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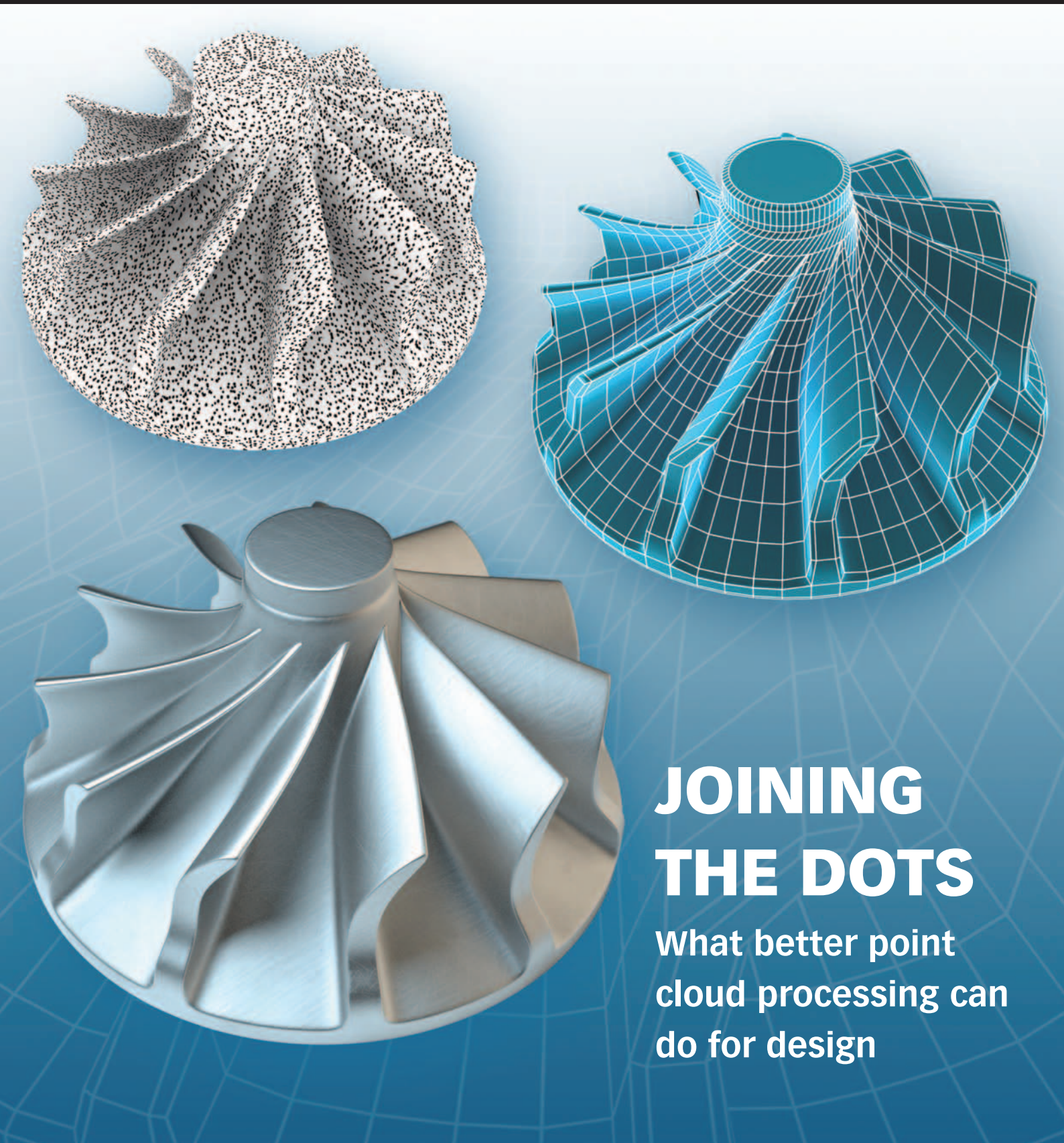

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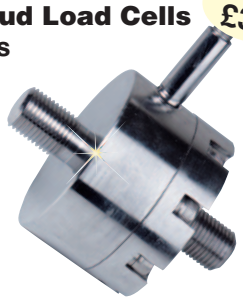

- 0.15% accuracy
- Hermetically sealed

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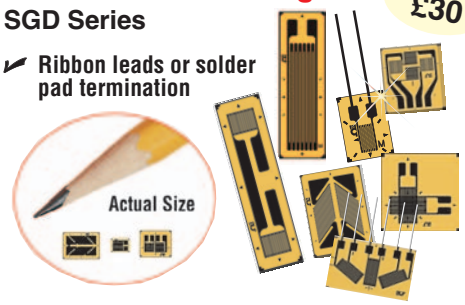

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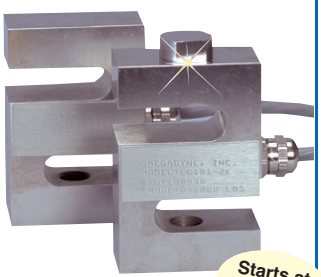

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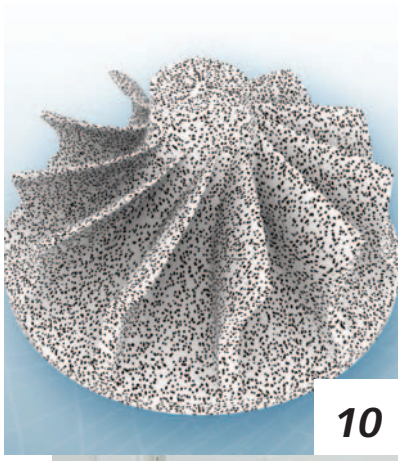

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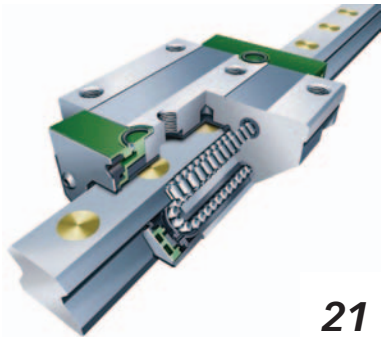

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35

Confocal measurement system

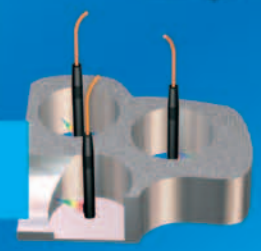
- Measuring ranges from 0.12 to 24mm
- Nanometre resolution
- Tiny, constant measuring spot 7µm
- Measure any target diffuse, specular and liquid

Typical applications:

Measuring of glass and mirrored surfaces

Measurements inside bores and holes

One-sided thickness measurement of transparent materials (e.g. glass)



NEW

optoNCDT 2402
The world's first miniature sensor with just a 4mm outside diameter

Laser profile sensors

- Measuring ranges from 25 to 245mm
- Lightweight and compact sensors
- Very high measuring rate of 256kHz
- 3D view of the target
- Micrometre resolution

Typical applications:

Position and contour measurement, edge detection, web width, groove width / depth, welding seam inspection, welding robot control

NEW

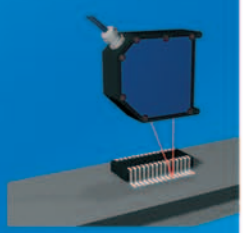
scanCONTROL 2700
Most compact design with integral controller

Laser triangulation sensors

- Measuring ranges from 2 to 1000mm
- Models with integrated controller
- From low-cost entry level models up to highest precision in class
- Analogue and digital interface
- In built synchronisation for thickness measurement

Typical applications:

High precision measurements in automation, positioningand in-process quality control



NEW

optoNCDT 1302 / 1402
Very compact sensors with integrated controller

optoNCDT 2220
Extremely fast measurement with 20kHz measuring rate

optoNCDT 2200LL
Small laser line for metallic, shiny surfaces

Compact infrared temperature sensors

- Temperature range: -50 to 3300°C
- Spot sizes as low as 0.45mm
- CTlaser with built in laser alignment
- CThot withstands ambient temperatures of 250°C without cooling
- Exposure time from 1ms
- Analogue and digital outputs incl. Profibus DP
- Specific models for glass, metals, ceramics

NEW

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Thermal imager for inline applications
Temperature ranges: -20°C to 900°C

Eddy-current displacement sensors

- Measuring ranges from 0.4 to 80mm
- More than 300 sensor models
- Nanometer resolution
- Intelligent controller
- Robust sensor - IP67
- Pressure-resistant sensors up to 2000 bar
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Typical applications:

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A concrete commitment

Paul Fanning, Editor (pfanning@findlay.co.uk)

At the risk of hyperbole, it is probably fair to say that the recent Budget was possibly the most positive for manufacturing that most of those reading this can remember. And while it may be the case that this fact is as much proof of how neglected manufacturing has been in recent decades as of how highly the current Government regards the sector, it is nonetheless represents a wholly welcome change.

There were a number of positives to be drawn from the Chancellor's speech. Not the least of these were a doubling of the Research and Development Tax Credit for small companies and £2bn extra for the Green Investment Bank. However, it was in the area of skills that the really heartening news was to be found.

Among the highlights of the Budget was the Government's announcement of £180 million for up to 50,000 additional apprenticeship places over the next four years.

Equally pleasing was the pledge to expand the University Technical Colleges (UTCs) programme in order to establish at least 24 new colleges of this type. Also welcome is the support for business consortia to set up and maintain advanced and higher apprenticeship schemes, supported by grants, creating a further 10,000 apprenticeships.

Perhaps what is most heartening about these developments is that they represent a concrete commitment on the part of Government to placing manufacturing and engineering at the heart of the UK's economic recovery. We have all heard promises from Government before. Here, at last, appears to be evidence that this administration is prepared to back up its words with deeds. Long may it continue.

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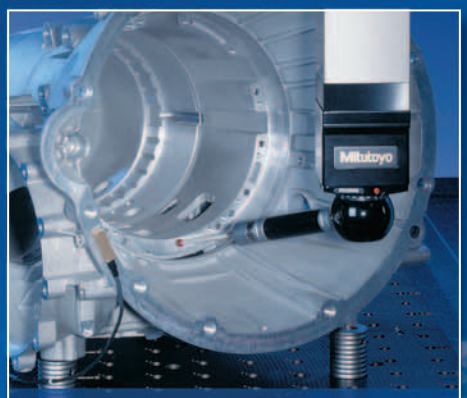
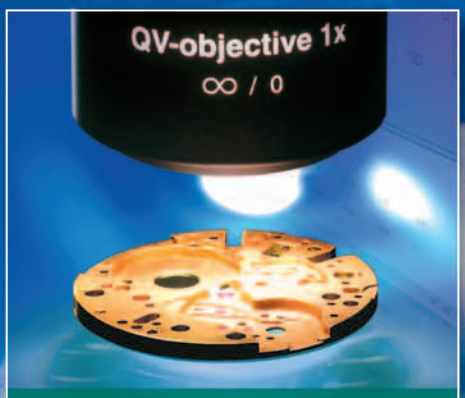


Coordinate Measuring Machines



Vision Measuring Machines

Form Measurement

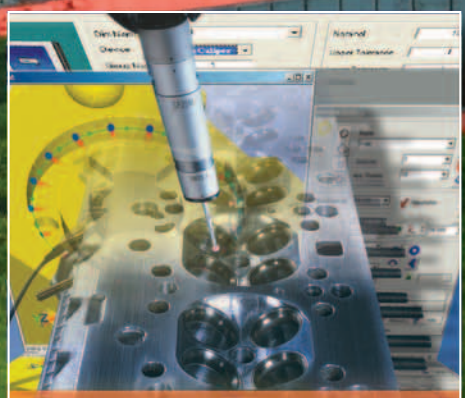
Optical Measurement

Sensor Systems

Test Equipment and Hardness Testers

Digital Scale and DRO

Small Tool Instruments



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Tata Motors to boost UK engineering base

Tata Motors' European Technical Centre (TMETC), a wholly-owned UK-based subsidiary of Tata Motors, has announced that it will be expanding its partnership with WMG at the University of Warwick. TMETC plans to increase its team of highly skilled engineers working on the campus by 40% over the next two years.

Tata Motors has invested over £85m in automotive R&D at TMETC since it was established on the University Campus in 2005 and it already has a team of 240 engineers and researchers working alongside WMG colleagues, with 60 of these hired over the last 12 months due to increased R&D investment. TMETC announced that it aims to increase the engineering and research force by a further 100 to 340 by 2013.

Dr Tim Leverton, Head of Advanced and Product Engineering at Tata Motors Limited said "Today's announcement represents a further demonstration of Tata's long-term commitment to build and develop R&D facilities here in the UK. TMETC plays a vital role in Tata Motors global R&D network. Tata Motors gets access to world class thoughts, skills and technologies through the TMETC and its collaboration with WMG. The contribution of TMETC and WMG is important to Tata Motors product development".

TMETC's engineers, who have extensive experience in automotive research, design and development, work alongside WMG researchers in Low Carbon Technology collaborative R&D programmes. The focus on Low Carbon Technology has already started to produce tangible results.

Tata Motors' Pixel City Car, which was unveiled by the Chairman, Ratan N. Tata, and Managing Director & Group CEO, Carl-Peter Forster at the Geneva Motor Show earlier this month, has also been developed on WMG campus. Based on the Tata Nano, the Tata Pixel is a concept car aimed at the European market and features a Zero Turn Infinitely Variable Transmission which gives it a turning circle radius of just 2.6 metres.

Laryngoscope advances anaesthesia

Leading product design agency Industrial Design Consultancy (IDC), has completed a project to develop a groundbreaking laryngoscope for the Venner Group. The device, which is used during anaesthesia to introduce an endotracheal tube, is the first of its kind to offer both standard, Mac3 and Mac4, as well as the Difficult Airway Blades (DAB). The DAB offers manoeuvrability and both excellent viewing and exact positioning of the endotracheal tube through the vocal chords in cases where the anatomy would otherwise make intubation difficult. IDC was tasked to work alongside Venner clinicians through all the design phases; from concept through to production, including electronics, compliance and testing.

