Metrology challenge
Micro- and nano-scale structures

The development of a micro standards infrastructure is critical for manufacturers to interchange parts, packaging and designs - NPL - see page 28
Selecting a force tester has never been easier. Consider the innovative new ESM301 from Mark-10, with the industry’s only "build-your-own" feature configuration platform. The ESM301 lets you pick and choose only the features you want, such as PC control, travel indication, programmable cycling, and more. Features can be selected at time of order, or activated in the field at a later date.

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**Force Tester**  
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September 2009

News and comment

Perceived quality
Quality is in the eye of the beholder - manufacturing variation simulation and visualization software help GM Opel/Vauxhall's Insignia win Car of the Year 2009 award

Data management
Measurement data available anytime, anywhere at the VW engine works in Chemnitz, Germany.

Turbo charged inspection
Leader in five-axis turbomachinery production, TURBO-CAM, has adopted the five-axis Renishaw inspection system to achieve faster throughput, big programming reductions and greater CMM utilization.

CMMs

Nano and micrometrology

Optimal quality at BMW
BMW Group has made an euro 170 million investment in the future with its advanced Aerodynamic Test Centre in Munich.

Testing quality in India
Electronic product testing and quality - the key to electronic product development in India. By Prasad Bhatt – vice president, Product Engineering Services, Wipro Technologies.

Metrology for nanotechnology
The development of a micro standards infrastructure is a critical for manufacturers to interchange parts, packaging and designs. By Richard Leach, Engineering Measurement Division, National Physical Laboratory.

Straining to get it right
The new standard ISO 6892-1 : 2009 will improve the reproducibility of test results obtained from a tensile test on metal. Closed loop strain control systems of testing machines will deliver results with a higher degree of confidence.

Environmental testing

Materials Testing 2009 preview
Materials Testing 2009, in Blackpool, is the industry's premier event for NDT technology with a comprehensive exhibition and conference organised by the British Institute of NDT.

NDT & NDI

Testing products

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www.qmtmag.com
Editor’s comment

First impressions count - whether its a job interview, house or car purchase. Those first few seconds very often determine the fate of an individual and the success (or failure) of a transaction. It’s a gut feeling approach to life which is subsequently confirmed by facts and figures. We look for precisely those facts and figures which serve to reinforce our decision, validate our emotional judgement.

When it comes to purchasing a product, such as a car, this emotional judgement is critical. One of the things we look for is beauty - how good does the car look, how much will we enjoy the look and feel of sitting in a prized possession of, say, an Aston Martin or a BMW? Glossy magazines have pages of very expensively produced on-location shots, TV adverts spare no expense and car company literature ooze quality. Perception of beauty is the key to brand identity. Visibly high quality is an important differentiating factor because it is used in the overall design and development process. This made it possible to achieve the highest possible perceived quality in the final vehicle without negatively impacting its development and manufacturing costs.

Enjoy your read.

Brendan Coyne
Editor, QMT

Norbar wins Coutts prize for family business

Norbar Torque Tools, from Banbury, has been named Best UK Family Business in the £5-25m turnover category of the Coutts Prize for Family Business 2008/9. They were in competition with knitwear manufacturer John Smedley and specialist pharmaceutical and medical supplies distributor Durbin Plc at the national finals held at the Coutts headquarters on the Strand in London.

Established in 1942, Norbar as a third generation family business became the first company in Britain to commercially manufacture a torque wrench. Norbar now employs 200 people in Banbury, with a further 90 staff within its sales companies overseas.

The Coutts Prize recognises firms in three categories (£1m-5m, £5m-£25m, £25m+) that demonstrate a combination of high standards of family governance and corporate governance, a competitive market position, consistent financial growth, and a track record of charitable giving or involvement in local community.

www.norbar.com
www.coutts.com

People

James Barnes has been appointed as exclusive sales representative for Verisurf Software for the UK and Ireland.

www.verisurf.com
info@verisurf.com

Brendan Coyne
Editor, QMT

Continued on page 5

320kV Micro-CT system.
Located at the Materials Science Centre at the University of Manchester, the Henry Moseley X-ray Imaging Facility houses a suite of five computed tomography (CT) systems.
Researchers will be able to examine a wide range of materials, from micron-sized biological samples to heavy engineering components. Biological events, degradation

Continued on page 5

The Henry Moseley X-ray Imaging Facility recently took delivery of a powerful and highly accurate custom Metris

320kV Micro-CT system.
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Researchers will be able to examine a wide range of materials, from micron-sized biological samples to heavy engineering components. Biological events, degradation

Continued on page 5

The Henry Moseley X-ray Imaging Facility recently took delivery of a powerful and highly accurate custom Metris
processes such as corrosion, or crushing of materials can be monitored in a non-invasive way. Imaging equipment is supported by a suite of powerful workstations for the off-line reconstruction and visualization of data.

Prof Phil Withers, founder of the new facility said: “From a series of 2D x-ray images we can construct 3D ‘pictures’. This facility enables us to study how things evolve over time, either naturally or under a range of loads, temperatures or other stimuli. It is bringing together scientists and engineers from many disciplines to see things behave at a level of detail not previously possible.”

www.metris.com

**Mantech to represent Werth in UK**

Mantech Sales Ltd has won the contract to distribute Werth Messtechnik GmbH’s dimensional measurement machines in the UK. Mantech say they have already secured orders of £1.4 million euros, which includes the sale of a Werth Tomoscope CT scanner.

Email: Paulnnash1@aol.com

www.werthmesstechnik.de

**Advanced manufacturing support package for UK launched.**

“The UK not a post industrial society,” said Lord Mandelson at the launch of a £151 million package of support for advanced manufacturing announced on July 28th. The secretary of state for Business, Innovation and Skills, BIS, pointed out that the UK had a (fractionally) larger manufacturing sector than that of France, commonly regarded as a strong manufacturing nation and is ranked sixth in the world by measured output. Lord Mandelson said the UK is particularly well placed as a leading exporter of hi-tech goods with 25% of exports defined as high-tech compared to 22% for the USA, 15% for France and 115 for Germany.

Building on the 2008 Government’s Manufacturing strategy and the New Industry, New Jobs strategy of April 2009, the Advance Manufacturing initiative includes £45 million of funding to Rolls-Royce, part of a £300 million investment by the global company. Four new advanced manufacturing facilities are to be built in the UK – three in aerospace and one civil nuclear - creating and sustaining around 800 jobs.

Additionally, there is a provision of £45 million from the low carbon element of the Strategic Investment Fund to support research and technology critical to the development of low carbon aircraft engine technology. This will be led by Rolls-Royce who will invest a further £45 million.

Another key element of the support package announced is a £40+ million investment in SAMULET Research and Technology programme – a collaborative aerospace project focussing on productivity and environmental improvements – with £28.5 million from the Technology Strategy Board, £11.5 million from the Engineering and Physical Sciences Research Council, and further support under discussion with regional bodies.

Other elements include:
- £12 million expansion of the Printable Electronics Centre in Sedgefield which focuses on display technology, creating up to 1,500 jobs by 2014;
- The Technology Strategy Board will invest a further £5 million in collaborative R&D projects as part of its High Value Manufacturing competition, in addition to the £24 million invested earlier this year.

NDS.BIS@coi.gsi.gov.uk

**EVENTS**

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**£1.4 million investment in optical metrology**

Loughborough-based Phase Vision has secured funding of over £1.4M for investment in 3D optical metrology based on structured light. The funding was lead by Octopus Ventures, with the Lachesis Fund (and others) also participating. Assistance was provided by Connect Midlands.

The company’s products are 3D measurement systems using a non-contact structured lighting technique, originally developed at Loughborough University. “Our systems provide data to control manufacturing processes accurately and rapidly, saving money, energy and scrap,” explains CEO Ralph Weir, a veteran of several VC-backed start-ups. Weir continues; “We’ve effectively mastered the use of broadband light for measurement, which brings the same gains that broadband brought to the internet. With this well-proven technology at our core, we now also have the investment to build our production and sales organisations to create a real world leader.

Phase Vision’s product is currently in beta trials at several sites in the UK, and will be more widely available later in the year.

www.phasevision.com
The dimensional management team at GM Europe's International Technical Development Centre used Icona Solutions' manufacturing variation simulation and visualization software, aesthetica, to help it achieve high perceived quality at the same time as cutting development time and costs.

In October, 2008, the 59 senior motoring journalists from 23 European countries who make up the jury for the annual European Car of the Year (COTY) awards chose seven finalists from a total of 37 contenders for the latest awards. After the points allotted by the jury during the final round of judging had been counted, the Car of the Year 2009 award went to the brand new Opel/Vauxhall Insignia from GM Europe. The Insignia gathered a total of 321 points, beating the new Ford Fiesta into second place by the narrowest of margins and the Volkswagen Golf VI into third place.

An important contributor to the winning of this award was the high perceived quality of the Insignia. Perceived quality is a key component of brand identity. It describes the first impression a customer gets regarding the look-and-feel of a product, without regard to its functionality. Visibly high quality is an important differentiating factor.

Perceived quality

Quality is in the eye of the beholder - manufacturing variation simulation and visualization software help GM Opel/Vauxhall’s Insignia win Car of the Year 2009 award.

Very early in the development process the target specifications could be defined based on realistic images.
Total quality control solutions where you need us most – everywhere!

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because it is used by potential customers to decide which products and brands they will consider for purchase.

Key to GM Europe’s success here with the Insignia was the use they made of advanced manufacturing variation simulation and visualization software during the car’s development. Known as aesthetica and developed in the UK by Icona Solutions, the software was used from the early concept design stages of the project, enabling the various design, engineering and manufacturing disciplines involved in the project to understand the manufacturing constraints and to agree on gap and flush conditions and manufacturing tolerances as early as possible in the overall design and development process. This made it possible to achieve the highest possible perceived quality in the final vehicle without negatively impacting its development and manufacturing costs.

