



FAG

IN **ATION**

ISSUE 9 - DECEMBER 2011

Major new investment **at Llanelli plant**

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SCHAEFFLER GROUP



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INMOTION

POSITIVE SIGNS IN A CHALLENGING YEAR



It gives me great pleasure to welcome you to the last issue of *In Motion* for 2011.

Globally, it has been another challenging but

positive year for the Schaeffler Group, with many encouraging signs of growth and investment in all regions around the world. It is therefore all the more pleasing for me and my fellow directors to witness the significant investment that is being made here in the UK. Our manufacturing plant in Llanelli is benefitting from the single largest investment in new processes in its 50 year history. Thanks to the commitment of all our employees to the successful installation of new plant and machinery, our UK automotive customers will benefit from the latest innovative components and processes from the Schaeffler Group.

However, it is not only the automotive sector that is benefiting from Schaeffler's ongoing investment strategies.

Renewable energy sectors such as wind, wave and tidal power are welcoming our investment in new bearing technologies and condition monitoring solutions. And the investment doesn't stop there.

These growth opportunities are having a positive impact on the recruitment sector as the Group looks to the next generation of young engineers to support its global expansion plans. As you will see from the articles in this issue, it is never too early to start a career in engineering.

I hope you will agree there are some exciting developments which will benefit us all in the coming months and years.

Kate Hartigan
Managing Director

SCHAEFFLER RECEIVES 2011 SUPPLIER AWARD FROM PORSCHE



GERMAN LUXURY CAR MAKER PORSCHE HAS AWARDED THE SCHAEFFLER GROUP ITS 2011 SUPPLIER AWARD IN RECOGNITION OF THE CONTINUED SUCCESSFUL COLLABORATION BETWEEN THE TWO COMPANIES.

The most important components in Porsche's latest variable valve control system, the Porsche VarioCam Plus, were amongst Schaeffler products praised by Porsche during the award ceremony.

Prof. Peter Pleus, President of Schaeffler Group Automotive, passed the 2011 Supplier Award on to Schaeffler's Engine Systems Business team. "We are very proud of this award because it is recognition of our innovative capabilities and manufacturing qualities," said Prof. Pleus.

Various rolling bearing solutions used in the Porsche 356 have laid the foundations for the long-standing partnership between the two companies. Porsche was one of Schaeffler's first customers as the company began to produce its novel, LuK-branded diaphragm spring clutches in the mid-1960s. In the same decade Schaeffler built up its expertise in combustion engines and its high precision

valve train components were first tested in the Porsche 917 Le Mans racing car.

In the mid-1980s, as Porsche launched its technologically advanced Porsche 959 model, Schaeffler was again selected as one of the company's high-tech development partners. One of the developments was Schaeffler's hydraulic chain tensioner which proved to be extremely effective in what was considered the most innovative sports car of its time.

With Schaeffler's support, Porsche is now setting the benchmark in variable valve train technology. Switchable bucket tappets and camshaft phasing units are key components of the Porsche VarioCam Plus valve train system, a highly efficient, powerful engine technology.

Examples of successful collaboration projects between Porsche and Schaeffler in engine, transmission and chassis systems are numerous.

TWO SUPPLIER AWARDS FROM SIEMENS MOBILITY ROLLING STOCK



Siemens Mobility Rolling Stock has presented The Schaeffler Group with two supplier awards in the "Competitiveness in Mechanical Engineering" and "Logistics" categories.

A total of 271 companies from 10,000 suppliers were nominated for the awards and of these, just 21 made it through to the final round.

Each of these 21 suppliers received an invitation to attend the "Our Stars for Mobility Rolling Stock" award ceremony in Berlin.

"I am extremely proud of the fact we've received this award from Siemens for Schaeffler's successful collaboration with the company in railway engineering during the last few years," said Simone Purbs, Director of Railway sector management at Schaeffler Group Industrial.

Schaeffler was the only company to be nominated in three separate categories and was the only supplier to receive awards in two different categories.

The highest possible level of quality is essential for Siemens and Schaeffler to survive in a global market in the long term and to form long lasting business relationships with customers.

"To achieve these goals, we need partners like The Schaeffler Group, which has the same high standards and commitment to success as Siemens," explained Joern F. Sens, Director of Siemens Mobility Rolling Stock.

The Schaeffler Group and Siemens Mobility have a long-standing and successful partnership. Amongst other projects, The Schaeffler Group recently became development partner and sole supplier for the axlebox bearings in Siemens' Velaro high-speed trains, which are used in China and Russia at speeds of up to 350 km/h.

PACE AWARD FOR LOWERING CO₂ EMISSIONS



The Schaeffler Group's lightweight balancer shaft with rolling bearing supports has won a PACE Award for outstanding innovation.

Presented annually since 1994 by *Automotive News* magazine in conjunction with audit and consulting firm Ernst & Young and the Transportation Research Center (TRC), the PACE Awards honour outstanding product innovations from automotive suppliers.

The international jury's focus this year was on Schaeffler's lightweight balancer shaft with rolling bearing supports used in modern internal combustion engines.

"The award for the lightweight balancer shaft demonstrates the significance of innovative detailed work," said Prof. Peter Pleus, President of Schaeffler Group Automotive.

"Modern technologies, innovative products and lightweight designs are key factors in the

optimisation of drive trains with internal combustion engines," he said.

"For Schaeffler, the PACE Award is a valuable confirmation of our innovative strengths which are so highly appreciated by our customers."

Lightweight balancer shafts with rolling bearing supports contribute to reducing fuel consumption and CO₂ emissions, whilst increasing driver comfort. The system is just one of many innovations from Schaeffler which are helping to downsize and downspeed engines.

Dr. Peter Solfrank, Schaeffler Product Application Manager Rolling Bearings and Balancer Shafts, who accepted the award commented: "As the optimisation of internal combustion engines becomes increasingly important, the topic of rolling bearing supports in the engine is also increasingly moving into

focus. It still has potential for improving the energy efficiency in classic drive trains."

The lightweight balancer shaft with rolling bearing supports celebrated its premiere in Daimler's OM 651 four-cylinder diesel engine, which was awarded Engine of the Year in 2009. The balancer shafts of other modern engines such as Fiat's two-cylinder 'TwinAir' engine, which received this year's Engine of the Year award, are now also equipped with rolling bearing supports from Schaeffler.

To date, Schaeffler has been nominated five times for the PACE Award and won a distinction once again this year. Other nominated or winning innovations from Schaeffler are its LuK dry double clutch and hybrid damper, as well as the FAG wheel bearing with face spline and angular contact Twin Tandem bearing for rear axle drives.

PUPILS GIVEN A TASTE OF A CAREER IN MANUFACTURING

MORE THAN 60 PUPILS FROM LOCAL SECONDARY SCHOOLS TOOK PART IN A *SEE INSIDE MANUFACTURING* OPEN DAY AT SCHAEFFLER UK'S AUTOMOTIVE ENGINE COMPONENT MANUFACTURING PLANT IN LLANELLI, SOUTH WALES.

The event was part of a nationwide Government initiative to help improve the image of UK manufacturing to young people, with the aim of attracting the brightest and best talent into a career in manufacturing and engineering.

The open day took place in November 2011 and a total of 60 Year 9 (aged 13 – 14 pupils) attended the event from six local schools including Amman Valley, St John Lloyds, Bryngwyn, Queen Elizabeth High School, Coedcae and Glan y Mor.

Following presentations from Plant Director Roger Evans MBE and Schaeffler UK Training Manager Donna Williams-Bevan, the pupils and teachers were given a guided tour of the factory.

Pupils were then split into teams to compete in an Engineering Challenge which involved pupils having to correctly read an engineering drawing before devising a suitable method for assembling an idler hub bearing. The winner was the team that correctly assembled their idler hub in the fastest time.

The Engineering Challenge was followed by a Schaeffler quiz, which tested the pupils' ability to recall information provided in the presentations.

The event was also attended by Alex Robinson, Automotive Components Section Manager at The Society of Motor Manufacturers & Traders (SMMT) and Paul Bullock, Industry Liaison Manager at the Welsh Automotive Forum.

Alex Robinson commented: "I believe Schaeffler's event is a credit to the initiative and has undoubtedly left a positive impression on many of the school children who visited."

Paul Bullock agreed: "If the UK is to plug the current skills gap in manufacturing and



engineering, it is critical that we attract more young people, both boys and girls, into a career in manufacturing. It was particularly pleasing to see as many girls attending the Schaeffler open day as there were boys."

