UKIVA

VISION IN ACTION

Editor: Dr Denis Bulgin
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Autumn 2014 | Newsletter of the UK Industrial Vision Association

Framos See our adverts on pages 11 & 17

Stemmer Imaging See our advert on page 13

MultiPix See our advert on page 16

ClearView Imaging See our advert on page 18

High-speed imaging gains pace!

Most of us have had some experience of high-speed imaging. Classic images such as the corona formed in a liquid when a droplet hits the surface or the rupturing of a balloon's fabric as it bursts are well known. High-speed imaging is used extensively in film making and in TV programmes such as sports coverage.

However, high-speed imaging is a diverse technology which also has a host of industrial applications. Examples include sports biomechanics analysis and performance evaluation; vehicle crash testing including impact analysis and airbag deployment and ballistics analysis in the military and in mining. In the manufacturing industry inspection applications on high-speed production lines include product, packaging and label defect identification, label reading and verification for codes and human readable data, and web-based product inspection.

Detection of the presence and position of labels on bars of soap

Process and machinery diagnostics are another important application since even minimal discrepancies in high-speed process machinery mechanisms can cause an entire production line to come to a standstill. Intermittent failures can be even more difficult to troubleshoot. High-speed diagnostic systems can record image sequences both before and after an event for slow motion review to allow causes of failures to be identified and any necessary adjustments made.

How fast is 'high-speed'?

High-speed cameras need to be capable of short exposure times and fast frame rates. Short exposure times are needed when imaging a fast moving object (typically so the object moves less than 1 pixel during the exposure) to avoid motion blur. However when a series of objects are moving past the camera, high frame rates will also be required to ensure that each item is imaged on a successive frame for analysis. Many manufacturers would suggest that 'high-speed' cameras operate at frame rates in excess of 200 frames/second although frame rates of thousands of frames/second may be required for troubleshooting manufacturing process problems. However, effective high-speed imaging is a function of much more than just the frame rate and exposure time of the camera. Factors such as illumination intensity needed, camera and light source triggering, data capture, transfer, processing and storage all play a key role and UKIVA members who are vision technology suppliers or vision systems integrators can provide expert advice on this specialist topic. More details on these technology considerations as well as some application examples can be found in our special centre page spread. Thanks are due to UKIVA members Alrad Imaging, Cognex UK, Industrial Vision Systems, Lambda Photometrics, Olmec UK, Sick (UK) and Stemmer Imaging for their technical and application contributions to these features

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FOREWORD by Mark Williamson

In 1957 the first computer scanner was used to record a 176 x 176 pixel image from a photograph of the son of its inventor, Russell A Kirsch, at the National Bureau of Standards (now known as the National Institute of Standards and Technology) in the USA. Today's multi-billion pound machine vision industry has come a long way from these humble beginnings of computer vision. Most industries experience highs and lows due to a variety of factors, yet in spite of the difficult economic conditions that have prevailed in recent years, the machine vision industry continues to flourish and I am delighted to see significant growth being reported in the UK vision market.

A survey for 2013 recently published by the VDMA in Germany (one of the largest and most important industrial associations in Europe) showed that the total sales of machine vision components and systems from European companies into the UK was second only to Germany across the EU. Not only that, but the growth of machine vision sales in the UK was the greatest in the EU, rising by an impressive 23.2% during this period. Many UKIVA members are distributors for European machine vision companies and so have been instrumental in achieving these sales and yet these figures relate only to the vision components and systems sold. Many UKIVA members who are vision systems integrators will also have benefitted from this period of growth with the added value they offer in terms of integrating vision technology into manufacturing environments and OEM equipment.

This increased activity by UKIVA members is reflected in this issue of Vision in Action, which is even bigger than our Spring issue which broke all previous records. We welcome another 2 new members, Industrial Vision Systems and Bytronic Automation who, together with the other members who joined us earlier in 2014, have helped UKIVA grow at its fastest rate this century. As well as the special feature on high-speed imaging, this issue contains eleven application articles showcasing the use of vision in a diverse range of industries. I hope you find the Autumn 2014 issue of Vision in Action both interesting and informative.

Mark Williamson, UKIVA Chairman

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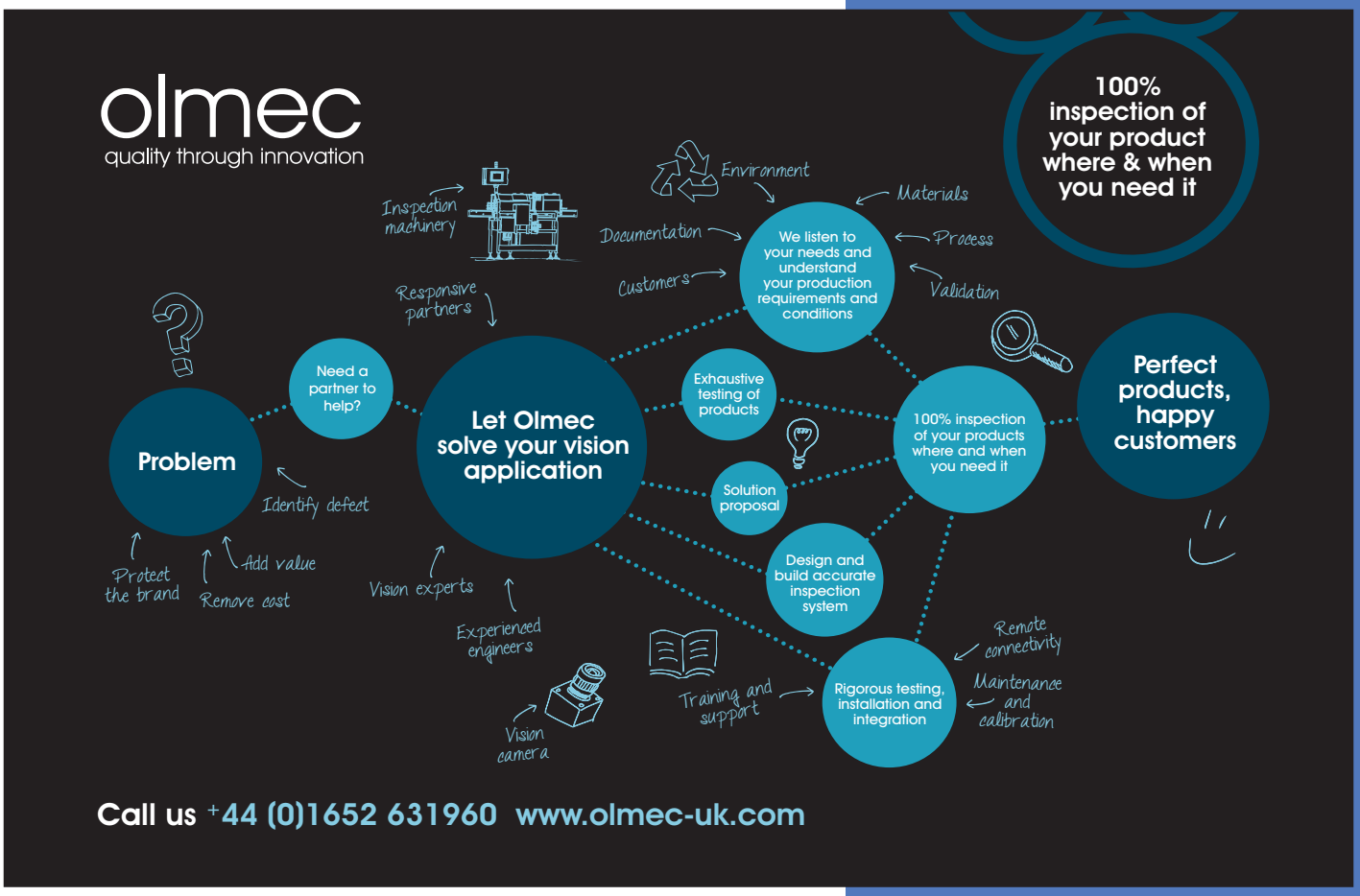

MEMBERS NEWS

Two new members for UKIVA

UKIVA is delighted to welcome Industrial Vision Systems and Bytronic Automation as its latest new members.

Industrial Vision Systems Ltd specialises in the supply and support of machine vision solutions, special purpose vision machines and peripheral vision equipment, as well as operating as a vision system manufacturer and a vision system integrator.

Bytronic Automation designs and implements innovative manufacturing solutions that transform manufacturing performance. These include total MES solutions, machine inspection & measurement, industrial networks, manufacturing data management, or automated test equipment to help customers achieve manufacturing improvements and get production right first and every time.

Finalists for 'Most Innovative Machine Vision Project' announced

The judging panel for the 'Most Innovative Machine Vision Project Award' 2014, have announced the finalists are:

- Dimaco
- Framos
- Olmec
- Scandinavian Machine Vision
- SICK
- Valco Melton

The 'Most Innovative Machine Vision Project Award' is one of the PPMA Group Awards and is sponsored this year by Stemmer Imaging. The winner will be announced at the Gala Awards Dinner to be held on Tuesday 30th September at the National Motorcycle Museum, Birmingham; an event to be hosted by Rory Bremner.

Editorial material in this section is provided by UKIVA Members. Content accuracy is the responsibility of individual UKIVA Members.

