



FAG

INMOTION

ISSUE 7 - Winter 2007



Dreamliner contract

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ROLLING BEARINGS FOR BOEING'S 787 'DREAMLINER'

THE SCHAEFFLER GROUP'S AEROSPACE DIVISION, FAG AEROSPACE, HAS SECURED LONG TERM SUPPLY CONTRACTS WORTH SEVERAL MILLION EUROS FOR SUPPORTING THE ENGINES THAT WILL POWER BOEING'S NEW 787 AIRLINER.



In addition, the new engines including the Trent 1000 from Rolls-Royce also play a critical role in ensuring the aircraft is more fuel-efficient. The high performance, weight-saving engine bearing supports also play a key role in the engines.

FAG Aerospace became involved in the development of the engine bearing concepts as early as 2005. The first prototype bearings were manufactured and supplied in 2006 and results of the first engine test runs, which took place in Autumn 2006, were extremely positive. The civil aviation authorities' approval process for the engines will be completed by the end of 2007. First test flights for the Dreamliner are scheduled to take place within the next few months and in the summer of 2008 the first machines will be delivered to the airline companies.

The Boeing 787 is already selling well – more than 600 machines are already on order – making the launch of the aircraft one of the most successful in the history of civil aviation. The Boeing 787 Dreamliner is a medium-sized long-haul airliner. Depending on its cabin furnishings, the first version will seat 210 to 250 passengers. Its cruising range will be up to 15,200km. From 2010, a stretched variant for up to 290 passengers, as well as a short-haul version with a maximum range of 5,650km for 330 passengers, are being launched. The Schaeffler Group develops and manufactures special bearing industry supports for the aviation industry under its two brands FAG and Barden. Almost all modern passenger airliners incorporate FAG bearing technology. ■

bearings," said Franz-Josef Ebert, Head of Sales and Product Development at FAG Aerospace. "When developing the bearing systems, our primary goal was to achieve low weight and high performance capability, together with high reliability."

The fuel-efficient Boeing 787 Dreamliner consumes 20 per cent less fuel than comparable aircraft, due to its improved aerodynamics, better operating systems and lighter materials.



Rolling bearings from FAG Aerospace will play a key role in supporting the fuel efficient Rolls-Royce and other engines that will power Boeing's new 787 'Dreamliner' long haul passenger airliners. Boeing's 787 series is to US aircraft manufacturers what the super jumbo A380 is to its European competitor Airbus.

The first Dreamliner prototype was recently introduced to the public in Seattle, USA. This was also an important event for the two Schaeffler Group subsidiaries, FAG Aerospace GmbH and FAG Aerospace Inc. Canada. Both engine types approved for the new long-haul airliner rely on FAG Aerospace's rolling bearing expertise.

The entire aircraft is designed to consume as little energy as possible. "We had to develop a completely new design for the main shaft and gearbox

FEDERAL CROSS OF MERIT FOR MARIA-ELISABETH SCHAEFFLER

HERZOGENAURACH. FEDERAL PRESIDENT HORST KÖHLER AWARDED MARIA-ELISABETH SCHAEFFLER THE CROSS OF MERIT, 1ST CLASS OF THE ORDER OF MERIT, FOR SPECIAL SERVICES TO THE NATION. THE AWARD WAS PRESENTED DURING A CEREMONY TO MARK THE ANNIVERSARY OF GERMAN REUNIFICATION.

The Federal President honoured 50 citizens in Berlin's Schloss Bellevue for their outstanding achievements in the fields of politics, in social and economic issues and intellectual work who have therefore made a special contribution to the Federal Republic of Germany. The Office of the Federal President explained the award as follows: "As a successful business woman, Mrs.Schaeffler manages INA-Holding Schaeffler KG, one of the largest industrial companies under family ownership. In a voluntary capacity as Vice President of the Nuremberg Chamber of Commerce and Industry since 2000, she has been committed to the Mid-Franconian

economy and is especially dedicated to the needs of trainees. She has been a board member of the Bavarian Red Cross since 1977 and a member of the council of Friedrich-Alexander University in Erlangen and Nuremberg since 2002.

Maria-Elisabeth Schaeffler told the FAG Times editors: "I consider this award as recognition of the success of our company and its employees and I'm very grateful to have received it." The Order of Merit was instituted in 1951 by Federal President Theodor Heuss. It is the only general state decoration and thus the highest tribute the Federal Republic of Germany can pay to individuals for services to the nation. ■

▼ Maria-Elisabeth Schaeffler receives the Cross of Merit, 1st Class of the Order of Merit of the Federal Republic of Germany, from Federal President Horst Köhler.