IDC's design team spent considerable time observing and researching the different types of laryngoscopes in use. This research identified a gap in capabilities of instruments, whereby some laryngoscopes were good for viewing the vocal chords and some good at positioning the tracheal tube, but none were capable of achieving both of these proficiently at the same time. The Venner Group realised the potential to bridge the gap between these capabilities and create a product with outstanding function and form.

Briefs

BOOST FOR MANUFACTURING RESEARCH

A £51million investment to ensure the UK stays at the leading edge of manufacturing research was unveiled today by Universities and Science Minister David Willetts.

The investment forms part of the Advanced Manufacturing strand of the Government's Growth Review and aims to help stimulate growth in manufacturing research in areas such as pharmaceuticals, aerospace and the automotive industry.

£45m will fund nine Engineering and Physical Sciences Research Council (EPSRC) Centres for Innovative Manufacturing and a further £6m will support the manufacturing pioneers of the future.

£6 MILLION TO DEVELOP NEW COMPOSITES

A collaborative research team from the University of Bristol and Imperial College London has been awarded a grant to develop a new generation of high performance, fibre reinforced polymer composites.

Existing fibre-reinforced polymer composites are known for their high strength and stiffness, which are used in applications from sporting goods to aircraft, but if the material fails it can be catastrophic and happen with little warning. It is hoped to develop a new generation of high performance, fibre reinforced polymer composites to overcome this key limitation.

SCIENCE IN SCHOOLS

Environmental Scientifics Group (ESG) is launching a new initiative to support science in education. The environmental compliance company says the 'Science in Schools' initiative will provide a range of support services to secondary schools and sixth form colleges.

www.esg.co.uk/

Got a story? Then drop us a line at eurekanews@findlay.co.uk or call us on 01322 221144

Briefs

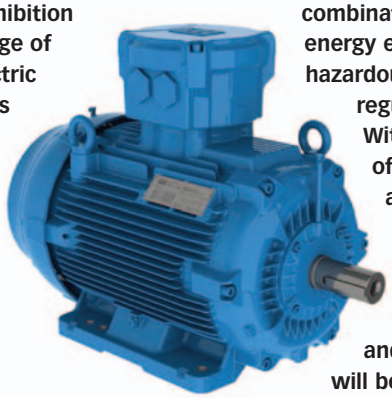
NEW CONTROL VALVE

Hughes Safety Showers has launched a new range of control valves that focuses on durability, reliability and ease of operation. The new valves have been developed by the award winning Hughes design team using the latest 3D modelling software to optimise every aspect of performance. There are 5 sizes and a range of end connections to step up or down to different pipe sizes. Straight or cranked actuator levers can be fitted at 45° or 90° to the valve body providing a choice of operating positions for maximum flexibility. The original bespoke design, unique to Hughes Safety Showers, uses investment casting of components for enhanced quality and precision. This is reinforced with a stainless steel construction that will withstand the harshest environments and site conditions.

www.hughes-safety-showers.co.uk

WEG to launch high-efficiency drives and motors

New at this year's Hanover exhibition WEG is launching its W22X range of high-efficiency flameproof electric motors. The new W22X range is ATEX/IECEx certified and offers the highest levels of safeguarding with motors that are designed to cope with the rigours of aggressive and explosive atmospheres, while delivering the added benefits of high energy efficiency.



The new range is set to provide petrochemical, oil and gas markets with a combination of very high levels of motor energy efficiency, and protection from hazardous environments, even though regulations do not yet require it. Within the W22X range, WEG is offering both IE2 high efficiency, and IE3 premium efficiency motors for hazardous areas, where most other manufacturers are not.

Also new are the CFW700 and CFW701 drive ranges, visitors will be able to see these on display for the first time on the WEG Germany stand.

www.weg.net

Elastomeric couplings last 30 times longer

The Sure-Flex brand of elastomeric couplings is a best seller in the US and provides many performance advantages over other power transmission couplings of this type. Now Sure-Flex is available from Huco Dynatork.

Sure-Flex elastomeric couplings are the ideal choice where low cost, high flexibility and vibration dampening are primary concerns. Quick and easy installation is assured as the design has no bolts, gaskets, covers or seals; no special tools are required. Alignment is simply checked with a straight edge placed against the outside of the precision-machine flanges.

Characterised by their clean, dependable and quiet performance, these products need neither lubrication nor maintenance as the components are wear-free and the design is immune from the ingress of abrasive dirt and moisture.

Sure-Flex couplings use a synthetic rubber or Hytrel thermoplastic flex element to transmit torque – up to 8.2 kNm – and to accommodate shaft misalignment. Indeed they have exceptional torsional flexibility and their 4-way flexing action absorbs virtually all types of shock, vibration, misalignment and end float.

www.huco.com

Solution to last month's Coffee Time Challenge

The solution to our March Coffee Time Challenge comes from Ali Montazami, an automotive designer who lives and works in Tehran, Iran. His solution is all based around using vehicle lighting. He suggests that at the front, a car should shine a light on the ground so that the spot that it produces, perhaps formed in the shape of the manufacturing company logo, should fall at a distance that indicates how far it should keep away from any vehicle in front in order to have a good chance of stopping. At the rear, a red light should shine a bar pattern on the road to indicate a threshold. He also proposes that a rearward range finding system should activate a pattern of extra LED tail lights, so focussed that only the driver of the following car could see them, so as to avoid distracting other drivers. He proposes that if a following car comes a bit too close, a circular warning should start to blink at 0.3Hz and shine a warning message on the road. If the following car gets much too close, the blink frequency should rise to 14Hz,.

montiale@yahoo.com

New sealed belt actuator

HepcoMotion has introduced a new addition to its Sealed Belt Drive (SBD) linear motion product programme that is ideal for systems whose main credentials are high loads and long spans. In essence the new SBD 30-100XL is 2.5 times stiffer than its standard counterpart and has greater load bearing capabilities.

The HepcoMotion® SBD is a high performing yet cost competitive product that provides a compact and exceptionally clean solution. And because it is sealed, it keeps on working in applications where other systems readily fail. A stainless steel cover strip runs the entire length of the high strength aluminium beam which houses the linear guide and belt and provides excellent protection against dirt and debris.

It is this anodised aluminium beam that is the differentiator on the SBD 30-100XL. The greater stiffness of the 100mm wide beam on this new product makes it ideal for any application where underside support is limited or even non-existent. It can also be used to span two parallel X axis', subject to load, with no further support. This will enable one unit to be used as opposed to two smaller units fitted together.

www.hepcomotion.com

Bearings reduce B&M costs

help OEM manufacturers and end users to improve their competitiveness, cutting build and maintenance times by reducing bearing complexity and mounting costs.

Self-Lube bearing units provide integrated benefits in general manufacturing industry, food processing, materials handling and agricultural applications. By providing units that are ready assembled to bolt into place, they enable designers

problems relating to component complexity, mounting, and also bearing maintenance and life in difficult environments.

Self-Lube bearings materials and configurations. Cast Iron pillow block and flange types are used for normal and medium duty applications, while zinc plated press steel units are available for lighter duty operations. In addition, as many Self-Lube units are called upon to operate in harsh environments, NSK has introduced the Silver-Lube range of corrosion resistant bearings and housings.

www.nskeurope.com

Joining the dots

Point cloud processing – the ability to create an accurate 3D model from a collection of scanned data, has traditionally presented a number of difficulties from a design point of view. However, thanks to a number of factors, that may be changing, which could give industrial designers the freedom to explore new and endless variations of products.

For more than a decade, engineers have been able to scan physical objects and create a 3D point cloud. A point cloud is exactly what the name suggests: a digital collection of points that represents a physical object. In the past, it's taken a fair amount of expertise to go from a point cloud to an accurate 3D model that is completely editable in a CAD program. But steady progress over the last 10 years, aided by somerecent breakthroughs, has made things a lot easier.

According to Ping Fu, president and CEO of Geomagic, a leading provider of 3D software for creating digital models of physical objects: "Within automotive and aerospace companies, hospitals, consumer product manufacturers, design boutiques, electrical component makers, medical device providers and a host of traditional and newly minted entities popping up throughout the world, a quiet revolution is taking place. And it all starts with the point cloud."

Until recently, the most tenuous part of the physical-digital loop was making the connection between 3D scan data and 3D CAD parametric models. Over the past two years, that connection has been simplified and streamlined by two major developments. One is the ability to capture and reproduce design intent for a physical object; the other is Parametric Exchange, which enables automatic native reconstruction of geometry, speeding product development time and increasing quality of the final model.

'Design-intent modelling' is fundamentally the ability to extract design intent automatically from a physical object. It extends reverse engineering from simply producing an accurate digital copy to extracting the original design intent from a scan of a physical model, kick-starting the process of modelling and adapting that design in CAD. Users can start with physical models and prototypes of a new design (such as a car body sculpted in clay) and quickly get to a digital, CAD-ready representation.

The technology involved in design-intent modelling is fundamentally different from CAD. CAD focuses on creating and combining various geometric features. It is a prescriptive process, where everything is explicitly driven by the user and built by the system. Design-intent modelling searches for unknown information by structuring the scanned data from physical objects and extracting engineering features. It determines a valid structure from partial data sets, and compensates for measurement errors to generate perfect surface geometries.

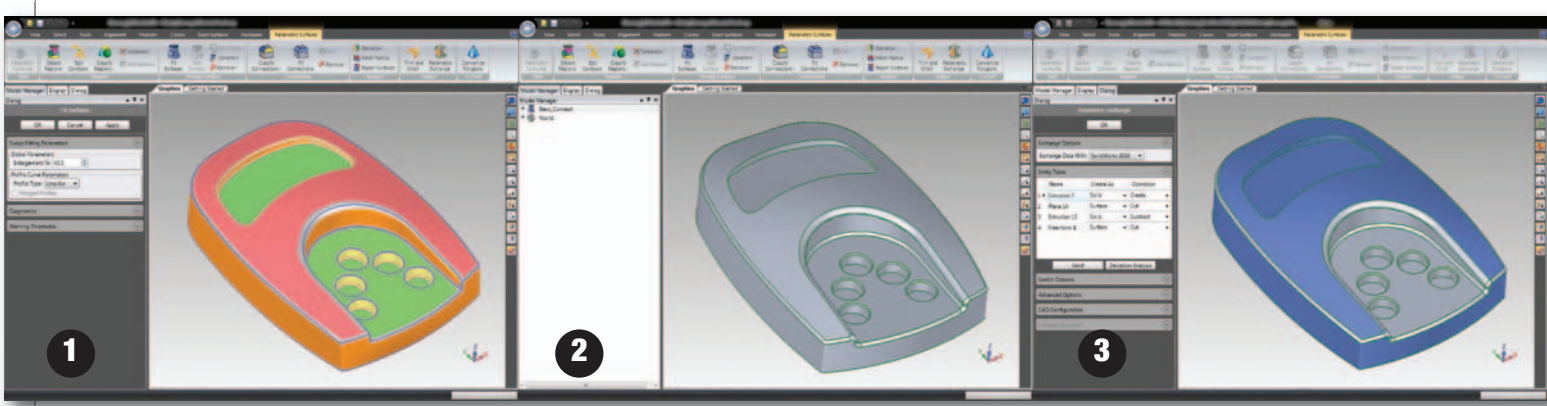
The ability to generate CAD-ready surfaces from scans of physical objects laid the groundwork for the other significant development mentioned earlier: parametric exchange. Parametric Exchange (PE) is a feature exclusive to Geomagic that enables parametric models created in Geomagic Studio to be transferred directly into 3D CAD software.

Parametric Exchange completes the software bridge between point clouds and CAD. It provides an intelligent connection with CAD to enable automatic native reconstruction of geometry. With Parametric Exchange, parametric surfaces, datums and curves can be transferred from point-processing software to CAD without the need for intermediate neutral files such as IGES or STEP.

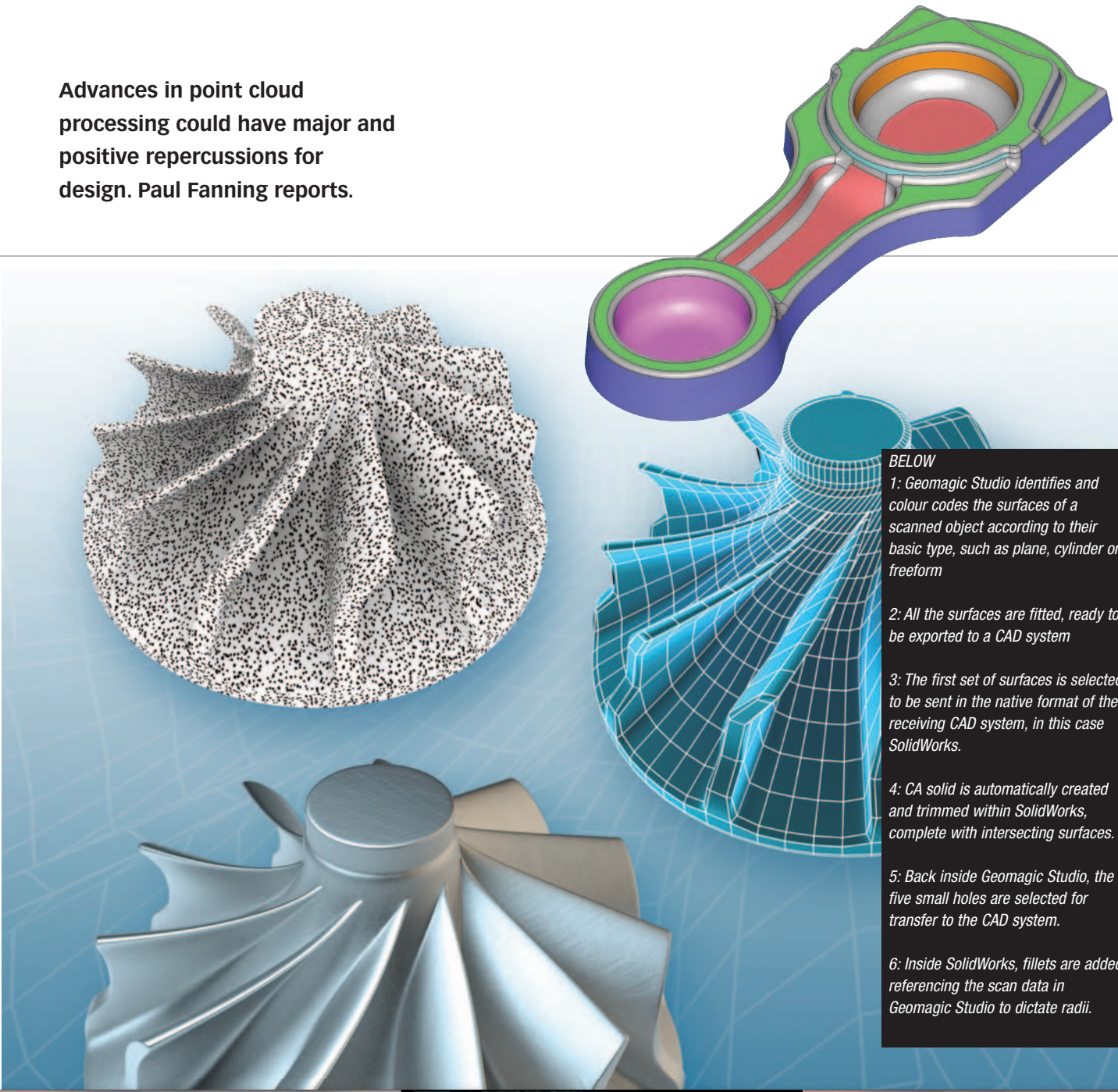
Instead of duplicating CAD functionality, Parametric Exchange sends the parts of an assembly – in sketch, surface or solid form – to the CAD program in its native format, where it can then be edited, assembled and modified according to the user's specifications and downstream needs. There is no longer the need to fill in missing data lost in the transfer to a neutral format, or to reconstruct features and pieces of geometry from scratch.