ALRAD IMAGING www.alrad.co.uk

New cameras from Alrad

New cameras from Alrad include the Lightwise range of smart cameras from ISG. These are available in 'IQ' dual GigE Vision plus CoaXPress versions (from 8 MP @ 138 fps to 29 MP @ 4 fps) and 'Allegro' USB 3.0 versions (from 1MP @ 133 fps to 12 MP @ 80 fps). LightWise cameras feature compact form factors, high resolution and high performance, along with unmatched programmability and flexibility for OEM vision system designers. On-board processors, FPGAs, image buffers and other features improve performance and simplify integration.

ISG USB camera

Also new are sub – THz imaging cameras manufactured by Terasense which detect radiation from a sub terahertz source. With sensors containing 256, 1024 or 4096 pixels, these cameras operate at frequencies from 0.05 — 0.7 THz, where most common materials are transparent and allow sub surface imaging without the use of harmful X-rays. Terahertz imaging is ideal for a wide range of applications including hidden object and defect detection; security; medical diagnostics and quality control.

CLEARVIEW IMAGING www.clearviewimaging.co.uk

PointGrey release USB 3.0 Vision Blackfly

The new Blackfly USB 3.0 Vision family features highly sensitive Sony CCD and CMOS sensors from VGA up to 5.0MP, so customers now have even more choice in USB 3 Vision cameras. The first model to be released uses the popular 1.3 MP Sony ICX445 CCD running at 30 FPS, with further releases coming soon.

This latest USB 3.0 Vision camera line combines the throughput of USB 3.0, highly sensitive sensors, industry-leading affordability, and a host of unique features for uncompromising value. The ultra-compact Blackfly camera weighs just 36 grams, measures 29 x 29 x 30mm, uses 2 watts of power, and comes with a 3-year warranty.

PointGrey Blackfly

Every Blackfly model comes packed with functionality designed to maximize performance and reliability, including a 16 MByte frame buffer; LED status indicators; and an on-camera image processing pipeline that provides colour interpolation, gamma, and lookup table functionality.

FRAMOS www.framos.co.uk

Vision processors added to range

Framos is now adding vision processors from Datalogic to its portfolio. These vision processors can be used to develop complex systems using several cameras, without needing any knowledge of programming languages such as C, C++ or similar. Datalogic's graphic programming environment, IMPACT®, offers a diverse number of image processing algorithms. Complex image processing solutions can be created using conventional methods in just minutes. Datalogic's image processing PCs suit all applications; with Intel® GPUs and multi-core CPUs from dual-core 1.9 Ghz to quad-core 2.1 GHz, and with up to four GigE camera ports and Power over Ethernet (PoE), or up to 6 USB 2.0/USB 3.0 ports. The vision processors can be combined with industrial standard cameras such as Smartek Vision or SVS-Vistek. With SMARTEK's Giganetix Plus series of GigE cameras being one of the first in the world to offer the Sony IMX174 image sensor providing high sensitivity, dynamic range, low noise, and super crisp images of moving objects at attractive costs, the vision processors offer a clear cost advantage over so-called smart cameras.

Datalogic vision processor

MEMBERS NEWS

IDS IMAGING DEVELOPMENT SYSTEMS GMBH
www.ids-imaging.com

Greatly extended USB 3.0 camera portfolio


USB 3-uEye-family

Three new USB 3.0 camera families from IDS are ideally suited to cost critical applications in automation, robotics, print and packaging and medical engineering. The uEye LE is available in both board-level and housed versions, while the compact uEye ML camera weighs in at just 41g. All models are equipped with the latest and highly sensitive CMOS sensors from Aptina and e2v with resolutions from 1.3 to 5 Megapixel. In addition, special sensor features guarantee extra functionality and the highest detail accuracy for light and speed critical applications. The 1.3 Megapixel sensor from e2v is also available in a NIR enhanced version.

The USB 3 uEye LE series includes the first true USB 3.0 board-level industrial camera and is easily integrated into embedded systems, medical engineering and instrumentation thanks to its tiny size. The USB 3 uEye ML cameras offer light sensitivity often associated with CCD cameras. Switching from USB 2.0 to USB 3.0 technology is made easy thanks to USB's Plug & Play properties and the sophisticated and interface independent IDS Software Suite.

IMPERX
www.imperx.com

Flexible approach to imaging

IMPERX' Bobcat 2.0 "FLEX" camera architecture allows the internal boards to be separated by up to 10 inches for use in oddly configured or space constrained applications. The FLEX converts any Bobcat 2.0 into a high performance, remote head camera.


Flex PCB Camera

The Flex retains all of the Bobcat 2.0 programmable features and preserves the MIL-SPEC 810F integrity, MTBF of > 660,000 hours @ 40˚C (Telcordia SD-332) and operating temperature range -40˚C to +85˚C. The FLEX is available in any of the Bobcat 2.0 models ranging from VGA-29 megapixel with several interfaces to choose from including GigE Vision™, PoE, Camera Link™, HD-SDI and CoaXPress.

INDUSTRIAL VISION SYSTEMS
www.industrialvision.co.uk

New cameras offer one of the fastest vision systems in industry

The new NCG inspection cameras from IVS offer one of the fastest vision systems available on the market, featuring higher resolutions and faster read rates resulting in greater levels of inspection monitoring. With a resolution of up to 2592 x 1944 pixels and operating at 105 frames per second they can inspect up to 6,300 parts per minute at much finer detail than previously available making them ideally suited to higher speed productions lines such as medical device inspection, food processing, label inspection and automotive applications.

Cameras

continued on page 7

THE CHARACTERISATION, MEASUREMENT & ANALYSIS COMPANY

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- Easy To Use
- Cost Effective

The **HHC series** from **Mega Speed** is a line of rugged, handheld, high-speed video cameras. They have built-in, high-intensity LEDs, eliminating the need for external lighting. Record from 30 to 20,000 frames/s with maximum resolution of 1920x1080 pixels.

Cameras include a lithium battery, touch-screen interface, analytical software, USB, GigE, microSD card, and HDMI.

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Multivac Vision System within the packaging line

Multivac utilise state of the art vision detection systems across our range of processing and packaging machinery. Vision technology is selected to best suit the individual customers requirements. In the below example there are two different vision systems in action.

From the right products arrive via an upstream infeed belt into the loading area of the robot cell. Each product arrives in random orientation and passes under a MVS (Multivac vision system) this directs the robot (or multiple robots) to pick / place each product into the correct pocket on the packaging machine completely automating the loading process.

After automatic packaging including labelling and coding a second vision system QC checks each pack as it advances from the packaging machine, this system checks for - label position, label type and seal contamination. The system also checks the position and characters on the applied date code / barcode. Once checks are complete the second robot on the left unloads good packages to the downstream inspection systems, e.g. metal detection, X-ray and checkweighing equipment (which are also part of Multivac's portfolio of equipment)

Packs that do not pass a pre agreed criteria are not picked by the robot and are automatically driven to a reject position for reworking. This system working with the downstream inspection systems ensures no unsuitable packs reach the end user. This is also a significant benefit when automating further processes such as case pack and palletise as the need for manual QC is removed.

All of the equipment in the example functions together using Multivac's MLC (Multivac Line Control) this effectively makes the line "one machine" not a series of machines bolted together. This offers the customer a truly integrated system with significant benefits in OEE.

We also have a full portfolio of machines that allow us to provide a true end to end process offer for our customers. Our portfolio includes Processing, Packaging (Thermoform and Tray seal) Robot loading, Robot Unloading, Inspection, Labelling, Auto case / crate pack & Robot palletising.

All of this equipment is supplied and supported by Multivac.

Fully automated. Totally integrated.

H 100
Handling

MVS
Detection and inspection

MR
Marking

R 245
Thermoform Packaging

H 130
Pick and Place

MLC
Line Control

Integrated automation of packaging lines

Multivac offers engineering excellence in designing and integrating fully automated packaging line solutions. Whether you are just beginning to automate or you are looking for a total turnkey packaging line, Multivac has the in-house capability to layout and tailor a solution to meet your specific requirements.

The cameras are 'plug and play' meaning they are already fully integrated with IVS's NeuroCheck software platform, giving users a significant performance boost in both ease of use and capability. The cameras have been designed to increase system efficiency and save cost at a vision system level. They offer easy calibration, versatile implementation and boast optimal mechanical design.

MATROX IMAGING **www.matrox.com**

World's first flowchart-based, hardware-independent machine vision software

Matrox Imaging's new Design Assistant 4 vision software is the first hardware-independent integrated development environment that lets users easily create an application flowchart and HMI. Projects can be taken from concept to completion in record time, without the need for conventional programming. It works with Matrox Iris GT smart camera as well as any PC with GigE Vision® or USB 3 Vision™ cameras, including the Matrox 4Sight GPm industrial computer. It is ideally suited for use by system integrators, machine builders and line integrators. Design Assistant is field-proven in demanding vision applications in a wide range of industries including automotive manufacturing, consumer products production, electronics assembly, food and beverage production, medical device manufacturing, logistics, pharmaceutical production and semiconductor fabrication. Being hardware independent, Design Assistant 4 can take advantage of cameras offering high resolution, speed, and specialty features such as thermal images.

Design Assistant

METTLER-TOLEDO **www.mt.com**

Flexible vision inspection system for label, print and package defects for glass bottles

The V6300 from Mettler Toledo is a turnkey solution for a wide range of package inspection needs to prevent products with torn, flagged, or missing labels from leaving production facilities, ensuring that the correct label is on each product. The system will also verify the readability of any barcodes or important text, preventing product recalls. With configurations to fit every budget, line layout and plant environment, the V6300's flexible design allows simple installation into a production line without the need for costly line breakages or product handling.

