

SCHAEFFLER GROUP



COVER STORY Schaeffler at Hanover Fair

INTON

PEOPLE TAKE CENTRE STAGE



e latest edition IK's corporate

> When you read hrough the latest stories on

product and service innovation containe in these pages, you will see very clearly just how important innovation is to the Schaeffler Group. But innovation is to the just happen on its own. It is driven by a passionate workforce striving to support our customers with improved technologies that fulfill the current and future requirements of the markets they serve. So the articles on innovative product developments or innovative use of service equipment are really about our people and how their passion for problem effective or more energy-efficient solution than was previously available.

So, whether Schaeffler technology helps to support Team Audi's newly sponsored A4 to reach the chequered flag first, whether our asset management techniques help to safeguard visitors to the Eiffel Tower, or whether the sustainability of our planet is supported by innovations in electric vehicle technology, it is our people that take centre stage within the global Schaeffle organisation. This is just as evident her in the UK from the many long service awards we present to our employees each year, and from the pride that all our staff take in their work for Schaeffler. Our people are the reason we can proudly claim that Together We Move the World!

I wish you an enjoyable and informative read, and as always, welcome any feedback you may have on any of the articles contained in this issue

Kate Hartigan Managing Director **SCOOPS** NATIONAL **SUSTAINABILITY** PRIZE



The national award demonstrates the company's ongoing commitment to sustainability.

Schaeffler UK received top honours in the Sustainability Prize category. Donna Williams-Bevan, Training Officer at Schaeffler UK, accepted the prize on behalf of the company at the annual awards ceremony held at the City Hall, Cardiff.

SCHAEFFLER

The Wales Quality Award is an annual competition based on the EFQM (European Excellence Model). The awards are open to all types of business operating in Wales, including manufacturing firms, financial organisations, hospitals, service



SCHAEFFLER UK'S AUTOMOTIVE COMPONENT MANUFACTURING PLANT IN SOUTH WALES HAS WON A WALES QUALITY AWARD FOR SUSTAINABILITY.

> providers, educational establishments and councils.

Winning a Wales Quality Award is an accolade for any business. The judging and assessment process is carried out by a panel of independent industry experts from the private and public sectors.

In a speech at the awards ceremony, David Phillips, CEO at the Wales Quality Centre, the organisation responsible for the Wales Quality Awards, commented: "As winner of this year's Sustainability Prize, Schaeffler UK has demonstrated the most significant impact in this area over a period of time."

Roger Evans, Plant Director at Schaeffler UK commented: "We are very pleased to win a Wales Quality Award again. This is the third year in succession that Schaeffler has won a Quality Award and we believe it acknowledges our ongoing commitment to continuous improvement. The award for sustainability recognises the strategy and plans that are being prepared to ensure the success of Schaeffler UK in the future. This process has resulted in the Llanelli plant securing a considerable amount of investment in new technology during 2011."

PRINCE LEARNS ABOUT ENERGY EFFICIENT **ROLLING BEARINGS AT START WALES FESTIVAL**

The Prince of Wales met with Schaeffler staff at their exhibition stand at the Start Wales Festival, held at the National Botanical Gardens in Camarthen, West Wales.

His Roval Highness spoke to Richard Granger, Sales Engineer at Schaeffler UK, about the company's range of rolling and plain bearings that are helping engineers to design more energy efficient wind, wave and tidal turbines.

Start (www.startuk.org) is a UK nationwide initiative by The Prince's Charities Foundation aimed at promoting and celebrating sustainable living. The Prince cut the ribbon at the very first Start Wales Festival which featured presentations and exhibits on the simple steps we can all take to make better use of

natural resources, including energy, food, transport, buildings and waste at home and in the workplace.

Schaeffler UK was one of 160 exhibitors at the event. A variety of different rolling bearings and plain bearings were displayed on Schaeffler's stand, many of them designed to support specific types of renewable energy systems, including wind, wave and tidal turbines.

Richard Granger commented: "It was a pleasure to meet and talk with His Royal Highness on such an important day for the Welsh community and industry. The Prince took a great interest in Schaeffler's products, particularly our bearing ranges for specific types of renewable energy systems such as wind turbines, wave power and tidal energy systems.

"The Prince also showed a keen interest in Schaeffler's automotive engine components plant based in Llanelli."



NEW CAMPAIGN AIMS TO PREVENT BEARING COUNTERFEITING

In the last two decades, product counterfeiting has grown substantially across the globe. While much has been reported about counterfeits in the music, film, home electronics and designer clothing industries, far greater risks lie in counterfeiting of safety-critical industrial products such as tyres, seals and bearings. Here, fake versions can pose a genuine threat to health and safety.

As a result, the World Bearing Association (WBA) has launched a campaign to highlight the very real safety hazards that come with counterfeit bearings.

The WBA anti-counterfeiting campaign will reach out to various audiences via e-mail, website banners, social media and the campaign website, www.stopfakebearings.com where interested parties can learn more about threats posed by illegal counterfeiting and what is being done to stop it.



The Schaeffler Group with its bearing brands INA and FAG has been fighting counterfeiting for many years. "We are seeking close contact with public authorities and are

cooperating closely with associations and other industrial companies to draw attention to this issue", said Dr. Juergen M. Geissinger, President and CEO of Schaeffler Group.

"We operate a zero tolerance strategy which means that we examine and pursue each and every case of counterfeiting worldwide, even if they seem like petty offences."

Counterfeiting violates intellectual property rights, such as patents and trademarks and, because counterfeits look like and are marketed as genuine products, it normally takes a trained expert to identify them until they fail..

KIEV GETS READY FOR EURO 2012

A TOTAL OF 240 MAINTENANCE-FREE SPHERICAL PLAIN BEARINGS SUPPLIED BY SCHAEFFLER ARE TO PLAY A VITAL ROLE IN SUPPORTING A NEW RETRACTABLE ROOF FOR THE OLYMPIC STADIUM IN KIEV IN THE UKRAINE.



Ukraine's Olympic Stadium in Kiev has been renovated on several occasions but is currently undergoing a thorough, comprehensive modernisation programme in

preparation for the UEFA Euro 2012 football tournament Co-hosted by Poland and the Ukraine, Euro

2012 tournament matches are scheduled to take place in various cities in both host nations with the final being staged in Kiev's Olympic Stadium on 1st July 2012.

The Olympic Stadium will need to accommodate more than 83,000 spectators for the final and at the core of its modernisation programme is a new retractable, translucent stadium roof, as well as integrated floodlighting systems.

Schaeffler is playing a leading role in the stadium roof project. The roof is spanned by ropes, whose coupling points comprise loadfree bearing supports. All rope coupling points at the edge of the roof and on the

masts are accommodated by a total of 240 spherical plain bearings, which are lined with Schaeffler's Elgoglide® sliding low friction layer. The bearings are dimensioned in such a way that that they can easily support the loads from the roof acting on the bearing positions

A total of 80 radial spherical plain bearings support the base plates of the roof columns. These maintenance-free bearings have a 160mm diameter bore, are sealed on both sides and have a corrosion-resistant steel inner ring.

Arranged in pairs, a further 160 radial spherical plain bearings support the loads from the roof structure itself. These bearings have a 140mm diameter bore and are sealed on both sides. The bearings also have a special inner ring bore that is lined with Elgoglide®, enabling the bearings to be mounted more easily in the application. In addition, the bearings are designed to compensate for any temperature-related axial expansion.



competent authorities and the manufacturer of the brand should be contacted. "Our initiative is aimed at sensitising the public

Where there are doubts about a product, the

to the dangers associated with counterfeits," says James W. Griffith, WBA President and President and Chief Executive officer of The Timken Company. "The WBA is intensifying its anti-counterfeiting operations - this means providing information for customers on the one hand and consistent prosecution of offenders through the competent authorities on the other."

Visit www.stopfakebearings.com to learn more.



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 neither expands when exposed to humidity, nor heatseals with metal. Elgoglide is also resistant to most chemical agents and is ideal for use in rotary and linear motion applications.

Elgoglide® accommodates loads, transmits them and also replaces the lubrication function. Relubrication of Elgoglide® bearings is therefore not required.

Elgoglide® bearings offer high load carrying capacity and long service life combined with small installation space and low friction and provide a number of advantages in applications that are characterised by high loads and small swivel angles.





SCHAEFFLER COLOURS APPEAR IN THE FAST LANE

LOOKING AFTER A LANDMARK

A BRIGHT NEW SCHAEFFLER LIVERY, IN LUMINOUS YELLOW AND STRIKING GREEN, MADE ITS FIRST APPEARANCE ON THE GRID WHEN THE GERMAN TOURING CAR SERIES - DTM (DEUTSCHE TOURENWAGEN MASTERS) - KICKED OFF THE 2011 SEASON AT HOCKENHEIM RECENTLY.



he Schaeffler colours, together with the LuK, INA and FAG logos, are featured on an Audi A4 driven by 29-year-old Martin Tomczyk from

Rosenheim in Bavaria, who will receive backing as Schaeffler's brand representative.