Dimensional management
Ten years ago, as part of its focus on quality, innovation and affordability, GM Europe created the dimensional management department at its International Technical Development Centre in Rüsselsheim, Germany.

The International Technical Development Centre is at the heart of engineering for GM Europe. Within it, the dimensional management department, led by Edgar Lossnitzer, who has defined the new perceived quality processes, is responsible for the management of tolerances over the entire vehicle development cycle.

Dimensional quality is already defined at Opel at the start of a project in a tracking schedule known as the dimensional technical specification (DTS). Dimensional quality is tracked during the entire development cycle, all the way to production. In the DTS, all gaps and offsets visible to the customer along with their nominal values and allowable deviations are specified.

Nevertheless, one of the problems faced by the company was that too many gaps were falsely interpreted through the tolerance simulation. This often led to controversial discussions in the DTS setting meetings, as well as in follow-up meetings, until a physical model could be produced for review. This costly and time-intensive process resulted in agreements and decisions being made late in the process, with the result that there were often additional costs involved in implementing the required design changes.

With a view to overcoming this problem, Lossnitzer and his team set out to fully investigate how, or if, 3D visualization software could help in the dimensional management process for the Insignia programme. This brought them into contact with Icona Solutions, developer of the innovative manufacturing variation simulation and visualization software solution, aesthetica, and Icona’s business partner in Germany, Casolute.

Icona Solutions’ aesthetica software applies tolerances and component deformations directly to the product’s 3D CAD geometry. These 3D models can then be visualized, in real time, using different light sources, colours and materials. This is unlike traditional visualization software, which can only visualize a virtual product in its perfect,
as-designed nominal condition. With aesthetica, a realistic representation of the vehicle as it would appear at various points within the range of assigned tolerances can be produced at a very early stage of the vehicle development. This enables perceived quality reviews to be carried out, in which fit and finish problems can be spatially represented in real time and solved immediately.

Perceived quality studies
When Opel made the decision to implement aesthetica they were at the very early stage of the development of the Insignia. Superior design, vehicle dynamics, safety and comfort, as well as superior aerodynamics and appearance (gap and flush) were all expected from this vehicle.

With the introduction of aesthetica, design review meetings were routinely carried out in a virtual reality (VR) room in order to show the meeting participants the three dimensional model without it being necessary for any physical models to be built.

aesthetica can be used in every phase of the development process to accurately and visually present the influence of tolerances on perceived quality. The parameters used for the simulations are based on the design and manufacturing data, including the material, fastening scheme and the tolerances. Complex deformation effects such as arching, bending and distorting are represented, thereby allowing the root cause of problem areas to be identified. These parameters can be changed freely to enable all possible solutions to be tested in order to achieve the highest possible quality in the final product.

The first use of aesthetica on the Insignia project began at the early concept stage. As soon as the first styling data was released, the first aesthetica models for the interior and exterior were generated. From this point the digital model would be continuously updated to accommodate styling changes and/or the development progress. This process continued through the Design & Validation phase up to the final Confirmation and Improvement phase.

Early engineering used the digital models in order to visualize the effects of the different tolerances and if necessary, to kick off changes at a time when the cost of change was minimal. aesthetica made it possible for the calculated variations and their effects to be visualized in 3D. Alternatives could be brought directly into the aesthetica model and the effects of technical implementations could be shown immediately in the 3D representation.

For the interior the concentration was placed, above all, on the area visible to the driver and passenger in order to allocate the priorities for the tolerances in this area. This allowed areas that are
difficult to see or aren’t seen at all to be used to compensate for build tolerances. Overall, additional attention was given to “forgiving design” in which design elements and their optimizations were evaluated in 3D in the VR room before being implemented in physical products.

In the concept phase of the new vehicle development process it was crucial to include key stakeholders in meetings in order to present the new product, as well as all tolerances and the effects of those tolerances. As a result, very early in the development process the target specifications could be defined based on realistic images. Decisions were able to be released for product development simultaneously, thereby avoiding future surprises, because agreements were more quickly obtained.

In order for discussions in the VR rooms to be completed as efficiently as possible, a type script was generated beforehand. With this, the area of the vehicle, perspective, material combination and light sources for the visualisation were defined and stored in aesthetica. As a result, every condition could be quickly reconstructed. The new points and desired notes from the meeting could also be directly entered and stored in the same manner. This allowed new ideas to be discussed immediately and either pursued, or rejected, partially eliminating the need for physical models and resulting in cost and above all, time savings.

Depending on the phase of vehicle development, different goals were pursued in these meetings. Here the 3D visualization capabilities of aesthetica were indispensable because, in the absence of a physical vehicle, no conclusions could have been reached otherwise. This was especially so in areas of the vehicle in which many components interface with each other, for example on the boot (trunk) lid and the front end of the vehicle, as well as the area where the dashboard and door trim meet. In the development of the Insignia Sports Tourer, this area was investigated with aesthetica and its “Gap-/Flush-Fitting tools”. Using this, different possibilities for gap and flush could be judged until an image representing an optimal combination could be found.

In the later Design & Validation phase of the development process attention was always geared towards the calculated gap and flush dimensions. The results of these calculations were based on the assembly processes, component geometry, component tolerances and assembly tolerances. For visualization, separate interior and exterior models were required because the development phases started at different times.

As a rule only partial models were generated in the interior area. These models included the front door trim, instrument panel and the Centre console. In order to observe these areas from the viewpoint of the driver and/or passenger, information from the RAMIS human models was also used in these models. Additionally, within the aesthetica model, rotation points were set in the position of the eyes in order to evaluate the view in all directions. With this, sensitive areas could be identified and the required focus could be applied to the resulting images. Moreover, this avoided a situation where certain areas were defined as problematic as a result of being evaluated from unrealistic views.

In the exterior area, the tolerance calculations that were categorized as critical were visualized on the Powerwall in the VR room using the “Gap-/Flush-Fitting Tools” of aesthetica and presented to the decision makers. This provided a great advantage because the meeting participants easily could see how large the adjusted gap dimensions were.

As the models became more advanced further attention could be applied to elements such as visible structural items like screws, rivets or ribs within the gap, clip connections of components within the visible area, visible sub-materials such as sealing foam or glue, and elements visible through transparent components such as headlamps. This all helped to improve the overall visual appearance, or perceived quality, of the final vehicle.

As a business that has actively integrated dimensional engineering into the vehicle development process for more than 10 years, Opel was looking for a tool to support decision making. Icona Solutions’ aesthetica software was developed as a visualization tool that enables vehicles to be developed in a cost efficient and effective way. Although some people were initially critical of the high investment needed for the software and 3D visualization on a Powerwall, once it became clear how easily concrete decisions could be made, they were convinced of the value.

Communication of necessary changes to management has improved, decisions are made faster and as a result, development costs are saved. Considerable resources have been saved by eliminating the need for physical validation models, which together with the time savings have more than compensated for the acquisition costs of the software.

Since introducing aesthetica into Opel, there have been no more long-winded and time-consuming discussions regarding a few tenths of a millimetre.

www.iconasolutions.com
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Email: metrology-sales@zeiss.co.uk
Website: www.zeiss.co.uk/metrology
Measurement data available anytime, anywhere at the VW engine works in Chemnitz, Germany.

Precision measuring is the first step in displaying the quality of workpieces. The second is the seamless documentation and effective management of the measured values. The VW engine works in Chemnitz selected the Master Control Centre (MCC) from Carl Zeiss for the effective and reliable management of measurement data. This data is now available anytime, anywhere.

Without digital capture and documentation, the amount of paper would increase proportionally to the number of measuring machines. This is how it was in the past at the Volkswagen factory in Chemnitz, “because we worked with printed measurement logs,” says Matthias Kurth who is responsible for measurement planning. This was before the MCC was installed, which features a Measurement Log Archive, Production Data Acquisition (PDA) and Onboard Diagnostics software modules. Now, anyone with the proper authorization can access all data available on the MCC from their computer.

The developers at Carl Zeiss have matched the software modules to the requirements of everyday use. However, every now and again, modifications may be required by the user. This is where the modular concept comes into play. “We used a modular design for the MCC to enable us to (relatively) easily implement customer-specific modifications,” says Wolfgang Thaler from Carl Zeiss 3D Metrology Services.

A glance at the VW engine factory in Chemnitz provides a good example of everything the MCC and its modules are capable of: all authorized personnel can access the measurement log database on the central data pool. Long-term documentation is also available. The management function enables not only professional data backup, but also traceability of all measurement plan modifications. All measurement plans for all measuring machines are saved in the measurement log database and approved for volume use. This guarantees that only approved and up-to-date measuring programs are used.

The PDA and OBD software modules provide an effective measuring machine management system. It is now possible to access the operating status of each machine. This allows the user to monitor not only the temperature gradients, but also the level of utilization, which is an important criterion in measurement planning. Additionally, a knowledge database, which ensures the centralized provision of operating manuals and general metrology know-how, was set-up. This is based on the existing MCC data. The new systems enabled the VW factory to meet the increased demands of highly flexible production without additional personnel expenses.

www.zeiss.de
TURBOCAM is a preferred supplier of both production and prototype bladed parts to aerospace, automotive and industrial turbomachinery OEMs. Constantly changing surface geometries, pin-wheeling shapes and tight, intricate features make turbomachinery components—impellers, blades and blisks—some of industry’s most complex and exacting shapes. TURBOCAM International achieved leadership in this specialized field by mastery of five-axis machining and five-axis programming software.

However, efficient inspection of ever increasing numbers of complex parts was frustrated by slow, tedious, stop-and-go measurement inspection on a legacy 3+2 axis coordinate measuring machine (CMM).

Changing 3-D part geometries required many different probe orientations, plus frequent stylus and tip changes for difficult to reach features, explains Dave Romaine, quality assurance manager. "We would have to stop the CMM and calibrate each re-orientation of the probe. That was compounded as we inspected multiple blades around a part."