Designed specifically for ease of use, V6300 parts are readily accessible for maintenance and can be quickly replaced when needed. The V6300 system has been designed to expand with manufacturer needs and the easy-to-use adjustable camera mounts make it simple to include additional cameras. The powerful CIVCore® software and intuitive user interface greatly simplifies the inspection process. CIVCore® offers a quick part change-over interface, wizard based tool training, easy-to-export statistical reports and the ability to send warning or shut down signals based on pattern failures.

V6300

OLMEC-UK **www.olmec-uk.com**

Food packaging inspection system commercialised

'VisionPerfoControl' is a vision-based system for true real-time monitoring of perforation quality of laser-perforated, flexible modified atmosphere packaging (MAP) for the food industry. Capable of inspecting the extruded web material with hole sizes from 50 – 350 µm at web speeds up to 400 m/min, VisionPerfoControl was developed in partnership with Rofin-Baasel, a world leader in laser systems for MAP.

The vision system checks that each hole is present and measures it to ensure it meets specification. In addition, the vision system is linked into Rofin's StarMAP software which calculates the number and size of micro-holes, required to achieve the optimum O2/CO2 balance in the head space of the packaging. This allows the hole parameter details to be transferred directly to the vision software.

VisionPerfoControl

MEMBERS NEWS

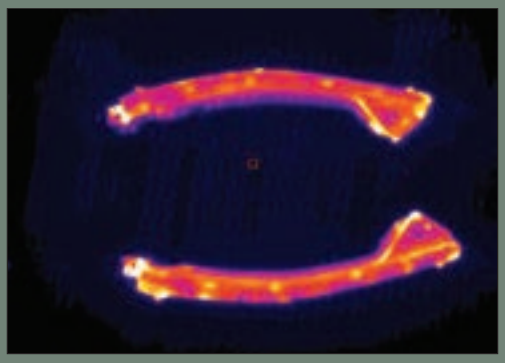
Save Food Initiative

OMRON www.industrial.omron.co.uk

Omron joins the SAVE FOOD initiative

Omron has joined the Save Food initiative as an official member. Launched in January 2011 to help fight global food losses and waste, the Save Food initiative provides people in less developed countries with a fair economic chance to participate in the opportunities that global food chains can provide throughout the world.

The Save Food initiative provides Omron with a unique opportunity to contribute towards fixing important social problems using pioneering technology that helps reduce waste during production. Omron provides solutions that include inline inspection of product quality and quality control of packaging material and packaging, verification of printed label with expiry and manufacturing data (characters, barcode and data matrix code) and traceability of individual packaging and product across all production steps. Many of Omron's powerful vision systems allow manufacturers to release products that are safe and without hidden defects which can affect the shelf life of the products. Also, the speed and simplicity of its control systems ensure that manufacturers can quickly pack fresh products, minimising packaging errors.



Thermal imaging of pressed parts for hot spot detection, process monitoring and quality control

SCANDINAVIAN MACHINE VISION www.scandinavianmv.co.uk

Thermal imaging added to Press Vision 3.0

Scandinavian Machine Vision's Press Vision 3.0 solution for hot stamping machines has been expanded with new modules for thermal imaging before pressing and after pressing. Featuring a FLIR A65 thermal camera, the new modules can be added to existing systems or are available as stand alone systems which can also be used in many other applications where thermal imaging can overcome limitations with visual range imaging.

Before pressing the new module allows temperature monitoring of blanks straight out of the furnace for furnace condition/function monitoring, process monitoring and optimisation and quality assurance. Double blanks can be detected by means of high or low temperature limits and the presence of a patch can be verified as well as a rough verification of its position. After pressing the temperature of pressed parts can be measured for process monitoring, optimisation and quality assessment. Hotspots can be detected to monitor the condition and cooling of the dies. In addition, checking that all parts are moved out of the dies prevents crashed dies.

Scorpion Vision Familiy

SCORPION VISION www.scorpionvision.co.uk

Addition to Scorpion Compact Vision range

Scorpion Vision Ltd has recently added to the Scorpion Compact Vision range of quick install vision systems with the release of the new ultra compact PC with USB 3 ports. This increases the capability of the Scorpion Compact Vision family with USB 3 supported directly within Scorpion as an option. The Scorpion Compact Vision suite now consists of: embedded Hexacore PCs; quad core Compact PCs with expansion capability; quad core ultra compact PCs; Scorpion 2D Stinger cameras with integrated light source and strobing; Scorpion 3D Stinger cameras with stereo vision configuration, and integrated laser illumination options and a suite of add-on LED light bars and spots that are independently controlled by the Scorpion Stinger camera.

Scorpion Compact Vision products are pre-configured in the factory and are delivered ready to go. This reduces the time it takes to install a compact vision system and greatly reduces the risk involved in building vision systems, allowing the integrator to put 100% effort into making the automation work.

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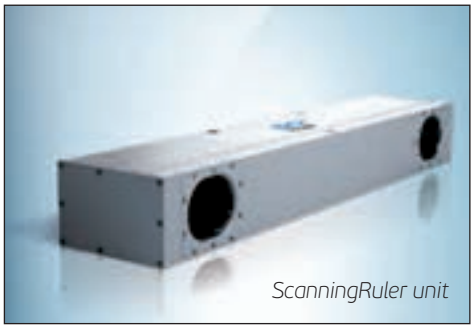
Industrial.omron.co.uk/vision

MEMBERS NEWS

SICK (UK) www.sick.co.uk

ScanningRuler boosts robot picking productivity with innovative 3D vision



ScanningRuler unit

ScanningRuler is an advanced new 3D camera solution from Sick UK for vision-guided robot picking applications. By combining 3D and 2D measurements, the ScanningRuler offers unique new features to support fast and accurate picking of random machined parts piled in stillages, bins and baskets without requiring movement of the camera unit or the container. With a built-in laser light source, the imaging technology is resistant to ambient light changes and provides reliable measurements with varying surface characteristics and part colours. Incorporating a fixed laser with a rotating mirror, the camera sweep-scans the volumetric area producing a 3D image of all parts with their x/y/z points in millimetres and an accurate 2D overlay which enables part identification against known profiles. The combined image can be processed by image handling software to tell the robot arm where to start gripping. A single ScanningRuler can generate a complete 3D image of the content contained within the volumetric area associated with a U.S. or Euro pallet.

STEMMER IMAGING www.stemmer-imaging.co.uk

High-speed cameras feature high speed interface

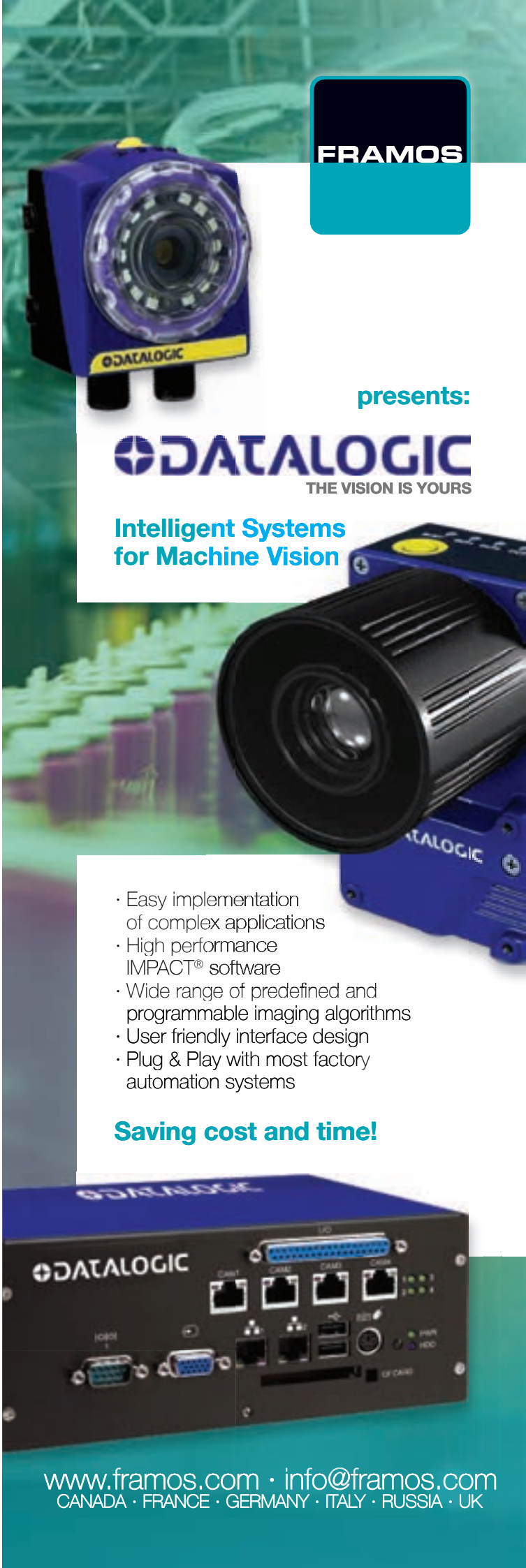
CamPerform

Four models in the CamPerform range of high-speed machine vision cameras from Optronis now feature the high-speed CoaXPress data transfer interface, with data rates of 2 GB/sec over distances of 200 feet. Available in monochrome and colour versions with sensor resolutions from 3 to 25 MP and frame rates between 540 and 72 full images/s, CamPerform cameras are ideally suited for use in industrial applications for 2D/3D real-time quality assurance, process analysis and fault detection where slower cameras no longer offer a solution. Frame rates between 170,000 and 1688 fps can be achieved with reduced resolution.