Roger Evans MBE, Plant Director at Schaeffler UK, commented: "The open day has been a tremendous success for everyone involved and we look forward to holding similar events in the future."

THE MOST IMPORTANT INVESTMENT IN OUR HISTORY

NEW PLANT AND MACHINERY MAKES LLANELLI A WORLD BEATER

A MAJOR INVESTMENT BY THE SCHAEFFLER GROUP IN ITS AUTOMOTIVE ENGINE COMPONENT PLANT IN SOUTH WALES WILL MAKE LLANELLI A WORLD CENTRE OF EXCELLENCE FOR THE MANUFACTURE OF MECHANICAL TAPPETS



"Without doubt, this investment is the single most important investment in this factory's history," said Roger Evans MBE, Plant Director.

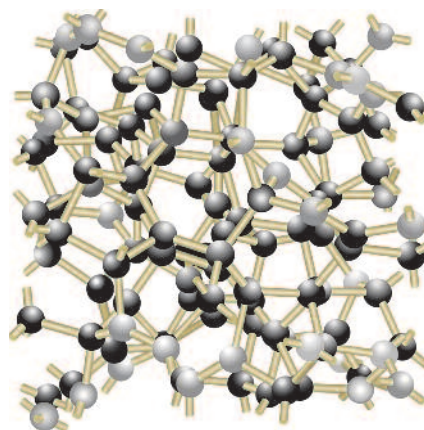
The Schaeffler Group has invested several million euros in new plant and machinery for the Llanelli manufacturing plant. The new investment was supported by the Welsh Government.

Established in 1955, the Llanelli plant manufactures high precision engine components for the automotive industry and currently employs 230 people.

The new machinery – which includes a state-of-the-art surface coating machine and an enormous, deep drawing press – will enable Schaeffler UK to produce highly repeatable, superior quality mechanical tappets and other automotive engine components.

The new coatings plant, which currently comprises of one coating machine but with the possibility of more to follow, was installed in June 2011.

The new coating machines will enable Schaeffler UK to coat the surface of engine components



Ultra-thin Tiondur® coating will be applied by the new coating machine.

with an ultra-thin Tiondur® + DLC, extremely hard, multi-layer coating that is applied via special, vacuum-controlled chambers. The function of the extremely wear-resistant coating is to minimise friction between mating

components in the engine, resulting in lower fuel consumption and reduced CO₂ emissions.

The applied coating material is either in the form of a solid (PVD – Physical Vapour Deposition) or in the form of a gas (PACVD – Plasma Assisted Chemical Vapour Deposition).

In contrast to conventional coating methods, this new technique will enable Schaeffler to produce unique compositions of materials and coatings using an environmentally friendly (no CO₂ is produced) vacuum process.

The new coating machines require components to be thoroughly cleaned before entering the vacuum chambers. The new plant therefore includes new special purpose washing machines for each coating machine.

315-tonne deep drawing press

The installation of the 315-tonne deep drawing and blanking press is also now complete.

The multi-million pound press is one of only four of its kind in the world and will enable the UK plant to produce up to 20 million mechanical tappets per year for its automotive customers.

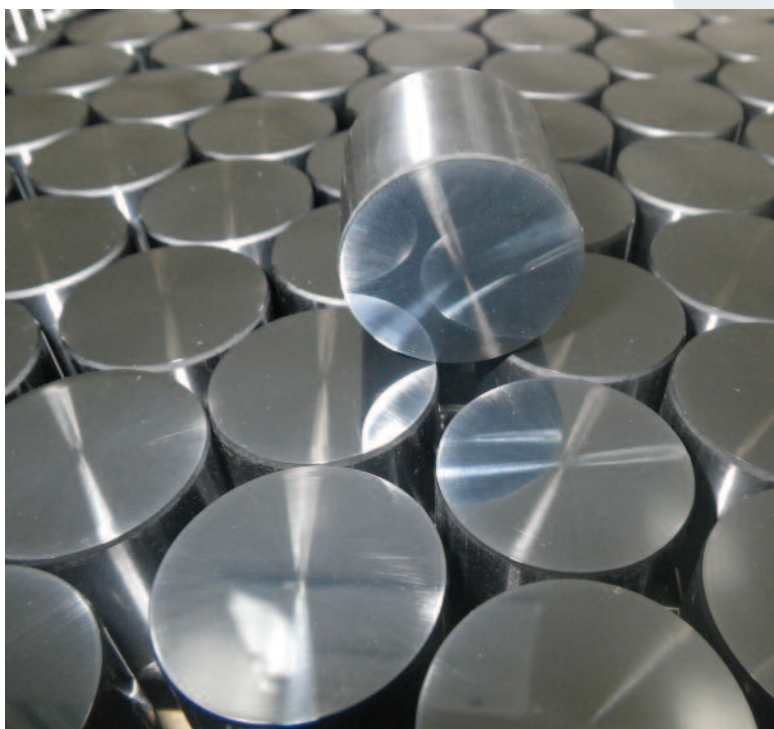
The press will produce highly repeatable, superior quality mechanical (shimless) tappets to 'near net shape'.

Ken Poolman, Tool Design Manager at Schaeffler UK commented: "The press was delivered to the plant in October and more than 30 people were required to install the machine. We've now completed internal trials, tooling sign-offs and factory acceptance tests and the press is now operational."

The Llanelli plant is now the lead Schaeffler production plant in Europe for mechanical tappets.

The new deep drawing press stands at a towering 5.5 metres tall and incorporates a total of 12 production stations, including associated blanking press and other feed-in equipment. The press required special foundations to be prepared and is sunk in a purpose built pit below factory floor level. It is capable of producing forces of up to 315 tonnes.

Each of the 12 press stations functions as a progressive stage in the manufacture of a tappet. These stages involve blanking, four or five



different forming processes, followed by cropping and coining.

The press will operate round the clock for 6 days a week across three continuous shifts.

In terms of technical advantages, the press enables Schaeffler UK to press tappet blanks to 'near net shape', i.e. as close to the finished product as possible. By deep drawing the tappets, the plant will be able to manufacture a more cost effective alternative to the traditional 'forged and turned' design, resulting in less wastage.

The press is also fitted with the latest advanced sensors and monitoring technology to ensure zero defects and a high quality finished product. These technologies include movement detection systems and vision cameras that look for any performance and



Plant Director Roger Evans, MBE

quality issues or product marking and surface defects.

Roger Evans commented: "Following the installation of the

new tappet coating machine in June this year, the arrival of the new deep drawing press is the second important stage of this plant's machinery investment programme, which will help us to improve plant productivity and secure future business from our automotive customers.

"This significant investment in new plant and machinery represents a tremendous shift in the way this factory will produce automotive components in the future," he said.



"By embracing these advanced coating and deep drawing technologies, we will be able to produce superior quality components that meet the specific needs of our automotive customers. This, in turn, will help safeguard the long term future of this factory.

"Introducing the deep drawing press has required a comprehensive re-training programme for our workforce, including machine operators, tool designers and production engineers. More than 25 of our staff have received training in readiness for the new press. In fact, the training element is just as important as the machine itself as our workforce needs to adapt and embrace these significant changes in machinery and new technologies," he added.

Edwina Hart, The Welsh Government's Minister for Business, Enterprise, Technology and Science, said it was good to hear that the significant investment by Schaeffler in the Llanelli plant would support its long-term future and give the company a competitive advantage.

"In these challenging trading conditions, it is vital that businesses remain ahead of



Welsh Government Minister Edwina Hart

the game and this investment will enable Schaeffler to remain highly competitive within a global market. I am pleased it has been supported by the Welsh Government."

ENERGY EFFICIENT MOBILITY SOLUTIONS AT FRANKFURT MOTOR SHOW



THE SCHAEFFLER GROUP RECEIVED SOME VERY PROMINENT VISITORS TO ITS EXHIBITION STAND AT THE RECENT INTERNATIONAL MOTOR SHOW IN FRANKFURT, GERMANY WHICH ATTRACTED CLOSE TO 1 MILLION VISITORS OVER 10 DAYS

Federal Chancellor Dr. Angela Merkel visited Schaeffler's 500 metre-square stand as part of her tour of the exhibition halls. The Chancellor was welcomed by Schaeffler Group partner Maria-Elisabeth Schaeffler, Georg F.W. Schaeffler, Chairman of the Supervisory Board and Dr. Juergen M. Geissinger, President and CEO of Schaeffler Group. The Chancellor was able to gain valuable insights into current developments in energy-efficient vehicles.