While Schaeffler, primarily through LuK, has been active in motor sport for over 30 years, the new 2011 sponsorship represents a big step forward in its involvement. Instead of the smaller LuK emblems on the Red Bull Audi and INA emblems on an S-line Audi, seen in previous seasons, this year will seen the new fully liveried Schaeffler Audi A4

"We are pleased to be brightening up DTM race days with some fresh colours this season," said Dr Juergen M. Geissinger, President and CEO of the Schaeffler Group. "We are continuing our commitment to touring car racing in the DTM and with Audi, and through this new sponsorship we are also raising public awareness of our company."

The DTM is amongst the most popular touring car series in the world and has true international appeal. Of the ten rounds in this year's calendar, six take place at German venues with the others taking place in Holland, Austria, Spain and the UK.





The UK race will take place at Brands Hatch on September 4th. Starting at 1.00pm, the race will cover 98 fast and furious laps of the Kent circuit.

Adding to the interest in the events is the list of drivers who are participating in this year's championship such as Ralf Schumacher and David Coulthard, the latter one of a very strong British contingent.

At the time of writing, three rounds in the series had been completed and the Schaeffler Audi had

done brilliantly well - coming in fifth at Hockenheim, third at Zandvoort in Holland, and then taking the chequered flag in first place at Spielberg, with Martin Tomczyk bringing the Schaeffler car home split seconds ahead of Ralf Schumacher

(By the time this edition of 'In Motion' is published, more races in the DTM calendar will have been completed. We'll keep you in touch with the results in later editions).

THE SCHAEFFLER GROUP HAS RECENTLY EXTENDED ITS LONG-STANDING RELATIONSHIP WITH SETE (SOCIÉTÉ D'EXPLOITATION DE LA TOUR EIFFEL) BY PROVIDING ADDITIONAL SERVICES TO THE COMPANY THAT OPERATES THE EIFFEL TOWER. ONE OF THE WORLD'S BEST KNOWN LANDMARKS.



chaeffler's maintenance and asset management division IAM (Industrial Aftermarket) is now providing technical support in the selection of

the most suitable rolling bearings together with vibration analysis and bearing mounting services to the Eiffel Tower's operating company.

The extended services agreement with SETE was brought about as a result of an urgent need to replace the bearings in the cabins of the hydraulic elevator in the Eiffel Tower's western column. These bearings support a total weight of 20 tonnes, which means they are permanently subjected to extremely high loads. Furthermore, the axial clearance of the original bearings was too large. It was therefore imperative to find an alternative solution.

By working in close collaboration with SETE, Schaeffler application engineering experts selected the most suitable FAG tapered roller bearings. These bearings meet all requirements with respect to the radial and axial load ratings and can be easily integrated in the system. An experienced IAM fitter provided on site support to the maintenance team that mounted the elevator cabin bearings, a task that took just one day to complete.

Later, when the upper pulleys of the elevator in the eastern column of the Eiffel Tower also needed to be inspected, SETE once again contacted Schaeffler. Experienced IAM engineers carried out measurements using an offline vibration measuring device and provided SETE with a detailed condition report on the bearings along with recommendations regarding future maintenance measures that should be taken.

The relationship between Schaeffler and the Eiffel Tower started in the late 1980s, when Schaeffler undertook an extensive project to overhaul all of the famous landmark's mechanical systems.

At that time, in order to modernise the elevators, the bronze rings in the pulleys were replaced with FAG rolling bearing systems. This significantly increased the reliability of the elevators.

In 2002, Schaeffler developed and mounted an INA gear ring, which aligns the revolving



PEOPLE TAKE CENTRE STAGE AT SCHAEFFLER

MARIA-ELISABETH SCHAEFFLER, HEAD OF THE SCHAEFFLER FAMILY BUSINESS, WAS INTERVIEWED LIVE IN FRONT OF AN AUDIENCE OF AUTOMOTIVE EXPERTS AT THE RECENT CAR (CENTRE AUTOMOTIVE RESEARCH) SYMPOSIUM IN BOCHUM, GERMANY, AND REVEALED THAT A CLOSE RELATIONSHIP WITH EMPLOYEES HAS BEEN A CORE VALUE OF THE BUSINESS SINCE IT WAS FIRST FOUNDED.



he interview was conducted by Prof. Dr Ferdinand Dudenhöffer. one of the organisers of the CAR Symposium, an event held annually since 2001 with the aim of investigating the economic interrelationships and activities in the worldwide automotive industry.

The motto for this year's event was "Innovations and Profitable Growth" and the key message was that the automotive industry has left the economic trough.

Below are key extracts from the interview with Maria-Elisabeth Schaeffler

Prof. Dr. Dudenhöffer: The Schaeffler Group increases its sales by 10 percent, year on year, which is very impressive.

Could you tell us the secrets of your success? What are your key principles?

Maria-Elisabeth Schaeffler: Schaeffler is a family business established by Georg and Wilhelm Schaeffler. When I came from Vienna to Herzogenaurach as a 21-year-old, I found there was nothing as important as the company. My husband lived for it seven days a week. There was a bond with the company right from the beginning which is impossible to express in words.

Even back then, the company was our life, our responsibility and our highest priority at all times. This hasn't changed and includes a very close relationship with employees. When I take journalists or customers round

our plants they can see how the employees meet me and how deep human ties can be. This is something very precious; something very binding.

Prof. Dr. Dudenhöffer: How important is it for you to be in contact with large numbers of staff?

Maria-Elisabeth Schaeffler: I believe that knowledge about employees and contact with them is extremely important. It is a special characteristic of a family owned business. People take centre stage at Schaeffler and, because the company has been my life too, seven days a week for many years now, I know the people and appreciate that there



are many families where two or three generations have worked for Schaeffler. Many started as apprentices and I still meet employees whose grandfathers worked here. These special ties motivate people and are an important factor in our SUCCESS

This is one of the reasons I try to travel as much as possible. I want to meet the employees at our plants throughout the world to get to know them and learn about their local situations. I attach great importance to this because as a family entrepreneur it is necessary for me to show solidarity with all these people who work and achieve for our company

For a while now, my son has accompanied me on these trips which makes me very happy.

Prof. Dr. Dudenhöffer: Does it take a certain level of humility and a down-to-earth approach to demonstrate to your employees and to the general public that these aspects are more important than things such as shareholder value and the like?

Maria-Elisabeth Schaeffler:

Humility has always been important at Schaeffler and this remains the case today. My husband always attached great importance to this and, having come from a very strict family where I was brought up to treasure frugality and restraint, I also feel this is very important.

Prof. Dr. Dudenhöffer: The Schaeffler Group has tripled its sales since 1996. How important are takeovers in the context of such a growth process and what role do acquisitions play in the long term for family owned enterprises?

Maria-Elisabeth Schaeffler: /t all started with LuK. Initially we took a 50% stake in the company and it was my husband's wish to acquire the remaining 50% at some stage in the future. However, we managed this only after his death.

Next came the takeover of FAG which, considering our future orientation and growth plan, was a real stroke of luck. Now our business is well balanced with automotive sales accounting for 60% and our industrial business providing 40%.

Our logo - the LuK, INA and FAG brands drawn together by the Schaeffler name - reflects the real situation. We are a family; we make a good match; we have grown together; and we can provide an excellent service to the market.

Prof. Dr. Dudenhöffer: How important was your entry at **Continental AG?**

Maria-Elisabeth Schaeffler: Very important and I still support the decision. Schaeffler is orientated towards mechanics - albeit hi-tech but still mechanics. Continental, on the other hand, stands for electronics

The close connection between these two fields will be vital to finding solutions for future mobility and increased energy efficiency.

I am convinced that even the greatest sceptics will come to realise that this was exactly the right decision maybe not today or tomorrow, but one day in the near future.

Internationales CAR-Symposium 26. und 27. Januar 2011

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INNOVATIVE SCHAEFFLER ENGINEERING STARS AT HANOVER



WITH OVER 230,000 VISITORS THE HANOVER FAIR, HELD FROM APRIL 23 TO 27, PROVIDED AN EXCELLENT LAUNCH PAD FOR THE LATEST INNOVATIONS FROM SCHAEFFLER GROUP WHERE THE FOCUS WAS ON INCREASING EFFICIENCY AND CONSERVING RESOURCES WHILST IMPROVING PERFORMANCE AND RELIABILITY.





isitors to the stand were able to view the latest rolling and plain bearing solutions, together with developments in linear and direct drive technology and a range of new mechatronic components.