Designed with a sturdy camera housing and with no ventilation slots needed, the CamPerform series can be readily integrated into industrial applications. Standard C-mount, F-mount and M42 lenses can be used. CamPerform cameras are also available with the CameraLink data transfer interface.

Free help with
contact:
tom.fisher@ppma.co.uk

Free help with
LinkedIn
contact:
tom.fisher@ppma.co.uk



MEMBERS DIRECTORY

VISION TECHNOLOGY PROVIDERS

ALRAD IMAGING www.alrad.co.uk T 01635 30345	Alrad Imaging is a prime UK distributor of vision products. Products include cameras and sensors, frame grabbers, illumination, imaging software and sub system solutions for OEMs and system integrators.
BAUMER LTD www.baumer.com T 01793 783839	Baumer is one of the leading global manufacturers of innovative image processing components and offers an extensive product range of high quality industrial cameras and vision sensors.
CLEARVIEW IMAGING LTD www.clearviewimaging.co.uk T 01844 217270	ClearView Imaging is a supplier of vision components, including a wide range of cameras, frame grabbers, software, embedded systems, smart cameras, vision processors, lighting and optics.
COGNEX UK LTD www.cognex.com T 01327 856040	Cognex is the world's leading vision company, with over 150,000 systems delivered. We offer a complete range of vision solutions, from smart cameras to powerful framegrabbers.
FRAMOS ELECTRONICS LTD www.framos.co.uk T 01276 404 140	Framos is a specialist distributor of digital and electronic imaging devices and complete cameras. Both area and linear CCD and CMOS devices are offered with full technical support for design and integration.
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LAMBDA PHOTOMETRICS LTD www.lambdaphoto.co.uk T 01582 764334	Lambda distributes a broad range of MV products for industrial, research and logistic applications. Providing digital cameras, frame grabbers, software, lenses and lighting teamed together a wealth of technical experience.
LEUZE ELECTRONIC LTD www.leuze.co.uk T 01480 408500	Leuze electronic 'the sensor people' are the experts for sensors. They also specialise in smart cameras and identification products.
MATROX IMAGING www.matrox.com/imaging T +1 514 822 6020	Matrox Imaging is a leading developer of hardware & software for machine vision and imaging technology.
MULTIPIX IMAGING LTD www.multipix.com T 01730 233332	The wide range of products offered includes frame grabbers, cameras, lenses and imaging software together with a highly experienced support service.
NATIONAL INSTRUMENTS UK LTD uk.ni.com T 01635 523545	National Instruments manufactures hundreds of integrated software and hardware products, which are used to replace and/or communicate with traditional instrumentation.
OMRON ELECTRONICS (UK) LTD www.omron.co.uk T 01908 258 258	Omron Electronics manufactures a wide range of vision-based industrial solutions, ranging from cost effective vision sensor products to high-end vision controller and camera products.
SCORPION VISION LTD www.scorpionvision.co.uk T 01590 679 333	We sell and support Scorpion Vision 2D and 3D Compact Vision Systems for integrators and machine builders. We represent The Imaging Source in the UK and sell machine vision products through our ecommerce website.
SICK (UK) LTD www.sick.co.uk T 01727 831121	Inspect, locate, detect and verify your products on the production line. Enhanced productivity and quality is the result when using Sick Vision sensors and systems – just part of the total sensor offering from Sick.
STEMMER IMAGING www.stemmer-imaging.co.uk T 01252 780000	Europe's premier Machine Vision technology provider. Offering the widest range of 2D and 3D vision systems and components along with independent technology training and extended technical services delivered with passion.

VISION SYSTEM INTEGRATORS & CONSULTANTS

ACROVISION LTD www.acrovision.co.uk T 0845 337 0250 (3)	Acrovision is a leading Systems Integrator of Vision Inspection and Barcode Reading systems. Our Validator series has been designed to carry out any required End of Line Packaging validation and inspection.
BYTRONIC AUTOMATION LTD www.bytronic.com T 01564 793174	Bytronic is a leading UK systems integrator, specialising in machine vision and factory automation. Bytronic are experts in total MES solutions, industrial networks, manufacturing data management and more.
FISHER SMITH www.fishersmith.co.uk T 01933 625162	Fisher Smith is a UK specialist in machine vision. Our product range covers, Vision and Control machine vision components, and GenVis and RoboVis PC-based vision systems and vision training.
INDUSTRIAL VISION SYSTEMS LTD www.industrialvision.co.uk T 01865 823322	Easy to use vision systems, special purpose vision machines & smart cameras. Improve yield and remove defects with our automated quality control machine vision solutions. Practical and simple to maintain.
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OLMEC UK LTD www.olmec-uk.com T 01652 631960	Specialists in product handling, controls automation and validation; Olmec deliver complete inline and stand-alone vision inspection into existing, new and OEM machinery processes.
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High Speed Cameras

Exposure time

Exposure time is the amount of time that light is allowed to fall onto the camera sensor. Longer exposure times allow the sensor to gather more light, but this leads to more noise being generated on the sensor. Standard vision cameras mostly specify the maximum exposure time to avoid noise becoming

Getting the correct exposure time eliminates motion blur (courtesy Sick (UK))

an issue. Short exposure times are needed when imaging a fast moving scene to avoid motion blur and typically the exposure time should be short enough so that the object moves by less than 1 pixel. Consider an object moving at 100mm/sec with an area of 100mm x 100mm to be imaged. Using a camera with a resolution of 1K x 1K pixels, each pixel will be imaging an area of 0.1mm. In 1 second, the object will have moved by 1000 pixels which will require a camera capable of exposure times of 1/1000th second or faster to avoid motion blur.

Frame Rates

The frame rate, or number of complete images from an area scan camera that can be output in a particular time is important. For example a production line where objects are passing by at a rate of 20 units per second will require a camera capable of capturing 20 discrete frames per second. Frame rates are quoted at the full resolution of the particular camera sensor, but many cameras offer the ability to partially scan the sensor or sample a discrete portion of the sensor, allowing much higher frame rates for that area. This can be useful if the full frame is not required for imaging. A technique known as 'binning' can also increase frame rates. Binning combines the output of adjacent pixels on a sensor and this also results in increased sensitivity and S/N, but decreased spatial resolution.

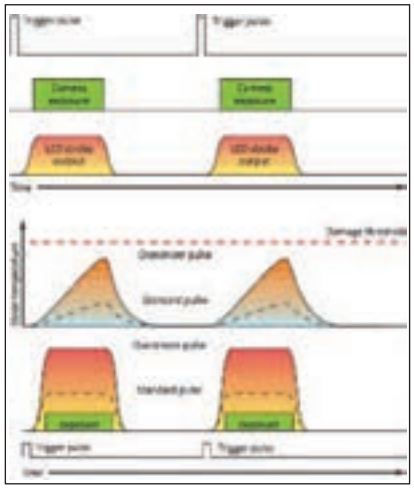
Line scan imaging

Line scan cameras are used extensively in high-speed imaging. In general, a single line of pixels is scanned at high speed and the frame is built up by the motion of the object past the camera. The size of the object to be imaged and the speed of movement determines the line rate required in the camera. Line scan cameras have shorter exposure times and therefore require greater illumination levels.

High Speed Image Acquisition and Processing

Illumination

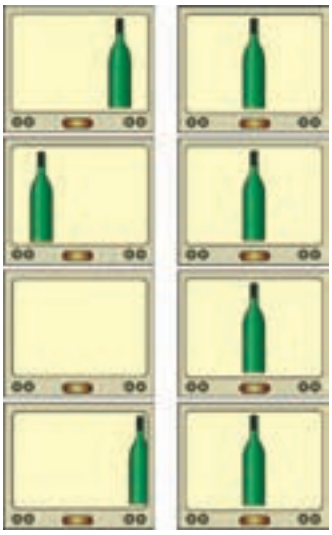
Light Emitting Diodes (LEDs) are a popular form of illumination for machine vision applications, offering a good deal of control. They can be readily pulsed, or strobed to capture images of objects moving past the camera at high speeds. Strobing needs to be synchronised with the objects to be inspected so the camera is triggered at the same moment as the pulse of light. The short exposure times required for high speed imaging mean that high light intensities are required. It is possible to dramatically increase the LED intensity over short exposure times by temporarily increasing the current beyond the rated maximum using lighting controllers. However the LED must be allowed to cool between pulses to avoid heat damage. Lighting controllers can provide fine adjustment of the pulse timing, which is often more flexible than the camera's timing. The camera can be then set for a longer exposure time and the light pulsed on for a short time to 'freeze' the motion.