Frau Schaeffler explained the underlying intention of the IAA participation to Dr. Merkel: "With our product presentation we have demonstrated impressively that we are a source of innovation for the vehicles of tomorrow. Continuous research and development enables us to produce forward-looking solutions and set new standards in automobile manufacturing."

An important delegation from the UK also visited the Schaeffler stand. This group included Prof. Richard Parry-Jones, Co-Chairman of the UK Automotive Council, and Mark Prisk MP, Minister of State for Business & Enterprise.

The UK delegation was welcomed by Richard Hall, Director & General Manager, Automotive Division, at Schaeffler (UK) Ltd. During the tour of the stand, Mark Prisk was introduced to a number of key Schaeffler innovations that are helping to optimise the drive train of internal combustion engines and to meet the demands for global energy-efficient mobility. He was given a guided tour by Prof. Peter Pleus, President of Schaeffler Group Automotive.

Schaeffler's stand highlighted a number of innovative products and solutions for the automotive industry. These included efficient drive trains for internal combustion engines, new components for hybrid vehicles, and advanced solutions for electric mobility.

One particularly novel solution unveiled at Frankfurt was a new thermal management module that reduces fuel consumption and CO₂ emissions by up to 4 per cent by optimising and controlling the temperature of engines and



transmissions (see separate article on page 8)

Innovation on show at Frankfurt

A four-wheel drive battery-electric vehicle (BEV), based on a Skoda Octavia Scout, the Group's latest electric vehicle concept, was unveiled at the show.

This new ACTIVEdrive complements two other existing vehicle concepts from Schaeffler - the Schaeffler Hybrid and the CO₂cept-10%. These three vehicles together represent Schaeffler's future strategy and product portfolio for the automotive industry.

Prof. Dr.-Ing Peter Gutzmer, President Technical Development at Schaeffler, commented: "These three cars are full of new ideas and function as platforms for the testing of various components and systems under realistic conditions."

The innovation behind the ACTIVEdrive is its active electric differential (eDifferential), which is installed on both the front and rear axles.

"The eDifferential enables active intervention in driving dynamics via well-directed power supplies - rather than braking intervention and therefore power reduction, as is the case with ESP (Electronic Stability Programme). The active electric differential significantly improves power transmission when driving on surfaces with different friction coefficients. It also assists steering and has a clearly positive effect on driving dynamics, safety and comfort.

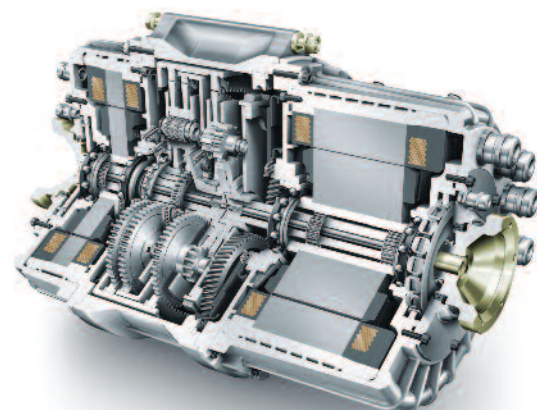
"This means that the vehicle can be controlled virtually without the use of steering and

braking by using a wheel-selective flow of forces.

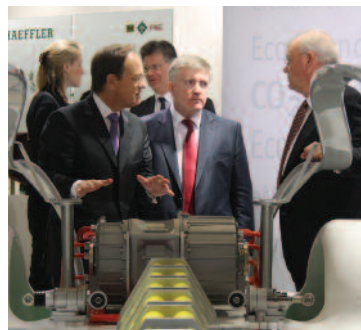
"The potential fields of application for the eDifferential range from sports cars with extremely high driving dynamics, to conventional passenger cars and agricultural vehicles," explained Dr. Tomas Smetana, Senior Manager Advance Development Power Transmission Systems at Schaeffler Automotive.

The eDifferential system integrates two water-cooled permanent magnet synchronous motors (PMSM) of different dimensions, a planetary gear, a gearbox for active torque distribution, and a central element - Schaeffler's lightweight differential. The electric motors were developed by Schaeffler's IDAM (INA Drives & Mechatronics) division.

Other novel features of the ACTIVEdrive include an integrated electromechanical parking lock; a new forced lubrication system for the gearbox that requires no oil pump; sheet metal planetary carriers; plus various high speed, friction-optimised bearing solutions. The electronic



AUTOMOTIVE



controls for the ACTIVEdrive are supplied by AFT (Atlas Fahrzeugtechnik GmbH), Schaeffler's automotive drive train mechatronics and vehicle testing division.

Because of the use of two active electric differentials, the four-wheel drive ACTIVEdrive has an overall output of up to 210kW.

Due to its performance and traction capacity, the 1,900kg test vehicle accelerates from 0 to 100km/h in just 8.5 seconds. The vehicle has an electronic maximum speed regulation of 150km/h. In this configuration, the vehicle's cruise range is up to 100km.

The CO₂concept-10%

Based on a Porsche Cayenne, Schaeffler's CO₂concept-10% vehicle impressively demonstrates the improvements that can be achieved through consistent, detailed work on vehicles that are powered by internal combustion engines. In the case of the CO₂concept-10%, these optimisation measures cover detailed solutions that are already available on the market or are close to series production, but do not touch or alter the basic vehicle configuration. Furthermore, the optimisation of the classic drive train also includes the use of electrical components rather than the previous hydraulically-actuated elements.

Schaeffler Hybrid

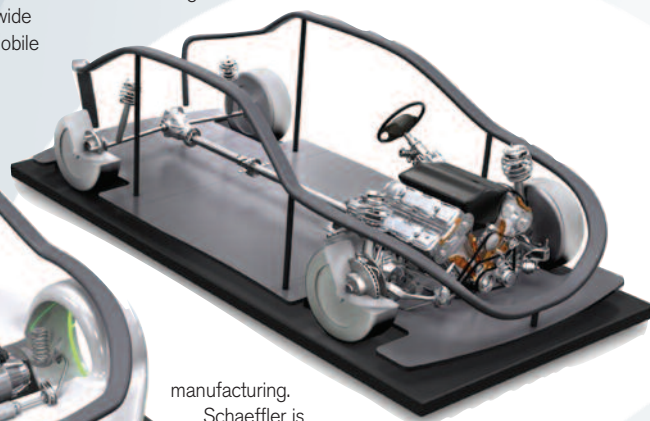
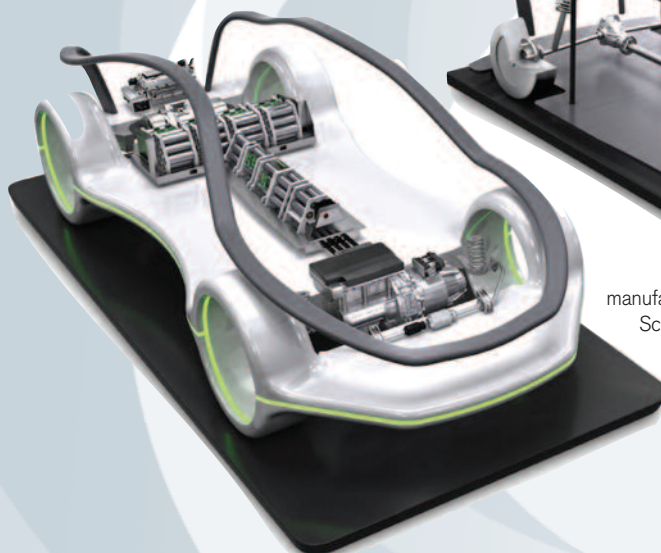
Based on a compact Vauxhall Corsa, the Schaeffler Hybrid is a versatile advance

development project that enables practical comparisons of a wide range of electric mobility options.

The driving modes represented on the vehicle range from conventional operation using an internal combustion engine, to parallel and serial hybrid operating modes using a range extender, as well as all-electric driving modes.

Together, the ACTIVEdrive, CO₂concept-10% and Schaeffler Hybrid, provide an overview of Schaeffler's broad automotive product portfolio, which ranges from energy-efficient solutions for conventional internal combustion engines, through to systems for hybrid vehicles and all-electric vehicles.