As five-axis experts, TURBOCAM staff were quick to see the potential of a scanning system from Renishaw that makes possible automated, programmable five-axis measurement at speeds and accuracies never before possible by CMMs. The Renscan5 scanning system offered the capability for continuous five-axis interpolated motion, transforming part measurement and inspection from a bottleneck to an enabler.

Leader in five-axis turbomachinery production, TURBOCAM, has adopted the five-axis Renishaw inspection system to achieve faster throughput, big programming reductions and greater CMM utilization.

Renscan5 transformed part measurement and inspection from a bottleneck to an enabler.
comparable to TURBOCAM’s five-axis machine tools.

In January 2007 TURBOCAM became one of the first adopters of the new Renscan5 continuous five-axis inspection capability. Installed on a new Wenzel LH8.10.7 bridge-type CMM at the company’s Dover, New Hampshire, USA plant, Renscan5 transformed part measurement and inspection from a bottleneck to an enabler. High-speed continuous probing routines are reducing programming time, set-up time and measurement time by 50 percent and more. Besides faster throughput, Renscan5 time-savings allows the taking of many more data points for greater measurement precision and frees up CMM time for qualification of turned blanks and in-process checks before final machining passes.

Those advantages led TURBOCAM in early 2008 to become the first company worldwide to add a second Renscan5 CMM, a larger Wenzel LH10.12.8, this time at a new facility in nearby Barrington. In this new facility, Renscan5 is an “essential resource” says Romaine, that is being developed to support higher-throughput production generated by around-the-clock, reduced-staff manufacturing.

High speed measurement
Renscan5 uses two patented hardware breakthroughs to speed part checking, generate more data points for analyzing part form, and increase available CMM run time.

Active probe head
Named REVO-, a powered head provides infinite positioning capability between simultaneous coordinated motion in vertical and horizontal rotary axes. This allows the low-mass two-axis head, a 3-D measuring device in its own right, to perform most of the motion during inspection routines. Infinite positioning allows continuous motion, optimizes part access, and delivers high accuracy part measurements. The active head avoids dynamic errors caused in rapid acceleration/deceleration of the larger mass of a CMM structure. Low-mass, low-inertia design allows Renscan5 to measure at up to 500 mm/sec versus conventional CMM scanning that is typically limited to 5-15 mm/sec to avoid dynamic errors.

REVO repositions continuously on the fly, simultaneous with measurement, unlike indexing heads which first must be locked into position, after which the CMM provides the measuring motion. On complex parts, says Romaine, “Hundreds of calibrations have now been eliminated, saving us hours of calibration time.”

Renscan5 allows the CMM’s three-axis platform to be used primarily to “rapid” the REVO head into position for measurement. Where CMM motion is required for a measurement routine, it can usually be limited to a single linear axis and performed at constant velocity, minimizing dynamic effects.
on accuracy from acc/dec and inertia.

**Laser-corrected probing**

REVO employs industry’s first laser-corrected “Tip Sense” probing. A laser mounted within the head sends its beam down a hollow stylus to a reflector at the tip. The return beam is received by a position sensor and any deflection is used to calculate true tip position. This allows REVO to perform a complete part inspection routine in a continuous operation without recalibration or stylus changes. “Only one probe is typically used to measure an entire part with no tip change time,” says Romaine. Tip Sense probes deliver 1 micron accuracy at 250 mm from the axis of rotation. Sizes are available providing probe reach to 500 mm.

While the previous 3+2 axis CMM at TURBOCAM provided a two-axis head, vertical changes in probe angle could only be made in 2.5 degree increments, then calibrated and fixed at the position for measuring. “As we inspected more blades around a part, such as a blisk, it would obviously require more and more probe orientations and calibration. Programming, access, stylus change, and calibration were incredibly painful,” notes Romaine.

**Confidence in blade geometry**

TURBOCAM uses Renscan5 for both point-to-point probing to verify feature location and size and for contact scanning of part surfaces for shape and form data. “On point to point we are able to gather more data simply because the head can orient to any angle and it’s a very simple set-up to get more points,” says Romaine.

Renscan5 high-speed scanning greatly increases data points. “Previously we might collect 50 or 100 points spaced over a blade,” he says. “Now we can collect hundreds or thousands of points with a scan.” In scanning mode, the probe moves continuously, adjusting to programmed changes in part geometry. REVO gives TURBOCAM up to 4000 points/sec in scanning mode.

“Increased point data allows us to see a more complete picture of what we’re manufacturing,” says Romaine. “We can see deviations better as they increase and decrease along a blade or around a part. This lets us better trouble-shoot our manufacturing process.” As example, he notes that TURBOCAM has been able to detect tooling breakdowns based on Renscan5 surfacing data.

Helping to reduce measurement time for higher...
utilization, the Renscan5 system includes a UCC2 universal CMM controller with patented MoveScan™ software that synchronizes, smooths and speeds motion between the CMM and the REVO head. MoveScan drives the probe to the surface of the part in the shortest distance by looking ahead to go-to points and blending moves into smooth, continuous motion.

Reduced programming times
Parts inspected on the CMMs range from small impellers just 2" in diameter to 36" diameter, multi-vane components. TURBOCAM produces more than 400 different bladed part designs a year for compressor, turbine and pump OEMs.

Just as important as the inspection advantages, stresses Romaine, “are the programming benefits. This has been exciting. We’ve been able to apply our five-axis machine tool programming methods to drastically reduce programming time for five-axis inspection. This is only possible because of the infinite indexing of REVO and its programmability through the I++ DME protocol.”

Renscan5’s I++ interface gives the UCC2 controller cross-platform compatibility with measurement software packages and maintains user choice of CMM and software. On complex parts such as blisks (integral hub and blades machined from a monolithic blank), notes Romaine, “What used to take three days to program now takes three hours. The biggest time savings have come in programming and set-up, even more than run time.”

The ability to apply five-axis programming expertise makes it much easier and faster to provide programs for part inspection, increasing machine utilization for a wide range of parts, he says. While Renscan5 integration is still evolving, he estimates the CMM utilization has already increased between 30 and 50 percent.

By automating and simplifying inspection, Renscan5 has changed not only utilization, but also uses and users of CMM inspection, according to Romaine.

First, it greatly reduces need for operator intervention in changing probe orientation. “This has been a big benefit and is definitely one of the selling points of the machine,” he says. Second, the simplicity of Renscan5 in conjunction with the CMM software makes it possible for machinists and operators to directly measure in-process parts without the need for an inspector to run the CMM. “They simply need to put the part on the table and call up the appropriate program,” he says. “We do inspections of turned blanks and perform in-process check before final machining passes,” he notes.

www.renishaw.com
CMMs

**Aerospace - biggest Metris CMM ever**

A leading aerospace manufacturer recently took delivery of one of the widest ever bridge style co-ordinate measuring machine (CMM) manufactured in the world. CMM manufacturer, Metris, developed the gantry CMM with a measurement volume of 6m x 6m x 3m, to run geometry verification on large aerospace components and assemblies.

The gantry style CMM performs with an accuracy of 5 microns, which is achieved by the use of ceramic guide ways for the beam and spindle components. Ceramic is an ideal material for metrology because it offers the ultimate in stiffness combined with low weight and excellent thermal properties. Used in combination with double air bearings that prevent torsion, this ceramic Metris LK gantry CMM provides high and long-lasting measurement accuracy. In its final location, the granite rails will be positioned on a purpose built ‘U’ shaped concrete foundation in order to provide the 3m vertical measurement range.

Intensive collaboration with the customer enabled Metris to determine the final configuration and build the LK V 60.60.30 GP to match the customer’s application needs. www.metris.com

**Hexagon Metrology unveil a new product line - Standard Gage.**

Hexagon’s Standard Gage range comprises of traditional measuring instruments such as callipers, micrometers, bore gages and indicators. Hexagon say the range will expand to include products in the fields of contact and optical measurement, with the first being a vision machine, the Visual 250. Already shown

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at Control Exhibition in Germany and Subcon in the UK. Hexagon say the Visual 250 is low cost entry system retailing in the UK at about £8K.

Standard Gage products are manufactured mainly in Asia. Each instrument is delivered with a control certificate, proving its conformity to technical specifications.

Hexagon say the Standard Gage line fills the gap between low-cost products with an uncertain quality, and Premium class instruments, such as those available from TESA.

www.standardgage.com

High speed surface measurement

Following the acquisition of Steintek GmbH, Wenzel Group has launched a high speed measurement and digitizing System (photo below).

The system is based on the Wenzel Steintek white light sensor, with a high precision swivel head for sensor positioning and high precision rotary table for part positioning. Suited to a production checking role in a workshop environment, the high speed system achieves 180 points per minute in point measurement mode and in scanning mode, 4,200 points per minute. This translates to 3 minutes measuring time for 10 aerofoil sections, including axis alignment and reporting, for example.

This is a non contact white light solution and makes measurement of soft, sensitive or rough surfaces possible. A range of surface finishes are easily handled with no coating required. These include shiny, rusty, black, white, machined or polished surfaces.

Applications include the measurement and reporting of turbine blades, nozzle guide vanes and blisks - any component that require surface measurement or digitizing.

www.wenzel

Heavy duty console-type CMM

Hexagon Metrology’s DEA

BRAVO C (Console Version) horizontal measuring machine builds on the its BRAVO HP and BRAVO HD line. The BRAVO C is a cost-effective solution for flexible and accurate dimensional inspection of thin-walled components, ideal for mid-size parts in industrial environments. The guideways located on the side of the machine base (Console architecture) allow the arm to be moved fully outside of the working area. This allows for optimal access to the work area for simple part loading/unloading operations. The cast iron machine table features the exclusive three-point support system, which eliminates the need for costly dedicated foundations, and makes the installation on vibration dampers easier.

The BRAVO C offers a measuring range from 3000 to 5000 mm (X axis), 1400 or 1600 mm on the Y axis and 1600, 2100 or 2500 mm on the Z axis.