LED Triggering - standard and overdriving (courtesy Stemmer Imaging)

Triggering

High-speed imaging requires that the exposure of the camera happens exactly when the object is in the correct position. Initiating the start of an exposure at a particular time is called triggering. If a camera is free running the position of the moving object could be anywhere in each captures frame or even completely absent from some frames. Triggering delivers image acquisition at a precise time. The frequency of a trigger should not exceed the maximum frame rate of the camera to avoid over triggering. This also means that the exposure time cannot be greater than the inverse value of the image sequence. The exposure is generally triggered by an external source such as a PLC with a simple optical sensor often used to detect when the object is in the correct position. Precise triggering is very important for high speed imaging and in very high speed applications great care must be taken to assess and reduce all of the factors that can influence any delays from initiating a signal to the resultant action in the sensor in order to ensure the required image is acquired. These factors could include opto isolators in cameras as well as the latency and jitter within the imaging hardware.



Free running camera compared to triggered camera (courtesy Stemmer Imaging)

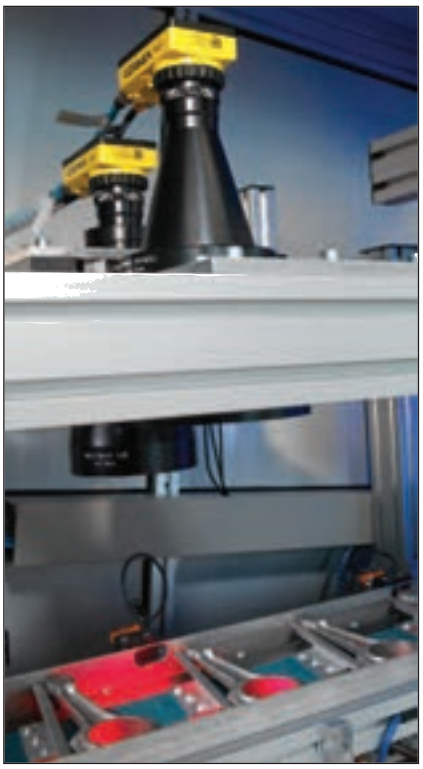
Data capture & storage

High frame rates and high spatial resolution generate high volumes of data for processing. Image data are generally transferred directly to a PC's system memory or hard disk. This relies on an appropriate interface speed between the camera and the computer and the speed of the computer. There are a number of vision image data transfer standards such as GigE Vision, Camera Link, Camera Link HS, USB 3 Vision and CoaXPress which generally offer a trade-off between data transfer rates and the allowable distance between the camera and the PC. One of these interfaces offer an acceptable data transfer rate for the application and long sequences are required, this is a good solution. The alternative is to have the image recording memory within the camera itself, which increases data throughput significantly since images are held in the camera without any need for transmission while recording. However the amount of on-board memory is significantly less that a PC hard drive, which means that only relatively short sequences can be recorded.

High Speed Inspection

Product defects

Inspection of products for defects is an important aspect of high speed inspection applications, The key areas are verification, measurement and flaw detection. Verification ensures that a product, assembly or package has been correctly produced. Applications range from simple presence checks such as ensuring that all the caps are in place on a bottling line or components such as clips, screws, springs, and parts are in place, to checking that seals and tamper-proof bands are in the correct position and that no product has been trapped in a packaging seal. Other verification examples include solder joints, moulded parts, assembly, and blister packs. The accurate measurement of component dimensions to ensure that they are within pre-defined manufacturing tolerances is also extremely important, both from the point of quality control for the end-user and from the point of monitoring the manufacturing process to keep it within tolerance and therefore minimise waste. Products or components also need to be inspected for flaws such as contamination, scratches, cracks, discoloration, textural changes etc.



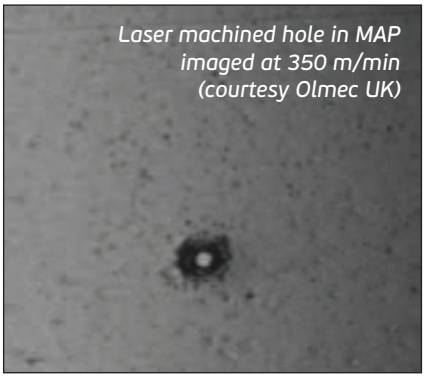
Automated automotive connecting rod inspection (courtesy Cognex)

Labels and marking

Mislabelled products account for the highest percentage of recalls across all industries. Vision systems are also used extensively to check labels. Code reading tasks can include fully validated character recognition, character verification and robust 2D data matrix handling and grading. Code verification systems can help eliminate variables that affect the readability of a code, and confirm that the printing is good from the start. Reading tasks could include simultaneously detecting changing batch code orientation and differing quantities and location of characters on a label. Vision is also closely involved in the implementation of the 2011 EU Falsified Medicines Directive which requires manufacturers to apply safety features to verify the authenticity and identity of individual packs of medication rather than just batches. Vision systems are also used for code reading of directly marked components for product identification and traceability, especially in safety-critical industries such as aerospace and automotive. Tracking a component and all the processes it has gone through, from manufacturing, assembly right through to end-user requirements for spare parts replacement (from the cradle to the grave) helps compliance with industry guidelines and standards and quality assurance used in the manufacturing supply chain.

Web inspection

High-speed line scan imaging is used extensively for industrial web inspection applications on fast moving continuous product in a variety of industries including printing, the manufacture and subsequent processing of paper, the manufacture of steel plate, glass tape or textiles. Applications generally involve the identification and classification of faults and defects in these materials. In the food and packaging industry high-speed inspection systems have been developed to inspect laser-perforated holes in flexible modified atmosphere packaging films. The vision system can locate and measure hole sizes ranging from 30 – 120 µm diameter (approximately the diameter of a human hair) on a web running at a speed of 350m/min.



Laser machined hole in MAP imaged at 350 m/min (courtesy Olmec UK)

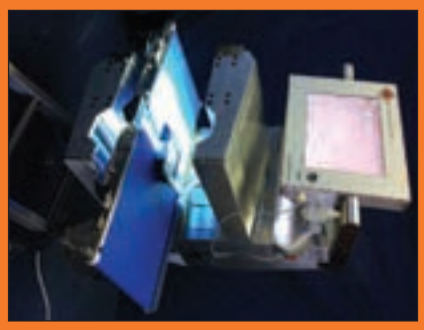
High Speed Troubleshooting

High-speed vision systems can significantly improve the accuracy of diagnostic analysis and maintenance operations in industrial manufacturing applications. Users can record and review a high-speed sequence, either frame by frame or using slow motion playback to allow perfect machine setup and system synchronisation. Alternatively the system can be used as a 'watchdog' by continuously monitoring a process and waiting for a predefined image trigger to occur. These troubleshooting systems are generally portable and can be used in a wide range of manufacturing applications including: bottling lines, packaging manufacture, food production lines, plastic container manufacture, pharmaceutical packaging, component manufacturing, paper manufacture and printing.

Troubleshooting applications can require short exposure times so high-intensity illumination is required. Camera frame rates of thousands of frames/second generate a lot of data at high speed, especially if they have high spatial resolution. Rather than try to transfer this data to a PC, in-built high-speed ring buffers may be used for image recording. Image sequences can be replayed in slow motion on self contained image displays after the event has been recorded or transferred to the hard disk of a PC for later review. Image sequences can be recorded in standard video file format.

Frame by frame evaluation of high speed processes, (courtesy Alrad Imaging)

Specialist triggering is used for troubleshooting because generally it is important to see what is happening both before and after the trigger event. The system continuously records into a ring buffer and once full, the system starts overwriting the first records. Once a trigger event has occurred, the system records until the ring buffer is filled up and stops. In this way both pre- and post-event recording information is acquired. Sequences can also be triggered by monitoring either changes in intensity or movement in the image, meaning that the camera triggers itself to send an image or sequence, removing the need to generate a trigger using hardware. This is particularly useful for capturing intermittent or random events.



Veri-Pack inspection system

ALRAD IMAGING www.alrad.co.uk

Meeting supermarket labelling needs

Quality vision company Dimaco has installed over 100 Veri-Pack systems to meet the most demanding supermarket label inspection requirements, reducing wastage in unsaleable or mis-labelled product being transported to the supermarkets. Veri-Pack offers comprehensive solutions for ensuring accuracy in labelling and the ultimate in traceability for food manufacturing plants by addressing a host of challenges. These include integrating all the checks without the need to change label artwork and spotting subtle differences in promo labels without costly barcode backing strips. Systems need to be able to be adaptable to the needs of supplying several supermarkets all with their own criteria and accommodate any changes in line layout or printer. Dimaco have exclusive rights to newly developed software tools that can, and do, resolve these issues with the minimum of user input required.

Dimaco's Veri-Pack systems capture high quality images of every product using line scan cameras from e2v supplied by Alrad at speeds of up to 200 packs per minute, and compare the product image with data from a SQL server database. Customers can prove that a line has been set up correctly, and that every pack has the correct label, overprint and promotional labels in the correct position. High-resolution e2v cameras mean that the system is capable of reading 2D bar codes anywhere across a 300mm conveyor without any mechanical adjustment, while Dimaco's software allows even hand-applied promotional labels to be checked quickly and reliably. The system's "click to train" vision tools are simple enough for QA technicians to operate and configure on their own, and yet allow robust and reliable inspection.

Saber Engineering vision system at Sun Pacific

COGNEX www.cognex.com

Machine vision helps citrus packer achieve product traceability compliance

A major challenge for the produce industry is automatic recognition of the wide range of different package designs and hand stamps currently used to provide information about the produce. Sun Pacific, the largest grower, packer and marketer of citrus fruits in the United States, has addressed this by implementing the HarvestMark Product Traceability

Initiative (PTI) solution with the Saber Engineering VR-3000 vision inspection systems in several of its packing houses. These vision inspection systems utilise Cognex PatMax® pattern recognition technology to consistently recognise case designs and hand stamps in spite of varying case positions and orientations, changes in ambient lighting and other variables.