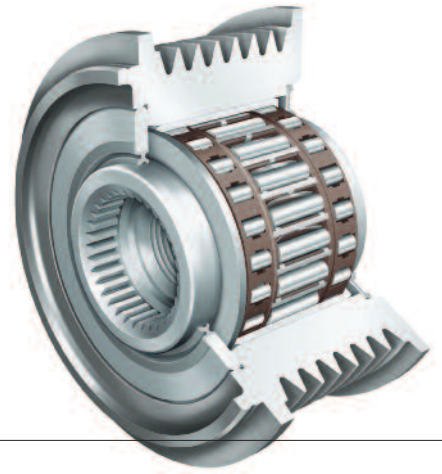
Schaeffler CEO Dr. Jürgen M. Geissinger summed it up: "With our motto of 'efficient future mobility', Schaeffler continues to consistently pursue its traditional path. Schaeffler is in an excellent position in this respect. Activities such as setting up the eMobility Systems Division enable us to further develop our capacities in research and development as well as in manufacturing and allow us to orientate ourselves towards the demands placed on us by the automobile of today and tomorrow. With a view to our innovative product range and the demands of global energy-efficient mobility, Schaeffler will gain more than proportional benefit from the growth in worldwide automobile



manufacturing.
Schaeffler is
a global

supplier

AN OAP THAT'S STILL GOING STRONG



A comprehensive modular OAP (overrunning alternator pulley) system has been developed by Schaeffler that offers many different custom designs for diesel and petrol engines, passenger cars, commercial vehicles and motorcycles. These include an OAP manufactured partly to aircraft specifications, which is used in the Schaeffler Audi A4 DTM.

The Schaeffler Group currently manufactures more than 400 different types of belt pulley with OAP. In fact, during the last 15 years, around 140 million of these unsung heroes have rolled off the production lines at Schaeffler.

In modern internal combustion engines, the OAP is an important component that often gets overlooked, particularly when you consider the positive effects it has on improving the energy efficiency of an engine.

The OAP is the functional interior of the belt pulley mounted on the alternator and its function is to decouple the alternator from the rotational irregularities of an internal combustion engine. This task is a critical one, particularly as the rotational irregularities that occur in the latest internal



combustion engines – including turbocharged versions – are significantly higher than those indicated to the vehicle's driver by the tachometer needle.

In a vehicle's accessory drive, the alternator is the component with the greatest mass moment of inertia and the highest speed. This means that the acceleration and deceleration forces acting on the alternator resulting from the rotational irregularities have the greatest effect on the belt transferring these forces. The OAP therefore ensures that, at many operating points, only the accelerating proportion of the crankshaft forces that are transferred to the belt drive are used to drive the alternator. The advantages of the OAP with

a one-way clutch are clear. The reduction in the force level in the belt drive extends the life (typically by a factor of 10) of individual components, while ensuring an increase in the generator speed and a reduction in noise. In addition to smoother engine running, the OAP also contributes towards the reduction of fuel consumption and therefore CO₂ emissions.

Its important contribution towards improving energy efficiency also explains why the OAP has been so successful in both diesel and petrol engines. The OAP is now also included in the extensive list of measures for optimising the fuel consumption of internal combustion engines.

NEW THERMAL MANAGEMENT SYSTEM WILL REDUCE CO₂ EMISSIONS

A new temperature control system for automotive engines and transmissions has been developed by Schaeffler.

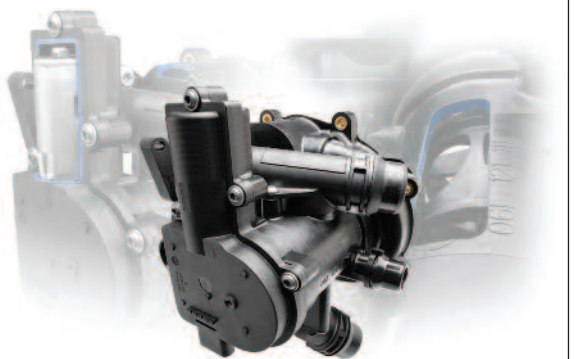
The system can reduce CO₂ emissions by up to 4 per cent for both internal combustion engines and hybrid electric components and batteries. The system is also ideal for use on engines with start-stop functionality.

The new Thermal Management Module is actually an innovative temperature control unit for the entire vehicle drive train. The module combines numerous functions into a single compact, integrated unit housed in a high-strength plastic enclosure.

Up to now, the temperature of almost all internal combustion engine-driven vehicles has been controlled by a thermostat mounted on the engine block. The engine is typically cooled by circulating water from a pump which operates continuously regardless of engine load. Even on

engine start up when the engine is cold, the pump continues to operate – which is inefficient.

Schaeffler's Thermal Management Module precisely maintains the temperature of all drive train components, according to requirements, by electronically controlling cooling water distribution. This enables the engine to operate at the optimum temperature in response to changing engine load and driving conditions. For example, the cold running phase can be significantly reduced by switching off the water pump at engine start up. Individual components can also be run at higher temperatures than is possible in a thermostat-controlled engine. Engine temperature can be reduced under full load and the tendency for 'knocking' or having to enrich the fuel mixture under full load is also reduced using the



Thermal Management Module.

The sensor-controlled Thermal Management Module enables the speed of the electronic water pump to be increased or decreased depending on the driving conditions. At full speed, the temperature of the engine can be decreased by the control module so that the fuel mixture doesn't need enriching, which in turn reduces fuel consumption. Driving at part-load means the temperature of the engine can be increased by the control module, enabling the optimum fuel mixture to be achieved.

SCHAEFFLER AUDI TRIUMPHS IN THE DTM

MOTORSPORT

THE SCHAEFFLER BRAND TOOK A STARRING ROLE AT THE HOCKENHEIM RACE CIRCUIT AT THE END OF OCTOBER WHEN 29-YEAR-OLD MARTIN TOMCZYK, DRIVER OF THE SCHAEFFLER-SPONSORED AUDI A4, WAS CROWNED DTM CHAMPION 2011

DTM (Deutsche Tourenwagen Masters) is the most popular international touring car series. The 2011 season consisted of ten races, with six taking place at German circuits and the other four at circuits in Holland, Austria, Spain and the UK.

Whilst Schaeffler has been involved in motorsport for over 30 years through LuK, the 2011 season saw a change in emphasis with the Audi A4 being liveried in vivid yellow and green colours featuring the Schaeffler name together with the logos of its three primary brands, LuK, INA and FAG.

And, thanks to the determination of Martin Tomczyk and the back-up of his team at Audi motorsport, the 2011 season was a triumph.

It has to be said that at the start of the season Martin was not amongst the favourites and his win is considered sensational.

Audi motorsport boss Dr Wolfgang Ullrich was delighted with the win: "I feel so happy for Martin. He has been a member of our Audi DTM family for eleven years and he's had many ups and downs during this time. He never hung his head, always fought hard and, especially this season, proved he's a winner. He is a strong race driver and a great guy – and now he's a real champion too."

New to the Phoenix Audi Sport team at the start of the season, Martin learned the names of all the mechanics by heart and then organised a barbeque party so they could get to know each other. From the outset the chemistry between him and team principal Ernst Moser, race engineer Jurgen Jongklaus and the whole team was right and this played a major part in the success.

The DTM series kicked off in May at Hockenheim, before travelling on to Zandvoort, Spielberg, Lausitzring, Norisring, Munich, Nurburgring, Brands Hatch, Valencia and then, for the final race, back to Hockenheim.

The Schaeffler-sponsored Audi came in



fifth in the first race, third at Zandvoort, first at Spielberg, first at Lausitz, third at Norisring, fifth at Nurburgring, first again at Brands Hatch, second at Oschersleben, third at Valencia and second at the final race at Hockenheim. He achieved eight podium finishes out of ten races, accumulating a total of 72 points, a full 20 ahead of his nearest rival.

The UK round at Brands Hatch was a fantastic race, run in the wet. Canadian Mike Rockenfeller in another Audi, took the lead from pole closely followed by two-time champion Mattias Ekstrom and another ex-DTM champion, Gary Paffett.

However, by lap 2, Martin Tomczyk had passed Paffett and was hunting down



Ekstrom and Rockenfeller. He took the lead on lap 11 and once in front, he didn't put a foot wrong and took the chequered flag two seconds ahead of Ekstrom.

GETTING TO THE SLOPES SAFELY

IN COLD OPERATING ENVIRONMENTS LIKE SKI RESORTS, MATERIAL ROPEWAYS AND GUIDE PULLEY SYSTEMS RELY ON PRECISION BEARINGS TO ENSURE THAT MAINTENANCE, SERVICING AND BREAKDOWN COSTS ARE KEPT TO A MINIMUM



Strong winds, snow and condensation are a constant challenge for machine operators in ski resorts, and rolling bearings and plain bearings both play important roles in ensuring that material ropeways, guide pulleys, cable cars, ski lifts, mountain railways and other critical transportation systems remain in operation at all times and require little or no maintenance.