The Parametric Exchange process leverages the specific strengths of point-processing and CAD software. Point-processing software organises and processes point-cloud data to create CAD models, and CAD software enables users to further modify and prepare models for product design and manufacturing.

So what are the potential implications for design engineers of this



Advances in point cloud processing could have major and positive repercussions for design. Paul Fanning reports.



BELOW
1: Geomagic Studio identifies and colour codes the surfaces of a scanned object according to their basic type, such as plane, cylinder or freeform

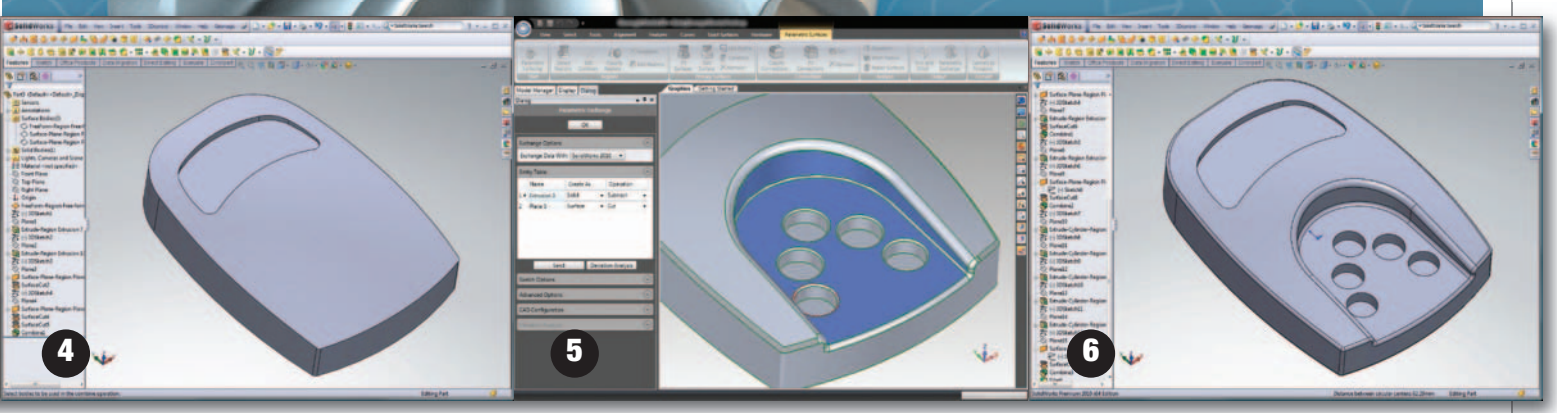
2: All the surfaces are fitted, ready to be exported to a CAD system

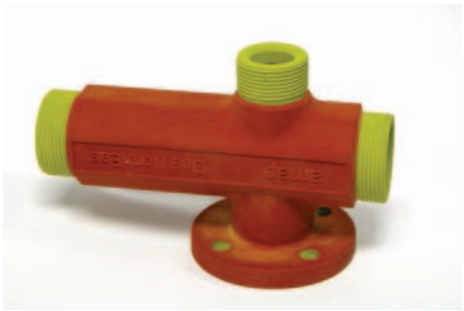
3: The first set of surfaces is selected to be sent in the native format of the receiving CAD system, in this case SolidWorks.

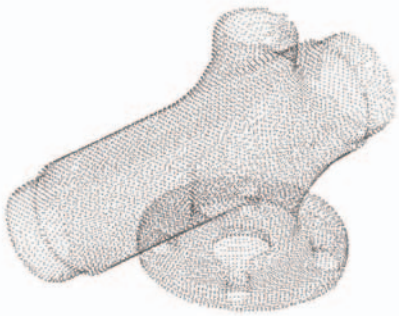
4: CA solid is automatically created and trimmed within SolidWorks, complete with intersecting surfaces.

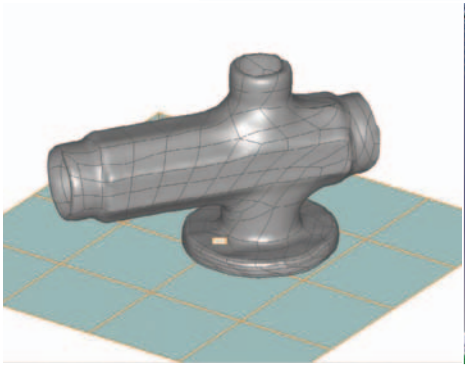
5: Back inside Geomagic Studio, the five small holes are selected for transfer to the CAD system.

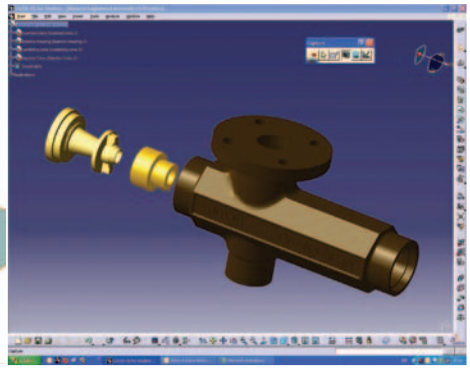
6: Inside SolidWorks, fillets are added, referencing the scan data in Geomagic Studio to dictate radii.











'closed loop' between scanned data and 3D CAD? Theoretically, they are huge. Says Ping Fu of Geomagic: "The closed loop between scan data and CAD gives industrial designers the freedom to explore new and endless variations of products. Think of thousands of permutations of classic Nike shoes, individualized Mattel toys, or personalised fuel tanks for Harley-Davidson motorcycles… The ability to capture an existing design and quickly adapt it to new styles and purposes is critical to the evolution from mass manufacturing to mass customisation. The combination of design-intent modelling with parametric modelling provides many of the essential tools that will deliver on the promise of individualised design on an affordable, mass scale."

The possibility exists, then, that this process could save manufacturers millions in tooling costs. Instead of recreating an expensive mould from scratch, for example, companies can scan an existing one, analyse the wear and tear, design an improved model, and manufacture new moulds in days instead of weeks or months.

In addition, the ability to process point clouds into accurate digital models is also opening up new applications in 3D inspection, computer-aided analysis, and quality control. Companies now have the ability to almost instantly scan a product coming off an assembly line and compare it to the idealised CAD model to determine deviations and changes caused by tooling or moulds.

Car companies can conduct finite-element analysis (FEA) and computational fluid dynamics (CFD) simulations based on the actual digital model of a physical as-built part or assembly, rather than the nominal CAD model. Maintenance, repair and overhaul (MRO) organisations can quickly assess damage to parts and fulfil the dual goals of better repairs and getting planes back in the air faster.

In organisations such as Schneider-Electric and ITT/Goulds Pumps, point-cloud processing is driving major engineering changes. Schneider-Electric has progressed from dimensional analysis of singular parts to being able to analyse functionality for an entire assembly, saving countless hours and material across the company's 90,000-employee, 130-country operations.

Meanwhile, at ITT/Goulds Pumps, point-cloud processing has generated quality control breakthroughs, including new processes to improve impeller balance and determine foundry process variation. The time it takes to analyse impeller balance has been reduced from hours to 10 minutes, and the ability to accurately measure wall thickness for moulds is delivering greater quality in much less time.

Another major area that is benefiting from increased automation and accuracy in point processing is the medical field. The ability to transform scan data into models that can be manufactured rapidly is having a major impact in areas such as dental implants, orthodontics, prosthetics, hearing instruments, breast reconstruction, and cleft lip and palate treatment.

Industrial processes based on point clouds have crossed the chasm into medical, where the ability to scan a body part or a dental mould enables doctors and dentists to tailor treatments to the exact physiological needs of their patients. The results include better fit and functionality of prosthetic, dental and hearing devices; less invasive and more personalised treatment; greater ability to analyse success of treatment and make adjustments; and better communication with patients through 3D imaging.

Summing up, Ping Fu says: "The beauty of applications spawned from the point cloud is their seemingly infinite variety. A confluence of ideas and new applications is coming out of dialogue among industrial, medical and artistic communities."

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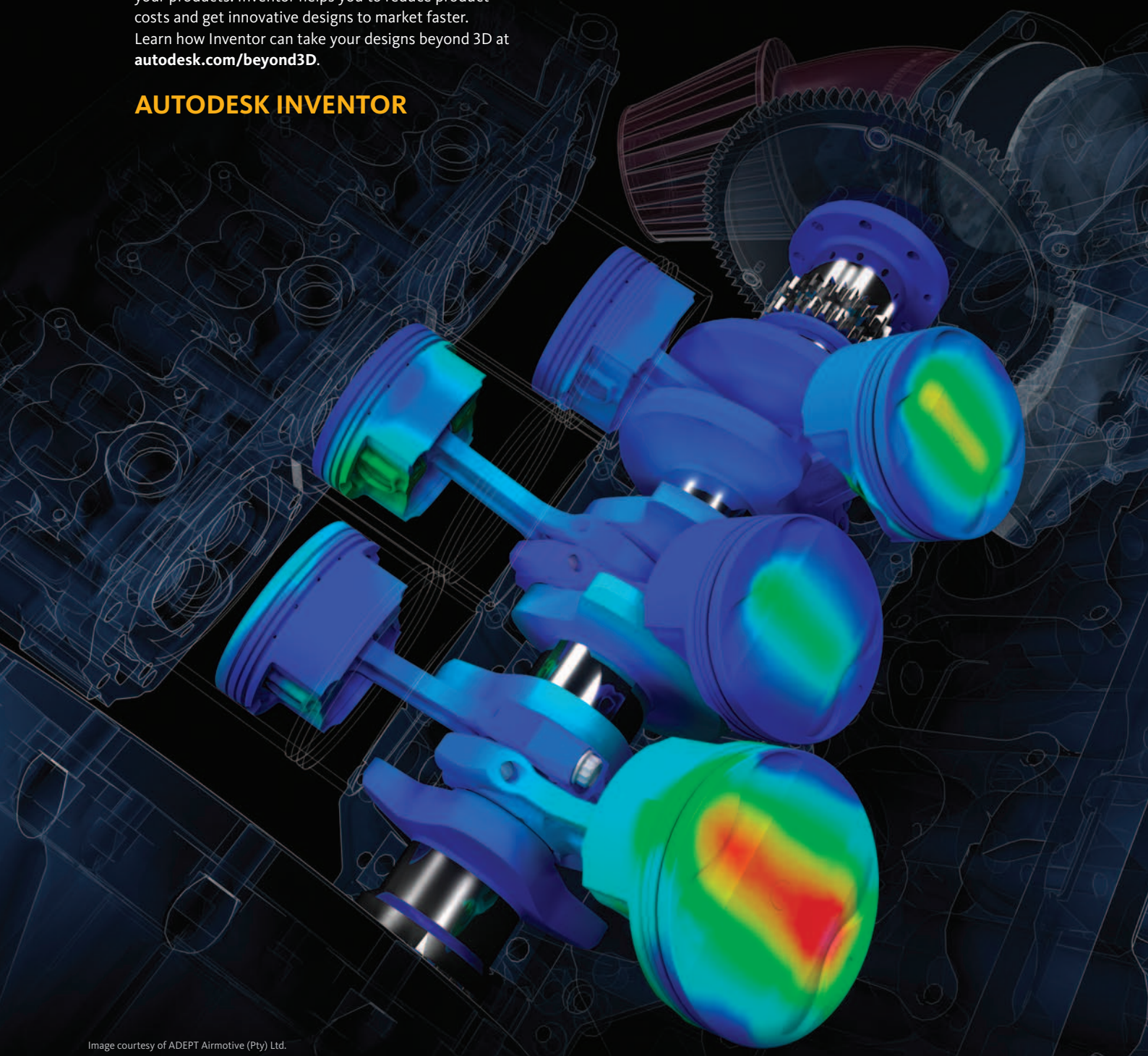


Image courtesy of ADEPT Airmotive (Pty) Ltd.

High water mark

Andrew Burrows won the British Engineering Excellence Award for Engineer of The Year for 2010 for his water-saving valve design. Here he talks to *Eureka*.

When discussing the value of engineers and the attractions of engineering, it is common for its proponents to say that engineers are those who will solve the big problems the world faces. To the cynical, this may sound like empty rhetoric, but proof that it is not can be seen in the form of 2010's winner of the British Engineering Excellence Award, Andrew Burrows.