The PTI is designed to identify the source of contaminated produce much faster and more accurately than is possible with conventional methods, thus reducing the risk to consumers by ensuring that contaminated products are removed from the supply chain as quickly as possible. For PTI compliance the packer must automatically read the rubber stamp and identify the product associated with the package design, and then automatically generate a label that contains all this information in both human readable and 2D barcode format and affix it to the side of the case.

Saber Engineering's VR-3000 system utilises advanced machine vision technology to distinguish between the different types of packages and stamps with near perfect accuracy. It recognises and verifies attributes such as type of shipping container, commodity and size and passes this information to the HarvestMark database for processing. A custom Visual Basic human machine interface (HMI) integrated with Cognex VisionPro® vision tools, including the PatMax part and feature location tool recognises package designs and stamps using advanced geometric pattern matching technology. The system can be trained to recognise new case designs and stamps simply by putting a box in front of the camera and pressing "learn" in the HMI.

Sun Pacific has ordered 15 VR-3000 systems that are now deployed and operating in several of their packing houses.

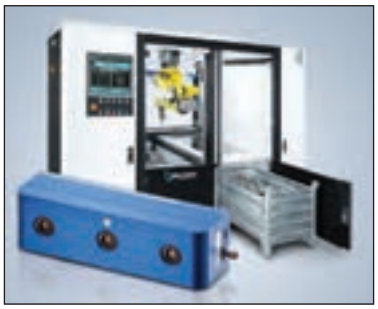
IDS IMAGING DEVELOPMENT SYSTEMS GMBH
www.ids-imaging.com

Stereo 3D camera helps robots get to grips with bin picking!

The IDS Ensenso stereo 3D camera with USB connection is being used by German company bsAutomatisierung GmbH as a cost-effective solution for generating co-ordinates for automated robot picking of unsorted parts from a wire-mesh pallet or stacking container.

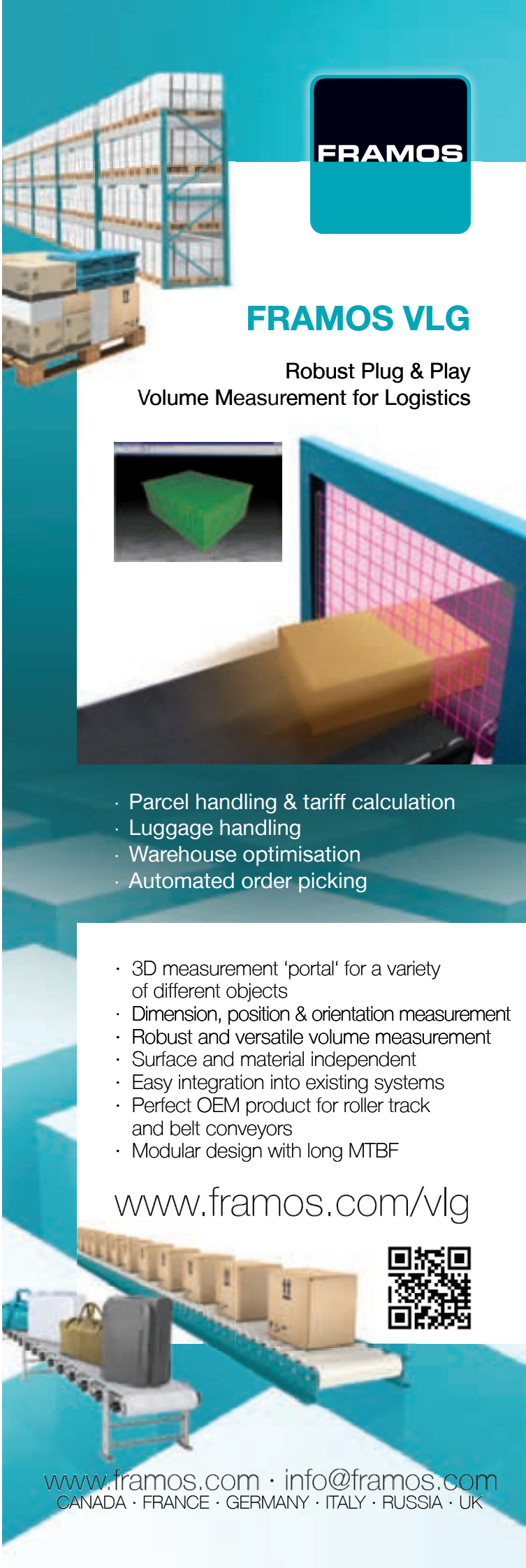
The Ensenso stereo 3D camera integrates two global shutter WVGA resolution CMOS sensors, powerful software and an infrared pattern projector in a very compact housing. It projects a random pattern of dots onto the object to be captured, allowing structures that are not visible or only faintly visible on the surface to be enhanced or highlighted to allow stereo matching. Two images of the object are captured and 3D coordinates calculated for each pixel using the triangulation principle. A virtually seamless and detailed 3D image of the entire surface can be generated in just a few milliseconds, even for parts with a relatively plain surface.

Bin-picking cells produced by bsAutomatisierung can automatically pick individual, randomly aligned parts out of a container and pass them to downstream production processes with cycle times of less than 10 seconds. Two fixed Ensenso cameras monitor each bin. This reduces cycle times since while the robot is picking parts from one bin, object detection can begin in another bin. Even for a single bin, searching for the next part can begin while the robot is placing the most recently picked part.



Ensenso bin picking

The images from two or more Ensenso cameras can be combined to simultaneously capture a scene from different sides, reducing shadows and extending the field of view. The camera software delivers a single 3D point cloud containing data from all the Ensenso cameras used. The software can also capture colour information or barcodes from additional conventional industrial cameras. The target coordinates of the found parts and a map of the remaining contents of the container are combined with the CAD data from the cell, the robot, and the robot gripper to generate a collision-free robot path which is executed by robot control.



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INDUSTRIAL VISION SYSTEMS www.industrialvision.co.uk

Vision system inspects automotive door handles

IVS has automated the process for inspection of automotive door handles for a large UK-based OEM manufacturer to confirm the quality levels expected of a Tier 1 automotive supplier. This manufacturer produces an average of 60,000 door handles, 100,000 keys or ID-devices and 24,000 steering column locks each day.

The handles are sent to the customer in re-usable rigid boxes with a polystyrene in-fill designed to take a combination of handle types. An automotive handle consists of the main body, closure and cap. Inspection criteria include: checking the individual components to confirm they are seated correctly in the handle; checking the correct combination of parts is present in terms of left hand/right hand handles, and 2 door and 4 door sets; confirmation of chrome or standard paint finish on the parts; checking the correct type against the manifest sheet and checking that the handles are correctly seated in the inserts before final delivery.

A manually loaded station features an automatic conveyor feed to present the boxes to the vision system cameras, a conveyor area for re-work, and an out feed for good products. The box stops to allow the vision system to read the barcode manifest on the side of the box, allowing the correct inspection routine to be selected for the particular handle type. Six cameras were mounted into the canopy over the conveyor - five medium resolution digital cameras for the general inspection processes and one high resolution digital camera for label inspection and reading of the bar code relating to the manifest sheets.

Lighting levels in the inspection area are controlled using high intensity white LED line lights and lasers mounted obliquely to the box. Following inspection, the machine automatically ink marks the label of a good part. This marking is then verified by the vision system before final release to the pass conveyor area. The manifest is also logged to the factory information system as passing final inspection. IVS machine vision software communicates with the cameras, completes the entire industrial image processing to confirm the acceptance or rejection of the part – and finally communicates with the internal machine PLC and the factory information system.

Door handle inspection system

LEUZE ELECTRONIC www.leuze.co.uk

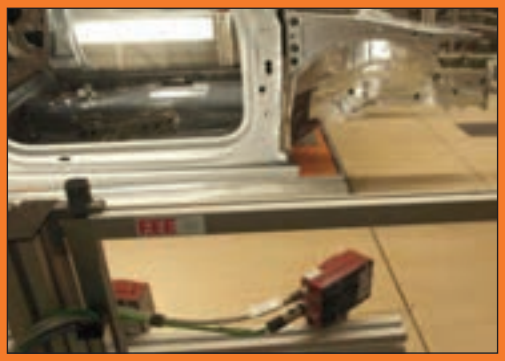
Smart cameras aid automated vehicle door installation on new Audi A3

The body of the new Audi A3 is produced in one of the world's most modern assembly plants in Ingolstadt. Reliability of the fully automated door attachment process is ensured by checking the hinge bolt holes with the aid of LSIS 400i smart camera systems from Leuze electronic. Door installation is the first step on the attachment line and a malfunction would lead to 20 to 25 employees not being able to continue working. The vision system was required to check that a bolt hole for a hinge is present and not blocked by a screw or hinge already present.