The Schaeffler Group is working with a number of manufacturers whose equipment is required to operate in temperatures as low as -30°C and in high altitude locations where snow and high winds are a constant threat. These manufacturers produce ski lifts, inclined elevators, detachable and fixed chairlifts, gondola ropeways, aerial tramways and funiculars (cable trams or light railways).

Most of these systems use pulley wheels, guide pulleys or rope pulleys and each will normally require a bearing arrangement to support the loads. In material ropeways, for example, design loads can be up to 40 tonnes. Line inclination is up to 45° with spans of 1,500m over often-difficult terrain. Aerial tramways or cable cars are used to transport either heavy goods or passengers, with some catering for up to 2,000 passengers per hour.

The guide pulley bearings must therefore be capable of withstanding the required loads, as well as the harsh environmental conditions.

The operator of the ski lift or tramway will want to minimise maintenance and servicing costs and will certainly not wish to replace bearings more than once during a skiing season.

For ropeways, accelerators and guide pulleys, Schaeffler supplies manufacturers such as Leitner and Doppelmayr with its single row deep groove ball bearings. These bearings are provided with lip seals on both sides made from nitrile butadiene rubber (NBR). The bearings are suitable for moderate speeds and axial loads, but are lubricated for life using a high quality grease.

Schaeffler's single row deep groove ball bearings are capable of withstanding operating temperatures from -30°C up to 70°C , are designed to deal with the accumulation of condensate and offer longer operating life.

Bearings in vertical mounting configurations are often required for ropeways and pulley wheels and for these types of applications, spherical roller

bearings are the recommended choice. Schaeffler's standard spherical roller bearings with metal cages can also be used at temperatures down to -30°C .

Spherical roller bearings are double row, self-retaining units that comprise solid outer rings with a concave raceway, solid inner rings and barrel rollers with cages. The inner rings have cylindrical or tapered bores.

The symmetrical barrel rollers position themselves freely on the concave outer ring raceway. As a result, shaft flexing and any misalignment of the bearing seats are compensated for.

Spherical roller bearings can support axial forces in both directions as well as high radial loads. The bearings are designed with the maximum possible number of large and extremely long barrel rollers, which means they support heavy loads. Due to the narrow osculation between the rollers and raceways, uniform stress distribution is achieved in the bearing.

Schaeffler's spherical roller bearings are also available in the premium X-life quality standard, which represents improvements in product design, product performance and service life that far exceed current standard values. As a result, under identical operating conditions, the basic dynamic load rating and basic rating life of these bearings are significantly improved. In certain applications, this means that a smaller bearing arrangement is possible.

In applications such as funiculars or cable railways, liquid and solid contaminants can cause vertically mounted rolling bearings to fail prematurely. Schaeffler's GE..SW angular contact spherical plain bearings are therefore used as a plain bearing alternative to tapered roller bearings.



GE..SW bearings are complete units comprising an inner ring with a convex outer slideway and an outer ring with a concave inner slideway that has a hard chromium Elgoglide® low friction sliding contact surface.

These bearings can support axial loads as well as

radial loads and so are suitable for alternating dynamic loads. The bearings can also be used in pairs as preloaded units. Just as important, the bearings, which are available for shafts from 25mm up to 200mm, are maintenance-free throughout their operating life.

What is ELGOGLIDE®?

Elgoglide® is a highly wear-resistant sliding layer made from PTFE fabric, which is embedded in synthetic resin and bonded to the outer or inner ring bore. This low friction, sliding material developed by Schaeffler neither expands when exposed to humidity, nor heat-seals with metal. Elgoglide® is also resistant to most chemical agents and is ideal for use in rotary and linear motion applications.

Spherical plain bearings with the Elgoglide®

layer can be classed as maintenance-free because they replace the lubrication function. Relubrication of Elgoglide® bearings is therefore not required. In fact, relubrication of the bearings would destroy the carefully matched tribological system.

Elgoglide® bearings offer a number of advantages for applications requiring high load carrying capacity and small swivel angles, long service life, small installation space and low friction. These maintenance-free bearings also minimise downtime and service costs, whilst eliminating the need and cost of lubricants.



SPORT

ENGINEERING KNOW-HOW SUPPORTS TOP LEVEL SPORTS



SCHAEFFLER GROUP'S TECHNOLOGICAL EXPERTISE IS BEING USED TO SUPPORT TOP-LEVEL SPORT

Under a cooperation agreement Schaeffler and the Institute for Research and Development of Sports Equipment (FES) will collaborate on future development projects for sports equipment and measurement systems used to monitor the activities of athletes.

The cooperation is not restricted to the development and supply of rolling and plain bearings. Both parties will work together on surface coatings for components, basic tribological investigations and on developing special materials.

They have, for example, already co-developed a new blade for ice skates. Schaeffler introduced a special lightweight material for the blades using a high-tech steel that is normally used in rolling bearings for extreme environments.

"We are pleased that this collaboration has developed into a longer term cooperation.

The Schaeffler Group's technological expertise will provide us with new sources of inspiration and help athletes to stay amongst the world's top performers," said Harald Schaale, Director of the FES.

Rolling and plain bearing solutions and linear guidance systems are already important components in many types of competitive sports and training equipment. Examples include racing bikes, inline speed skates and summer bobsleighs.

"We are really pleased that we can make a valuable contribution to supporting top-level sport with our products and expertise," commented Dr. Arbogast Grunau, President of Product Development at Schaeffler Group Industrial.

"Our low-friction products, in particular, can improve the smooth running of sports equipment and therefore provide athletes with a decisive advantage of a few tenths of

a second during competitions."

Lower mass, longer life and maximum reliability are key objectives during the development of sports equipment. The partnership with the FES offers Schaeffler the opportunity to test products under extreme conditions and to define development methods for pushing performance limits.

Schaeffler's most recent developments have included rolling bearings for the bottom bracket units and wheel hubs of racing bicycles; Cronitect® Hybrid roller bearings used in the bottom brackets of city and touring bicycles; and sensor bottom brackets for drive control systems on electric-bikes. Schaeffler has also developed components for Rohloff's 14-speed hub gear bearings for fitness and training equipment, and special corrosion-protected bearings and roller clutches for fishing reels.

'MAGIC' BEARINGS FOR INLINE SKATERS

Corrosion-resistant, low friction, lightweight, maintenance-free hybrid bearings that were originally developed as bearings for city and touring bikes, are now helping to boost the performance of inline skates.

Inline skating became a new trend sport at the beginning of the 1990s. Many variations have since developed, including street hockey, inline football and basketball, freestyle slalom, street skating, aggressive skating, night skating, downhill, Alpine and speed skating.

The choice of wheels depends on the specific discipline. Most skaters move on wheels with diameters between 74 and 90mm, while stunt skaters prefer smaller wheel sizes of between 54 and 60mm diameter. The most frequently used wheel size in speed skating is 100mm.

Schaeffler's new low-friction, maintenance-free FAG Cronitect® hybrid bearings have been attracting considerable attention as bottom bracket and wheel hub bearings in bikes. Now, this innovative bearing technology is helping to provide

inline skaters with the extra impetus they require for a more dynamic and smoother skating performance.

The Cronitect® hybrid bearings use high performance ceramic balls, which rotate in high-tech plastic cages on wear-resistant, hard Cronitect® raceways. This provides skaters with a technical advantage and competitive edge over skates that are fitted with conventional bearings.

12% lighter, 49% less friction

Developed and patented by Schaeffler, Cronitect® is a unique bearing steel that offers extremely high load carrying capacity and high corrosion resistance. Used in combination with only five ceramic balls, the result is a bearing that weighs just 10.5g – 12% less than conventional bearing solutions.

In addition, friction is reduced by 49% compared to other bearings currently available on the market. The hybrid bearings are also fitted with non-contact plastic seals on one side. Together, all these improvements offer



excellent, smooth-running characteristics for inline skates by minimising both friction and weight.

FAG Cronitect® hybrid bearings demonstrated their unique qualities during initial tests in professional speed skating at the European Inline Skating Championships where the bearings helped skaters to win numerous medals. As a result, professional skaters are showing a keen interest in the bearings with some even referring to them as "Magic Bearings" due to their noticeably smoother running characteristics.

FAG Cronitect® hybrid bearings are available in size 608, the most frequently used size for inline skates. A set consisting of 16 bearings is available in 'Powerslide' inline skates and as an add-on kit (FAG 608 Cronitect® PS12).