Robert Schullan, President of Schaeffler Group Industrial, said: "With our wide product range, innovative strengths and position in growth markets, we are able to shape the big future trends in our sectors energy and energy efficiency, mechatronics and electric mobility - and to expand the

Schaeffler Group's market position."

Renewable energy

Renewable energies, including wind, solar, tidal and wave power, are a strategic growth area for Schaeffler Group Industrial, which works as a development partner for various projects in the sector, creating the prerequisites for the development and economic use of regenerative energies with application-specific expertise and innovative products.

As an example of its work in this area, Schaeffler featured its strategic partnership with British firm Pelamis Wave Power which has resulted in a decisive breakthrough in the development of wave energy converters. The extended performance limits in bearing and seal technology was key to the success of the project. The Pelamis wave energy converter floats on the surface of the water like a sea serpent and is anchored to the sea bed. Its gigantic steel tubes are linked together using ioints and are located transverse to the waves. Upward and downward wave motion drives hydraulic motors that are linked to generators.

The main steel tube structures are connected by bearing units containing a combination of Schaeffler bearings specially developed for the project.

Rolling and plain bearing supports developed for use in the tracking systems of solar powered plants were also featured on the stand. Series AXS angular contact bearings are particularly suitable for this application, providing maximum efficiency and high costefficiency.





Mechatronics

Mechatronics, which are playing an increasingly important role in innovative rolling bearing solutions, were also a feature of the Hanover stand. These newly developed rolling bearings, with integrated sensors and an integrated or adjacent power supply, are improving the reliability and cost-effectiveness of machines by means of increased functionality.

One example on show was the new torque sensor bottom bracket for electric bikes (or "pedelecs").

Another was the new grease sensor, incorporating an electronic valuation system, that enables the condition of the grease in a bearing to be analysed during operation. Developed by Schaeffler in association with the sealing specialist Freudenberg and lubrication expert Klüber-Lubrication, the system detects any changes in the condition of the grease before any damage to the rolling bearing occurs.

Hanover is one of the world's biggest engineering exhibitions and attracted visitors from across the

Needle roller bearings have been a core part of

the business since its formation in the 1940s

and the latest developments in this sector, with the emphasis on downsizing and friction

Three new needle roller bearing designs, all

carrying the X-life quality brand, were unveiled

The newly developed, profiled steel cage of

the new X-life machined needle roller bearing

methods, provides a significantly higher load

carrying capacity. The cage

design means that

both the number of

needle rollers

and their

be

any

overall

load-bearing

length can

increased

without

increase in

type D, produced by optimising forming

reduction, were introduced at Hanover.

The latest needle

roller bearings

at the show.

bearing dimensions, opening new design options for downsizing. For example, a new Xlife NK 55/25-D-XL can achieve a 25% higher load carrying capacity. Previously a needle roller bearing of the size NK 75/25-XL would have been required.

A second development introduced at Hanover was the machined needle roller bearing with a Twin Cage made of plastic. Designed to provide higher efficiency, the development allows two short needle rollers to be inserted next to each other in one cage pocket instead of the usual single long needle roller. The new combination achieves a significantly lower frictional torque in comparison with conventional needle roller bearings.

The third development presented at the show was a new slimline drawn cup needle roller bearing which also makes a significant contribution to lower friction and higher efficiency. This is the first bearing in the diameter range from 15 to 50mm that has a section height of only 1.5mm and is therefore particularly suitable for replacing plain bearings in automatic transmissions. The new bearings also reduce friction by up to 60% compared to conventional bearings and simplify the adjacent construction considerably.





globe, including many from the UK. In all, over 6000 companies exhibited at the show, but, with its raft of innovative developments, Schaeffler Group Industrial, was definitely amongst the stars.



ALL ELECTRIC AND 0 – 60MPH IN LESS THAN 5 SECONDS

SCHAEFFLER BEARING TECHNOLOGY FEATURES IN THE NEW DELTA E-4



nnovative hybrid bearing technology from Schaeffler UK has enabled engineering consultancy and electric vehicle

manufacturer, Delta Motorsport, to design and build from scratch an all-electric road car capable of 0-60mph in less than 5 seconds and with a top speed in excess of 150mph.

The Delta E-4 Coupe is a stylish 4-seater, 2-door coupe that boasts a class-leading range of more than 200 miles on a single charge.

The vehicle, which can accommodate four adults, boasts an acceleration comparable to a Porsche 911 Turbo.

The key to the E-4 Coupe's stunning performance is the direct-drive electric motor that powers the car. Designed in by Delta Motorsport in partnership with Oxford University and Oxford Yasa Motors to meet Delta's performance requirements, the new design axial-flux electric motor generates well over 600Nm of torque while only weighing 23kg.

"The bearings were absolutely critical to enabling the modular design of the Yokeless and Segmented Armature [YASA] motor," said Nick Carpenter, Technical Director at Delta Motorsport. "Ultra Low Energy Vehicles such as the E-4 Coupe rely on lightweight components to compensate for the inherent problem of the low energy density of lithium batteries when compared to gasoline.

"When I first came up with the idea of a new bearing arrangement that would help to optimise the space available for the stator while accurately controlling the air gap to the rotors, I almost dismissed it due to the fact that standard bearings would have been too big and too heavy. However, following detailed discussions with Schaeffler UK, the company's engineers were able to offer a special design of hybrid double-row angular contact ball bearing, which has a split inner ring that was able to meet the demanding criteria of reduced weight and cross-section."

This was the breakthrough that Delta Motorsport needed if it was to fulfil its ambition to develop a highly-efficient, plug-in battery electric 'car for the people' that is stylish in design, financially viable and capable of overcoming the 'range anxiety' of many potential purchasers of all-electric vehicles

Stewart Davies, Senior Applications Engineer at Schaeffler UK, said the E-4 project had presented some very demanding criteria. "The challenge was to keep the bearing as narrow as possible in order to meet the dimensional constraints of the design envelope inside the YASA motor, whilst at the same time offering a commercially viable bearing solution within a very tight timescale."

Schaeffler UK was able to supply the first samples four months after it started work on the project. Davies continues: "The initial bearing design concept proved to be too expensive but, following intensive design calculations, we were able to offer a single hybrid bearing that met the key design criteria and could also be competitively produced in volume."

One of the problems encountered by Schaeffler's design team was the high seal lip speed. With the bearing rotating at such high speeds, all calculations indicated that the seal would wear out and the bearing

would fail prematurely. By specifying a Coupe and the

non-contact shield, this problem was solved. Another advantage of using a non-contact shield is the increased life expectancy of the grease.

According to Davies, "A hybrid bearing has all the insulation gualities required for use in electric motors, including low friction, but the non-contact shield doubled the life expectancy of the grease which further enhanced the performance of the bearing."

Dr Tim Woolmer, whose DPhil at Oxford University led to the creation of the YASA motor added: "The partnership with Delta and Schaeffler helped us to create performance prototypes of the motors very quickly. The design has proven to be so robust at high torque and high speed conditions that Oxford YASA Motors have adopted it as part of the next generation design being finalised for higher volume production."

Delta Motorsport is used to overcoming many challenging engineering problems, having been involved in a wide variety of concept, design and prototype projects ranging from sports cars and motorcycle safety products, to hybrid and battery electric vehicles. The company's work in top level motor sport - where vehicle weight, aerodynamics and mechanical efficiency are key factors - has enabled Delta to optimise the performance and handling of the E-4 Coupe.

"Problem solving is in our DNA," states Carpenter. "However, designing a road car is a very different challenge to designing a racing car. It's not that any one task is particularly complex but simply the sheer number of challenges involved, from keeping the water out to making sure the car handles well."

Carpenter's enthusiasm for the E-4

future of sustainable vehicle technology is inspirational. "We have learnt so much just by rolling our sleeves up and having a go. With the motorsport industry firmly based in the UK, the culture of innovation is in our DNA There is a great opportunity in this sector for UK plc, and Delta is looking forward to taking this stage."

"Schaeffler's bearing know-how has been an enabling factor in Delta We wouldn't be where we are now without it," concludes Carpenter.



AUTOMOTIVE I

GROUNDBREAKING DIFFERENTIAL WEIGHS 30% LESS



A GROUNDBREAKING NEW SLIM DESIGN OF SPUR GEAR DIFFERENTIAL FOR PASSENGER CARS, WHICH IS 30 PER CENT LIGHTER THAN ITS PREDECESSORS AND WILL ALSO CREATE UP TO 70 PER CENT FREE AXIAL SPACE IN THE GEARBOX, HAS BEEN DEVELOPED BY SCHAEFFLER.

The slim shape of the new differential enables the use of new bearing concepts with optimised friction characteristics, which in turn will have a positive effect on fuel economy and CO_2 emissions. Ultimately, the lightweight differential will save space that can be used for larger dual clutches or transfer gearboxes, as well as making room for electrical components on hybrid electric vehicles.