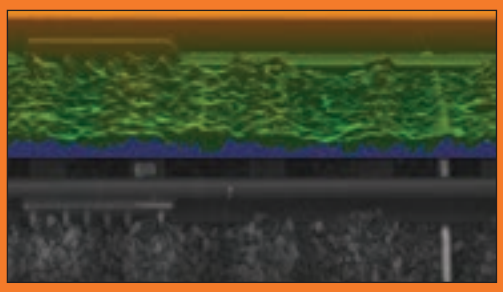
LSIS 400i series smart camera systems are mounted on robot grippers on the complex measuring and assembly units where space is at a premium. The mechanics of the assembly units, and the angles required between the cameras and bolt holes to ensure reliable image contrast, determine the positioning of the cameras. LSIS 400i smart cameras combine image processing software, illumination, data storage and interfaces as well as a display for operation and viewing results in a single unit. Operation is possible via a standard browser using the webConfig interface.

Integrated, homogenous light with specially developed lenses provides even illumination of the entire image field. For each hinge two bolt holes must be checked - one larger hole without thread and one smaller hole which is already threaded. The distance of the camera from the holes, the body position and the reflection/contrast characteristics of the thread and the material make the inspection particularly demanding. The larger bolt holes are identified and checked first, because of their higher contrast. Then, once the exact positions are known, the regions of interest for the smaller bolt holes can be set.

This configuration means that only four cameras are required for eight check points at the door installation stations. One camera is used at the A and B-pillar on each side of the body, with each camera checking the bolt holes for the upper and lower hinge simultaneously.



LSIS 400i smart camers inspect door bolt holes on Audi A3



OmniVision laser profile

MULTIPIX IMAGING **www.multipix.com**

On track for success!

Omnicom Engineering's OmniVision® system triumphed in the Asset Management category of the annual Institute of Engineering and Technology (IET) Innovation Awards along with several other prestigious awards over the last two years. OmniVision also made the shortlist in the Navigation & Surveillance Communications category. The system, installed on several specifically designed measurement & inspection trains, represents a technological revolution in railway inspection by combining high-speed high-resolution cameras and cutting-edge pattern recognition software to automate the detection of track defects. The system improves both the quality and safety of the process whilst saving huge amounts of time and money. It also means that tracks do not have to be closed whilst they are being inspected.

Multipix Imaging has worked closely with Omnicom Engineering in recommending and specifying the vision equipment with the end result being a system which combines many different aspect of machine vision technology ranging from 3D to thermal, with the visual imagery being captured by a series of Basler Sprint Linescan cameras with the scene being illuminated using ProPhotonix Cobra LED line lights. The high speed data is recorded uncompressed direct to hard disk using IOI Industries DVR CORE which are a Solid State Drive based storage device. The image data is then processed by MVTec's Halcon and results are combined with the extensive set of data also being processed and stored, from other non-vision devices, which makes Omnicom's OmniVision such a powerful solution.

Established over eighteen years ago, Omnicom's products are designed to add value at all levels of the organisation, from strategic long-term planning through to daily engineering tasks, enabling maintainers and operators to undertake their roles and responsibilities in a safer and more cost-effective manner.

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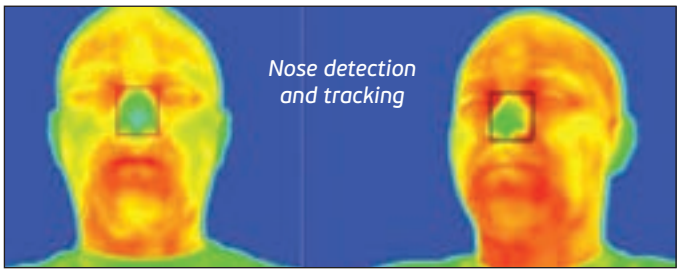
APPLICATION ARTICLES

NATIONAL INSTRUMENTS uk.ni.com

Thermal imaging device for noncontact respiration monitoring

A system based on thermal imaging to measure respiratory rate (RR) in children has been developed by Dr. Saatchi at Sheffield Hallam University. RR is a key indicator of a person's well-being and needs accurate measurement. Existing devices relying on patient contact have various shortcomings, including complex set-up, patient discomfort, disruption of recording when the device is dislodged, and erroneous measurements due to subject movement. During a hospital audit of feverish children against the standards defined by the National Institute for Health and Care Excellence, 40% of the children at the hospital did not have their RR monitored due to unsettlement.



Since the RR of an unwell infant can be greater than 80 cycles per minute, any image-based monitoring system must be able to process enough images per second to obtain an acceptable respiration signal. A noncontact monitoring device that processes thermal images at a stable rate of 25 frames per second was developed. The solution also needed to be user friendly, intelligent, reliable, and safe. Additionally, a contactless RR monitoring device must mitigate the effects of subject movement, including the involuntary movements caused by the human heartbeat.

The human body has a mean temperature of 36.8 °C. Air exhaled from the body is always warmer than inhaled air, with a mean temperature of 34.5 °C. Inhalation and exhalation constantly affect the skin temperature around the nose. These temperature fluctuations can be observed using a thermal camera and this area of skin can be intelligently analysed to see the respiration pattern for the subject. NI LabVIEW software and the NI Vision Development Module are used to acquire the infrared images, then perform complex image processing to track the patient's face, eyes and nose — details which are then used to extract pertinent thermal information from the region of interest beneath each of the subject's nostrils.

4FA eliminates patient discomfort, improves analysis accuracy, and reduces set-up complexity, thereby increasing respiratory monitoring in child patients by about 50%. The device is now undergoing clinical trials at the Sheffield Children's Hospital.

OLMEC-UK www.olmec-uk.com

Multifunctional 8-camera woundcare dressing inspection system

Woundcare "island" dressings are manufactured by attaching a cut dressing pad to the backing material on a web, which is then cut to size. In a packaging machine, a top and bottom paper packaging web come together with the dressing between them. The edges are heat-sealed to form a sterilisable pouch. Defects must be identified at the full line speed of 330 parts/min so that non-conforming product can be rejected. An 8-camera, two stage vision solution was implemented.

Four 2K resolution line scan cameras inspect the incoming raw material for defects such as contamination. A 1.4MP resolution area scan camera measures the dressing pad material before cutting. The pad is placed onto the web and two further webs are laid on top before this laminate is cut into a dressing. A code on the paper packaging material is checked by another area scan camera. The dressing is fed

continued on page 22

acrovision Validator

End of Line Packaging Validation systems

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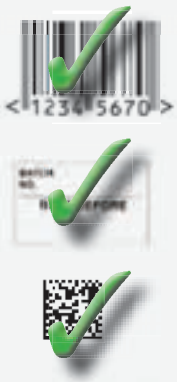

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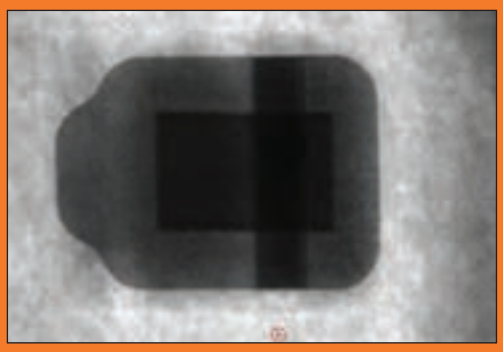

Small defect in lower seal

into the packaging at the product nip roller, illuminated from below and imaged with a line scan camera to check total dressing size in addition to defects such as: splices in the laminate, pad placement relative to the dressing cut, pad size, pad skew and position of the folds.

As the packaging line operates, the average position (distance and direction) of the last 'n' dressings is compared to a calibrated reference threshold in the image. The vision system then outputs a result to the parent machine to allow a large or small (1 or 2 mm) advancement or retardation of the packaging end of the process to minimise the risk of the dressing being trapped in seal.

All 7 cameras are networked together and produce minute-by-minute time-stamped data, including reject images, run statistics and useful data such as the product position in the pack. Defects detected at any stage of the process result in rejection of that particular dressing pack.

Since latency of the correction or a poor cut could still result in product being trapped in seal, all product that has passed Stage 1 inspection moves to a separate end of line seal inspection system. Here, the packages are inspected by an infra-red backlit line scan imaging system. The paper packaging transmits more infra-red light than the dressings inside, revealing the position of the dressing with respect to the seal. Trapped in seal products are automatically rejected.

Robot laser drill, vision inspection system

RNA AUTOMATION **www.rnaautomation.com**

Laser drilling and inspection system

RNA has designed and manufactured an automated laser drilling process cell and inspection system for a range of plastic moulded components for a leading global manufacturer of gas detectors for the mining industry. The hole diameters to be drilled range from 15um to 50um. The system incorporates bowl feeder, vision guided robot, walking beam transfer system, laser drilling system, vision inspection stations and a control system. The vision system needed to provide 100% inspection on position, entry hole size and exit hole size

This particular configuration utilises one laser drilling station and three camera stations to verify part accuracy.

The components are presented to a vision-guided robot by an RNA bowl feeder that feeds parts onto a pick conveyor mounted below the robot. The robot then picks the component and places it in the correct orientation to a nest mounted on a walking beam transfer system. The component is then moved one position ahead to the laser drilling station supplied by ES Technology to drill the correct size hole in the desired position. Designed by machine vision partner Fisher Smith, the vision system incorporates 3 camera stations, with the ability to inspect each component for position of the hole, entry hole size and exit hole size. Components that fail the vision inspection are rejected into a reject bin. 'Good' components are fed into a collection bin for bagging and a separate bin for random sampling (1/1000 of 'good' components for further off-line checking).