Burrows, of i20 Water, received the award for developing a highly effective and innovative water-saving solution. The effect his design is having where it has been implemented is something that clearly gives him great satisfaction. He says: "As innovators and engineers we can get so involved in our technology that we don't really realise what an impact it is having outside of the design office. The solution that we have built is now having an impact on a really major problem, and it is great, not only for me, but for all the team of very talented engineers who have supported this vision, to receive recognition for the effort, the innovation and what it is now doing for this urgent problem."

"As innovators and engineers we can get so involved in our technology that we don't really realise what an impact it is having outside of the design office. The solution that we have built is now having an impact on a really major problem, and it is great, not only for me, but for all the team of very talented engineers who have supported this vision"

Despite being collected, filtered and chlorinated, then being distributed via high pressure mains, 25% of water is lost before it reaches the consumer. Water leakage can be reduced by limiting pressure in the distribution system but, until recently, no effective technologies existed to do this. Burrows designed an intelligent valve, controlled by a central server. This learns the behaviour of the network and constantly adjusts the pressure to the optimum. The system also reduces leakage by reducing pressure to the optimum to satisfy demand.

Says Burrows: "The pilot valve is just one of the many innovations in our system – but a key one to enable us to smoothly control the pressure reducing valves. The pilot valve maintains the fundamental operation of a hydraulic pilot valve; which provides its inherent reliability, but introduces a smooth sliding and rotating control component which can move with tiny amounts of energy where previously it required the brute force of a spanner to adjust."

The system, now in service, reduces water leakage by more than 20% and is now becoming recognised as the most economic solution to solving water shortage. Says Burrows: "In Malaysia, we are now saving 20 million litres per day from just 100 systems, we are in detailed discussions with water companies and governments in many countries to use our technologies to solve the problems of water supply shortage and wastage. We have also launched a new application of our technology which allows water companies to make substantial savings in energy consumption in pumping water and this is now also receiving a great deal of attention."

However, it is clear that Burrows is not prepared to rest on his laurels, promising more innovations on the way. "We are now working on an even more innovative pilot valve which will bring more capability to our system and enhance the operating envelope of the existing pressure reducing valves," he says. "Probably the most innovative feature of the system is the architecture with the centralised server and artificial intelligence which automatically learns the network characteristics and remotely optimises.... and that is also being significantly enhanced. We are working on a couple of other technologies which we are looking to patent during 2011."

The accolade of Design Engineer of The Year (awarded alongside the Grand Prix at the BEEAs last October), is something that Burrows sees both as vindication of the design and a tremendous boost for the company as a whole. He says: "The award demonstrates very clearly to our customers that we have developed something really rather special – an innovation which is out of the ordinary and makes our customers and potential customers see us as a provider of the leading technology in our sector. I wouldn't hesitate to recommend other companies to nominate for the award."

www.I20water.com
www.beeas.co.uk

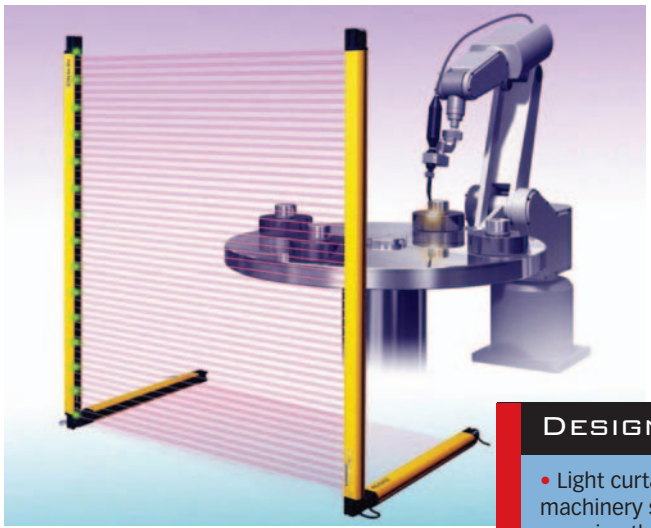
Ensuring the safety of light curtains

Tom Shelley reports on a serious problem that arises when users install light curtains without knowing what they are doing.

Machine light guides can give a false sense of security, if their failure does not result in turning the machine off.

Furthermore, even if they are of a failsafe type, they can still be worse than useless if they are either too close to the danger area, so that in the event of an accident involving somebody falling into the machinery, there is insufficient time to stop it, or if there are ways of body parts getting between beams without triggering a shutdown.

Nonetheless, there are too many installations, according to Gary Trewhitt, operations director at Safety Systems Technology, part of TÜV SÜD Product Service, which are 'protected' either by the wrong kind of light curtain or by the right kind of light curtain installed in the wrong kind of way.



Because the beams are infra red and cannot be seen, a malfunctioning or incorrectly selected system can result in workers being at greater risk of serious injury of death than if there were no guards at all, because they may approach dangerous parts of machinery more closely than they would if they were unprotected, believing that the light curtain system is protecting them.

The difference is because there are both safety sensor systems that are SIL – Safety Integrity Level 4, and SIL 2. SIL 4 means that the sensors constantly diagnose themselves, and if they are not working, they send a stop signal to the machine, and then go into a lockout state until they have been put right. A SIL 2 system, on the other hand, only stops the machine if it detects something. SIL 2 light curtains and other sensing systems, look very much the same as SIL 4 devices, but are, of course, substantially cheaper. A light curtain that does not diagnose itself may be perfectly satisfactory within a manufacturing process, if it is used to trigger actions within the process, or if the hazard is minor, but if it is there to protect humans from serious injury or death, it is inappropriate to the task.

Equally, it is no use purchasing a SIL 4 light curtain or other sensor and trying to wire it into a system where there is no provision for a malfunctioning light curtain preventing the functioning of the main machine. If purchasing a system from a reputable company, they will almost certainly go to some trouble to ensure they are applying an appropriate solution. The problems usually come, he said, when people purchase replacements from a general catalogue or sources on alibaba.com, without really knowing what they are doing.

The trick is, to think through the whole system and ensure that if the safety system fails, the machinery shuts down and cannot be made to go again until the safety system is fixed. And in addition, there should be no easy way that fingers or whole persons should be able to get past the safety system before the machinery can be stopped.

For these reasons, Trewhitt said that the trend is increasingly for customers to ask Safety Systems Technology to, "Project manage everything". The company will then do physical tests on the safety system to ensure that it conforms to all the latest requirements of the Machinery Directive and really does protect operators in the way it should. This includes tests with a plunger on light curtains to simulate fingers or body parts entering the guarding system at appropriate speeds.

www.safetysys.co.uk
www.tuvps.co.uk
www.sick.co.uk
www.rockwellautomation.com
www.smartscan.co.uk
www.ifm.com/uk

Design Pointers

- Light curtains guarding dangerous machinery should always be SIL 4, ensuring that they shut the machine down if they malfunction
- Installing SIL 4 light curtains without the right interlocking circuitry in the machinery can lead to an equally disastrous result
- SIL 2 light curtains have their uses if the hazards are minor and within manufacturing systems to control processes, but should not be relied on to protect human operators from possible serious injury or death.

Seeing what you need to see

Tom Shelley looks at military vision aids to situational awareness that also have uses in the civilian sector.

In mission-critical military situations, new IT developments flash up information in gunsights that gunners need to be aware of, and vision system fusion allows an operator who is relatively safe inside an armoured vehicle to see all around it as if he were outside, but with his vision enhanced by fusing information from different types of camera.

As well as military situations, such aids could be invaluable in plant and security control rooms if they can similarly be made to flag up matters that need to be paid attention to, and improve visibility of what is going on.

The gunsight system is called, 'Pointer', and has been developed by QinetiQ in conjunction with Istec Services and QioptiQ. At the recent International Armoured Vehicles Show, Qinetic's Ian Caesar explained that cues about where a gunner should be looking come from sensors that might be anywhere: acoustic gun shot detectors, muzzle flash detectors, retro reflective detectors, CCTV cameras with laser range finders, hand held laser range finders, radar, remote ground sensors, or any system that produces a point in space.

This information is processed by a base station – a laptop computer – on which can also be plotted areas occupied by friendly forces, where gun activity should be ignored, as well as tracking friendly call signs to avoid fratricide. Using a secure wireless network, targets can be relayed to gunners in a second, either automatically, or by the commander clicking off targets. Indication in the gun sight is in the form of chevrons indicating which way to turn to look and a diamond when the target is found.

Similar systems that flag up hot spots in plant, or suspicious activities, could be invaluable in civilian control rooms.

Of equal value, Barco has come up with a 'Local Situational Awareness' technology that can fuse information from multiple cameras so as to create a single all round view, instead of operators having to glance between multiple screens. Reggy Mortier, director key account management, explained that since cameras are mounted in different places and at different heights, this can involve panoramic stitching, warping and fusing image information from cameras that have different pixel resolutions, and may be optimised for normal daylight vision, low light levels or infra red. The system uses1 Gbit/s Ethernet, JPEG 2000 compression, standard IEEE protocols and dedicated hardware in order to be able to process information in real time and keep latency below 80ms. The system is DEF-STAN-0082 compliant and can be made to detect motion.

Some idea of the other possible applications can be gleaned from the group functions on Mortier's business card, which include: avionics, monitoring, control and medical, as well as defence. He said that each system is tailored to its particular application and installation, which suggests that at this stage they are not likely to be cheap. However, the cost of electronic hardware continues to come down all the time and it is not inconceivable that all round intelligent vision systems will in time come as standard on cars and trucks, enabling total rearward vision when reversing, and alerting drivers to vehicles in blind spots.

www.qinetiq.com
www.istecservices.com
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www.internationalarmouredvehicles.com
http://www.barco.com/en/defense/

Design Pointers

- Pointer system takes information from multiple sensors and transmits information to gunners so that they can quickly locate targets, while ignoring friendly activities
- Local Situational Awareness video system takes data from multiple camera s in different positions and of different types and stitches them together into single panoramic views, which can also be zoomed and panned
- Motion detection can be built and its sensitivity fine tuned. Images can also be stabilised if the platform is moving

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Linear motion off the shelf

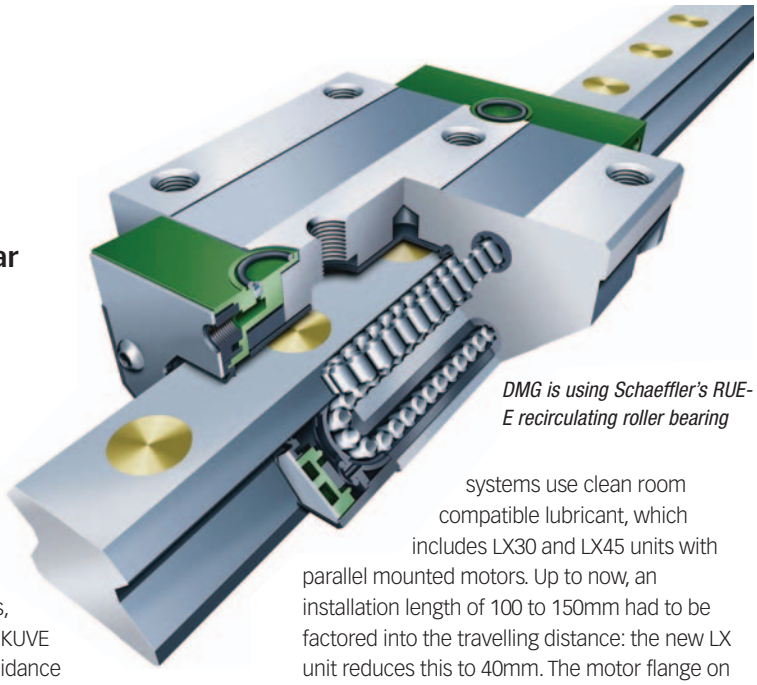
Tom Shelley reports on some of the plethora of linear motion systems available from specialist suppliers.

With so many high-quality, competitively-priced linear actuators of different types, it makes no sense for an OEM engineer to try to design their own or manufacture them from bought-in parts.

In addition to the cost of the parts, there is also cost of obtaining and assembling them, plus the cost of the time spent designing the actuator. If the unit is to work as intended, it is necessary to calculate forces, loads and tolerance build up, plus, thanks to the requirements of BS EN 13849-1 and the Machinery Directive, the MTTFd - Mean Time To (dangerous) Failure for each component. Furthermore, if the completed machine is to perform in a medical, clean room, food industry or other critical environment, there will need to be a careful assessment of the suitability of all the materials used to make parts, lubricants and the methods of lubrication.

If, on the other hand, the engineer decides to purchase completed units, the vendor can be expected to specify dimensions, speed, accuracy, positioning repeatability, load, stroke and suitability for particular industries and environmental conditions. If it isn't in the catalogue, most vendors can make whatever a customer wants, calling up information from a database and configuring designs automatically or semi-automatically and downloading the relevant information electronically to their manufacturing system.

