances of the mounting plate and hanger.

In order to ensure that the vehicle was properly sealed, an additional quantity of adhesive was applied as a safeguard. Now, while the robot applies the bead of adhesive, a Z300 laser sensor permanently monitors the presence and correct height of the bead. In this way, the quality of the bead of adhesive is monitored in-process, all the measured values are recorded and displayed on the station controller and are also available for quality management afterwards.

Savings from the measuring system after a short time in operation

After almost a year in operation, the measuring system described here is proving beneficial to AUDI on a number of different points. The planner in charge, Mr. Fleckenstein, points out first and foremost that the bead of adhesive is being positioned with much greater accuracy, facilitating considerable savings in adhesive. Furthermore, this means that there is no need for permanent visual inspections of cockpit mounting plates to which adhesive has been applied.

Another positive side effect of this is that, through the measurement of the mounting plates, defective or misaligned hangers on the power trolley system are rejected in good time when certain limits are exceeded.

By Uwe Kloß and Jürgen Melzl

Omron engineering data for EPLAN

Omron Europe B.V. recently entered into a partnership with EPLAN, a software development company whose Computer Aided Engineering (CAE) software package (also called EPLAN) facilitates the design and engineering of control panels. EPLAN supports engineers with product selection, schematic diagrams, mounting diagrams, wiring overviews and parts lists. Using EPLAN helps to reduce engineering time and enhances the quality of project documentation.

Omron and EPLAN have mutually developed the engineering data for the most common Omron control panel products and systems, which include all motion & drive products, most industrial component products and the Omron CJ1 family of PLCs. Engineers using EPLAN now have the benefit of easily integrating Omron products into their projects.

The main functionalities that have been incorporated are:

• A contactor database, automatically linking a product to suitable sockets for easy socket selection.

• Brief explanations of all inputs and outputs in schematic diagrams, so engineers can easily wire the products without consulting technical documentation.

• Smart grouping of inputs and outputs, resulting in clear circuit diagrams.

• Plain rectangle and 2-D CAD mounting representation available for all products.

• A PLC overview function for easy navigation throughout the EPLAN project.

• The possibility of automatic backward and forward linking inside a project.

A practical project is available as an example to clearly show and explain above functions.

The EPLAN data is currently available in English and German. It can be downloaded either from the Omron website **'www.europe.omron.com'**, or it can be ordered on CD-ROM from Omron's local representatives throughout Europe.

By Winfried Pouw, ICC Activity Manager

Alan Smith

Field Application Engineer
Omron Electronics, United Kingdom

Booster
synchrotron

Linac

Electron
gun   Storage
           ring

Beamline

UK's biggest research project relies on CJ1 PLCs

When it becomes operational in 2007, the Diamond Light Source will provide one of the world's leading scientific research facilities. Protecting the machine from the damage that could be caused by the high energies involved in generating the particle stream is absolutely critical – and something to be trusted only to the most reliable and capable of control equipment.

An engineering challenge...

1,730,000 man-hours worked;
2,100 tons of steel erected;
35,000 m³ of concrete poured on-site;
33,000 m² of roofing;
To exacting tolerances... for example Concrete shielding walls cast to 5 mm tolerances.

Diamond will ultimately host as many as 40 cutting edge research stations, supporting the life, physical and environmental sciences.

Currently under construction, Diamond will provide the UK's third-generation synchrotron light source. A doughnut-shaped building in the size of several football fields, it can be described as a series of super-microscopes and will produce incredibly intense light – as X-rays, infrared and ultraviolet – that will help researchers in the development of new medicines and high tech materials, as well as in the investigation of environmental issues such as climate change.

Light generation
At the heart of the structure is a linear particle accelerator which fires electrons into a booster synchrotron ring. With powerful magnets steering the electrons around the ring, RF fields accelerate them close to the speed of light.

The electrons pass into a larger storage ring, again guided by magnetic fields and accelerated by RF fields. As they are bent via the dipole magnets, they emit synchrotron light which is channelled into beamlines where researchers can select the light, at the frequencies or energies they need to perform their experiments.