NEW IMPROVED ONLINE CONDITION MONITORING SYSTEM FOR INDUSTRIAL MACHINERY



CONDITION MONITORING

Schaeffler Industrial Aftermarket Services has launched an improved version of the FAG DTECT X1 online condition monitoring system which is suitable for a wide range of industrial vibration monitoring applications.

The updated version is more compact than its predecessor and offers increased functionality and flexibility.

The FAG DTECT X1 s can save up to 16 separate monitoring tasks and execute these automatically. The system is protected to IP67 and can therefore be installed in harsh environments, in ambient temperatures from -20°C to +70°C.

The system monitors vibration conditions which, if left undetected, can cause costly unplanned shutdowns of plant and machinery. These conditions include damage to bearings and gears, as well as shaft misalignments. If a specified threshold value or alarm limit is exceeded, the system triggers an alarm. The vibration monitoring data can be analysed directly on site at the central control station or this data can be retrieved via a TCP/IP communications link and analysed by either the

end user or by Schaeffler Industrial Aftermarket Services. This means that operators can make changes to system parameters remotely from anywhere in the world.

The FAG DTECT X1 s is designed for use in a wide range of industrial environments, including the monitoring of rotating components and machines such as bearings, gearboxes, compressors, fans, pumps, rolling stands, paper mills and drives.

All commonly used acceleration, speed and displacement sensors can be connected to the FAG DTECT X1 s system, enabling process parameters such as speed, temperature, torque and pressure to be monitored.

Applications in Paper Manufacturing

In the paper industry, FAG DTECT X1 s is already helping to keep plant availability high. Here, the system is suitable for monitoring complex machinery, including suction press rollers and pick-up rolls on paper machines.

FAG DTECT X1 s monitors the vibration behaviour of the rolls and the bearing positions. FAG DTECT X1 s is easy to retrofit to existing paper machines and machine operators require no specific knowledge or skills.



The monitoring system has an integrated GSM modem that enables direct communication between the user and the device. Automatic alarms can therefore be set up and measurement data provided for further analyses.

The user can choose whether to outsource the monitoring of the machine completely to Schaeffler Industrial Aftermarket Services or whether the machine operators should receive special training that qualifies them to carry out the monitoring independently.



GROUNDBREAKING GREASE MONITOR

planned precisely into maintenance schedules. Any changes in the condition of the grease are detected early, long before any damage can be caused to the bearings.

Grease operating life is key to maintenance

In preventive maintenance regimes, the operating life of the grease is critical, particularly if the life of the grease is less than the expected life of the bearing. In this case, the bearings would normally be relubricated halfway through the grease operating life. The disadvantage here is that the grease is replaced without knowing anything about the actual condition of the grease. For example, it may have been possible to continue using the grease for a longer time period without affecting the performance of the bearing. Conversely, perhaps damage has already occurred to the bearing due to ingress of water or high temperatures and so the grease should have been replaced earlier.

The new grease sensor enables grease to be replaced according to the actual operating requirements of the bearing and not according to any pre-defined time periods.

This is referred to as 'demand-based' rather than 'time-based' relubrication. The result is a reduction in the cost of lubricants, replacement parts and maintenance. In addition, operational downtime of plant and machinery will be reduced, whilst process efficiencies and machine utilisation will also improve.

How does it work?

The grease sensor, which has a diameter of just 5mm and a length of 40mm, is able to detect four parameters of the grease: water content, cloudiness (opacity), wear (thermal or mechanical), and temperature. From these parameters, the sensor's electronic evaluation system utilises complex software algorithms to generate an analogue signal (4-20mA), which then displays the condition of the grease. By setting alarm thresholds (limit values), digital signal outputs can also be generated, indicating whether the grease quality is 'poor' or 'good'.

Schaeffler, Freudenberg and Klüber have validated the measurement method for around 95 per cent of greases currently available on the market. A future solution, currently being developed, is for integration of the sensor in rolling bearing seals.

A new, groundbreaking sensor has been developed that enables the online condition monitoring of grease in rolling bearings.

The sensor is ideal for monitoring critical plant and machinery located in difficult-to-access areas, such as wind turbines and automated assembly lines. Its value is that it will signal if there is a problem, but equally importantly can prevent any unnecessary change of grease.

Developed by Schaeffler in conjunction with Freudenberg Dichtungs- und Schwingungstechnik GmbH & Co. KG and lubricants specialist Klüber Lubrication, the new grease sensor incorporates a unique electronic evaluation system which enables the condition of the grease to be monitored whilst the bearings are operating. The sensor is positioned directly in the rolling bearing immersed in the grease.

This is a significant breakthrough, as the schedule for replacing rolling bearing grease can now be

COMPOSITE PLAIN BEARINGS FOR WIND, WAVE, TIDAL AND SOLAR ENERGY SYSTEMS



RENEWABLE ENERGY SYSTEMS, INCLUDING SOLAR, WIND, WAVE AND TIDAL POWER, ARE IDEAL APPLICATIONS FOR COMPOSITE PLAIN BEARINGS

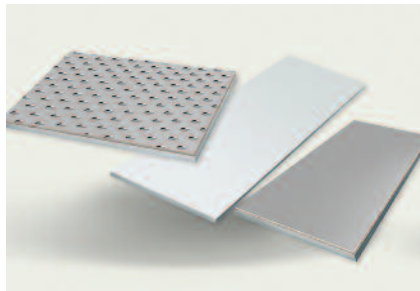
The Schaeffler Group now offers a rapidly expanding range of plain bearings for renewable energy systems. In addition to its Metal-Polymer Composite Bearings range, Schaeffler also recently launched ELGOTEX® plain bearings.

In solar energy systems, for example, plain bearings are particularly suitable to the operating conditions, which often involve slow swiveling movements with high loads. In addition, plain bearings are also suitable for operation in media such as water (hydro power) and for dry running applications.

Metal-polymer composite plain bearings

Schaeffler's metal-polymer composite bearings are particularly effective in oscillating applications, where the bearings achieve a higher basic rating life than conventional bearings.

The metal-polymer composite material provides low-wear sliding characteristics, as well as a high load carrying capacities and high thermal conductivity. Static load carrying capacities of up to 250 N/mm² can be achieved. Composite materials can also be used in water or other media due to its high moisture resistance.



Metal-polymer composite bearings are a cost-effective alternative for applications with minimum available space and a comparatively high sliding speed. The plain bearings are available as bushes and flanged bushes, as well as thrust washers and strips. The material can also be easily formed to specific customer requirements for rotary, linear and oscillating movements. All Schaeffler's metal-polymer bearings are lead-free.

ELGOTEX® plain bearings

Schaeffler's ELGOTEX® range of plain bushes provides a variety of technical advantages that stem from the product's unique, entwined double-layer design.

Each bush comprises two layers of wound (twisted) material. The inner, sliding layer is made from synthetic fibres and PTFE fibres in epoxy resin, whilst the outer layer comprises continuous glass fibres (filaments) in epoxy resin. This combined, double wound material is stabilised by applying a specific winding angle to the glass fibres, which significantly increases the strength of the bush.

The result is a host of technical advantages, including extreme robustness, compactness and low wear (due to consistent friction levels). In addition, ELGOTEX® plain bushes are lighter than their bronze equivalents.

The product is available with integrated seals and is resistant to corrosive media. The bushes also perform well in applications where swivel or axial movement is required. Good vibration damping properties is a further benefit of ELGOTEX®.

INA plain bushes with ELGOTEX® are available with bore diameters from 20-200mm, outside diameters from 24-220mm, and widths of 15-250mm. Custom versions with outside diameters up to 1,200mm are also possible.

COMPACT ONLINE CONDITION MONITORING FOR WIND TURBINES

An improved version of the FAG WiPro online condition monitoring system has been launched by Schaeffler Industrial Aftermarket (IAM).

The new system – the FAG WiPro s – is more compact than its predecessor and offers increased functionality and flexibility.

The new individual modules – the monitoring unit and the multiplexer – are now integrated in a single, compact unit that offers a high degree of flexibility for end users and is ideal for permanent condition monitoring of wind turbines.



Unlike its predecessor, the new system combines all control modules into a single compact housing, which measures just

260 x 150 x 90mm, enabling easy installation in control cabinets. The integrated multiplexer enables the recording of signals from up to eight different sensors.

It can save up to 16 separate monitoring tasks and execute these automatically. The system is protected to IP67 and can therefore be installed in harsh environments and in ambient temperatures from -20°C to + 70°C.