In the 1950s, a mid-sized car weighed in at around 900kg. 50 years later, this figure had increased to around 1,600kg due to a host of new safety and comfort features. Numerous electronic aids were also responsible for the additional vehicle weight.

Today the need is to reverse the trend and every kilogram that can be saved from the overall weight of a vehicle is critical, putting increasing pressure on vehicle manufacturers and their suppliers to minimise the size and weight of powertrain systems and engine components.

The new differential is the result of a twoand-a-half year advance development project. It has already been installed in a mid-size passenger car and has slipped seamlessly into a variety of other customer projects.



tving Towards a tainable Future



The Schaeffler Group's comprehensive range of systems and components for internal combustion engine-powered

ior internal combustion Scl engine-powered vehicles, hybrid vehicles and allelectric vehicles is detailed in a new brochure from Schaeffler UK. Entitled *'Driving Sustainable* Vehicles and allelectric vehicles from Schaeffler *Driving Sustainable* Vehicles and alldetailed in a *'Driving Sustainable* Vehicles and alldetailed in a *'Driving Sustainable*

Future', the brochure looks at a series of innovative engineering solutions developed by the Schaeffler Group, which are helping manufacturers of traditional internal combustion engine-powered vehicles to produce more compact, lightweight vehicles that deliver improved fuel consumption and lower CO₂ emissions.

Although the internal combustion engine (ICE) is likely to dominate the automotive landscape for the next decade, the increasing mismatch between energy consumption and available resources, together with tighter legal restrictions on pollution, is creating an increased demand for improvements to existing automotive technologies and the development of 'greener' alternatives.

Schaeffler is already successfully partnering a number of major automotive manufacturers to develop more energy-efficient solutions for ICE-powered vehicles. These solutions include a lightweight balancer shaft and rolling bearing assembly; UniAir, the world's first fully variable hydraulic valve control system, developed with Fiat Powertrain; the ball roller bearing; and the FAG wheel bearing, which provides simplified mounting and is 10 per cent lighter than its predecessor.

Another development project at Schaeffler involves the use of novel, optimised engine components, which together give an overall 10 per cent reduction in fuel consumption and CO₂ emissions. Schaeffler's CO₂ncept-10% is a CO₂ demonstration vehicle based on a Porsche Cayenne with a V8 engine.

In addition to tried-and-tested, optimised engine components, the vehicle is also equipped with several new powertrain and chassis components manufactured by Schaeffler. The project achieved an overall saving of 10 per cent in both fuel consumption and emissions when compared to existing production models.

Hybrid and electric vehicles

The brochure also details Schaeffler involvement in the ongoing development of concepts and components for the next generation of hybrid and all-electric vehicles.

The Group's new hybrid demonstration vehicle, the Schaeffler Hybrid, is based on a Vauxhall Corsa and is a fully operational hybrid vehicle. Part of an advanced development project at Schaeffler, this vehicle enables practical comparisons to be made of a number of different vehicle configurations and driving conditions. As well as using a conventional volume-manufactured ICE, the Schaeffler Hybrid also incorporates a central electric motor and two wheel hub motors. The vehicle incorporates every Schaeffler brand, including INA, FAG, LuK, IDAM and AFT (Atlas Fahrzeugtechnik).

The brochure also describes how Schaeffler has developed innovative hybrid bearing technology to support the next generation of all-electric vehicles. These innovations include high speed planetary gear sets, lightweight spur gear differentials, high speed ball bearings for electric motors and high frequency one-way clutches.

PRECISION BEARINGS MAKE ELECTRIC BIKES MORE RELIABLE AND ENERGY EFFICIENT

ALTHOUGH MUCH OF THE DEBATE ON HOW TO REDUCE HARMFUL EMISSIONS TO THE ENVIRONMENT IS FOCUSED ON ALL-ELECTRIC PASSENGER VEHICLES, THE PEDAL CYCLE INDUSTRY, WITH THE EMERGENCE OF THE 'E-BIKE', IS ALSO NOW A SIGNIFICANT GROWTH MARKET FOR NEW ALL-ELECTRIC DRIVE TRAIN TECHNOLOGIES.



olling bearings are an integral part of bicycle drive trains and Schaeffler's experience in developing bearing solutions for bicycles spans more than a century.

More recently, Schaeffler has introduced a variety of energy efficient bearing solutions for pedal cycles, including seat pillars, headsets, saddle wing mountings, free wheel hubs, internal gear hubs and bottom brackets.

The BB29 FAG bottom bracket, for example, has been designed to provide smoother running for city and touring bicycles.

Now, building on the foundations of the BB29 bottom bracket, Schaeffler has developed a new bottom bracket bearing specifically for electric bicycles (e-bikes).

With e-bikes, the drive only becomes active when the rider is pedalling at a certain force (torque).

However, the drive system must be controlled and regulated. The data required to do this (i.e. the speed, direction and angle of rotation, torque) is ideally measured directly on the bottom bracket itself.

Based on the BB29 bottom bracket, Schaeffler's new compact speed sensor bottom bracket bearing, the BB RS, determines the speed, direction of rotation and angle of rotation using a non-contact measurement method.

The system has a much higher resolution

than alternative designs, generating 16 pulses per shaft revolution. This enables more precise control via shorter response times in activating and deactivating the drive system. As a result, the drive can respond with much greater sensitivity to individual riding characteristics, providing optimum assistance to the cyclist. The system is also capable of distinguishing between forwards and reverse pedalling and can include this information in the output signal.

In contrast to traditional speed sensor bottom bracket designs that are normally based on a magnetic disc with a Hall Effect sensor – which are openly accessible and therefore sensitive to external influences and foreign matter – the BB RS sensor bottom bracket bearing is a completely encapsulated system that can be accommodated in the design envelope of a conventional bottom bracket bearing. This means that the sensor is optimally protected, secure from disruptive influences and completely maintenance-free.

Once the system is fitted, it is ready for operation without the need for further adjustment. The twin core cabling is located within the frame, giving optimum protection. The supply voltage is between 5 and 18 volts (rated voltage 12V) and is compatible with all conventional control systems.

Easy-to-fit

Mounting is particularly easy due to the connection preventing reversed polarity and the dual fix design. The housing profile is suitable for the use of FAG tools (externally) and Shimano tools (internally). Since the diameter at the centre of the bearing unit is significantly reduced, this allows space for light cables and other connections. The plastic housing with glass fibre reinforcement compensates small mounting tolerances and makes mounting easier.

The new BB RS was presented to the public for the first time at the Eurobike exhibition in September 2010, held in Friedrichshafen, Germany. Schaeffler also unveiled its new torque and speed sensor bottom bracket. A world first, the FAG torque sensor bottom bracket is able to determine the total torque from the sum of the force from the left and right pedals. Bosch is already using the device in its new high-performance drive.

Being able to correctly determine the rider's requirements for assistance from the motor as riding conditions change and the corresponding control of the power output, is critical to ensuring that the ride has a positive feel. As well as measuring the direction of rotation and speed, being able to measure the precise torque produced by the rider during pedalling, is a prerequisite for determining the exact additional power requirements.

The additional drive power provided by the electric motor is controlled principally by the torque sensor system in the bottom bracket. This means that the rider no longer needs to provide additional 'pedal power'.







AN INDUSTRY FIRST FOR SCHAEFFLER AND SIEMENS **NOVEL HANDHELD VIBRATION MONITOR** FOR TRAIN TRACTION MOTORS

A NOVEL, HANDHELD VIBRATION MONITORING SYSTEM HAS BEEN DEVELOPED TO ENABLE MAINTENANCE ENGINEERS AT SIEMENS MOBILITY TO CHECK TRAIN TRACTION MOTORS FOR EARLY SIGNS OF DAMAGE TO THE BEARINGS.



vibration monitoring systems supplied by Schaeffler UK paid for themselves within just two months, by minimising disruption costs to rail operators and by significantly reducing the number of traction motor repairs due to

bearing deterioration. "If we detect early signs of wear to traction motor bearings, we can repair or replace that motor at our own convenience before more significant damage

occurs," said Peter Ridgway, Production Support Engineer at Siemens Mobility, Rolling Stock. "The cost of repairing a damaged traction motor would be many times the cost of a standard overhaul."

Prior to investing in the FAG Detector III handheld vibration monitors, Siemens had been experiencing bearing deterioration problems on some traction motors, fitted to the Desiro electrical multiple units. The bogies on these trains are all driven by the same traction motor. What Siemens needed was a method of monitoring the condition of the traction motor bearings in order to predict their remaining operational life and enable appropriate corrective action to be taken before damage was caused to the motor.

"In theory, these traction motors have a service life approaching one million miles before they need overhauling, but we were experiencing some bearing issues earlier than this. In March last year, I therefore started to search for a suitable solution and came across Schaeffler's UK website, which was very helpful," said Peter Ridgway.