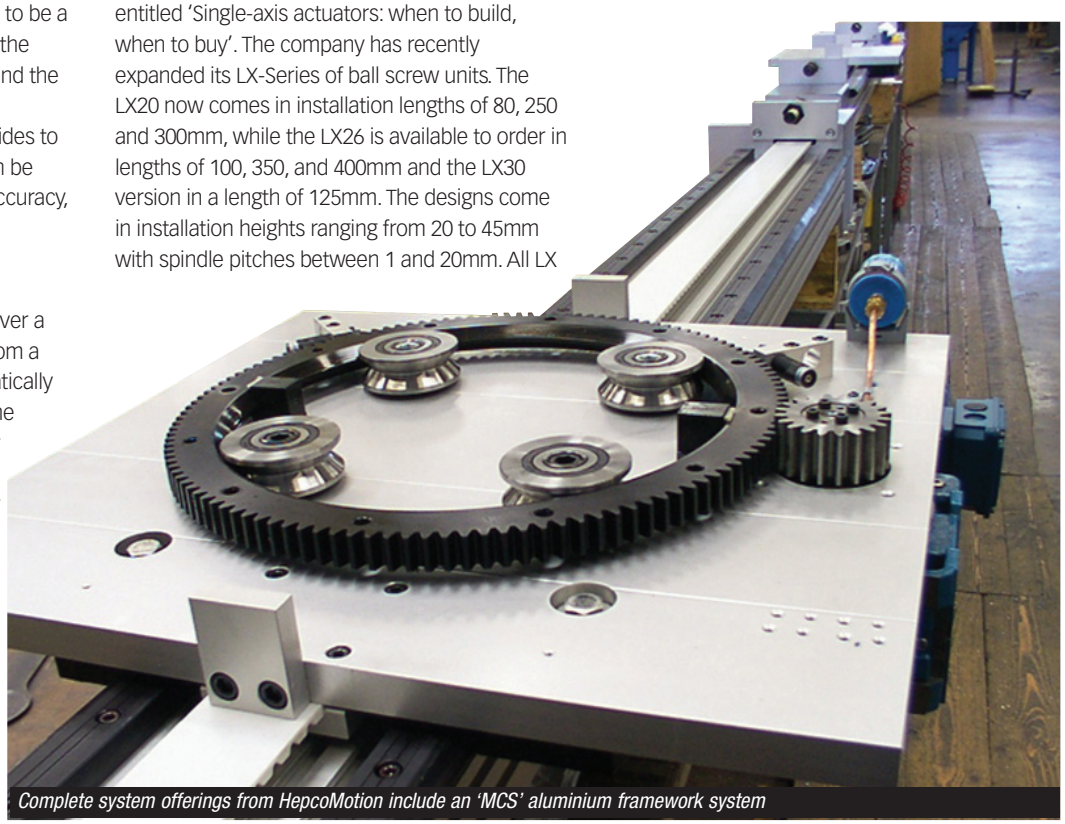
The automotive industries increasingly expect their Tier One suppliers to sell them complete packaged systems which they can assemble into vehicles in minimum times per vehicle. The same trend has spread into other industries such as makers of machine tools. German machine tool maker Deckel Maho Gildemeister (DMG) and the Italian BIGLIA Group have been closely working with Schaeffler on various developments involving the use of Schaeffler linear systems. DMG is using the company's RUE-E recirculating roller bearing and guideway assemblies, while BIGLIA is using KUVE four row monorail guidance systems in its lathes and multi-spindle tools.



DMG is using Schaeffler's RUE-E recirculating roller bearing

The case to purchase packaged linear actuators is strongly made by Misumi, whose US arm has produced a White Paper on the subject, entitled 'Single-axis actuators: when to build, when to buy'. The company has recently expanded its LX-Series of ball screw units. The LX20 now comes in installation lengths of 80, 250 and 300mm, while the LX26 is available to order in lengths of 100, 350, and 400mm and the LX30 version in a length of 125mm. The designs come in installation heights ranging from 20 to 45mm with spindle pitches between 1 and 20mm. All LX systems use clean room compatible lubricant, which includes LX30 and LX45 units with parallel mounted motors. Up to now, an installation length of 100 to 150mm had to be factored into the travelling distance: the new LX unit reduces this to 40mm. The motor flange on the flanged nut housing is designed to accommodate almost any servo or stepper motor. All versions are also available as sealed units.

Working with a supplier of packaged systems also means having access to the latest



Complete system offerings from HepcoMotion include an 'MCS' aluminium framework system

Rockwell Automation's alternative strategy is io turn to linear motors

developments in a field in which the vendor has specialised. For example, igus, which has its own proprietary 'DryLin' plastic bearing technology, has recently announced 'Fast Forward' which allows quick positioning of a trapezoidal lead screw drive.

For those who want more bespoke, packaged systems, Gary Livingston of LG Motion points out that his company contributes "Innovative micro-positioning solutions" that typically combine precision mechanical assemblies, motors, control electronics and software as complete Mechatronics assemblies. Applications include positioning biomedical sensors to within a few thousandths of a millimetre for cancer drug research, helping film makers synchronise the movement of multiple cameras for 3D movies, and providing packaging machine manufacturers with cost reducing multi-axis motion controls to give their products a distinct market edge.

Offerings from HepcoMotion include an 'MCS' aluminium framework system onto which can be mounted a combination of its linear motor products. "Our resources both in terms of our design and manufacturing capability and applications knowledge allow us to provide this added-value service to our customers," explains sales director, Chris Rees. "Design cost is minimised for the customer as it is very likely that we will have worked on a similar configuration before. It can then be tailored to the new application with just minor changes." All systems are thoroughly tested in the factory before being stripped down into modules for dispatch with a 3D drawing to the customer and all parts carry a 1-year warranty.

LG Motion offers innovative micro-positioning solutions

Typical examples include an MCS frame with a 'DLS' driven unit in parallel with a slave system used in the handling of steel trolleys. Another involves having a standard HD ring fitted to the carriage of an 'HDLS' belt driven unit for the handling of heavy components that need to be rotated when placed.

Rockwell Automation argues that an alternative strategy, with many potential benefits, is to turn to linear motors rather than rotary motors producing linear motion through ballscrews, rack and pinion mechanisms and belt and chain drives.

The motors themselves cost more, but do away with the need for other mechanical components, so that the overall cost can come out cheaper. Furthermore, speeds and accelerations tend to be higher, because there is less mechanical inertia, and accuracy and precision is improved, because there is no possibility of backlash between mechanical components. This can be a growing problem as the machinery becomes older, and meshing mechanical parts start to wear. The company also offers both 'MP'-series 'Integrated Linear Stages' as well as "Electric cylinders" which do convert rotary motor output to linear motion, but are designed to replace pneumatic and hydraulic cylinders and all their associated pipes, valves and other equipment.

John Smith of Olympus Technologies comments that linear motor drives are much more accurate but also "More expensive" than alternatives, and are hence, the solution of choice for linear gantries for robot welding or laser cutting where positional accuracy is, "Very important".

On the other hand, Smith told us that, "A rack and pinion drive with a servo motor is the cheapest solution and suffices for most applications where you are simply manipulating things: palletising or loading or unloading machine tools, for example." He adds that rack and pinion solutions allow the building of very large working areas, pointing out that, "Some production robots may be 30m or 40m long" whereas laser gantries tend to have smaller working areas, "e.g. 2.5m x 1m for example."

Offering a completely modular system, Duncan Matthews, engineering manager with Machine Building Systems comments that they have quite a number of different ways of creating slides using the Item aluminium extrusion system. "In general", Matthews observes, "It is possible to design slides to handle a wide range of loads using many of the same components." The slides are constructed by fitting hardened ground steel shafts to supporting aluminium profiles using a proprietary shaft clamp profile extrusion. The shafts can be 6mm, 10mm, 14mm or 25mm diameter and matching bearings are fitted to a carriage plate that fits the positions of the shafts.

The completed slides can be fitted with belts, ballscrews, chains or rack and pinion drive, standard items within the company's range, and can be fitted to, or made as integral parts of a machine frame. 'T' slots throughout any assembly allow the easy attachment of other components, such as sensors and guards.

www.schaeffler.co.uk
www.misumi-europe.com
www.igus.co.uk
www.lg-motion.co.uk
www.hepcomotion.com
http://uk.rockwellautomation.com
www.olympustechnologies.co.uk
www.mbsitem.co.uk

DESIGN POINTERS

- Linear slides and motion systems are best bought from companies experienced in their design
- There is nothing useful to be gained by engineers trying to design their own
- Linear motors are the most accurate and fastest, but mechanical systems can often be cheaper, and can easily be made with very large traverses

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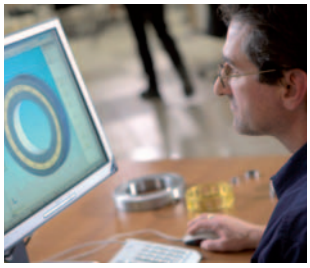

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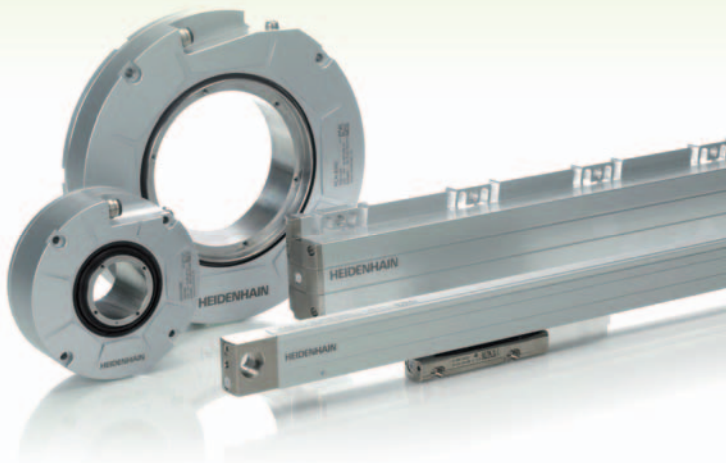

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Fast fastening with adhesives

Tom Shelley reports on bonding technologies that take only seconds to take effect.

While spot welding has for long been seen as the technology of choice for joining car components, particularly parts making up bodies in white, rapid bonding using adhesives is increasing its penetration of automotive as well as other markets, not least because it allows the very rapid bonding of plastic and composite parts, which cannot be spot welded.

We first heard just how fast bonding has become when we happened to encounter Julian Bond, R&D engineering manager for Parafix at the end of last month's Manufacturing Summit and asked if it was possible to bond parts together as fast or faster than using spot welding. He responded by saying they could bond parts, "In seconds" using adhesive tapes. These provide vastly stronger bonds that the kinds of sticky tapes used round the average home or office, so they can have failure modes in which substrates fail before bonded joints.

As regards time, Steve Barwick from Parafix described a recent job developing the technology to bond charcoal cloth onto a microporous PTFE vent where cloth die-cuts are spread out and bonded to the vents robotically, requiring less than a second for the whole operation, including bonding.

The company works with a range of suppliers of adhesive systems and machinery, including 3M, Tesa, Nitto Denko, Scapa, Advance Adhesive Tapes, Rogers, Laird Technologies, Accuplace and Adhesives Research. A lot of the leading edge development in structural bonding films, he said, is being undertaken by 3M, which he said, is "Developing all manner of technologies", including tapes for bonding composites. These generally give a tack strength but have to be heat cured to achieve full strength. Pick and place robotic handling copes with the problems of handling thin, flexible adhesive tape components. In automotive applications, final cure can often be achieved in the paint curing oven.

Barwick says that while designers of cars and mobile phones tend to be well aware of the advantages to be had from adhesive tape bonding: reduced assembly time, stronger bonds and the absence of stress concentrations or bosses to accept screws, smaller companies tend to be less aware.

There are even more adhesive bonding technologies coming down the line, especially for bonding composites for future vehicles and aircraft, according to Paul Burling, business development manager, and Dr Farshad Salamat-Zadeh, senior project leader, at TWI, who explained that success with bonding composites depends on the resin used in the composite, its surface treatment and compatibility with the adhesive.

There are many options that allow bonding to be undertaken more rapidly. For example thixotropic cyanoacrylates – 'Super glues', can provide an instantaneous bond but there should in addition be a structural adhesive to provide service strength. However, using something quick acting to hold a construction together allows it to be handled, without having to have it supported for a long period using

Bonded composite panels feature heavily in the design of the Nissan Leaf

expensive jigs and fixtures.

This is an accepted method of bonding panels to door frames for vehicles. The subsequent cure of the structural adhesive can be undertaken either at room temperature, or under the influence of elevated temperature, radio frequency radiation, infra red light or generally applied heat or ultra violet light, if a way can be found to shine it on the adhesive in the bond. One area of research at TWI is to apply microwaves to heat adhesives that possess hydroxyl or other polar groups. Since high power microwaves couple with human tissue, particularly in the brain, it is necessary to apply the microwaves in a closed enclosure, which could become quite expensive to build if that which is to be bonded together is car sized.

Curing in the case of cyanoacrylates is set off by moisture, which is why they are so good at bonding human skin. Threadlockers, on the other hand, cure by reacting with metal in the absence of oxygen. The most common structural adhesives are epoxies and acrylics. Since it is not possible to get ultra violet light into a metal to metal or opaque composite to opaque composite joint, heat is the most favoured option. Curing rate, along with most other chemical reactions, doubles in speed with every 10°C rise in temperature, so a 24 hour cure at room temperature can be reduced to about 10 min at 95°C. Alternatively, hot melts, are applied molten and bond when they solidify. TWI has in the past looked at electron beam curing, which Dr Salamat Zadeh noted can cure in 3s to 4s, but, as he also noted, "not everyone has an electron beam facility".

As regards compatibility with the substrate, it is easy if the substrate resin is epoxy based and the adhesive is too, but there can be problems with a vinyl ester resin and an epoxy adhesive. One option is to co-cure, bonding using the resin basis of the composite.

An 'Achilles heel' with adhesive bonding in critical applications is that it can be extremely difficult to detect poor bonding. Ultrasonic examination, for example, will not reveal a 'kissing' bond where two surfaces are in intimate contact, but not stuck together. This is an argument for 'belt and braces' approaches, such as rivets to back up adhesive bonding, as in the chassis of the Lotus Elise, but this adds both cost and weight. The only way out is to develop a process that always works, and always follow the recipe exactly, which is another argument for robotic bonding, to ensure reproducible conditions and consistency. Dr Salamat Zadeh noted that end users often demand a 15 or 20 year service guarantee of service, but said that it is "Difficult" to ensure that degree of confidence. Accelerated ageing tests are often relied on, as they are in electronics, but there is always a degree of uncertainty in relating performance at short times at elevated temperature and with other adverse stresses, with performance at longer times. Dr Salamat Zadeh observed that the most common cause of adhesive failure was, "Contamination", which can also be said to be true of metallurgical failures too. Cleanliness inside steel depends on the supplier but cleanliness in bonding depends on management in the factory where it is undertaken, which can be controlled.