New version of Delcam’s PowerINSPECT inspection software

Delcam has launched a new version of its PowerINSPECT inspection software for checking the dimensions of parts, prototypes and tooling against CAD data. The new version includes a range of enhancements to make the software easier and more flexible to use.

The most obvious change in the new version is a completely new interface for undertaking “simple” measurements. This will make it much easier to undertake basic tasks, such as measuring the distance between two points or two planes, or the centres of two circles, or checking the thickness of a section.

It has also been made easier to add or delete points during an inspection from a set of measurements defining any feature. Points might need to be added to collect extra data from a suspect area, while “rogue” measurements can be deleted to prevent them affecting the overall inspection result.

www.delcam.com

Economic fixturing for non-contact scanning parts

NVision Inc. and FixLogix LLC have partnered to provide a new easy-to-use and economical modular part-holding system designed especially for non-contact scanning. The FixLogix part-holding system uses a t-slot fixture plate with integrated components to stage the part on the machine. The t-slot plate has a clamp edge around the perimeter, allowing easy lock-down with toe-clamps. New “near zero” force clamps feature an innovative self-wedging design ideal for trapping soft or fragile parts without distortion. The FixLogix modular part-holding system provides multi-axis infinite positioning of locating components, which simplifies fixture construction. The frame is laser engraved with reference scales along the T-slots, providing clear documentation of the fixture setup for easy repeatability. The modular part-holding system works equally well with optical scanning systems mounted on gantries and portable coordinate measuring machines (CMM).

NVision provides the FixLogix modular part-holding system as part of a complete package with their non-contact optical scanning systems. These include the NVision HandHeld scanner, MAXOS,
and MobileScan.
E-mail: sales@nvision3d.com.

Replaces portable arm CMMs?
The Opti-Probe, from InspecVision, is a new vision system which aims to super-
sede CMM arms in both capa-
bility and cost.
The Opti-Probe (photo above) is a light weight portable CMM which uses a
hand held probe in conjunc-
tion with a very high resolution camera. The hand held probe has markers which are imaged
and located by the camera.
The image is then downloaded to a computer which then cal-
culates the 3D location of the device, allowing measure-
ments to be taken.
This arrangement has signif-
ificant advantages over tradi-
tional CMM arms. It has no
moving parts and is therefore
robust and flexible; it can be
used in a factory environment.
Accuracies quoted for the sys-
tem are up to 30 microns.
It is very easy to use (no bulky
and fragile arm to consider)
and can be fully recalibrated
on-site with little training.
The Opti-Probe can be used to
measure large or small vol-
umes, from 1 m³ to 50m³ and
is extremely competitively
priced, with prices starting at
around £10 000
www.InspecVision.com

Formidable tracker
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with the Leica Geosystems
PowerSearch module, the Leica
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ance is formidable.
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nology has been designed
from the ground up for this
new sensor. Based on Piezo
technology, the direct drives
enable high speed motoriza-
tion and acceleration, at up to
4x the previous generation,
but still allow sub micron level
fine positioning. This technolo-
gy has very low power con-
sumption, requires almost no
maintenance and is nearly
silent.
www.leica-
geosystems.com/metrology
PORTABLE CMMs

Robot calibration - limitations of fixed CMMs overcome

A Faro Gage speeds up robot calibration and measurement at Parallel Robotic Systems, PRSCO. PRSCO designs and produces high precision positioning systems for use in a wide variety of applications such as industrial, biomedical, simulation, and water jet cutting. Headquartered in Hampton, New Hampshire, USA, PRSCO’s 6-degree of freedom robots are based on a Stewart Platform or Hexapod (six-legged) system. This offers high load capacity and range of movement while maintaining a high degree of precision and repeatability. These devices are used to provide effective solutions to difficult motion problems, to eliminate errors in automated welding lines, and to advance testing in bio-mechanical research.

When building Hexapod robots, there are six spheres attached to the Hexapod’s table and another six attached to its base. It is critical that PRSCO accurately locate each sphere’s centre. The distance of each sphere’s centre to a reference point and plane and the lengths of the struts that connect each sphere must be precisely measured.

Using a stationary coordinate measuring machine (CMM) provided accurate measurements, but acquiring one large enough for their needs wasn’t economical. Some robots are so big, in fact, that even outside metrology services weren’t an option because of limited local availability and the high cost of transportation. The bottom line: PRSCO couldn’t qualify their robots’ performance conveniently, efficiently, or economically using fixed CMMs.

The FARO Gage-PLUS proved to be the solution that gave PRSCO the features and benefits not found in fixed CMMs. The Gage provided the needed accuracy of up to .0002” (.005mm) – without the need for regular calibration as with fixed CMMs – and is much more efficient and user-friendly.

With the Gage, PRSCO can now see an actual representation of the behaviour of their Hexapods’ moving tables and can compare geometric characteristics between features. They use the Gage in their calibration phase and in their qualifying procedure, both of which are required for every robot.

R.O.I.

"Typically, it took about six hours to calibrate each robot using outside resources, including travel time," said engineering manager, Andy Chui. "With the FARO Gage, this has been reduced to one hour and we can re-measure the parts anytime we want. In my opinion, the convenience is priceless when we must have something measured immediately."

On occasion, customers request robot re-calibration changes be made on-site at the last minute. Without the Gage, the entire robot would have to be removed from its mounting structure and sent to a CMM large enough to perform the measurement. The portable FARO Gage eliminates that burden.

www.faro.com
**MICRO & NANOMETROLOGY**

**Improved observation and imaging**

The Nikon LSI inspection microscopes, Eclipse L200N and L200ND, build on the high resolution and precision of the Eclipse L200 and L200D series. The L200N and L200ND offer improved observation and operating performance, providing images with greater contrast and higher resolving power. Used independently or in combination with wafer loaders, the L200 series performs precise optical inspection of wafers, photo masks, reticles and other substrates.

Featuring an ergonomic design, main controls are located at the front of the base for easy access, allowing stage movements and focusing to be carried out with ease and minimising fatigue during lengthy observations. A tilting trinocular eyepiece tube enables observation at optimum eye level to ensure a comfortable viewing position. Quick and easy microscope operation while viewing samples is possible. The L200N series allows easy and accurate focusing on low-contrast samples, such as bare wafers, simply by inserting a focusing target in the optical path. Up to six objectives can be mounted on the robust motorised nosepiece which also minimises image shifting even between high magnifications.

Control of the camera, peripherals and microscope are all integrated within NIS-Elements imaging software which offers high-quality advanced image acquisition, processing and analysis. Easy USB connection offers high-speed data transfer.

**Optical profiling system based on spinning disc**

The Veeco Confocal Metrology (VCM) Optical Profiler Systems provide a compact and easy-to-use non-contact metrology solution for applications requiring data acquisition from steep slopes, high surface roughness, or beneath transparent layers. VCM Profiler Systems are based on spinning disc architecture and employ white light as the excitation source, enabling faster, more accurate and repeatable measurements than competing confocal systems.

“Veeco has a strong heritage of providing world-class, white-light optical profilers in a variety of configurations, from table-top models to fully automated production floor systems,” said Mark R. Munch, executive VP, Veeco Metrology. “Our new VCM confocal microscopes continue this tradition of scalable white-light optical instrumentation, providing our research and industry customers with a suite of metrology options for difficult sample requirements and a variety of sub-millimetre applications.”

Veeco’s VCM series of confocal microscopes allow for 150, 200, or 300 millimetres of travel, and can be configured for either manual or automated operation. The VCM System software has an optional stitching interface that makes stitching multiple data sets simple and automatic, providing high-resolution imaging of features requiring a larger field of view.

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**www.qmtmag.com**
Nanometric precision measurement of large complex parts

IBS Precision Engineering (IBS PE) takes the measurement of large complex parts to nanometre level with the introduction of the multi-probe ISARA 400 3D coordinate measuring machine (CMM). This has been achieved by increasing the measuring volume of its ultra precision 3D CMM by a factor of 40 to to 400 x 400 x 100 mm³ - a significant volume in view of the 45 nanometre (nm) 1D measuring uncertainty in all three directions.

Using three planar mirror laser interferometers, ISARA measures the position of an object on a table according to the Abbe principle (i.e., the functional point is in line with the measuring line to avoid errors in parallax). Positioned in one stiff frame with the probe, the three planar mirror laser interferometers have their virtual intersection point coinciding with the measuring point of the probe.

The product table - made from Silicon Carbide (SiC) for its stiffness and thermal stability - is placed on a mirror table that can be moved in X and Y directions over a granite plate using porous media air bearings. A monolithic block of Zerodur deposits the reflective coating directly onto three extremely flat surfaces to form the mirror block assembly which is directly connected to the machine and calibrated within it, allowing for both the flatness and the mutual perpendicularity of each mirror.

The metrology frame containing the three laser interferometers and the probe moves in the Z direction using air bearings, over a granite guiding surface. The interferometers always point to the centre point of the probe tip (fulfilling the 3D Abbe principle) while the metrology frame (also made from SiC) is stiff with no internal degree of freedom, avoiding the need for extra bearings.

The base frame consists of two granite guiding units - one for the XY system and one for the Z - joined to form a stable base frame. The air-bearing-equipped direct drives for all three directions are each mounted separately from the part they drive.

ISARA 400 is fully equipped for ultra precision performance and user convenience. Thermal shielding prevents measurement errors because of differences in thermal expansion. Three vibration isolators counter disturbances due to environmental vibrations while automated product handling prevents damage to critical parts that could be caused by manual operations. The machine comes with a separate Abbe probe alignment tool and a camera for measurement visualisation - especially useful during product alignment - in addition to dust protection and acoustic insulation.

IBS PE’s Triskelion ultra-precision touch probe will be initially implemented in the ISARA 400. Its design addresses the problems associated with most conventional probe systems: measuring uncertainty, probing forces and probe tip being too large. An AFM, a non-contact probe or optical probe, can also be implemented in the machine.