After talking to Schaeffler UK's Engineering Manager Dr Steve Lacey, Peter Ridgway decided to work with Schaeffler to develop a suitable condition monitoring solution.

Schaeffler carried out a comprehensive program to measure vibration from around 100 traction motors. This involved measuring vibration on the traction motor housing and assessing the condition of the bearings and other associated mechanical components.

The vibration measurements were carried out whilst the trains were positioned over an Underfloor Wheel Lathe at two of Siemens' rail maintenance workshops in Southampton and Ilford.

As Dr Steve Lacey states: "At the onset of the investigation, I wasn't very hopeful that simple

vibration-based parameters could be used to give a reliable indication of motor condition. However, after carrying out detailed vibration measurements on the traction motor housing. it became apparent that simple characteristic vibration parameters could be used to give a very reliable indication of the condition of the motor, even in the presence of high background vibration from other sources.

We believe this novel solution for assessing the condition of rail

traction motors is an industry first and we're very excited about the potential benefits that our FAG Detector III can bring to rail operators."

Following in-depth analysis and reporting, Schaeffler developed special software for its FAG Detector III with the aim of providing Siemens with a device that would be easy to use and that didn't require a vibration monitoring expert to interpret the results.

The modified Detector III now enables maintenance engineers at Siemens to implement vibration checks on a routine basis. The device now has a new 'Rail-Measurement' menu option with pre-set limits for the Desiro traction motors.

"We collected vibration data using our FAG Bearing Analyser. The results demonstrated that, even amongst the very high background noise and vibration levels, it is possible to detect vibration frequencies that are related to the drive end bearing," added Dr Lacev.

Peter Ridgway concluded: "Siemens is committed to undertaking maintenance to the highest standards of integrity. We have been extremely impressed with Schaeffler's commitment to this project and cannot fault the company's drive and dedication to finding a reliable and practical solution for us."

"We can now properly survey the fleet of trains to



assess the condition of their traction motors and to make more informed decisions as to when to overhaul a particular motor.





TRAIN SUPPORT SYSTEM IMPROVES RAIL SAFETY AND EFFICIENCY

AN AWARD-WINNING TRAIN SUPPORT SYSTEM HAS BEEN DEVELOPED BY THE SCHAEFFLER GROUP.



his novel, onboard unit enables information relating to the condition of bearings, wheelsets and rail tracks to be recorded, and then transmitted to a higher level control system.

The evaluated data produced by the system forms the basis for maintenance and renair decisions and is also critical for railway supervisory systems as well as for online timetable generation, routing, process and risk analysis.

The Train Support System has already won many admirers in the rail industry and Germany's Center for Transportation & Logistics (CNA) recently recognised it with its 'Intelligence for Transportation and Logistics innovation' award

From Rolling Bearing to Onboard Unit

The Train Support System is based on Schaeffler's FAG axlebox bearing, which can be used with an integrated GSB (Generator Sensor Bearing) as a self-sufficient energy source in rail freight wagons. Schaeffler developed the system electronics and software and then integrated these in its GSB (Generator Sensor Bearing), forming an onboard unit.

Used in combination with an information management system, the GSB enables line operators and rail companies to improve track safety, whilst optimising freight logistics. A wide range of different signals are recorded in the GSB and transmitted to a central computer via GPS. The evaluated data forms the basis for rail supervision systems, as well as online timetable generation, routing, process and risk analysis, localisation, length of retention and so on.

Similar to a dynamo, the GSB induces the required electric power via the rotational movement of permanent magnets located on the wheel axle. This power is typically around 100W at a nominal voltage of 24V. Therefore, an independent, self-sufficient energy source is available, which, via an electric storage unit, enables additional functions, such as the automatic opening of train doors or the detection of switches and sensors.



For the Train Support System, Schaeffler has now refined the GSB with a sophisticated electronic system into an onboard unit and connected this with a higher-level information management system. Now the signals are not only recorded and processed in the bearing, but are also transmitted via GPS satellite technology.

From Onboard Unit to Train Support System

In the past, such onboard units were not because supply of data using satellite self-sufficient energy supply system.

messages via satellite opens up new possibilities for optimising freight haulage

"The great innovation for transportation and possible to develop, particularly in freight trains, logistics is achieved via the combination of the self-sufficient energy generation in the technology only works with an independent, Generator Sensor Bearing and the sensor data with the respective This is now available due to Schaeffler's onboard units and the higher level Generator Sensor Bearing. Communication of information and control system. This makes the Train Support System a groundbreaking solution for rail traffic in terms of safety logistics and for enhancing transport safety.. and communications, as well as The sensors integrated in the bearing record transportation and logistics data on the condition of the axlebox bearing, management," emphasised such as wear or excessive heat, and also Simone Purbs, Head of the determine and monitor other characteristics Schaeffler Group's such as mileage, speed, temperature and noise. Railway Sector Management. This data enables conclusions to be made

about the condition of wheels, bogies and rail tracks. Even the condition of butt joints and switches in the rail network can be monitored.

The evaluation of the data recorded in the bearing also enables the monitoring and optimisation of traffic and goods flow, as well as wagon availability, location tracking and the calculation of track utilisation costs, taking into account the loads, number of axles, time and distance.

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EXTENDED RATING LIFE FOR TURBINE BEARINGS

A new high capacity cylindrical roller bearing for wind turbine gearboxes offers a 20 per cent increase in rating life.

The bearing, which features a new bearing cage design, also provides higher load ratings and reduced friction.

The basic static and dynamic load ratings of the new bearings are 6 per cent higher than those of a conventional cylindrical roller bearing with solid brass cage, resulting in a 20 per cent increase in rating life.

These new FAG high capacity cylindrical roller bearings feature a new sheet steel cage, which enables a much more compact design compared to a conventional solid brass cage. The slimline cage leaves space for at least one additional rolling element in the bearing, which increases the load rating significantly.

There are other advantages too. Due to the new cage, the high capacity bearing has a significantly lower friction than full complement cylindrical roller bearings with maximum basic load rating. The 'selfretaining' cage also simplifies bearing mounting because the rolling elements are retained even when the ring is removed.

A novel design

of rolling

bearing for

wind turbine

gearboxes has

been developed

by Schaeffler. Not

Today, most planetary stages of wind turbine gearboxes use full complement cylindrical roller bearings. These bearings have no cage, the function of which is to guide the rolling elements and to maintain a set distance between them. These full complement bearings have the highest load ratings, since more rolling elements are fitted to bearings that have no cage.

However, full complement roller bearings have relatively high friction because the rolling elements are in direct contact with each other. These kinematic conditions cause higher friction losses. In contrast. cylindrical roller bearings with conventional solid brass cages have significantly lower friction, but often do not achieve the required load ratings due to the reduced number of rolling elements.

Schaeffler's new FAG high capacity cylindrical roller bearings incorporate the newly developed sheet steel cage, which ensures low friction and provides sufficient space for an additional roller in the bearing (due to very narrow crosspieces).

The cage comprises two cage rings lying one inside the other and joined together. The crosspieces of the inner cage guide the



rollers and retain them in the bearing, even when the bearing ring is removed. This means that the bearing is much easier to mount, as no separate device is required to help prevent the rollers from falling out. Meanwhile, the outer cage provides increased rigidity.

In addition, the special geometrical shape of the cage pockets improves lubricant flow, which reduces friction and prevents damage to the bearing.

only is it resistant to the effects of slippage, but actually prevents slippage from occurring in the first place.

The new FAG tube roller bearing incorporates three tube rollers that are of slightly larger diameter than the other rollers and thus rotate at all times in contact with the inner and outer ring, preventing slippage even when the bearing is under very low load. Due to the design of the tube rollers, they become slightly compressed under higher load and the full set of rolling elements then comes into contact with the bearing rings, supporting the load in the same way as a conventional bearing. The load rating and

rating life of the bearing are thus unaffected.

PREVENTING SLIPPAGE

Slippage is the natural enemy of all rolling bearings. The life and performance of a rolling bearing will suffer if it is overloaded or underloaded. This is because rolling bearings are designed with a minimum load

requirement in order to function optimally. If this minimum load is not met, slippage will occur. This means that the rolling elements not only rotate, but also slide on the bearing raceways. Eventually, this can lead to surface damage such as increased wear or smearing, particularly in critical lubrication conditions.

In wind turbines, rolling bearings have to meet special performance requirements. The bearings must be designed to withstand extremely low and high loads that act on the bearing during calm or strong wind conditions. The risk of damage to a bearing increases significantly when the roller set of a rolling bearing with high slippage is suddenly subjected to extremely high acceleration forces. For this reason,

Schaeffler has developed the tube roller bearing, which completely eliminates the problem of slippage.