Another problem is disassembly. If the construction is to be permanent, it is not too much a problem until the product comes to be recycled, when it is probably going to be crushed and/or fragmentised. Spot welding is not amenable to disassembly either but is still very widely used. The usual approach to disbanding joints is to apply more heat. There has been quite a lot of research on suitable strategies to make disassembly easier, without compromising assembly, but Dr Salamat-Zadeh observed that a proposed EU project on fast assembly and fast disassembly was never funded. Jennifer Harrison's Namtec report, "Active disassembly" is still available for free download from the Materials KTN website but political interest seems to have waned and commercial interest has waned also.

Nonetheless, there is no doubt that the use of adhesive bonding in the manufacture of motor vehicles and almost everything else is still advancing because of the inherent advantages in being able to join what can be otherwise incompatible materials in a way that reduces cost, transmission of vibration, weight, ingress of moisture and transmission of corrosion currents in the case of different metals. Our TWI informants observed that there is typically 18kg of adhesives in the average car, and with the pressure to further reduce weight, especially for electric vehicles, rapid adhesive bonding of composites is clearly the way forward. Composite panels, all bonded, feature extensively in the design of both the Nissan Leaf and Tesla Motors seven seat Model S cars.

www.parafix.com
www.3M-automotive.com
www.3m.com
www.twi.co.uk

Design Pointers

- It is now possible to bond parts in less than 1s
- If the assembly is to be able to withstand heavy structural loads, a fast acting bond can be used to tack the construction together in order to allow a structural adhesive to be cured
- Cure times of structural adhesives are now down to 10 mins in some cases, aided by heat
- Research is underway to investigate microwave curing to cut times still further

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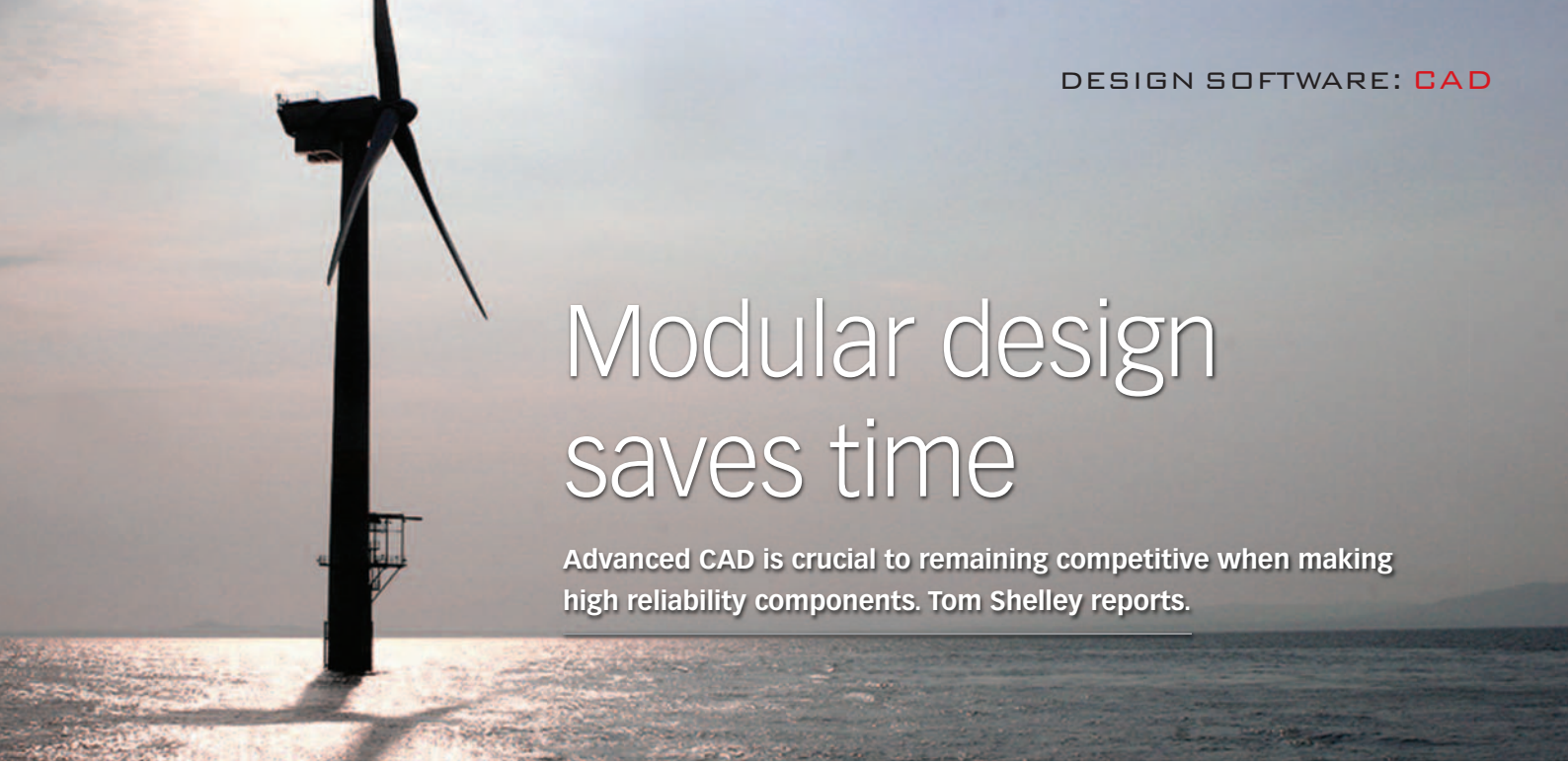


Modular design saves time

Advanced CAD is crucial to remaining competitive when making high reliability components. Tom Shelley reports.

Complex electro mechanical components for critical applications can now be designed in a few weeks, thanks to re-use of modular CAD data which is now being linked to up to date cost data.

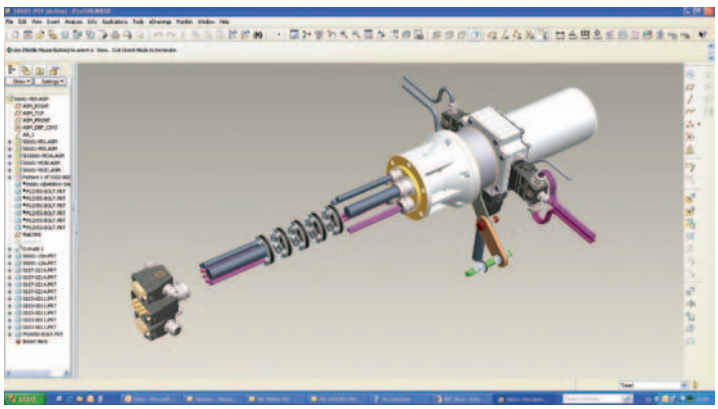
This ensures speedy and reliable designs – because of the applications, customers are increasingly demanding that they be 20 years maintenance free – which are also cost competitive.

Moog Components Group in Reading, formerly IDM Electronics, produces slip rings. Most of the products were saw being made there are for the military: ships, tanks and helicopters, but the company also designs slip rings for wind turbines. These carry power into and take monitoring and position data out of the hubs, in order to be able to control the pitch of the blades and de-ice them in cold climates.

The company designs with one of the major CAD packages – we cannot say which one since they decline to endorse any of their supplied products. Senior design engineer Nik Corbas told us that using it, "Has changed my life". We won't say what he was using before either, and while he admits that what he is using at Moog is, "tricky to get started", he insisted that, "Once you get into it, is pretty intuitive and certainly helps with the workflow." Data for manufacturing is exported to suppliers as STEP and IGES files, and a PLM package from the same vendor as the CAD system provides a user interface to the database. Formerly CAD files were stored in folders but having made the change, Corbas said, "Finding parts is now really easy." Formerly, he said designers had to remember part numbers in order to be able to locate them. "The hard bit is transferring the data into it", he admitted, but even though he has only been using the facility for a month, he finds it, "Most helpful."

Design Pointers

- Designs are modular, allowing re-use of data
- Model exports to manufacturers are as STEP and IGES files but shop floor staff are able to interrogate designs as eDrawings
- Cost information is currently held on Excel spreadsheets but the move is to extract it from a the company ERP system



Cost information, crucial to getting competitive but profitable quotations out, and doing designs in the most economical manner is presently held in Excel spreadsheets, but the company's software VAR also supplied the company's ERP system and there is a program under development to pull real time cost information out of this.

The need to produce products that are truly reliable is even more crucial with regard to wind turbines than it is for military customers, since wind turbine nacelles are often 150m above ground, and in the case of offshore installations, require use of a crane barge. Corbas told us that each design of slip ring is different. Largest currents that have to be transferred are currently 200A per ring, but as turbines become larger, the company is already receiving enquiries about 350A. There can in addition be hundreds of rings to transfer data which can be in a multitude of different protocols. Electrical contact is through silver alloy fibre brushes rubbing silver alloy tracks. In order to save both design and production costs, the products have become increasingly modular. Corbas says: "Very few components are now bespoke", which means that most have been designed before, and can be extracted from the database, and used again.

Assembly is assisted by drawings, although shop floor staff can interrogate aspects of designs as eDrawings, should the paper drawings not always be clear. Once a set of drawings has been produced, there is, we were told, a discussion with the production engineers so they can develop and issue a set of assembly instructions. The wind turbine slip rings are mostly assembled in China. Finite element analysis, when required, is referred to company FEA experts in Canada, so electronic transfer of data is now a crucial aspect of the business.

www.moog.com

Autodesk opts for the suite life

It may be early 2011, but Autodesk's 2012 products are already on the way. Paul Fanning offers a preview.

Among Autodesk's 2012 offerings will be 'suites' of software designed specifically for particular market sectors and a version of Inventor developed to be easier to use and deploy, faster and more open.

The suites are designed to make it easier for customers across a wide range of industries to adopt and use a broader set of Autodesk's comprehensive and sophisticated design software. The suites will be available in convenient packages with a range of capabilities that bring together compatible sets of complementary products for entertainment, building, infrastructure, product and visual design that, when used together, help to manage data, workflow and process.

Structured in a 'good/better/best' format the 'Product Design Suite' will contain a 'Standard' package featuring AutoCAD Mechanical, Autodesk Showcase, Autodesk SketchBook Designer, Autodesk Vault and Autodesk Mudbox software. The 'Premium' suite contains Standard edition tools along with Autodesk Inventor and Autodesk 3ds Max Design software, while the 'Ultimate' suite includes the same tools as the Premium edition along with Autodesk Inventor Professional and Autodesk Alias Design software.

Those already signed up to subscriptions to AutoCAD Mechanical, Inventor or Inventor Professional can upgrade to the Standard, Premium and Ultimate suites free of charge for the moment. However, Autodesk has not yet clarified for how long this will be the case or how much it may charge further down the line.

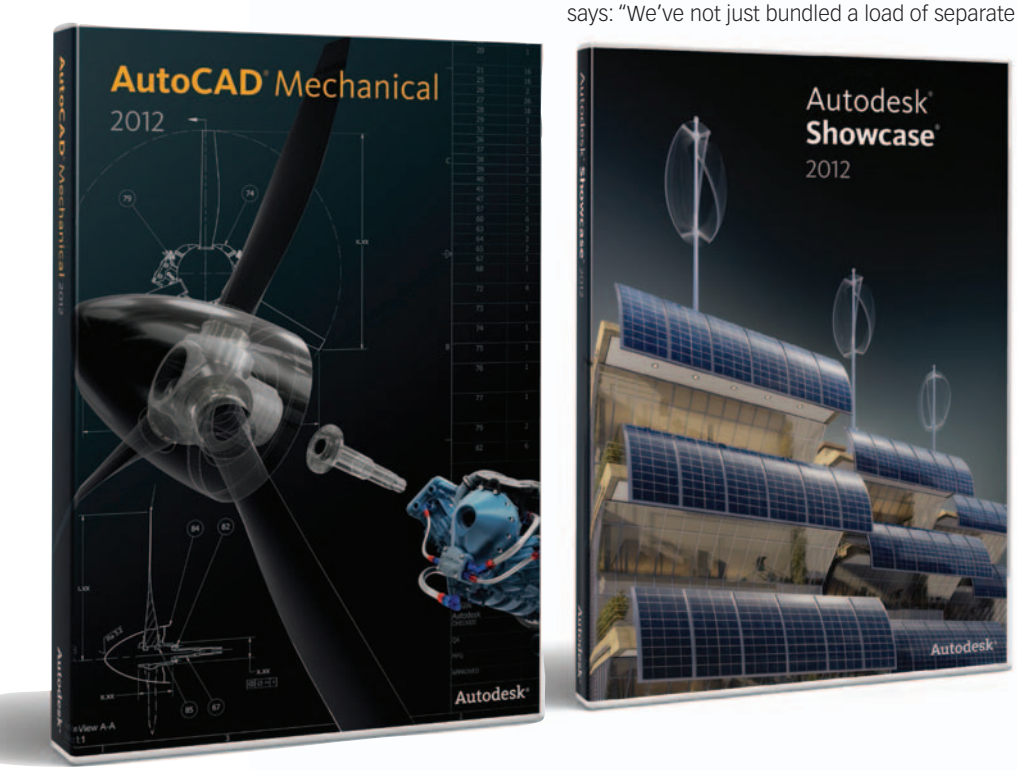
However, according to Stephen Hooper, Autodesk's Business Development Manager – EMEA, this development is not simply about charging customers more, but also about offering users increased interoperability. He says: "We've not just bundled a load of separate products into a box. There is actual integration." This takes the form of workflow integration between the various products. Inventor, for instance, is able to take advantage of the intelligent data in .dwg files without them having to be reworked.

Of course, as Hooper admits, there is an element in the use of design suites of Autodesk seeking to "rationalise" its product offerings somewhat, but he also insists that "It is a way of getting people to adopt new technology…the suites will allow users to leverage the potential of the various assets."

Inventor remains at the heart of Autodesk's offerings, however, and here there will be a number of changes in the 2012 version. Among these is the result of the strategic partnership announced in Oct. 2010, Autodesk and Granta Design have built new design methods into Autodesk Inventor 2012 software that help designers estimate a product's environmental impact and make more sustainable design decisions. The new Eco Materials Adviser in Inventor 2012 addresses sustainable design requirements early in the design process — when it matters most, enabling manufacturers to choose better materials without compromising on cost and performance. Powered by Granta's extensive materials database, the Eco Materials Adviser helps guide material selection and generates reports so engineers can communicate the benefits of their sustainable design decisions.