For all axes, the 1D measuring uncertainty is 45 nm, whereas the full-stroke 3D measuring uncertainty totals 100 nm. ISARA 400 can be used, for example, to measure large, free-form optic components. The large measuring volume, in conjunction with the automated product handler, allows the use of trays containing several products to be measured in one run. The ISARA 400 will be available by the end of 2009.

Email: info@ibspe.com; www.ibspe.com

Quantum leap for micro calibration

Bowers Metrology, UK agent for the Swiss Metrology manufacturer Trimos, has launched the Labconcept Nano range of ultra-accurate Calibration Machines.

Able to calibrate a wide range of gauges and measuring instruments, the Labconcept Nano can check internal and external dimensions fully automatically. All functions, such as the unit’s displacement speed, measuring force, probing movement, measuring carriage locking and temperature compensation are automatically controlled by advanced electronics. Every possible user influence is eliminated from the Nano’s findings, resulting in high levels of measuring accuracy and repeatability.

The new Trimos range consists of 3 machines with application ranges of 350 mm, 600 mm and 1100 mm. Maximum permissible errors are 0.07 + L(mm)/2000 with repeatability and resolution of 0.03 um and 0.00001 mm (0.0000004 inches) respectively.

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BMW Group’s new Aerodynamic Test Centre (ATC) claims to be the world’s most modern facility of its kind throughout the entire automotive industry. The ATC is designed to optimise the aerodynamic qualities of future models, allowing tests under very realistic conditions both in the large wind tunnel and in the Aerolab. ATC comprises a wind tunnel serving to analyse vehicles in their original size. To reproduce the most important effects and phenomena when driving on the road, the road surface is modelled through a simulation process using five rolling tracks.

A second wind tunnel, the Aerolab, allows the engineer to move the models tested from one position to the other by means of a control system operating in all directions above the world’s largest rolling road in a wind tunnel. This serves to analyse vehicle flow conditions under all kinds of circumstances, applying a concept already used for a number of years in motorsport. Now aerodynamics and driving dynamics may interact and be combined with one another in the development of production cars.

The permutations of scenarios available, as well as the precision of the test processes applied at the ATC, offer a standard unique for a facility of this kind, say BMW. Both wind tunnels, to mention just one example, are able to generate an air flow velocity of up to 300 km/h or 186 mph, for the first time providing exactly the right, correct physical conditions for the measurement of true-to-scale models.

In all, the BMW Group has invested some Euro 170 million in the construction of the Aerodynamic Test Centre and the facilities/equipment used. Over a three year period, the five-floor building has been constructed on a piece of land measuring approximately 25,000 square metres, or 6.2 acres, and which is located in the immediate vicinity of the Munich FIZ Research and Innovation Centre. The futuristic design of the Centre provides a clear hint, right from the beginning, that the technology inside is very special indeed.

Optimal quality at BMW

BMW Group has made an euro 170 million investment in the future with its advanced Aerodynamic Test Centre in Munich.
One example of this distinctive look and architecture is the round contour of the fan that provides the horizontally arranged air flow ring in the main wind tunnel and which is clearly recognisable on the southern side of the building. The vertical air flow ring for the model wind tunnel also stands out clearly in the centre of the ATC.

BMW's EfficientDynamics specialists used to work at no less than five different locations before moving into the new Test Centre, travelling up to 20 kilometres in order to work together in the wind tunnel. Now, by putting all these specialists together in one building, the BMW Group ensures direct contact with extremely small distances between the various specialists and has established new processes for highly efficient interaction and cooperation. In all, some 500 specialists in BMW EfficientDynamics will be working together in the new building.

Closer to reality.

By building the ATC, the BMW Group is giving even greater emphasis to the ongoing enhancement of aerodynamics as an essential cornerstone of the EfficientDynamics philosophy. Optimised aerodynamics have a direct impact on the car’s fuel economy and emission management, a reduction of air drag by 10 per cent offering the customer a reduction in fuel consumption on the road by more than 2.5 per cent – and even such an at first sight “insignificant” improvement is of great importance to the BMW Group as part of an overall package for the enhancement of efficiency.

The large wind tunnel in the new Aerodynamic Test Centre where car models are tested in their original size together with prototypes and production models, allows the most precise and realistic rendition of actual air flow conditions on the road. Here the flow of air generated by a fan measuring no less than 8 metres, or 26.2 feet, in diameter, after being diverted twice, acts directly on the vehicle held down in its measuring position. Thanks to the size of the measurement facility, the precise direction of air flow downstream of the fan and the nozzle opening of up to 25 square metres, or 269 sq ft, flow conditions are absolutely realistic and are not distorted in any way.

The wind tunnel comes with a special configuration of rolling tracks incorporating five different track sections. The wheels of the vehicle on the measuring track run on small rolling sections serving to simulate the actual rotation of the car’s wheels. These rolling tracks may be varied in width and length, and therefore adjusted to vehicles of various sizes. A wider track between the turning wheels serves additionally to render the flow of air beneath the car.

Using these five rolling tracks, the test engineer is able to determine the so-called flow-split, that is the share of air flow above and beneath as well as at the side of the vehicle, far more precisely than in a conventional wind tunnel.

The central rolling track may be varied in width, in accordance with the wheel track of the vehicle being examined. And measuring 10 metres, or almost 33 feet, in length, the central track also offers ideal conditions for simulating the changes in air flow typically encountered on the road. Ultimately, therefore, the development engineer can see exactly how the optimisation of specific details affects air resistance, the aerodynamic balance of the vehicle, as well as the supply and extraction of cooling air.

Maximum flow velocity in the new wind tunnel is 300 km/h or 186 mph. This allows realistic measurements also of racing cars travelling at high speeds.

The ATC is now able for the first time to render and analyse the interaction of a car with other vehicles, for example when overtaking, thus offering yet another new benefit in the development of production cars.

To-date, such tests could only be conducted on the test track with cars almost completely developed in every respect. Now, the knowledge gained in this process can be fed back into the development process much earlier, serving to effectively optimise a new model right from the start.
Looking at the electronic product development landscape in India today, we see that several industries have grown substantially in the last few years. As electronic product development in India expands, the opportunities thrown up for testing the quality of these products are immense. Testing labs in India are trying to address this need in the industry.

Considering the mobile phone industry in India as an example, the country added 15.4 million mobile subscribers in the month of January 2009. This has taken the total number of activated wireless lines to 362.3 million. And adding to this the country’s 37.75 million fixed lines, takes India’s total number of telephone lines to more than 400 million. When product sales volumes are this large, even minor quality issues in mobile handsets lead to large volume of field recalls resulting in a significant impact on the profitability of manufacturers.

Hence, the product needs to undergo quality testing in the initial design stage itself to ensure fewer respins. EMI/EMC (Electromagnetic Interference/Electromagnetic Compatibility) test as a part of quality testing comes into play at an early stage to ensure good EMI/EMC performance of the product. EMI/EMC test is also applicable to various other industries like automotive electronics, Avionics, Telecommunication, Industrial Automation etc.

Design for EMI/EMC compliance starts with a thorough survey of all applicable standards mandatory for the product in all targeted geographic regions. Owing to each standard having specific requirements, the consultant will need to identify the superset of different standard requirements and various testing needs. In the next step, the consultant advises on selection of components, to get the best EMI performance. However, there will be some tradeoffs, such as price, which need to be made to match requirements. As a next step, the consultant analyses the mechanical and electronic design and continuously monitors to see that the changes from reviews are imple-

Reliability of CFL improved 4 times due to increase in design margin in temperature withstanding capability.
mented. The consultant plans for testing software which could exercise worst case scenarios.

Here, module-wise activation and functionality help in debugging issues. During the pre-compliance tests, the consultant helps in planning the tests, interpreting the test results and finding suitable solutions to match the design team’s needs and constraints. EMI/EMC pre-compliance & final compliance tests are provided by labs, such as Wipro’s recently launched ‘Tarang’. The team here provided consultancy and testing services to a leading electric car manufacturer who was targeting to enter a new geographical market. The battery management system of the electric car was tested for the standards required in the new geography.

Design for Reliability practices are also implemented rigorously in electronic product design tools and processes prevalent in commercial and defence industry along with EMI/EMC testing. Prevention based techniques deployed by reliability consultants include Derating Analysis, MTBF Prediction, Reliability Block Diagram & modelling, FMEA/FMECA, Lead free – Reliability plans, Reliability demonstration plans and Life data analysis. Once the prototype is ready for appraisal based reliability validation, various reliability tests - environmental, shock, vibration, temperature cycling and life test are carried out. Reliability consultants can provide consultancy on entire life cycle of products from concept phase to maintenance phase.

To cite an industry example recently, when derating analysis was carried out on a high availability server product, it was found through detailed analysis that a few electrolytic capacitors were not meeting life requirement. If these were not identified during the early phase of design, thousands of products would have been under risk of recall after 6 to 8 months.

Another important aspect of product quality is assessed through environmental tests. These tests are significant for ensuring quality of equipment used in harsh environment, such as telecommunication equipment. This equipment needs to endure installations in harsh weather and external conditions with fluctuations in temperature, humidity and altitude. This requires them to be tested in Thermal and Altitude chambers in a lab.

Similarly, HALT or Highly Accelerated Life Testing resulting from Design study and bug identification can help bring out high quality products and reduce product recalls. Recently, an Indian CFL (Compact Fluorescent Lamp) manufacturer saw field returns of its CFLs in large numbers. This was diagnosed as a design problem by testing lab consultants after a study phase. Consultants then put the product through Highly Accelerated Life Testing after a design review. Reliability of CFL improved 4 times due to increase in design margin in temperature withstand capability. Wipro’s Tarang, which houses India’s first HALT chamber, is equipped to conduct reliability testing of products. It can simulate harsh environmental conditions with temperature ranging from +200 deg C to -100 deg C (with ramp rate of 60 deg/min) along with maximum vibration level of 50 Grms.