The system monitors vibration conditions, which if left undetected, can cause costly unplanned shutdowns of wind turbines. These conditions include damage to bearings and gears, as well as shaft misalignments. If a specified threshold value or alarm limit is exceeded, the system triggers an alarm. The vibration monitoring data can be analysed directly on site at the central control station or this data can be retrieved via a TCP/IP communications link and analysed by either the end user or by Schaeffler Industrial Aftermarket Services. This means that operators can make

changes to system parameters remotely from anywhere in the world.

The FAG WiPro s is specially developed for the wind power industry. Wind turbine drive train (main bearings, gearboxes, couplings and generators) and tower vibration can be monitored as a function of the operating parameters. Integration of oil quality (particles) as part of the monitoring is also possible. FAG WiPro s can also analyse measurement signals already installed in the wind turbine nacelle.

Due to its integrated overvoltage protection device, the WiPro s can be adapted to customers' specific requirements. The system is based on its predecessor, the FAG WiPro, which was certified by Germanische Lloyd and acknowledged by German insurance company Allianz Zentrum für Technik (AZT). This will enable insurance companies to offer customers of the FAG WiPro s more favourable insurance terms for wind turbine installations.

SINGLE BEARING DESIGN CONCEPT FOR MULTI-MEGAWATT WIND TURBINES

A SINGLE BEARING DESIGN CONCEPT FOR MULTI-MEGAWATT WIND TURBINE ROTOR SHAFTS, HAS BEEN INTRODUCED BY SCHAEFFLER. THIS NOT ONLY IMPROVES THE ENERGY EFFICIENCY AND RELIABILITY OF THE TURBINE BUT ALSO ELIMINATES DRIVE TRAIN COMPONENTS, THEREBY HELPING TO REDUCE THE OVERALL WEIGHT OF THE TURBINE

U sing its in-house advanced rolling bearing calculation software, BEARINX®, in combination with Finite Element Analysis tools and multi-body simulation (MBS) models, Schaeffler engineers can assist customers during the initial stages of wind turbine design with the aim of improving the reliability and efficiency of the turbine under a wide variety of load conditions.

Schaeffler is able to develop bearing designs that are tailored to specific wind turbine requirements, including turbines for both onshore and offshore wind farms.

This powerful combination of software enables Schaeffler to evaluate various load conditions and to accurately assess all relevant, critical load conditions for wind turbines. The use of 'moment' bearings in single bearing designs enables a high level of system integration, resulting in extremely compact, less complex wind turbine designs. The preloaded bearing also prevents the transfer of negative axial loads to the wind turbine drive train.

With single bearings, the wind turbine rotor is supported by a single, double row tapered roller bearing (or 'moment' bearing), typically in a back-to-back arrangement that supports all forces and moments. This concept can take many different forms, for example, with a shaft and gearbox and a high-speed generator, as a hybrid solution with shortened gearbox and medium-speed generator, or as a direct drive without a gearbox.

Single bearings always result in more compact designs. For example, the wind turbine nacelle can be fully integrated with the bearing-gearbox-generator unit. This means that it is possible to eliminate drive train components and reduce weight. This in turn reduces the head weight of the wind turbine, allowing smaller foundations to be used and simplifying logistics.

Another advantage of the single bearing design is that preloaded tapered roller



bearings can be utilised, which prevent axial clearance and small axial misalignments. This controlled guidance of the rotor shaft means that fewer movements act on the system, reducing the negative effects on the gearbox and generator.

Schaeffler supplies moment bearings that are individually designed to match specific turbines. These bearings are supplied with classic steel pin cages or with plastic (PEEK) segmented cages. PEEK is a lightweight, high-strength plastic with low wear characteristics, which is also able to support high forces. The plastic segmented cage reduces friction and increases the efficiency of the turbine. This cage also improves the guidance of the rolling elements, whilst optimising lubricant supply. Moment bearings can also be supplied with integrated anti-corrosion protection, which is achieved by applying a zinc flame-sprayed surface coating and multi-layer painting. Special hardening processes enable custom material characteristics for integrated functions such as seals or connections to adjacent structures.



RENEWABLES

LINEAR

SYSTEM SOLUTIONS FOR MEDICAL AND LABORATORY AUTOMATION

Using a wide range of linear guidance systems, radial components, direct drive systems and complex bearing assemblies, The Schaeffler Group has developed a number of system solutions for laboratory automation applications.

Schaeffler's engineering field service team ensures close collaboration with the customer from early on in the development process. When conceiving customised components and system solutions, Schaeffler engineers use a range of modern CAD/CAM software tools. For bearing calculations and selection, they use Schaeffler's own bearing calculation software program, BEARINX®. This enables detailed analyses of bearing loads and life calculations, ensuring the selection of the most appropriate bearings for the application. In the design and modeling stages, the latest methods such as Finite Element Analysis (FEA) software is used in order to optimise system solutions.

Blood-testing and diagnostics devices

In a recent example, a customer required a bearing solution for a new blood-testing device. Quiet operation, low maintenance and corrosion resistance were specified as key attributes for the compact design.

Schaeffler's solution consisted of a four-row linear ball bearing and guideway assembly (KUBE-B) with Corrotect® coating for the X-axis, as well as corrosion-resistant miniature linear guidance systems for the Y- and Z-axes. In addition, the solution incorporated a spindle bearing with semi-locating functionality. Due to comprehensive engineering support and by procuring all rolling bearings from a single source, the customer received a maintenance-free blood-testing device with improved performance and longer service life.

Analysis Devices and DNA sequencers

In another customer application – a medical analysis device – the principal requirements were high degree of positioning accuracy and repeatability. In this case, engineering support and medical technology specialists from Schaeffler developed a ready-to-fit module that consisted of four miniature linear guidance systems, two toothed racks and a



mounting plate. The customer was delighted to receive a cost-effective, low-maintenance solution and was particularly satisfied with the simplified installation procedure.

In another application that involved a DNA sequencer, the customer required a direct-drive X-Y-Z (three-axis) unit with very high positioning accuracy and repeatability, smooth running, low displacement resistance, and maintenance-free operation. Schaeffler's solution comprised a ready-to-fit direct drive for a mechatronics system with monorail guidance systems, miniature linear guidance systems, a PCB direct drive motor, stepper motors, encoder and housing. The customer benefited from Schaeffler's comprehensive engineering support, which resulted in a direct drive solution that significantly improved the performance of the DNA sequencer.

Sample Changers

Schaeffler has also developed a system for a laboratory sample changer. In addition to smooth running and low maintenance requirements, the customer specified that the sample changer should be compact and robust. Schaeffler's solution comprised miniature linear modules, housings and motors. Due to

the decision to outsource the hardware development and production to Schaeffler, the client was able to achieve significant cost savings in R&D, production and purchasing.

Surface Coating

Schaeffler's engineering and technical support services also include recommendations on surface coatings that impact a whole range of bearing properties. These include the durability, corrosion and media resistance, and running-in behaviour of the bearings.

Corrotect®, Triondur®, Protect A® and Protect B® are just a few examples of coating solutions provided by Schaeffler. Depending on the customer's requirements, special materials such as Cronidur 30, ceramics, PEEK heavy-duty plastics and hardened non-magnetic bearing steel can be combined to achieve optimised solutions.



NEW ANGULAR CONTACT ROLLING BEARINGS FOR LIGHTER, MORE COMPACT MACHINE BUILDS

NEW PRODUCT

IN APPLICATIONS SUCH AS INDUSTRIAL ROBOTS, MECHANICAL HANDLING SYSTEMS AND INDUSTRIAL GEARBOXES, DESIGN CHARACTERISTICS SUCH AS HIGH PRECISION, LIGHT WEIGHT AND COMPACTNESS ARE OFTEN THE MOST IMPORTANT. AT THE SAME TIME, THERE IS ALSO A DRIVE TOWARDS INCREASING RIGIDITY, POSITIONAL ACCURACY AND RATING LIFE

In order to fulfil these demanding requirements, The Schaeffler Group has launched two new ranges of angular contact rolling bearings – the AXS and SGL series.

AXS and SGL bearings provide extremely lightweight bearing solutions capable of supporting significant loads and high tilting moments. The reduced design envelope of these bearings opens up new opportunities for even more compact machine builds and automation systems.

Similar to thin disc springs, AXS bearings have a conical bearing ring, produced by forming technology and a roller and cage assembly runs between these two hardened rings. Bearing diameters are currently available from 8-175mm.