In general, the watchwords for Inventor 2012 are 'Easy, Fast and Open', with the software software providing easier ways to interact with 3D mechanical design data, new opportunities for sharing, accepting and updating CAD data regardless of source and complexity and high-impact performance and productivity improvements for both users and IT departments.

www.autodesk.com.uk



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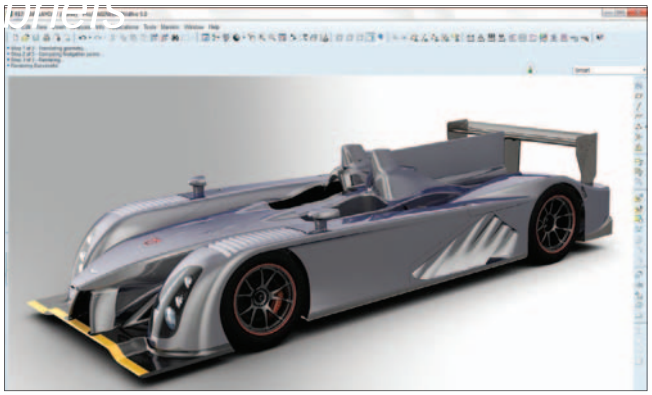


Aston Martin selects Creo

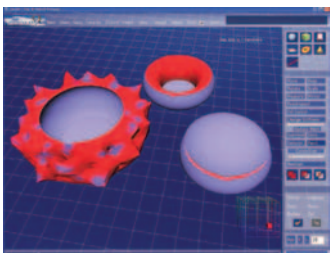
In an extensive benchmark process, Aston Martin Racing has selected and implemented PTC's Creo Elements/Pro for the 3D CAD design of its racing vehicles and Windchill® for product lifecycle management (PLM) in its racing car division.

Aston Martin is the only manufacturer that produces a car to compete in every category of the FIA GT Championship sports car racing series. Models range from modified standard vehicles in the GT4, GT3 and GT2 classes - including the high-performance V12 - to the 6.0 litre 600 BHP DBR9 in the GT1 class and the Le Mans prototype LMP1 Aston Martin. Aston Martin Racing has moved away from its previous third-party chassis strategy to develop its next generation LMP1 from scratch. This new racing vehicle is now being designed and engineered from the ground up using Creo Elements/Pro and Windchill to manage the development process. In addition to the designers, the purchasing department uses Windchill for its request for quotation process, enabling collaboration with suppliers.

www.ptc.com

Chameleon offers improved interfacing

The Chameleon haptic 3D design package from A1 Technologies is consistently undergoing a programme of continuous development. Following on from the 2nd release of Cloud9 from Anarkik3D in June of last year, the latest version of the virtual touch 3D modelling system software — Version 2.1 — has just been released.

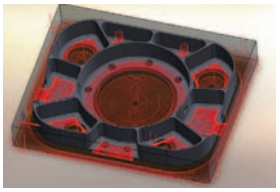


The improvements that have been made include: Submesh function that increases the number of triangles in an object's mesh for better resolution (all triangles or selected areas); reduce mesh function to decrease the number of triangles in an object's mesh (all triangles or just selected areas); ability to slice an object/objects with a slice plane; ability to create video clips and the individual frames; Boolean improvement and a well-designed and non-complex interface.

www.a1-tech.co.uk

High-productivity milling with iMachining

Designed for centralised control systems, the new Lenze 3200C controller combines PLC logic, motion control and visualisation in a single device. By bringing together the latest fast microprocessors with updated operating software, the 3200C delivers a tailored hardware-software combination that can implement automation systems in a cost-effective way. This new controller suits machines with single-and multi-axis drives giving powerful centralised control over a matching range of external drives and actuators. Dimensions are compact, with DIN rail mounting and a width of only 136mm, and reliability is assured as there is no fan or battery.



The 3200C controller is designed to integrate with the Lenze I/O system 1000 creating a single station with a fast 48MHz backplane bus and a 1µs time stamp. Up to 64 I/O modules can be combined with digital and analog I/O, temperature measurement, counters and encoder evaluation. Communication ports are provided for Ethernet and the fast bus EtherCAT which can connect to servo and inverter drives, also external I/O stations. Two USB connections are available and there is an optional third USB for DVI connections to a monitor panel such as the Lenze MP range. Two further ports are provided for CANopen and optional PROFIBUS.

www.lenze.co.uk

Lockheed Martin broadens use of DELMIA

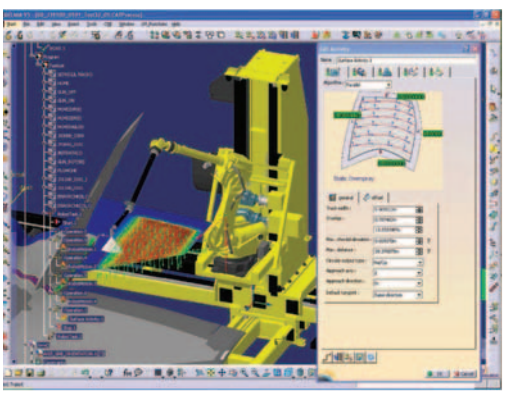
Lockheed Martin has migrated its F-35 Lightning II robotic painting workcells to Dassault Systèmes' DELMIA Robotics. A long-time user of DELMIA manufacturing simulation solutions,

Lockheed Martin's new implementation of DELMIA Robotics has made the company's manufacturing processes more efficient, leveraging a common interface across its CATIA design authoring and DELMIA digital manufacturing solutions.

Lockheed Martin uses simulations to verify that the robots will reach all the painting positions while avoiding any collisions. Automating the paint and coatings process provides significant time savings for the company, as well as offering considerably improved process control. In addition to this, the ability to protect workers from potentially harmful paint fumes is an added benefit of robots. The company had already experienced success with the previous generation of DELMIA Robotics simulation.

Since they are already familiar with the CATIA interface, Lockheed Martin NC programmers have been able to move easily into robot support roles, pick up the software and produce programs.

www.3ds.com



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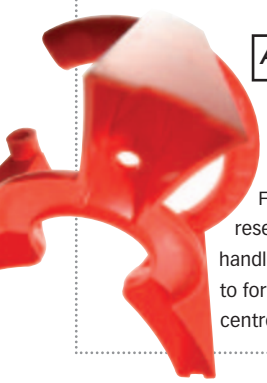
Q&A

Gas and injection moulding - a winning combination

Q What is Gas Assisted Injection Moulding?

A It is the introduction of nitrogen under pressure to the mould cavity during the moulding cycle. The aim is to either hollow out thick section mouldings or eliminate sinking and/or warping in thin section injection mouldings.

Q When would Gas Assisted Injection Moulding be used?



A There are two different product groups where this process is used, defined by their generic shape.

Firstly, rod shaped mouldings resemble the shape of a rod or handle. Here the gas is used either to force molten plastic out of the centre of the moulding, or the mould cavity is partially filled with molten plastic and then the gas is used to inflate the plastic to fill the mould. In both cases the result is a hollow moulding that appears to be solid.

The other type is panel shaped mouldings. Ribs act as gas channels, and tending to be deeper than conventional ribs provide additional rigidity. Using gas allows the mould to be filled at lower pressure so reducing internal stresses that lead to warping and also counteracts sink marks caused by ribs.

Q What are the main advantages of this process?

A For thick section mouldings by hollowing out the part weight savings can be made and, dependent upon the method used, less material is required. There is also the possibility of eliminating assembly costs by producing a traditional two-part moulding as a single piece.

For both types of moulding, parts can be produced with no sink marks and minimal warping. Due to the lower pressures required a smaller moulding machine may be used. Variable sections can be included and rigidity can be achieved through hollow box sections.

Q Is Gas Assisted Injection Moulding more expensive?

A Although there are additional tooling costs, such as gas pins, these are often outweighed by cost savings not just in the part, but also with a simplified mould cavity. Hollow sections can be produced without the need for mechanical cores and assembly costs may be eliminated.

PDM show makes plastic fantastic

PDM11 promises to be a great source of inspiration for plastics design professionals. Here, *Eureka* previews what will be on show.

Taking place from 18th-19th May, the annual Plastics Design and Moulding Exhibition (PDM11) is the most comprehensive plastics event in the UK and is a must-attend event for anyone involved in the production of plastic products. PDM is a vibrant source of information, education and inspiration for plastics design and moulding professionals.

PDM11 is the place for plastics and design professionals to network and learn. Visitors can meet representatives from every part of the UK plastics design and moulding community including suppliers of injection moulding machinery, rotational moulding machinery, blow moulding machinery and ancillary equipment as well as automation companies, mouldmakers, polymer producers, compounders, polymer distributors, masterbatch and additive suppliers, software companies, materials testing specialists, moulders, rapid prototyping companies, design companies and other industry services.

"Following on from the huge success of last year's seminar, the British Plastics Federation's Rotational Moulding Group is once again working with PDM to put on a similar session," says Martin Spencer, Chairman of the BPF's Rotational Moulding Group. "The BPF is particularly excited that PDM is coming to ExCel in London and the opportunities that this seminar will bring to interface with the London design community."

PDM11 is the place for plastics and design professionals to network and learn

The annual event, which this year moves to the ExCel Centre in London for 18-19 May 2011, includes a free two-day programme of design-related seminars and a new plastics design workshop. The BPF (British Plastics Federation) is also holding a seminar specifically for designers on the role of colour and additives in plastics densign and manufacture.

The PDM11 conference programme – running across both days of the show – tackles a host of in-depth topics that are based around the core subject of design for plastics manufacture. Seminar topics include: Award Winning Injection Moulding; Medical Device Manufacture;

Injection Moulding – design and product development, Injecting Innovation into Plastic Component Design and Manufacture and Injection Moulded Part Design – issues and optimisation. The BPF Rotation Moulding Group will also be hosting a session on Design Innovation in Rotational Moulding. Full details of the PDM conference programme are at the end of this press release.

Injection moulding technology group Engel, design company Agentdraw and materials distributor Plastribution are collaborating to hold PDM's first plastics design workshop on 18th May in the Titanium room, right next to the PDM 11 exhibition area at ExCel. The workshop repeats the successful format of similar events held earlier this year in which product designers can present new concepts and part-developed projects in a confidential session and receive fee high-level advice on product design, tooling and manufacture. Plastribution, Engel and Agentdraw are all exhibiting at PDM11 as well.

To register for a session at the plastics design workshop visit www.pdmevent.com/workshop

"Our first two plastics design workshops have been very successful, with some very interesting projects that might otherwise have taken much more time and money to bring to reality," according to Mike Boswell, managing director of Plastribution. He says: "The multi-disciplinary approach with our partners Engel and Agentdraw has been very fruitful, with one of the most promising projects to date being a metal replacement component for a demanding application."

The BPF colour and additives seminar, taking place on 19th May in the Titanium Room is being organised by the BPF's Masterbatch and Technical Compounds Group. The group's member companies will make presentations and be on hand to offer their expertise to designers attending the seminar.

Topics covered in the seminar will include: adding value through colour and additives; forecasting colour trends; liquid systems; the challenge of innovative polymers; advancements in colour and additive technologies. There will also be opportunity for questions and discussion.

Midas Pattern is just one of the companies that will be exhibiting at PDM11

Greg Hammond, chairman of the BPF's Masterbatch and Technical Compounds Group said: "The British masterbatch industry is at the forefront of colour and additive technology within the plastics world and PDM is the ideal platform on which to showcase our abilities to the design community."

The seminar will be held in two sessions: the morning session starts at 10.30 am and finishes at 12.30 pm; the afternoon session starts at 2.00 pm and finishes at 4.00 pm. For further information and to register contact Sarah Plant at the BPF, email splant@bpf.co.uk or Tel 020 7457 5000.

Visit www.pdmevent.com to register to attend and reserve a place for any of the PDM11 seminars. Attendance is free but the number of places at each seminar is limited so booking is recommended.

PDM11 is co-located at the ExCel Centre with a unique new event dedicated to industrial design: the Product Design + Innovation conference.

www.pdmevent.com
www.pdesigni.com

www.beeas.co.uk

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READER INTERVIEW

BOB ARNOTT
MANAGING DIRECTOR, CENTA TRANSMISSIONS

60 SECOND

Q How did you get into engineering?

A Well it was sort of a natural interest, really. My father was very much into motor mechanics and that sort of thing and my interest developed from there.

I went initially to BP tankers as a marine engineer apprentice. Then I went on to University and from there on to various things, so it was just a general progression from an interest into a career.

Q How did you come to your present role?

A Well I've known the owner of Centa for 20 years or more. We used to meet at various exhibitions around the world. Then, when the original managing director of Centa retired and he wanted somebody to come on board and fill the gap.

I must admit I'd been travelling the world a lot with the previous company and I was attracted by the prospect of being based in the UK rather than travelling around the world. So I came here, which meant I could very much be independent, which is what I've done.

Q What still attracts you about your current role?

A It's a great range of products and also I am virtually a free agent, so we can be very innovative in our designs. We can apply Centa products here rather than having to ask Centa Germany to do it. We can react much more quickly and do derivative designs that suit the UK market place. So we do a lot of test bench work with slip joints and things like that. There are all sorts of applications where a normal, conventional solution simply wouldn't fit. We provide an unconventional solution.

Some of the test bench work where we've been dealing with new engines that haven't even hit the market yet is probably the most interesting work I've been involved in at Centa.

Q What are the biggest issues facing the industry as a whole?

A There are fewer and fewer people coming into the industry and there seems to be less and less expertise. We get more and more work simply because other people simply don't have the expertise to do it.

We've become virtually the first point of call because we can generally do it. It is very rare that we have to say 'no, we can't do it'. Obviously, from our point of view, that's a good thing, but the industry as a whole is contracting and I don't see any prospect for that being arrested or reversed.