The tube roller bearing is not available from Schaeffler's standard catalogue but is custom designed for specific customer projects and applications.



IMPROVING ENERGY EFFICIENCY IN AXIAL PUMPS



motors.

y working closely with the manufacturer, the Schaeffler Group has optimised bearings used in newly developed Sauer-Danfoss H1 series of axial piston pumps and

As a result of the new optimised X-life cylindrical and tapered rolling bearings, overall efficiencies of the H1 pumps and H1 motors have increased by around 2 per cent, resulting in significant improvements in energy efficiency levels.

Energy saving potential for the end users of the pumps and motors is significant. For example, by utilising a new H1 hydraulic pump and two H1 hydraulic motors, a wheel loader that has a drive power of 140kW can save around 9kW. Projected onto 1,000 wheel loaders operating for eight hours a day, annual savings potential could reach 26,000MWh. This is equivalent to the average energy consumption of more than 6,500 households.

This results in approximately savings of around 5 million Euros (0.21 Euros/kWh) and around 16.000 tonnes of CO² per year. The latter is roughly equivalent to the annual emissions of 4,200 compact cars, each

traveling 25,000km per year.

Increasingly stringent emissions regulations and rising energy costs are boosting demand for more efficient machines and drive systems, including the optimisation of power train designs for diesel engines in order to reduce vehicle fuel consumption.

In non-automotive applications, various types of hydraulic units are now replacing traditional power transmission systems. Configurable axial piston pumps and motors, for example, are specifically designed for use with electrical machine controls.

In developing the H1 series, as well as optimising and improving the electro-hydraulic system itself. Sauer-Danfoss also focused on optimising the base components within the hydraulic pumps and motors. The various bearing positions on the pumps and motors were scrutinised down to the last detail in order to identify where any improvements could be made. New, low friction, optimised rolling bearing solutions from Schaeffler had a significant influence on reducing power loss, installation space and weight across the H1 range.

ENERGY CONSUMPTION IN HOUSEHOLD APPLIANCES CUT BY 5%

ew rolling bearings for household appliances have been developed that reduce energy consumption in refrigeration compressors by up to five per cent improving the energy efficiency rating of the compressor by one class.

The new FAG axial ball bearings from Schaeffler are specifically matched to eccentric shaft bearings in refrigeration compressors, replacing the plain bearings that are normally used.

Four types of FAG axial ball bearings are available, which can be freely combined. Both bearing washers can be supplied with or without raceways. Bearing cages are supplied in either sheet steel or plastic, matched to the operating environment. The bearing materials offer excellent compatibility with coolants and are resistant to varying temperatures.



The sheet steel cage has a special 'filigree' (twisted wire) design, which not only provides high rigidity, but is even more suitable than plastic cages for the high temperatures that occur in these bearing positions. In addition, coolant compatibility tests are no longer necessary.

The raceways in the axial washers provide even more secure guidance for the balls and improve load distribution and ball rotation. Overall, these characteristics



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A new option for an H1 axial piston pump in swashplate configuration was achieved by using new swashplate cradle bearings. Here, compact, low friction cylindrical roller bearings were used to support the drive shaft. Compared to the previous version, the installation space and weight were substantially reduced and efficiency was increased by around 2 per cent.





result in a bearing that offers reduced wear and which has a longer operating life. Bearings with raceways on both sides are also available, which provide increased mounting security.

In the basic design, the axial bearing washers are punched, throughhardened and polished, and both sides can be used as raceways. The size of the bearing can be adapted to suit individual mounting locations

ENSURING THE ACCURACY AND RELIABILITY OF DMG MILLING CENTRES



Machine tool manufacturers prefer to focus on their core competences, whilst sourcing 'ready-to-fit' components and sub-systems from high performance technology partners.

German machine tool manufacturer DECKEL MAHO GILDEMEISTER (DMG) for example, is working closely with The Schaeffler Group's INA Linear Technology division on a number of new machine tool develonments

DMG relies exclusively on Schaeffler's high performance RUE-E linear recirculating roller bearing and guideway assemblies for its large and super-sized milling centres.

The RUE-E system provides smooth. uniform running characteristics and high dynamics, ideal for precision linear movement of heavy loads. The range is modular and so customers can select from a range of accessories to suit their application.

The range also benefits from Schaeffler's patented injection moulding technology, which enables perfect rolling element guidance in the load and return zones, optimised transitions and the best possible running characteristics with very low stroke pulsation. Schaeffler has also reduced the number of components in the design, resulting in more robust, reliable rolling element guidance.

Labyrinth seals on the rolling element recirculation system improve protection against contamination. Uniform lubrication is also guaranteed due to a completely closed and sealed lubrication duct.

The design of the guides incorporates an efficient sealing concept, comprising standard seals: single lip upper seals, double lip lower sealing strips, as well as double lip end wipers. The end plates, fitted as standard in front of the contact end wipers, provide extra protection against coarse contaminants, which means the contact end

wipers retain their full performance capability even in environments with fine, often aggressive contaminants.

DMG has been working with Schaeffler to develop linear guidance systems for its DMU/DMC 200 to 340 milling centres, including 5-axis machining centres. Depending on the size of the machine tool and the loads acting on the main axes, linear recirculating roller bearing and guideway assemblies in sizes RUE 35, 45, 55 and 65 are specified. In addition, in order to meet specific customer requirements, DMG uses covering strips; double lip wipers and customised sealing kits from Schaeffler's modular KIT system. These are preassembled at the factory. Load calculations are carried out using Schaeffler's BEARINX[®] calculation software, complemented by DMG's own design calculations for further system refinements.

Optimised distribution of lubricant for the RUE-E units ensures minimal flow grease consumption of just one litre per year using machine lubrication intervals of four hours. Additional components are not required.





systems

chaeffler UK is now able to offer UK customers fast lead times on its RUS and PR linear recirculating roller guidance

The RUS and PR linear recirculating roller guidance systems have been part of the Schaeffler range for many years, but they remain popular with many UK customers, particularly machine builders and machine tool retrofitters. Now, Schaeffler UK can supply these units on fast lead times, typically 1-2 months.

"We are the only supplier in the UK that holds a comprehensive stock of these types of linear guide," said John Loonam, Linear Product Specialist at Schaeffler UK.

Schaeffler offers one of the most comprehensive ranges of linear guidance products in the world. Linear recirculating roller guidance systems comprise INA linear recirculating roller bearings, with guideways and adapters. The units can be used as locating/locating or locating/non-locating bearings. In a closed arrangement, the bearings can support loads from all directions and moments about all axes.

The RUS and PR versions are popular with machine tool retrofitters and machine builders, as they offer very high load carrying capacities, and require little installation space. The units also provide extremely high rigidity under preload.

"The RUS and PR units come with adjusting gibs, which facilitate mounting and provide uniform distribution of the preload over the entire length of the linear recirculating roller bearing, enabling the preload to be set very easily," explains Loonam.

The RUS..KS version offers very smooth, low noise operation due to seals on the end faces.

...AND RAPID DELIVERIES ON LINEAR GUIDES AND SHAFTS



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customers every day and the shafting comes off the linear production line in Germany continuously at walking pace, 24 hours a day, seven days a week.

A large stock of shafts is available from Schaeffler's UK Linear Quick-Centre, located at the company's UK manufacturing plant in Llanelli, South Wales. This facility enables Schaeffler to offer UK customers rapid deliveries on linear systems, rails, shafts, cages and carriages, as well as customer-specific machined shafts.

John Loonam, Linear Product Specialist, comments: "No other manufacturer of linear guides or bearings has a facility like this based in the UK. The Linear Quick-

TECHNICAL COLLABORATION WITH BIGLIA

The Schaeffler Group has expanded its close working partnership with Italian machine tool manufacturer The BIGLIA Group. In addition to supplying ball and roller monorail guidance systems for BIGLIA's range of lathes and multispindle machine tools, Schaeffler is now supplying its super precision FAG spindle and cylindrical roller bearings to the Italian company.

This technical and commercial collaboration with Schaeffler means that BIGLIA now has a reliable partner that supports the Group on a global level, offering long-term application engineering advice, premium quality products and fast deliveries.

Established in the 1950s, The BIGLIA Group is based in Incisa Scapaccino, a small town located in the famous Italian wine-growing region of Piedmont. The company initially focused on the manufacture of sawing and special purpose machines, but in recent years, has seen steady growth in the lathe sector. Today, the Group, which has manufactured more than 10,000 machines since its foundation, employs 170 staff.

BIGLIA first selected the Schaeffler Group as its preferred supplier of ball and roller monorail guidance systems in 2004 to ensure that the

company's range of lathes and multi-spindle machine tools would continue to meet customers' high expectations in terms of quality, reliability and performance.

Today, the majority of main axes in BIGLIA turning machines are equipped with ball and roller linear recirculating bearing and guideway assemblies, such as the KUVE 35 guidance system, from Schaeffler.