Effective control
Overall control of the facility is provided by a distributed control system – an established choice within the accelerator community. However, it was quickly realised that such a system was not the best option to provide the critical interlocking needed to protect the machine. A combination of dedicated high-speed machine protection, and a PLC subsystem was considered the most effective means of managing the protection functionality.

Electrical project engineer Simon Lay explains: "It was clear that we needed a control system that was modular in design, and distributed. That was the best way to assure the overall reliability
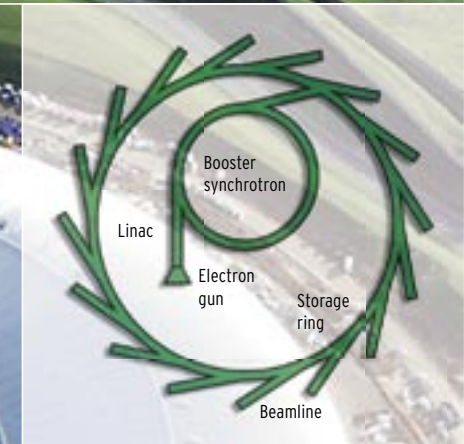
of the control system – our target is to achieve greater than 99% availability for the machine. Single point failure systems take too long to diagnose and too long to repair.

We also recognised a need for the system to be scalable. The facility is expected to have a 30 year life, and any necessary expansion of the control system in tandem with the evolution of facility must not impact on the performance. Finally, it was important that we built the control system on open standards and an open architecture. It had to have the ability to evolve to incorporate upgrades and new technology, and had to ensure seamless integration at all levels."

Machine protection
The machine protection concept is built around a series of interlocks on each of the 24 cells of the storage ring and the 4 quadrants of the booster ring, with the idea being to protect the machine

by isolating any individual cell as quickly as possible.

As well as monitoring critical parameters, Omron's CJ1 PLCs also control all of the vacuum valves, preventing a valve being opened without there being good vacuum on both sides and closing to protect in the event of pressure variations. In all there are 29 machine protection PLCs, 28 4-valve controls and at least 2 6-valve control PLCs per beamline combination. All the controllers are networked over a fibre optic star.

"We wanted to separate the machine protection functions from the valve control for a number of reasons," explains Simon Lay. "Building up such a high vacuum takes a long time to achieve. We needed to isolate this process from that of machine protection for increased reliability so using separate PLC systems help to maintain machine availability. Also, breaking down the

functionality onto a number of discrete CJ1 PLCs means we can build and test the machine in blocks."

The future
With the PLCs quickly proving their worth, Simon Lay reports that Omron's CJ1 is now the site standard for control at subsystem level. Further, the strategy provides a level of isolation from the operational parameters of the control system, ensuring that changes are not overly easy to make whilst maintaining flexibility to enable the technical group to make changes when required.

"Diamond is a very dynamic project," Simon Lay concludes. "In some areas such as future beamlines we don't know all the final requirements. Omron's PLCs not only give us the reliability and performance for the systems that we know we need, they also give us the maximum possible flexibility to accommodate the ones we don't."

Images and diagrams courtesy of Diamond Light Source Ltd

Never stop...

'Only one chance to get it right'

Mark Leeson
Technical Director

Gainsborough Craftsmen

Omron Yaskawa Motion Control
"For machines that never stop..."

www.never-stop.info

Our company

1948 – Since its establishment, Gainsborough Craftsmen has expanded its activities to become a leading special-purpose machinery manufacturer, especially in food process and packaging.

2000 – The Company introduced a standard range of food collation machines, as a result of their excellence in application.

Our machine

Our standard machine can collate food to suit a variety of packaging formats including flow-wrap, tray and bunch packaging. With continuous in-feed, it is the servo drive system, with its precise positioning, that sustains high-speed operation to maximise throughput without damaging the product.

Our choice

A typical machine now uses five Sigma II servos, together with Omron motion control. Over 20 machines are in service, all delivering superb performance and demonstrating high-levels of reliability in a 24/7 process. Backed by Omron's excellent support, we really couldn't ask for more to help us get it right first time!

Advanced Industrial Automation

OMRON