Design for safety reduces the design cycle time by eliminating probable design issues before the product undergoes safety compliance test. Compliance test for safety to meet global product marking requirement (example UL, CSA etc.) is mandatory before a product is sold in that country. Design for safety review mitigates possible failure due to shock, fire, radiation, energy, mechanical hazard and provides appropriate solutions to enable the product to meet standard requirement like UL/EN 60950, 60601, 61010, 60065 etc.

Safety consultancy also includes providing guidance for component selection to meet UL, CSA TUV/VDE Standards and approvals. To cite an industry example - a particular product of a global Consumer Electronics organization offering integrated multimedia solutions was evaluated and it was found that the system was restarting at extreme voltage points. Consultants reviewed the design schematic to suggest alternative components in regulating circuitry and implemented the same. This led to shortening of time to market for the customer.

One of the important aspects of testing be it EMI, Safety or Reliability is the need for Laboratory Accreditation to ISO 17025. Tarang is accredited for ISO 17025 by NABL (National Accreditation Board for Testing and Calibration Laboratories, Government of India), the accreditation body in India under APLAC (Asia Pacific Laboratory Accreditation Cooperation) which is signatory to ILAC MRA (International Laboratory Accreditation Cooperation - Mutual Recognition Arrangement).
Micro- and nano-scale structures are increasingly playing an exciting part in the manufacturing industries. An example is self-cleaning glass, now widely available, which features a micro pattern engineered onto the surface giving the window enhanced properties. Micro structured surfaces are also used to improve tribological properties in orthopaedics, leading to improved longevity of the implant. This trend is sure to increase and, just as standards played a significant role in the advancement of trade and prosperity in the macro world, the same is true of the micro and nano world. With these benefits, substantial funding is entering these sectors across the globe and commercial applications are becoming increasingly widespread.

The development of a micro standards infrastructure is critical for manufacturers to interchange parts, packaging and designs. By Richard Leach, Engineering Measurement Division, National Physical Laboratory.

Micro- and nano-scale structures are increasingly playing an exciting part in the manufacturing industries. An example is self-cleaning glass, now widely available, which features a micro pattern engineered onto the surface giving the window enhanced properties. Micro structured surfaces are also used to improve tribological properties in orthopaedics, leading to improved longevity of the implant. This trend is sure to increase and, just as standards played a significant role in the advancement of trade and prosperity in the macro world, the same is true of the micro and nano world. With these benefits, substantial funding is entering these sectors across the globe and commercial applications are becoming increasingly widespread.

The co-ordinate measurement machine (CMM) revolution has yet to come to the nano-manufacturing area towards measurement standards that are traceable to national or international realisations of the unit of length, the metre. A vital step towards this will be widespread access to equipment that will allow manufacturers to work to these standards.

Recognising the need to overcome these barriers, the UK Government established the Centre of Excellence in Metrology for Micro and Nano Technologies (CEMMNT*), now funded by the
Technology Strategy Board.

The National Physical Laboratory (NPL), in partnership with CEMMNT is addressing two major challenges of industry. Firstly, offering open access to a suite of nanometrology instruments including a micro CMM, vibrometers, surface profilometers, and white light interferometers amongst others. Secondly, developing traceable standards in nanometrology and offering open access measurement and characterisation services to organisations that are commercialising new micro and nano products.

With the support of CEMMNT funding, NPL is developing traceable methods to measure the dimensions of micro and nanostructures, which builds on a number of instruments previously developed at NPL. Two important aspects of engineering nanometrology are surface topography and micro co-ordinate metrology, and NPL is working in these areas to provide industry with an accurate, traceable measurement service. The work that is being done in each of these areas is outlined below.

**Surface topography**

Quantitative surface topography measurement is important in almost all areas of manufacturing, yet there has only been limited standardisation of such measurements at the nano-scale. 3D measurement currently has no infrastructure, and whilst standardisation of stylus instruments is now underway for 3D surface texture, there has been very little attention paid to the corresponding issues for optical instruments.

The topographic properties of a surface can strongly influence its functionality and these properties must be taken into account when designing or manufacturing nano-devices. Structured surfaces are not properly represented by 2D descriptions; 3D measurement is a minimum requirement.

To address these problems, NPL has developed a traceable 3D measuring instrument with a working range of 8 mm x 8 mm x 0.1 mm and corresponding measurement uncertainties of 50 nm x 50 nm x 5 nm, at a confidence level of 95 %. The instrument uses laser interferometers to measure the position of a stylus in three axes and obtains traceability to the metre via the laser sources. The instrument is currently being tested, with a view to launching an areal surface topography measurement service at NPL, in the near future.

To help companies develop their own traceable nano-metrology capabilities, NPL has also developed areal transfer artefacts that can be measured using the NPL areal instrument and then used to calibrate stylus and optical instruments in industry and academia.

**Micro co-ordinate metrology**

The co-ordinate measurement machine (CMM) revolution has yet to come to the nano-manufacturing area. The shape of key components, features on these components and assemblies of nano-components will need to be measured in three-dimensions. The development of probes and probing systems capable of making accurate, 3D measurements will, therefore, be of vital importance.

In recognition of the need for such measurements to enhance product quality and manufacturing process control, NPL is developing a high accuracy 3D micro-probing system capable of incorporation into commercial micro-CMMs.

With CEMMNT funding, NPL has purchased a Zeiss F25 micro-CMM and is carrying out research to develop a micro-probe system capable of making 3D measurements on miniature components with high aspect ratio features.

The probe element will consist of a flexure structure with integrated sensing and actuating elements, supporting a ball ended probe stylus. To overcome potential problems with surface adhesion that can restrict the performance of small contact probes, the new micro-probe will be designed to vibrate.

The final product will be available for industry to help meet the nano-measurement challenges it faces.

**Participation**

Manufacturers hoping to be part of the nano-revolution need to support and be involved in the development of traceable measurement standards. NPL is currently looking for companies with nano-measurement challenges that we can help solve. This will assist us in identifying the issues facing industry and develop standards traceable to the international realisation of the metre, in this exciting emerging sector. Specifically, NPL is now soliciting case studies that will require no direct funding for NPL from the companies involved.

Nanometrology sets a number of challenges for the future, but looks set to become huge business. It is, therefore, important to get the measurement infrastructure right from the start. NPL is active in this area and our work will help to build and maintain the infrastructure required for commercial development of nanotechnology, and the predicted revolution in manufacturing and life-style that such technologies will bring.

Email: richard.leach@npl.co.uk

www.npl.co.uk

*CEMMNT provides a point of access for world-leading measurement, characterisation and analytical services across multiple industry sectors, enabling companies to innovate in design, optimise product quality and performance, reduce costs and maximise competitive advantage. Its partners are NPL, BAE Systems, QinetiQ, Taylor Hobson and Coventor.*

www.cemmnt.co.uk
The imminent release of ISO 6892-1: 2009 signifies a new level of testing machine control intended to improve the reproducibility of test results obtained from a tensile test on metal. This new specification focuses particularly on closed loop strain control of the testing machine whilst recording data for results in the elastic and elastic-plastic transition zones. This affects results such as proof stress (e.g. Rp0.2), also known as offset yield, and Upper yield (ReH).

The accuracy of the determination of ReH, and Rp0.2 has a direct bearing on the calculations used by structural engineers involved in the building industry or engineers working in collaboration with testing institutes.

Until now variables such as different specimen grip types, testing machine load frame compliance, response of drive system, control electronics and specimen stiffness contributed to differences in results between different testing machines, and inter-laboratory tests around the world. Closed loop strain control is now internationally agreed to be the better type of machine control to obtain results with a high level of confidence.

The new standard ISO 6892-1: 2009 will improve the reproducibility of test results obtained from a tensile test on metal. Closed loop strain control systems of testing machines will deliver results with a higher degree of confidence.

The closed loop strain control system of a testing machine is complex and requires synergy between all major system components and in some cases the skill of the machine operator. It requires the testing system to monitor the strain signal which comes from the extensometer. This device measures the increase in gauge length of the specimen as it is subjected to load. This signal is then compared to a time base, and the drive controller constantly adjusts the speed of the crosshead in order to maintain the required strain rate.

Closed loop strain control is now internationally agreed to be the better type of machine control.

The new standard requires the strain rates to be controlled to a value of ±20%, which translates to ±4μm/s at strain rate of 0.025%/s, based on 80mm gauge length. All of this can now be achieved with a few mouse clicks using Zwick’s testXpert software. The benefit to users is that it will now be possible to obtain more reliable and reproducible test results especially for materials which
are strain rate sensitive.

The Standard explicitly states that an extensometer must be used to measure the specimen strain and the resulting strain rate must be controlled and maintained up to and around the characteristic being measured. For \( R_{p0.2} \) this is relatively straightforward, whilst for \( R_{eH} \) testing manufacturers have had to implement complex algorithms which can handle the inherently unstable stress / strain data as the specimen transits from the elastic to plastic zone (or behaviour). Failure to correctly recognise this transition point introduces errors in \( R_{eH} \).

For testing machines where closed loop strain control is not possible the Standard allows a position controlled variant where the crosshead speed must be pre-selected in order to achieve the desired strain rate. However this is time-consuming and requires the determination of the system stiffness and specimen stiffness at the characteristic point to be measured. As a result it requires a number of pre-tests and additional specimens in order to set up the machine control parameters.

The following topics are also prerequisites for carrying out tests correctly to the new ISO standard:

**Drive Unit**

The testing machine drive units must have a high resolution positioning technology so that small displacements can be traversed slowly and smoothly. To achieve this requires high resolution control and AC motors without gears and brushes, offering the additional benefit of being wear-free, and avoiding commutation effects or torque ripple at very low speeds. The wide speed range of AC motors, typically achieving crosshead speeds from 0.01\( \mu \)m up to 2000mm/min or more, also allows high speed crosshead return or high speeds for other tests carried out on the same machine.