The KUVE range of four-row monorail guidance systems offers high accuracy, rigidity and load carrying capacity, as well as other special characteristics. KUVE guides have integral lubricant reservoirs adjacent to the rolling elements and provide long operating life, with maintenance-free operation in certain applications.

The full complement KUVE-B guidance system is ideal for applications where the emphasis is on dynamic characteristics as well as maximum load carrying capacity and rigidity. A wide range of carriages are available, including standard, long, low, high, short and narrow, all of these running on the same modular guideway.

A special low noise KUVE design is also

available for applications in which quiet running has a higher priority than load

carrying capacity. This version incorporates plastic elements called 'Quad-Spacers', which guide and separate the balls, preventing collisions and reducina runnina noise.

BIGLIA now offers a comprehensive range of multi-functional lathes and multi-spindle machine tools, with two or three automatic turning heads. Available in 25 different versions with between 2 and 12 axes, these machines are suitable for universal turning operations and for machining complex assemblies in a single set up.

The company also manufactures a variety of lathes, including vertical lathes with inclined spindles, lathes with three automatic tool changers and multi-tasking lathes.

This unit can be lubricated through the end piece, and can operate in temperatures from -30 deg C to +90 deg C.

The PR model is a full complement cylindrical roller set and is suitable for high operating temperatures, high speeds and high accelerations. Due to its all-metal construction, the PR can operate in temperatures from -40 deg C to +120 deg C.

lobally, Schaeffler manufactures in excess of 10km of shafting for

Centre has enabled Schaeffler to reduce UK customer lead times significantly over the past two years, especially on low volume linear products and shafts.

"It means we can offer customers 48-hour emergency support on cut-to-length shafts. Custom, machined shafts are generally available on 3 to 5 day lead times."

The Linear Quick Centre can machine shafts up to 6m in length, with diameters between 5mm and 80mm. Monorails can also be machined up to 6m in length. Materials include inductionhardened steel, stainless steel and aluminium support rails.

HELPING TO MAKE TRACTORS AND GRADERS GREENER



NEW ROLLING BEARINGS DEVELOPED BY THE SCHAEFFLER GROUP FOR TRACTORS AND GRADERS PROVIDE GREATER DRIVE TRAIN EFFICIENCY WITH **RESULTANT REDUCTIONS IN** FUEL CONSUMPTION AND VEHICLE EMISSIONS.

ractors and graders require high drive power and operate at high speeds. As well as providing operational reliability under every conceivable load or speed condition, the design engineers responsible for the new generation of these machine are looking to develop more environmentally friendly machines with reduced fuel consumption and more energy efficient drive trains.

Many of the latest tractors offer more than 100kW drive power, with some capable of achieving road speeds of up to 80km/h. Most graders operate under full load at speeds of up to 40km/h. The high drive power required for these applications is transmitted via the gearbox and differential and significant fuel savings can be achieved by focusing on improving the efficiency of these two key drive train systems

Low Friction Bearings

The terms 'rolling bearings' and 'energy efficiency' are almost synonymous with one another. Rolling bearings are generally specified in order to save energy. Where mechanical work is required or components are in motion, rolling bearings ensure reduced friction and therefore increased energy efficiency. This is why the rolling bearing - a universally accepted machine component - is and will remain one of the key components in reducing energy consumption.

The continuous improvement of modelling, simulation and design calculation software is the main prerequisite for developing even better bearings, tailored more precisely to match customer requirements and to provide even higher energy efficiencies.

It is not only the selection of the most suitable bearing that plays a key role here. The internal design of a rolling bearing, for example the design of the cage, will also have a major impact on the bearing's performance and friction. Other design approaches involve the use of friction-



reducing, wear-resistant materials and coatings, as well as applying further surface quality improvements in the functional areas of the bearing during volume production.

Low Friction Tapered Roller Bearings

Low friction tapered roller bearings are optimised in terms of their geometry, surface structure and materials, as well as dimensional and running accuracy. As a result, the basic dynamic load rating is increased by up to 20 per cent and the basic rating life is extended by up to 70 per cent. This means that it is now possible to select more compact, lighter bearings, leading to a further reduction in friction. The use of premium grade materials and special heat treatments also provides the bearing with a higher resistance to solid particulates and contaminants such as sand, dirt, dust and heavy clay soil.

In addition, an improved logarithmic profile has been developed for the bearing raceways and roller surfaces, which compensates for stress peaks during high loads or misalignment. Due to the optimised roller surfaces and contact geometry, an elastohydrodynamic lubricant film is created, even at very low speeds. This film allows high loads on the bearings during initial start-up and reduces frictional torque by up to 75 per cent compared to conventional bearings.

Friction-optimised Tandem **Angular Contact Ball Bearings**

Schaeffler's INA and FAG tandem angular contact ball bearings prevent the loss of preload and also reduce friction losses. Therefore, the bearings increase the efficiency of the gearbox and enable significant fuel savings to be achieved.

Similar to tapered roller bearings, angular

contact ball bearings can support axial and radial loads. However, due to their point contact, angular contact ball bearings produce less friction and (unlike tapered roller bearings) have no roller/rib sliding contact, which would adversely affect friction.

Point contact is easier to lubricate than line contact of tapered roller bearings. This means that angular contact ball bearings operate with lower friction than similar-sized tapered roller bearings. The use of double-row angular contact ball bearings ensures that the required load carrying capacity can be achieved and, at the same time, the frictional torque is lower than single-row angular contact ball bearings with the same load carrying capacity. Another benefit of angular contact ball bearings is the preservation of preload, which provides consistently high riaidity.

Friction-optimised Tandem **Ball Roller Bearings**

This innovative "ball roller bearing" is based on an ingenious idea and novel rolling element combined with new assembly methods.

All areas of a conventional rolling element or "ball" that are not under load are removed. This means that 15 per cent of the ball diameter is cut off on both sides of the ball. The result is the 'ball roller', a ball that is flattened on both sides and is 30 per cent narrower than a conventional ball. This saves valuable design space. Furthermore, the very slim shape of the ball roller, together with specially developed assembly methods, enable an increase in the number of rolling elements, so that a filling capacity of up to 90 per cent can be achieved.

More rolling elements in the same design space results in much higher load ratings and correspondingly longer service life.

TEMPCHECK PRO – THE NEW, LOW COST, EASY-TO-USE ALTERNATIVE TO THERMAL IMAGING

A NEW, LOW COST, EASY-TO-USE NON-CONTACT (INFRARED) TEMPERATURE DEVICE THAT MEASURES THE SURFACE TEMPERATURE OF COMPONENTS IN A WIDE VARIETY OF APPLICATIONS HAS BEEN LAUNCHED BY SCHAEFFLER.

he new TempCheck PRO is a handheld infrared temperature measurement device that offers engineers a genuine, low cost alternative to thermal imaging cameras. The device requires little training as the user simply aims the device at the target object and presses a button. The temperature is then displayed on a coloured LCD display.

The device is extremely simple to operate and works in a non-intrusive manner. It delivers precise results within seconds. Users can carry out safe inspections on hot components or objects in hazardous areas, and sources of problems can be located without removing or exchanging parts. Valuable time and money can be saved by detecting weak points before they become a real production problem.

The TempCheck PRO can be used as part of the preventive maintenance regime for rotating machinery and components, as well as for locating 'hot spots' on bearings, gearboxes, motors, valves, HVAC systems, electrical connectors, fuses, electrical wiring and control cabinets

The device is supplied as standard with a surface sensor for situations where contact measurement is the preferred method, and an immersion sensor for measuring the temperature of fluids, making it ideal for use in chemical, pharmaceutical or food processing applications. The integrated data logger can store up to 20 recorded values.

High resolution, small spot size

TempCheck PRO offers a very wide temperature measurement range and is able to measure surface temperatures from -32°C to +760° C. The optical resolution of the unit is 40:1, which provides an accuracy of $\pm 1\%$ (or ±1 deg C between 0 °C and 760 ° C). This high resolution, combined with the unit's consistently small infrared measuring spot size of 13mm up to a distance of 260mm, minimises measurement errors and ensures that the device is capable of accurately measuring smaller targets (down to 13mm) that are further away.

TempCheck PRO's 300ms response time also allows the user to 'sweep' the unit around a room or control cabinet looking for 'hotspots'. The user can even programme the device to



compensate for the emissivity of different target materials.

TempCheck PRO comes with acoustic and visual HIGH/LOW alarm functions and a USB interface. The integrated reporting software enables the user to set parameters and record temperatures. The unit is also supplied with an adapter for a photographic tripod and a protective pouch and storage case.

The TempCheck PRO also benefits from a slimline, ergonomic design and is no larger or heavier than a standard TV remote control device, fitting neatly into an engineer's pocket.