This system has the flexibility to handle 11 variants. The bowl feed system utilises an innovative quick-change tooling system that speeds up tooling changes. First, each component variant is provided with a unique barcode which contains all the parameter set up for that particular component. When the barcode is scanned, the data is retrieved by the control PC to allow the operator to fit the necessary tooling models. The control PC automatically recognises incorrect tooling sets to eliminate the risk of inadvertent human errors. A fully validated changeover from one component to another can be accomplished in less than 5 minutes, resulting in improved uptime and productivity.

Lector620 pharmacode reading application

SICK (UK) **www.sick.co.uk**

Best practice for product traceability

Human readable on-pack data, such as batch, lot numbers, best before or expiry dates are critical for products such as food, pharmaceutical, medical devices and cosmetics. These numbers, letters, symbols and codes need to be verified, be of a readable quality and sometimes match the barcode to ensure the right data is associated with the right pack.

Optical Character Verification (OCV) systems and Optical Character Recognition (OCR) systems have been available for some time to offer automated solutions. Yet historically, these technologies have had limitations and making more of OCR and OCV technology depends on improving the power of the algorithm used by the scanner software.

In developing its new Lector620 OCR product which combines 2D and barcode reading, OCR and OCV in one device, Sick carried out extensive field testing which showed that although all OCR features worked very well, some users, especially in the food industry, were not used to having to produce print text and fonts of a high quality and reproducibility. In the pharmaceutical industry legal restrictions meant that the need for

continued on page 25

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perfect printed data was better established. It is important, therefore, to recognise 'best practice' to ensure success.

Manufacturers need to consider the set up of their printing and labelling carefully to achieve optimum results. The quality of the printing and marking techniques may need to be upgraded and the contrast or flatness of surface being printed improved. The choice of fonts, character size, use of upper or lower case letters and special characters and background contrast, for example, also need careful consideration. As with all code reading, a sufficient 'quiet zone' (i.e. one with no print in it) between the font and the edge of printing area is essential. It is important to work closely with a consultant or supplier to ensure the best conditions for optimum performance and evaluate the best system solution for each application.

STEMMER IMAGING www.stemmer-imaging.co.uk

100% inspection of screw joints in automotive brake lines

A manufacturer of automotive brake lines in France is using an industrial vision system for 100% inspection of the screw joints. The Optisort system from Gefra GmbH, a leading supplier of inspection systems to the fastener industry, utilises imaging components from Stemmer Imaging. Twelve cameras at six inspection stations identify faulty components at a rate of 500 parts per minute with positive selection of parts that have passed the inspection rather than rejection of components that have failed.

Overview of the 6 inspection stations

The screws are transferred to a glass ring which rotates through the six inspection stations. All inspections use telecentric LED lighting and lenses for high quality imaging giving a measurement accuracy to 1/100th mm. The first inspection station measures the thread diameter, the drill holes and the hexagonal measurements of the screw heads. In addition, any possible burrs on the screws are detected. A further partial inspection system at this location measures a side view of the nominal and core diameters of the thread, the phase, height and helix. The next station features LED dark field illumination and allows further contour inspection for chips. This is followed by surface inspection of the screws to detect damage such as indentations, scratches, deformation or coating faults. The next inspection station, which is illuminated from the top, detects differences in coating as well as deviations in brightness and colour. The final station features 360° inspection using four cameras per pass to check whether the threads follow the right direction, are continuous, and whether the thread tips and the thread roots meet requirements. The four cameras are arranged at 90 degree intervals, with each camera covering an angle of 110 to 120 degrees, so that the objects can be inspected all round with overlapping images. Control and analysis handled via a single high performance PC which evaluates all the images from the twelve cameras which are generated at 500 image sets per second.

The objects that have passed all the inspections are ejected from the system via a fast triggered pneumatic valve, ensuring that only positively tested parts remain in the process. This positive selection approach is preferred by the automotive industry to overcome any possibility that a defective component could get through in the event of any failure with a reject mechanism.

Machine Vision

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ALRAD IMAGING

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TECHNICAL TIPS

Some useful technical tips from UKIVA members

A guide to barcode symbology for the logistics industry (Cognex)
http://goo.gl/gbpOQ0

Multi integration mode: Multiple exposures within one image (IDS Imaging Development Systems GmbH)
en.ids-imaging.com/techtipp.html

Vision systems for Unique Device Identifier (UDI) inspection (Industrial Vision Systems)
www.industrialvision.co.uk/about-us/case-studies

Datalogic Print and verification solutions for packaging industry (Multipix Imaging)
multipix.com/?p=9394

Midwestern Optical - Using filters in colour inspection, increase resolution through optical filtering (Stemmer Imaging)
http://goo.gl/5zCEYn

EVENTS & TRAINING

EVENTS

Vision UK@Photonex,

15 – 16 October, Ricoh Arena, Coventry

UKIVA will be offering a program of vision technologies and applications master classes at Vision UK@Photonex.

www.photonex.org

VISION

4 – 6 November, Messe Stuttgart, Germany

UKIVA will have its own booth (E115) at the show, to provide a convenient place for visitors to hold meetings with UKIVA members and pick up literature.

www.vision-fair.de

TRAINING

Training courses offered by UKIVA members:

Industrial Vision Systems

'Basic vision training', October 7 – 8, 2014 and December 9 – 10, 2014

Williams F1 Conference Centre, Oxfordshire, UK

www.industrialvision.co.uk/products/vision-training

Stemmer Imaging
(in association with the European Imaging Academy)

'Optics and illumination for imaging', October 21, 2014

'Machine Vision Solutions from Teledyne DALSA', November 25 – 26, 2014

'3D Image Processing with the LMI Gocator', December 10, 2014

All courses at Tongham, UK

www.stemmer-imaging.co.uk/en/events/training

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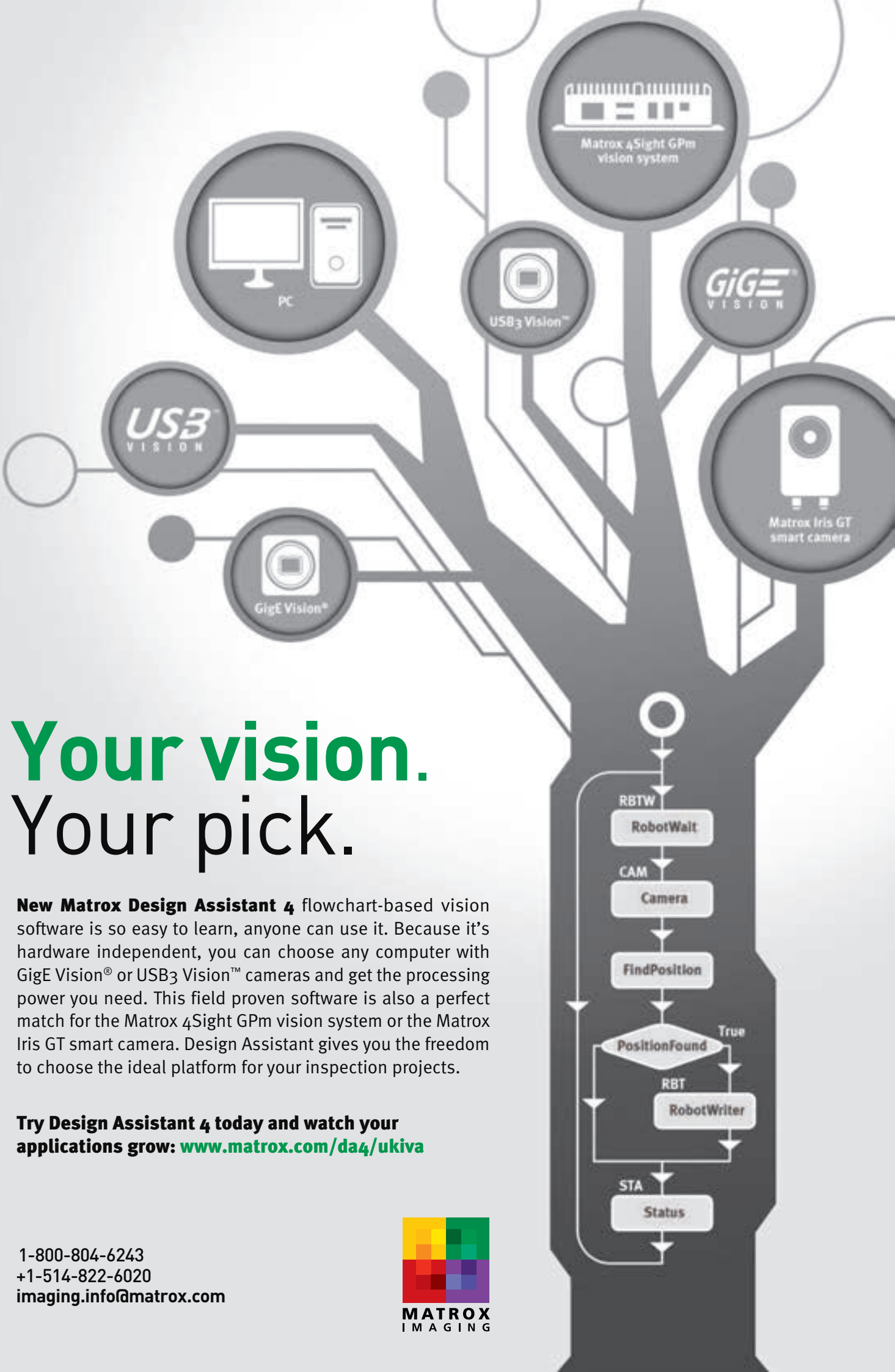

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