Compared to older technology systems, the performance of the latest technology enables materials testing machines to cycle continuously at maximum speed over the full load range of the testing machine without overheating.

**Controller**

As mentioned earlier in this article, closed loop control requires perfect synergy between all components of the testing machine, and the controller is no exception as it forms the important link between the mechanical components of the test frame and the control software algorithms. Zwick’s testControl system is able to handle multiple data acquisition channels as well as control multiple drive units, for example when adding torsion applications to a normal test machine. Its onboard firmware simultaneously handles complex real-time tasks, such as strain control, synchronized data acquisition and the monitoring of all safety systems.

**Application software**

The requirements of the upcoming Standard are already totally integrated into Zwick’s testXpert II software. Easily activated, if required, it means that users can switch to the new algorithm as soon as the Standard is released. Operators with alternative specifications can use the many other control functions built into the system, for example position control, or load / stress control. Once configured for the spectrum of specimen to be tested, there is no need for the operator to make preselections as the software automatically searches for the appropriate test material characteristic, slope of elastic part, Proof Stress, or Yield Stress, and controls the machine accordingly until the desired result has been achieved. After that the speed is automatically switched to that specified in the next test phase of the test. The software has been developed for use with Zwick’s roboTest testing systems as these robotic testing systems must be able to make real-time decisions during a testing sequence. The adaptive controller adjusts the response of the drive system according to the required strain rate setting, specimen geometry, and load frame compliance. The testXpert II software also includes the international TENSTAND algorithm validation system.

**Extensometers**

During the last twenty five years most organizations carrying out tensile tests on metals use digi-
tal extensometers which can measure both elastic and plastic strain up to specimen failure. The thousands of these devices in the market allow for gauge lengths from 10 to 200mm, and with high accuracy and measurement resolutions of up to 0.12μm, achieve Class 0.5 according to ISO 9513 or ASTM E 83 class B-1. The benefit of these devices is that no operator involvement is necessary and this improves the reproducibility of test results. With the advent of the new Standard these extensometers facilitate better strain control due to better and more consistent alignment as well as their measurement precision. An additional benefit is that time is also saved which improves the test throughput.

Specimen Gripping Systems

The recommended gripping solution for metals testing using closed loop strain control is to use parallel acting hydraulic grips. The benefits include: high clamping forces at the start of the test, no slip-stick effects as with poorly maintained wedge grips, and good specimen clamping and alignment throughout the entire test.

In summary, Zwick believes that its presence on the International Standard Committee enables it to remain ahead of the market, and that it is the first materials testing producer to integrate the requirements of ISO 6892-1:2009 into its products. It offers its customers the opportunity to lead in their own market sectors and begin working to the new standard as soon as it is released.

Email: info@zwickroell.eu
www.zwick.com
The most advanced space simulation chamber in the Southern Hemisphere

Spanish company, Telsta, has designed and developed the most advanced space simulation chamber in the Southern Hemisphere. This chamber will enable trials of complete satellites to be carried out on earth under thermal and vacuum conditions equivalent to those that the satellite will experience once it is in orbit around the Earth.

The project has been carried out under the direction of INPE (Instituto Nacional de Pesquisas Espaciais) space research centre, which is under the administration of the Ministry of Science and Technology in Brazil.

The test facility will enable simulation of the extreme temperatures experienced in space in order to test the operation of the various subsystems of the satellite as well as the possible degradation of the materials in the environment of space.

The space simulation chamber that Telstar has built for INPE is in the shape of a tunnel or a ‘mailbox’ with internal measurements of 7m in width, 8.5m in height and 9m in depth with a total internal volume of 485 m³. Its main functional characteristics are an ultimate vacuum level of 1x10-7 mbar and the temperature control range from -180ºC to +150ºC working with nitrogen gas in the thermal panels (shrouds), or down to -196ºC when flooding the shrouds with liquid nitrogen.

The test facility data acquisition system has 1500 channels for the recording and analysis of the experimental data. By controlling different temperature settings in each of the 6 zones of the thermal shroud in the chamber, an environment that simulates the conditions of temperature found when the satellite is manoeuvering in orbit around the Earth can be created, providing the engineers and designers with vital information of the behaviour and functionality of the satellite before launch.

In space, far away from the terrestrial surface, the pressure is around 1x10-13 mbar and the temperature to which the satellite will be submitted (depending whether or not it is receiving direct solar radiation) can vary between 650K (377ºC) and 4K (-269ºC). The simulator developed by Telstar reaches vacuum values of the order of 1x10-7 mbar and temperatures of -196ºC to +150ºC, far beyond than the majority of conventional systems.

www.telstar-vacuum.com
Materials Testing 2009

Materials Testing 2009, in Blackpool, is the industry’s premier event for NDT technology with a comprehensive exhibition and conference organised by the British Institute of NDT.

Materials Testing 2009 is the most comprehensive international exhibition in testing for quality, materials testing, non-destructive testing, condition monitoring and diagnostic engineering. Organised by the British Institute of Non Destructive Testing, BINDT, Materials Testing 2009 will be held 15-17th September at the Norbreck Castle Hotel and Conference Centre, Blackpool, United Kingdom, which was recently refurbished at a cost of £10 million.

Running alongside the Materials Testing Exhibition is the Institute’s Annual Conference, NDT 2009, allowing delegates many opportunities to visit the show. The conference programme has three parallel sessions covering a wide range of advances in NDT over many fields of application, from crack detection and condition monitoring to electromagnetics, phased arrays and thermal NDT to mention a few. The full conference programme is available on BINDT’s website, www.bindt.or

New products at MT2009

Advanced NDT Ltd is using the BINDT Materials Testing 2009 Exhibition to launch the new Isonic 2009 Phased Array Ultrasonic Flaw Detector. Concerned that some simple phased array units are being misused, Sonotron, the instrument manufacturer, have developed the Isonic 2009 to eliminate some of current errors.

A major advantage of Phased Array units is the ability to sweep the beam angle to cover a greater volume of material in one pass. Unfortunately, simpler instruments do not compensate for the gain changes at different refractive angles and defects could be missed.

The Isonic 2009 compensates for the refraction,
wedge attenuation and so on, to give a uniform sensitivity over the inspection area. The material thickness may be entered to display the skipped beam path for angle beam inspections and weld profiles added, making defect positioning and interpretation easier.

www.advanced-ndt.co.uk

Corrosion Wheelprobe launch
Sonatest, stand 72, are launching the Corrosion Wheelprobe for pipeline corrosion mapping applications. Ergonomically designed, the Corrosion Wheel Probe offers smooth handling, good control and comfortable grip positions for scanning around pipes and for easy overhead work. The Corrosion WheelProbe needs little support for use in the field, the Array angle is adjustable in situ, requiring no tools, whilst dry bearings enable angle rotation.

Circumferential and Longitudinal scanning are both completed rapidly and can be performed on pipes with diameters between 3 and 32 inches. Fast and easy configuration for different pipe diameters is possible in the field thanks to the Pipe Diameter Scale on the instrument itself which enables quick adjustments and fine tuning.

www.sonatest.com

UV light source
Ultrapine is a manufacturer and supplier of endoscopes and video systems for remote visual inspection and of UV light sources and liquid light guides for crack detection and other fluorescence investigations. On show is a new battery operated version of its Lumatec UV light source (photo left), together with fibrescopes, videoscopes and video workstations.

www.ultrapine.com

NDT instrument rental
Instrumentation specialists Ashtead Technology will be demonstrating the latest in Non-Destructive Testing (NDT) equipment at this year’s Materials Testing Exhibition. The company will also be explaining the benefits of hiring over buying outright at the event.
Instrumentation shown on the Ashtead stand (14/16) will include the Niton XRF metals analyser, the advanced FLIR P620 ThermaCAM, the Olympus I-Speed (high speed) camera and the GE Inspection XL GP videoprobe.

Ashtead’s General Manager James Carlyle said: “We will have expert staff on our stand throughout the event to provide information and advice on which instrument best suits individual needs.”

Email europe@ashtead-technology.com
www.ashtead-technology.com

Exhibitor case study - Phoenix Inspection Systems
A scanner to test the integrity of storage tanks has been produced by Phoenix Inspection Systems. The system was commissioned by Doosan Babcock on behalf of Babcock Marine at the Rosyth Naval Dockyard in Fife, Scotland, and has been designed to carry out inspection of the walls of a set of storage tanks as part of a programme of integrity assessment.

The two-axis automated system consists of a linear and turntable drive carrying ultrasonic transducers located on the end of a pneumatic operated arm that is also equipped with a camera for visual inspection. It uses 0° probes to measure the thickness of the tank walls and angled beam probes to inspect critical weld areas for internal defects and cracks.

Dr Neil Hankinson, project manager at Phoenix, said: “This particular system was designed to operate in a harsh environment and carry out detailed scans of the tank wall from the internal surface. The requirements were to fit through a small access hole and to scan the complete surface whilst negotiating a number of internal obstructions, such as stiffening bars and inlet / outlet nozzles, that hinder access and motion within the storage tanks.

“Inspecting these tanks to check their condition is a far more economical option than replacing them at regular intervals since design estimates on the tank’s life expectancy are often extremely conservative. The inspection system provided will allow Babcock Marine to maintain its high safety standards whilst reducing the frequency of replacing their storage tanks.”

www.phoenixisl.co.uk
General purpose thickness gauge

The Cygnus 4 General Purpose Multiple Echo thickness gauge, from Cygnus Instruments, has been engineered to be the smallest, lightest yet toughest instrument of its type.