Emissivity and temperature measurement

The emissivity of an object depends on the material, the type of surface, the temperature, wavelength and sometimes on the measuring arrangement. While an ideal emitter can emit all the radiation it receives and is known as a 'black body', this does not exist in nature and bodies emit radiation to varying extents at the same temperature. The emissivity defines the ratio between the radiation emitted from the measured object and that emitted by a black body and is therefore a value between one and zero. Infrared sensors receive the radiation emitted from the object surface, but may also receive reflected radiation from the





surroundings and in some cases, radiation from other sources transmitted through the measuring object.

When selecting an infrared measurement sensor, it is therefore crucial that the wavelength band over which it measures is known and that the correct wavelength band is used for the object to be measured. Many objects consisting of non-metallic materials show a high and relatively constant emissivity, irrespective of their surface consistency, at least in the long-wave spectral range, typically 8-14um

The FAG TempCheck PRO is the latest device in Schaeffler's TempCheck family of contact and non-contact temperature measurement products.

This range includes the FAG TempCheck PLUS, which is similar to the FAG TempCheck PRO, but is a lower cost version that offers a reduced temperature measurement range (-32 deg C to +530 deg C) and a reduced optical resolution of 20:1.

N D I T O

MARATHON CHARITY BIKE RIDE FROM NORTH TO SOUTH WALES



The 160 mile ride started on Friday, June 3 and finished on Sunday, June 5, with a large reception party at a local rugby club.

As the team photograph shows, the event was blessed with hot, sunny weather all weekend enabling the riders to enjoy spectacular views of the Welsh countryside.

To date the team has raised over 2,000 for the school with donations still coming in.

Many thanks from all the staff and pupils of the school to all those who have so generously donated to such a worthy cause



Pictured left to right

Back: Mike Barber, Jason Merrifield, Rob Edwards, Brian Fox, Les 'The Driver' Evans, Steve Peters, James Phillips, Richard Davies; Middle:- Barry Fox, Paul Leaker; Front:- Christian Fox (Organiser), Charles Phillips

MARSTON GREEN GIRLS MAKE THEIR MARK WITH SCHAEFFLER HELP



Having won the League Title at Under 16's, the Schaeffler (UK) sponsored Marston Green Girls took the brave step ahead of the 2010/11 season of jumping up two age groups to Under 18's.

Competing in the Central Warwickshire Girls Football League – one of the largest Girls Football Leagues in the UK – the Girls set about their task with the commitment and desire that had carried them to that League title just a few months earlier.

Starting in early September, so positive

was their start to the season, that by the end of October the girls had won 5 and drawn 1, scoring 36 goals and conceding just 1.

Even when they finally tasted defeat, a 5 – 0 reverse against eventual league runners-up RPS Dynamos, the girls immediately bounced back by putting Stratford Town to the sword the following week – the result... 16 - 0 !!!!!

As well as great success in the League, the girls also embarked on a fantastic cup run, ending only when, due to injury and absence, just 8 players took to the field for the semi final against Leamingtom Lions, a game they eventually lost just 1 - 0.

The girls would taste defeat only twice more during the season - both times against eventual League Champions Wyrley Juniors - on their way to securing a third place finish – a remarkable achievement considering the girls were playing a year above their own age group against the very best sides the Midlands has to offer.

"It truly is a pleasure to work with these players," said Glenn Hughes, team coach and Sector Leader for Distribution, FIS and MRO at Schaeffler UK. "Put simply, they enjoy what they do. They have a passion for the game and an understanding that great success is not achieved through individual brilliance, but through TEAMWORK.

"On behalf of myself, my coaching team and the players I would like to thank Schaeffler UK for their fantastic support this season. Marston Green Girls and Schaeffler are two teams with a similar ethos based on commitment and cooperation.

"Together, we may not move the world, but we are making a mark in ladies football !!!!"

LONG SERVICE AWARDS



Long serving staff at Schaeffler's UK Head Office in Sutton Coldfield were honoured at a special dinner held at Moor Hall Hotel. *Pictured at the event are (I to r), Roger Evans, Plant Director, Martin Ryan (15 years service), Richard Oldfield (25* years service), Richard Hall (15 years service), Kate Hartigan, Managing Director, Adrian Horne (15 years service), Siobhan Griffin (15 years service) and Des Pattinson, Director and General Manager, Industrial Division.

Alan Owen (left), Customer Services

Co-ordinator has completed 40 years

(below).

with the company and Steve Boyle



Regional Sales Engineer and Distributor National Accounts Coordinator, has worked with Schaeffler for 25 years.

Two other members of the Minworth team were also recently presented with Long Service Awards by Managing Director Kate Hartigan.

Ad Schaeffler for 25 years. TO BRIAN

FAREWELL TO BRIAN AFTER 41 YEARS

Many friends and colleagues attended a special farewell lunch to wish Brian Fox, Engineering Manager at the Llanelli manufacturing plant, a long and happy retirement after over 41 years of dedicated service to the company.

Brian started working for INA in Germany as a product technician in 1970. "Back in the early days when I started work in the metal-forming department in Herzogenaurach I felt privileged to have worked alongside Dr Schaeffler on the factory floor and to have been involved in the development of new deep-drawing technology used in the production of needle roller bearings," he said.

"Now, at the end of my career with Schaeffler, I have again been involved with this precision technology to deepdraw mechanical tappets, as well as commissioning the exciting new investment in the South Wales plant."

Brian paid tribute to his colleagues, past and present, who have helped build the successful team that has contributed to the outstanding achievements of the Llanelli plant. "These are really exciting times for everyone at Llanelli and I am pleased to have been a part of them."





Brian is pictured being presented with a new cycling jersey and a cake to mark his wonderful achievements. He is now looking forward to spending more time with his family and three grandchildren, and to continuing his fundraising efforts for local charities.

THE NEXT STIG LARSSON'

Like virtually everyone else in the country who has any interest in books, I got hooked on Stig Larsson's addictive Millennium Trilogy and his wonderful anti-heroine Lisbeth Salander. I couldn't put the books down and finished all three over a couple of weeks.



And there lies the problem. I wanted more, but because Stig Larsson's books were published after his death from a heart attack, there aren't any.

It was a bit of a literary void. But then, just before flying off for a holiday in sunnier climes, I was introduced to Jo Nesbo, another Scandinavian author, and his alcoholic hero, Detective Harry Hole.

Hooked again!

Nesbo's books are genuine page turners and only constant nagging from family to 'do things' persuaded me to put them down. I managed to finish two on holiday.

The Redbreast' opens in the German lines on the frozen Russian Front during the Second World War – did you know that a huge number of Norwegians volunteered to join the Wehrmacht – but comes right up to date with neo-Nazi sympathisers in modern-day Oslo. The two narrative threads cleverly intertwine throughout the book until it reaches its gripping climax.

The Redbreast' was over 600 pages long, but they passed in a flash and then it was on to 'Nemesis', the second in Nesbo's 'Oslo Trilogy'. It starts with a bank robbery when the teller is given 25 seconds to hand over the money. It takes 31 seconds and the robber coldbloodedly shoots his female hostage in the head. The start of another 450+ pages of suspense and shocks.

Nesbo is a brilliant thriller writer with the talent to surprise and shock from the first page to the last. Blood and horrific violence feature throughout the books, but so does a fair smattering of dark humour. Hole (which is actually pronounced 'Huller') may seem like the stereotypical fictional detective, but he's actually completely original and engaging.

I'm about to start my third Nesbo book, 'The Devil's Star', and the good news is that there are three more left when I've finished this one.

Ray Hirst, Trinity Marketing, July 2011 *From a review in 'The Independent'

BSC FOR MATTHEW



Graduation day for Matthew Anthony (second left)

For the past seven years Matthew Anthony, a member of the team at the Llanelli plant, has been studying at Coleg Sir Gar in Swansea and recently all his hard work paid off when he received his BSc Hons in Computer Aided Engineering and Mechanical and Manufacturing Engineering.

Matthew first enrolled at the college in 2004 on a National Diploma but then moved on to an HND and, finally, the BSc.

"I found the course enjoyable and interesting," he said. "But there were a lot of late and restless nights doing course work and revision.

"I hope the qualifications will give me a good grounding for future development and enable me to further my career with the Schaeffler Group."





🕂 Health Check

Prevention is Better than Cure



Keeping a healthy check on the condition of your plant and machinery means that the major financial headaches associated with unplanned downtime can be easily avoided.

Condition monitoring systems from Schaeffler UK are a cost-effective way of preventing problems before they arise. They enable engineers to keep control of their plant, minimise the risk of breakdown and reduce their maintenance costs.

So rather than waiting until things start to go wrong, why not make an appointment with an experienced Schaeffler engineer today and prevent those unforeseen problems from becoming a real headache.