The high precision of the SGL bearings is achieved by the machined, ground bearing rings, which have a triangular profile. The cylindrical rollers are guided by a cage, which is made from a wear-resistant polymer.

AXS – lightweight with high load carrying capacity

The AXS angular contact rolling bearing



combines low mass and a compact design envelope with impressive basic load ratings. With a bearing ring thickness of just 1.2mm and radial section heights of 7mm and 10mm, the AXS offers great potential for design miniaturisation.

The roller and cage assemblies comprise cylindrical rollers, snap fitted into high strength polymer cages with the smallest possible pitch. The high basic load ratings enable additional preload, for conditions such as swivel operations, in order to further increase the tilting rigidity.

AXS bearings can be mounted very easily and securely. As the bearing rings are geometrically identical, there is no risk of mix up during fitting. The bearings can be fitted easily with the roller and cage assembly without requiring specialist skills or knowledge.

SGL – accurate and rigid

SGL series bearings are the preferred choice where high load carrying capacity, accuracy and rigidity are required. The precision machined, ground triangular profile bearing rings – in combination with the line contact of the cylindrical rollers – enable highly precise, rigid bearing solutions.

SGL bearings have significantly higher tilting rigidity than conventional angular contact ball bearings and the use of quadratic rolling elements provides significantly improved kinematics. The rolling behaviour of SGL bearings is almost ideal. The bearings run uniformly with low friction and so are suitable for high speed applications.

SGL bearings are used predominantly in 'O' arrangements. The resulting large support distances increase the rigidity of the bearing design.

The SGL bearing is best used where the rating life and tilting rigidity in the



application need to be increased further. The SGL is therefore a suitable alternative, for example, to crossed roller bearings under higher requirements.

Applications

Used in the **hand of a paint robot**, AXS bearings open up new possibilities in terms of cost optimisation for supporting several axes in extremely thin-walled designs. The low weight of the bearings, combined with its relatively large diameter, enables lightweight designs with high load carrying capacities to be produced, which in turn leaves more space for the passage of paint hoses. The bearings are maintenance-free, lubricated for life with special grease.

AXS bearings are also being used in **tracking systems on solar power plants**. Here, the small cross-section, high load carrying capacity and high rigidity of the bearings are critical.

In **medical equipment**, AXS bearings are being utilised in ceiling mounts for operating theatres, where they are replacing wire raceway ball bearings.

High precision gearboxes are constantly undergoing design refinements and optimisation. Due to increasing demands for reduced design envelopes, less friction, lower temperatures, smooth running and high tilting rigidity, the capabilities of the bearings within gearboxes are subjected to constant analyses.

Increasingly, conventional angular contact ball bearings or crossed roller bearings used in gearbox output bearing designs are being replaced by SGL angular contact rolling bearings. The rigidity and accuracy achieved with line contact and an 'O' arrangement make a strong case and also increase the rating life.

DIRECTING DEBUT FOR SIOBHAN

Congratulations to Siobhan Griffin, New Business Coordinator, Marketing Services, on her successful debut as Director of the latest play produced by the Alrewas Dramatic Society.

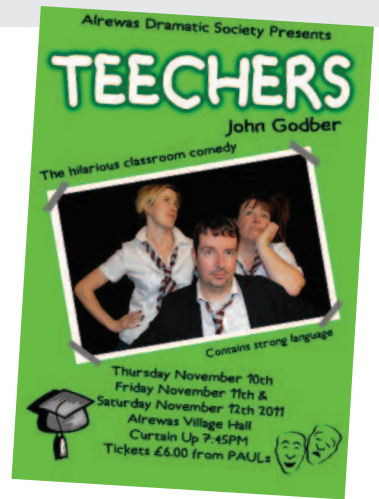
Siobhan's idea, to take the script of 'Teachers', which was written by John Godber in 1987, and give it a contemporary theme, certainly paid off.

Siobhan, who has been a loyal member of the Alrewas Dramatic Society for a number of years, said of her recent achievement: "I began thinking about doing 'Teachers' following other John Godber plays I had either seen or heard about and sent off for

the script in anticipation.

"After reading through the script I could see it was still very relevant today but wanted our version to be set in Liverpool, even though the play is not written with any given accent in mind. So I just had to knuckle down and re-write a couple of bits as I wanted it to be set 'in the now'."

According to a review in the local press: "The performance of 'Teachers' was one of their best in recent years. The acting of the



main three actors was superb and had the audience laughing from start to finish. Credit must go to the actors and to Siobhan Griffin, the Director, who recognised the potential of the script and stage managed the cast of only five to create a play with 15 characters and many scene changes".

THE EGG CHALLENGE



Schaeffler UK's goal to develop young people's interest in everything engineering took another step closer recently when an engineering design and build challenge was successfully adopted by a local primary school in Llanelli.

Thirty 11 year old pupils from Penyrheol Primary School took part in a variation of the Young Engineers' Egg Challenge, 'to

design and build a system that will allow the safe transportation of two eggs across chasms and up cliff faces without damaging the eggs, and using only limited items to create the mechanisms'.

The project, which took place over a number of weeks, was managed by Derrick Lewis, Technology Manager at Schaeffler UK's manufacturing plant in



Llanelli, supported by John Bailey, Press Technologist and Matthew Anthony, Health and Safety Officer.

The school children were split into six groups and final entries were judged by Kate Hartigan, Managing Director, Roger Evans, Plant Director and Adrian Roberts, HR Director. The winning team's submission was forwarded to The Young Engineers for recognition on their website.

Derrick said: "It has been great to see the enthusiasm shown by all pupils for our activities and we look forward to working with this and other local schools in the future".

TEAM WORK

When his keen footballing son wasn't getting enough 'game time' with his team, Derrick Lewis, Technology Manager with Schaeffler UK in Llanelli, decided to do something about it. He started a new team.

Between June and September he completed a coaching course, recruited team members, roped in his father-in-law to help and launched Pengelli football team. They now have 17 lads on the books and thanks to Schaeffler, who sponsored the kit, Pengelli has entered a local league and have been playing since September.

"I did it for my lad," said Derrick, "but also with the aim of getting kids off their playstations and DS gaming machines. We've yet to get that first win, but it is getting closer."



LONG SERVICE AWARD



A total of fourteen members of staff at Schaeffler UK's plant in Llanelli were presented with long service awards recently. The awards were presented by Plant Director Roger Evans and HR Director Adrian Roberts.

Our picture shows (l to r): *Paul McGowan (15 years), Jamie Davies (20 years), Gavin Thomas (10 years), Paul Issac (20 years), Andrew Pritchard (15 years), Gary Morris (15 years), Barrie Kelley (15 years), Roger Evans, Mark Thomas (25 years), Mark Williams (15 years), Phillip Griffiths (20 years), Desmond Williams (15 years), Tony Bowen (15 years), Ian Sadler (20 years), Adrian Roberts, and Meirion Thomas (15 years).*

Staff and guests enjoyed the celebrations at this year's Annual Presentation Dinner Dance for Sutton Coldfield employees, held at the Moor Hall Hotel in Sutton Coldfield recently.

The picture shows recipients of Long Service Awards with members of the UK management team. (L to R): *Adrian Roberts (15 years), Richard Hall, Mike Barber (15 years), Richard Shand (10 years), Kate Hartigan, Roger Evans, Paul Gibbons (15 years), Janet Pelly (15 years), Des Pattinson and Paul Healey (10 years).*



THE LONDON 2012 QUIZ

THE OLYMPIC GAMES ARE JUST A FEW MONTHS AWAY SO HERE'S A QUICK QUIZ TO SEE HOW MUCH YOU KNOW ABOUT THE EVENT. SEND YOUR ENTRIES BY EMAIL TO INFO.UK@SCHAEFFLER.COM. ALL CORRECT ENTRIES WILL BE ENTERED IN A DRAW AND THE WINNER WILL RECEIVE A SELECTION OF 2012 MEMORABILIA!

What do you know about the London 2012 Olympics and Paralympics



1. What sport will take place around Hampton Court Palace?

2. Where will the equestrian events take place?

3. On what date do the Paralympics start?

4. What will start and finish in The Mall?

5. The Olympic Football Final will take place at Wembley. Can you name two other venues that will be used for matches?

6. Which special Olympic facility has been built near Waltham Cross?

7. How many people will carry the Olympic Torch on its relay round the country?

8. How many different sports will feature at the London Olympics?

9. How many years is it since London last hosted the Olympics?

10. What has the film 'Slumdog Millionaire' to do with the Olympics?



FAG

We're looking for engineers "with Bite"



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