The Cygnus 4 has a 3-button keypad and user-friendly menu and features automatic probe recognition (APR) for perfect probe/instrument optimisation, minimum thickness alert, echo strength indication, display freeze and ‘Deep Coat’ mode to allow measuring through even thicker coatings up to 20 mm thick. The large LCD graphic display has a fully automatic, white back light for all light conditions, with the velocity of sound, probe type and battery status always displayed. Supplied in an IP65 and IP67 rated aluminium enclosure the gauge can function perfectly in the most difficult operating environments.

www.cygnus-instruments.com
Email: sales@cygnus-instruments.com

First industrial CT system with unipolar 300 kV microfocus X-ray tube

GE Sensing & Inspection Technologies is adding the v|tome|x L 300 to its phoenix|x-ray range. This, say GE, is the first computed tomography (CT) system which can achieve a resolution of 1μm with a 300kV X-ray tube while offering higher contrast objects. Its 450kV micro-focus source combined with the newly developed Curved Linear Array (CLA) detector maximizes the detection of X-ray flux resulting in 25 micron accuracy and repeatability. Through automated inspection and high-speed CT reconstruction, blade manufacturers run detailed CT inspection of lightweight turbine blades to optimize the fuel economy of jet engines, contributing to a greener environment.

At the core is a 450kV/1200W micro-focus source, delivering focal spot size up to 25 microns! As this micro-focus spot size is considerably smaller than existing mini-focus sources, the level of detail that it captures is beyond comparison, claim Metris...The proprietary 450kV source offers sufficient X-ray power to penetrate dense specimens, such as turbine blades and cast engine parts.

To meet stricter tolerances on inner and outer wall thicknesses for latest- generation jet engine blades operating in extremely high temperatures, micro-focus X-ray and CT inspection is the solution. Single-crystal metal alloy turbine blades designed for optimum aerodynamics and mass centre location, resist higher temperatures and avoid corrosion. Superior blade characteristics contribute to higher efficiencies in aircraft jet engines or in power plants, reducing fuel consumption and the discharge of greenhouse gases.

www.metris.com
Test or monitor virtually anything

sigPOD PSV, from Sciemetric Instrument, is an out of the box, user configurable solution that can be used to test or monitor virtually any operation during manufacturing, including press, torque, vibration, dispense, and functional test. An easy to use, intuitive set up interface makes it easy to leverage the expansive library of processing and analysis tools available, and can be used on up to 8 channels to allow for greater output without sacrificing quality.


Portable GC leak detector is quick & precise

The Thermo Scientific GLD PRO Leak Detector can identify gas leaks precisely and quickly. This ergonomically designed, hand-held electronic device is a highly sensitive instrument for use with gas chromatography (GC) systems and their accessories, such as purge and trap systems. This compact unit provides fast, contamination-free, leak detection, and offers a much more reliable and convenient method than liquid leak detectors, which can contaminate the column and cause permanent damage to the stationary phase. It is capable of detecting even the smallest gas leaks (<1 ml/min), and any leaks are indicated with both a LED light display and an audible alarm. Therefore, the Thermo Scientific GLD PRO Leak Detector is ideal for checking valves, fittings, and traps for leaks after maintenance, preventing damage to columns and sensitive detectors, improving analytical performance and minimizing troubleshooting.

www.thermo.com/columns.

Force measurement modules

The new RG smart load cell from Mark-10 is a plug-and-play force measurement building block designed for integration within assembly systems, weighing systems, and other process automation and testing automation applications. All functions are controlled by commands sent from a PC or PLC via its RS-232 connection. The RG’s ASCII command library allows for peak force recall, set points, data averaging, data filtering, calibration, and many other functions. A rugged aluminum housing makes the RG durable enough to withstand the rigours of manufacturing environments. Capacities are available from 2 lb to 200 lb (10 N to 1000 N).

www.mark-10.com
Email: mf@mark-10.com

Automated test system punches holes in plasterboard

A specially adapted force testing system from Mecmesin is being used to measure the quality of gypsum plasterboard products. The system was purchased by Saint Gobain, leaders in the design, production and distribution of materials for the construction, industrial and consumer markets. They wished to accurately assess their plasterboard products performance and durability.

Mecmesin offered a specially modified MultiTest 1-x console-controlled test system, capable of testing up to 1kN. This is used in combination with a simulated PLC (Programmable Logic Controller) indexing unit, which enables full automation of the test method. When connected to the MultiTest-x, the simulated PLC indexing unit performs a pre-programmed testing sequence by running the operations that are normally undertaken manually during tests.

The application requires a precision probe to be fitted onto the systems loadcell, with the plasterboard fixed to a moveable platform. The probe is inserted into the side structure of the plasterboard to a depth of 13mm. Once complete, the simulated PLC indexing unit signals the platform to move enabling the same test to be performed on a new section of plasterboard. Up to 50 tests can be undertaken sequentially without the need for an operator to activate controls, thereby saving the time and labour normally required for this type of assessment.

Email: sales@mecmesin.com
www.mecmesin.com

Pipe girth welds are right first time

The Internal Weld Scanning Tool, developed by UK-based company Optical Metrology Services (OMS), internally scans welds inside pipes – both visually and dimensionally – enabling engineers to quickly and confidently assess the quality of the root weld. The technology can be deployed onshore and offshore at different stages of the pipe welding process. The tool can be used on corrosion-resistant alloy-lined pipe to identify sour (aggressive) ingress points, in both clad butt-weld and clad weld inlay applications. The tool can also be used to improve weld procedure development efficiency and to check the root weld and geometry before next passes are deposited. The technology provides similar uses in fatigue-sensitive applications (SCRs) where the pipe is subject to higher dynamic stresses.

The system can be mounted to a purge dam, with an integrated camera for positioning and inspection. Pipe can be inspected whilst it is being spooled onto a pipe laying vessel or during stalk fabrication/tie-in. Here, the tool is retrieved using a winch and wire system, with weld positioning controlled by a camera and precision motorised system.

Email Denise@optical-metrology-services.com
www.optical-metrology-services.com

The quality of gypsum plasterboard is being assessed during manufacturing using the company Optical Metrology Services (OMS) tool. The technology provides similar uses in fatigue-sensitive applications (SCRs) where the pipe is subject to higher dynamic stresses. The system can be mounted to a purge dam, with an integrated camera for positioning and inspection. Pipe can be inspected whilst it is being spooled onto a pipe laying vessel or during stalk fabrication/tie-in. Here, the tool is retrieved using a winch and wire system, with weld positioning controlled by a camera and precision motorised system.
Foundation degree in metrology launched

Coventry University is to become the first institution in the UK to offer a qualification in metrology - the science of measurement - helping to fill an important skills gap in the country. The first students will begin the course this August.

The foundation degree has been developed by the School of Lifelong Learning at Coventry University, with support from the National Physical Laboratory (NPL), the UK’s national measurement institute. The course is aligned to NPL’s training framework, meaning that graduating students will receive the dual accolade of the degree itself and certification from NPL.

The qualification fills the specific skills gap in the understanding and application of measurement; allowing organisations to benefit from savings in both time and money through the implementation of best practice within metrology.

Trevor Toman, Metrology Manager for the West Midlands Manufacturing Measurement Centre (WMMMC) explains: “The Foundation Degree in Metrology sets out to satisfy the needs of manufacturing, the individuals within industry and the scientific world. We strongly believe that metrology education should be diverse enough to satisfy the personal requirements of the metrology generalist and the metrology specialist, also that it should satisfy industrial needs now and in the future; that it should cover the laboratory and the shop floor and finally that it should prepare researchers for further study. This course is about applied measurement in real situations for improved performance.”

Fiona Auty, Head of Communications and Training at NPL, who has been helping to develop the course, commented: “With many talented graduates struggling to find work, it is reassuring that new courses are being developed that offer high academic standards, whilst also addressing predicted gaps within important areas of industry and providing students with the skills they need to find a career.”

This new Foundation Degree is a key step towards metrology gaining recognition as a National Occupational Standard (NOS). There is currently no standard describing the precise role of metrology practitioners, despite thousands of UK employees working in the field.

www.npl.co.uk

Micro & Nanotechnology Measurement Services

The National Physical Laboratory is a world-leading centre for the provision of micro and nanotechnology measurement services and solutions. NPL also develops measurement related standards, technology and provides best practice. NPL makes its science and technology as valuable, relevant and accessible as possible to our customers.

Please visit the Products and Services section at www.npl.co.uk to learn more about micro and nanotechnology measurement services offered by NPL.

NPL is a partner with CEMMNT (Centre of Excellence in Metrology for Micro and Nano Technologies) in providing world-leading measurement, characterisation and analytical services across all industry sectors.

Pioneer Lean training

Manufacturing companies across the UK will soon be benefiting from a unique training programme developed in the South West. The National Skills Academy for Manufacturing (The Skills Academy) has been working with manufacturers in the region to pilot new courses that promote ‘Lean’ manufacturing processes.

Brian Thornton, regional manager for The Skills Academy in the South West, explained: “Over the past few months we have been working with two companies in the region to trial the Lean Foundation Programme, an entry level short course that gives workers an introduction to the principles of lean manufacturing.”

The two companies – Plymouth-based computer cabinet manufacturer Rittal-CSM and Relyon, which makes beds at its factories in Wellington, Taunton and Okehampton – have introduced the course alongside NVQ qualifications in Business Improvement Techniques. As a result they have seen marked improvements in quality, cost reduction and product delivery. The initial pilots have proved so successful that the course look set to be adopted across the UK.

Email: emma.mulligan@nsl-m.co.uk

www.nsa-m.co.uk
Internationally Renowned Experts Share Their In-House Expertise:

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Mark O’Reilly, Associate Director, Operational Excellence, Elan Pharmaceuticals

Jennifer Miller, Executive Director, Global Research and Development, Pfizer

Michael Cummane, Business Excellence Manager, Abbott Vascular

Dr Andres Kanstrup, Principal Scientist and LEAN Manager, Novo Nordisk

Main conference: 8th and 9th December 2009
Pre-Conference Workshop: 7th December 2009
CCT Venues, Two East Poultry Avenue, Smithfield, London EC1A 9PT

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