In terms of general engineering I think there is simply less interest. People aren't really doing that sort of thing anymore. They want to buy it or sell it rather than doing the basic manufacturing themselves.

The difficulty is getting people into the industry. Most people going to university seem to want to do a management job rather than a doing job. I don't know what universities are teaching people, but it's not much use to us. We have difficulty recruiting people to do what might be called basic calculation work, so it's getting very difficult.

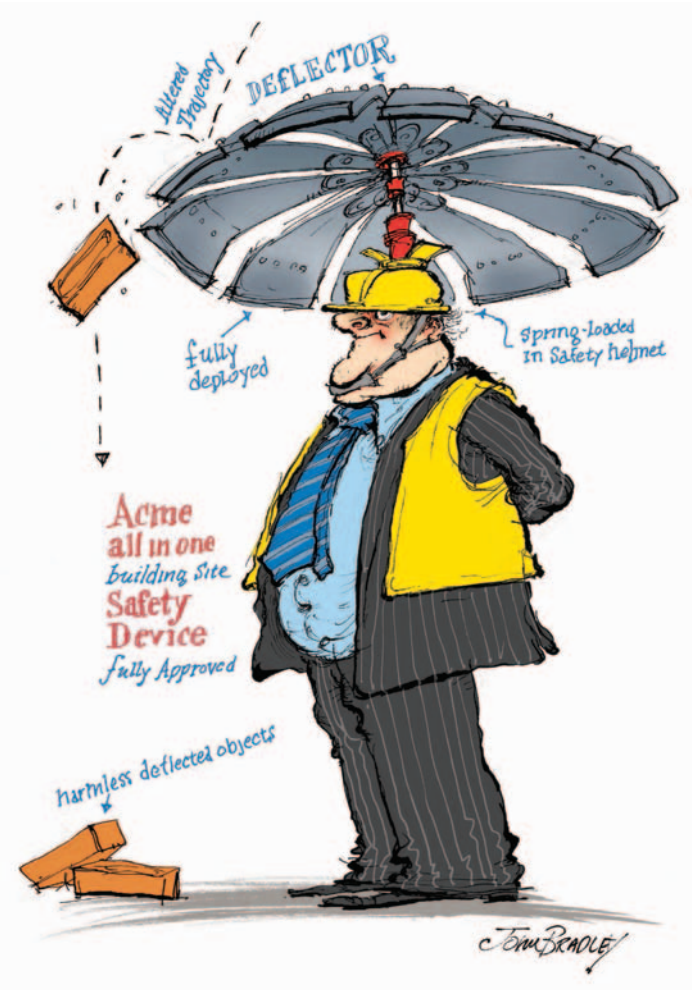
You've got to have a genuine interest in and flair for the subject and I despair of those who don't. I think engineers are born rather than made. You can teach people mechanics, but you can't teach the imagination to apply them properly.

Q What still excites you about engineering?

A Ultimately, it comes down to the fact that there's always something new. There's always a new challenge somewhere down the line. We've got special designs that we make that fill a very specific need and it's genuinely very satisfying to see them working as they should for the customer. There's no doubt that the satisfaction is basically the best thing about the job.

Protecting your feet

Many parts of the body are protected by law in the workplace, but what measures can be taken to protect the feet?



Going into a workshop or onto a construction site rightly requires the donning of personal protective equipment. If it is outside, visitors are required to put on a hard hat, to protect against things being dropped from above, and in a workshop, visitors are usually expected to put on protective goggles, to protect against flying particles. If it is a clean room, there will be an additional requirement to put on coveralls, overshoes, and usually something over the hair, to protect the environment.

But what about the feet? Things getting dropped on one's toes is a much more likely occurrence in both workshops and construction sites than objects falling on the head from high up. We have often noticed that hard hats are still required by workers and visitors going onto roof areas, where there is no more upwards from things to fall from, but there is still the risk of objects landing on feet. There is also a strong risk from slipping on wet patches or oil spillages, if shod with shoes chosen for their smart appearance in the office.

The obvious solution is to put on industrial boots with toe protectors. On site and in workshop site workers should be wearing these anyway, but for visitors, there is a need to have a large range of sizes available, and who wants to try wearing boots which have been worn by somebody else's smelly feet? The end result is that most companies simply don't bother. The hard hat and/or goggles show that they have made the ritual effort and visitors and office staff had better be careful where they walk and not try picking up heavy objects.

The Challenge

Our challenge this month therefore, is to provide something that can be handed out to visitors to a factory or construction site that will protect their feet without their having to put on boots. We have not heard of anyone going to litigation after dropping a lump of metal or concrete on their feet but with some lawyers hungry for business, it is sure to happen soon. Whatever solution is adopted should be effective, low cost, reliable and reusable. It is possible that the problem might be solved by visitors wearing steel or rigid plastic aprons which project outwards but apart from making them look silly, would be quite likely to lead to other accidents when people bump into each other, especially when crammed together in a lift.

The solution that we offer in next month's edition of *Eureka*, however, solves the problem most simply and inexpensively. Nobody seems to have thought of it before. See if you can come up with anything better.

The answer to last month's Coffee Time Challenge of how to avoid rear end collisions can be found in our Technology briefs section on page 8.

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Adhesives

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Loctite 3090 is a new two-part cyanoacrylate that increases the versatility of instant adhesives. Alongside the traditional benefits, 3090 allows any exposed adhesive outside of the joint to harden within minutes – removing the need for a post-assembly activator. In addition, gap sizes up to 5mm can be readily accommodated and the gel viscosity means it is suitable for vertical or overhead application.

It can be used on plastic, rubber, wood, stone, leather, fabric or metal and can withstand a force of 20N/mm². 3090 comes in a pack containing a dual syringe with seven mixer nozzles.

@: technicalservice.loctite@uk.henkel.com
✆: 01442 278100

www.loctitesolutions.com

Adhesive Tapes

For help and technical advice on our range of double sided, cloth and masking tapes or converted products please phone 01908 500235 for your nearest authorised tesa distributor

tesa AG
A Beiersdorf Company

tesa UK Ltd
Yeomans Drive Blakelands Milton Keynes MK14 5LS
tel: 01908 500235

think tesa

www.tesa.co.uk

Cameras

GigE Vision Capability For Sony FCB E Series Camera Range

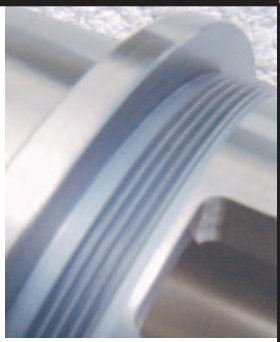
GigE Vision and GeniCam standards committee member, STEMMER IMAGING, is delighted to be able to announce the versatile performance of the new Sony FCB E Series of colour block cameras with GigE Vision and GeniCam functionality. The new CVC GE family includes a camera equipped with an FGI GigE Vision-compliant interface board produced by STEMMER IMAGING and the CVB CameraSuite software development kit. The CVC-1020P GE was demonstrated for the first time at the Vision Show in Stuttgart, Germany, 9-11 November, 2010 and will be available for shipment early in 2011.

@: sales@stemmer-imaging.co.uk
✆: +44 (0)1252 780000

www.stemmer-imaging.co.uk

Coatings

WS2 Stops galling of SS and Titanium



Stainless Steels and Titanium are both prone to galling and seizing. WS2 is a very low friction dry lubricant surface treatment, developed by NASA for use in deep space. It has been shown to provide a very cost effective solution, preventing both problems on threads and other sliding surfaces.

WS2 works well from -273° to 450° C and down to 10-14 Torr. WS2 has been applied to bearings and gears to extend life.

Design Out maintenance problems with WS2!

@: sales@ws2.co.uk
✆: 01430 861222

www.ws2.co.uk

Flash Steam Recovery Systems

Spirax Sarco flash steam recovery scheme cuts boiler costs at British Bakels

British Bakels has knocked almost 6.5% off the combined cost of energy and water to its boiler, thanks to a flash steam recovery system designed and supplied by Spirax Sarco. The system recovers the flash steam generated by blowdown from the main boiler at the company's site in Bicester.

Blowdown is an essential process in which water is periodically discharged from a steam boiler to prevent contamination from building up within the system. Bakels had already minimised the amount of water released during blowdown by adopting an automated system from Spirax Sarco, which monitors the build up of total dissolved solids (TDS) in the boiler. But any flash steam generated during the process was being discharged, rather than recycled.

@: natalie.byrne@uk.spiraxsarco.com
✆: 01242 521361

www.spiraxsarco.com/uk

Force Sensors

Force measurement for tough applications

Towcester – UK – February 2011: In addition to a wide range of standard load cells, load pins and force sensors, Strainsert Inc provide a custom design service that employs their patented integrated strain gauge process, where foil strain gauges are actually bonded and sealed inside small bore holes, as part of complete load bearing components and structures that can be manufactured to design or assembled into free-issued parts.

@: john@ixthus.co.uk
✆: 01327 353437

www.ixthus.co.uk

Motors

Injection moulded stepper motors offer higher efficiency in a smaller volume

A range of stepper motors manufactured using injection moulding techniques has been introduced by Astrosyn International Technology. The method of construction makes more space available internally, enabling the motors to be thinner while producing greater torque.

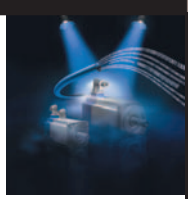
A 30% increase in efficiency is possible because the space saving design enables the use of more windings with lower resistance, resulting in a 27% reduction in temperature rise. The technique also allows greater precision in assembly, leading to significantly improved step angle accuracy - typically 2.5% compared with 4-5% in competitor models.

@: astrosyn@btinternet.com
✆: +44 (0)1634 815175

www.astrosyn.com

Motors

Sick Launches Revolutionary Encoder Interface for Sil3 Safety



SICK (UK) has introduced Hiperface® DSL, a fully digital encoder feedback interface with both SIL2 and SIL3 safety capability for the communication of feedback data from brushless servo motors to associated drive electronics.

The Hiperface® DSL data protocol has been designed to carry comprehensive sensor data from motor to drive while reducing system costs. The innovative solution is suitable for use in a wide range of robotic and automated machinery applications as well as process and packaging equipment.

Darren Pratt, encoder specialist for SICK (UK), commented: "Hiperface® DSL is currently the only motor feedback interface with the capability of supporting encoders to SIL3 levels for both safe speed and safe position functions. In addition, the protocol requires less expensive hardware than current digital encoder feedback systems, enabling significant cost savings."

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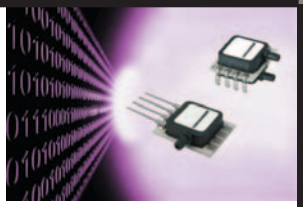
Pressure Sensors

Digital Miniature Ultra-Low Pressure Sensors Offer I²C and Analog Output at the Same Time



Sensortechnics' HCLA pressure sensors measure ultra-low gage or differential pressures from 2.5 mbar Full Scale. The sensors perform precision digital signal conditioning and achieve very high accuracies. The HCLA series provides a digital I²C bus interface plus an analog 0.5 ... 4.5 V output signal at the same time. This offers OEM customers increased design flexibility, e.g. in order to build up a redundancy functionality for safety critical applications. The sensors can directly communicate with microcontrollers without the need for additional A/D converters. Further, digital SPI bus and custom specific outputs are available on request.

@: uk@sensortechnics.com
✆: 01788 560426

www.sensortechnics.com

Rotary Atomiser

Fine Droplets without High Pressure

The small electric rotary atomiser produced by Newland Design is an efficient way of creating small, consistently-sized droplets by means of high-speed rotation alone, without need of compressed air or any high pressure.

The Newland Atomiser rotates a small porous plastic cylinder at speeds up to 35,000 rpm and emits droplets of less than 40 micrometres in diameter.

Applications include:

- Humidification and Evaporative cooling
- Gas scrubbing and Odour control
- Dust suppression
- Oil misting.

Flow rates up to 25 litres per hour. Power input 10 - 25 Volts DC, consumption less than 40 Watts. Evaluation units always available.

@: newland.design@btconnect.com
✆: 01524 733 424

www.newlanddesign.com

Sensors

Michell's new sensor makes recalibration and maintenance as easy 'as changing a light bulb'

Michell Instruments' I7000 'Hygrosmart' humidity sensor makes the maintenance of their relative humidity instruments quick and simple with no down-time. The interchangeable module incorporates all calibration data and is delivered together with a calibration certificate.

To ensure continued measurement accuracy over time, the user can 'recalibrate' an instrument by simply replacing the old sensor with a new one. The process is as quick and simple as changing a light bulb and no specialist training is required.

The new I7000 Hygrosmart interchangeable module forms the base of a complete range of temperature and humidity instruments, suitable for applications from precision manufacturing to controlled environments and HVAC.

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www.michell.com

Solid Barbed Pins

Solid Pins Improve Garage Door Window Trim Design

A leading door and window manufacturer approached Spirol with a request to improve the design of the fixing for a garage window door trim. Spirol undertook an extensive engineering evaluation of the existing design and performance requirements before recommending the use of a custom-designed bi-directional Spirol Solid Barbed Pin.

The company manufactures doors and windows that utilise traditional vinyl window trims commonly seen in metal exterior doors. The manufacturer was assembling the product with self-tapping screws and then plugging the interior hole for cosmetic purposes - less than ideal. A high clamping force was required to hold both sides of the trim together in the event of an attempted break-in by prying the trim off the window.

@: uksales@spirol.com
✆: 01536 444800

www.spirol.com

Make bottling lines flow without water

Conveyor lines in bottling plants are usually lubricated with a mix of water and lubricants. Thousands of liters of water are contaminated and wasted every day. But SKF engineer Frédéric Rousseau has a smart solution, using no water at all. SKF Dry Lubrication Systems can save 90 m^3 water per bottling line each month.

This is a great example of what we call Knowledge Engineering. And yet another way of how we apply our know-how by utilizing our wide range of products and services to help increase efficiency, save energy and reduce environmental impact. Read the full story at **www.skf.com**

The Power of Knowledge Engineering

Lubricates without water

SKF Dry Lubrication Systems

Frédéric Rousseau, SKF

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