Welcome to the Autumn/Winter issue of In Motion. I hope you enjoy reading about the wide variety of events and news topics from the Schaeffler Group. Once again it has been a busy year for us all in the UK and for our sister companies overseas. 2007 has seen an unprecedented growth in the demand for bearings worldwide, resulting in pressure on the manufacturers and processors of bearing steel and extensions to delivery lead times. Every effort has been made to meet customers' requirements, and we have experienced growth in virtually every sector of our business.

Of course this is only possible thanks to our committed and loyal employees, all of whom are dedicated to offering the best possible customer service. It is important to recognise the contribution that everyone makes within the organisation, and we are proud to have many long serving employees with the knowledge and experience to make a difference. We take time out to thank them for their contributions as you can see towards the back of the issue. We have recently been audited by TÜV for our TS16949 accreditation and I am pleased to say that we have achieved reaccreditation for another 12 months. It is important to maintain and improve on the high quality standards we set ourselves throughout the Schaeffler Group and we look forward to being able to offer high quality products and services in the year ahead.

In October we looked back over 50 years of successful UK manufacturing, celebrating this golden jubilee in our UK plant based in Llanelli, South Wales. We have achieved so much in recent years that we sometimes forget how it all started, with only 6 employees in a government factory in Dafen not far from our current site on the Loughor Estuary. Inward investment and new production orders mean that next year employment will grow to near 300 at the plant, and we will take on the worldwide role of "Group Lead Plant" for the manufacture of mechanical tappets.

The Schaeffler Group has always been firmly committed to innovation in production engineering and new product development, and as you can see from the number of new products and services launched in 2007, this commitment continues to go from strength to strength.

This is certainly true of our linear systems division, which has been further strengthened in the UK by the



appointment of a Linear Product Specialist. We are confident that this focussed approach will benefit not only our distribution partners but the wider industrial sector in the whole of the UK and Ireland. You can read about our linear activities on pages 8-9.

Best regards,
Kate Hartigan, Managing Director

We welcome your comments on this or any of our articles, and would be very pleased to receive your feedback on "In Motion"

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HILLHEAD 2007



THE LARGEST WORKING QUARRY IN EUROPE WAS THE LOCATION FOR THE 2007 INTERNATIONAL QUARRYING, MINING AND RECYCLING EXHIBITION. TARMAC'S HILLHEAD QUARRY IN BUXTON, DERBYSHIRE PLAYED HOST TO OVER 450 EXHIBITORS IN 85,000m² OF SHOWGROUND OVER 3 DAYS IN JUNE.

The show takes place every 2 years and is the ideal showcase for Schaeffler Group products and services to this most demanding of industry sectors.

For the first time Schaeffler UK shared a stand with Corus Northern Engineering Services. Alongside the individual product and service displays, the two companies were able to promote their PRAXIS partnership.

This partnership was set up in 2005 to offer the marketplace a complete condition monitoring service. Customers can benefit from a toolbox of condition monitoring techniques including from both vibration and acoustic emission monitoring, thermography and oil analysis, supported by the complete installation of all hardware and backed up by a comprehensive after sales service.



▲ The Schaeffler and Corus team at the exhibition

A number of new additions to the X-life product portfolio were on show at Hillhead for the first time. These included INA yoke and stud type track rollers with optimised geometry, FAG axial spherical roller bearings that offer double the life under the same loads, and INA cylindrical roller bearings with significantly improved load carrying capacity.



Barry Andrews, Sales Manager for Heavy Industry commented, "Hillhead is a unique event that in the past has attracted many quality visitors from all over the UK. Unfortunately the weather was against us this year and the unseasonal flooding impacted on the number of visitors to the show. However, we are pleased with the leads we have generated from the event and look forward to developing further bearing and condition monitoring business with new and existing customers over the coming months." ■



SCHAEFFLER BEARINGS WERE KEY TO TGV WORLD RECORD RUN

TRACTION MOTOR AND GEARBOX BEARINGS FROM THE SCHAEFFLER GROUP HAVE RECENTLY PLAYED A KEY ROLE IN HELPING TGV FRANCE'S V150 HIGH SPEED TRAIN REACH A WORLD RECORD SPEED OF MORE THAN 570 KILOMETRES PER HOUR.

The TGV V150 high-speed train – which has a top speed of 150 metres per second – set a new world record on rails recently, achieving 574.8 kilometres per hour.

Developers and production staff from Schaeffler Group Industrial, as well as application and field service engineers from Schaeffler France, viewed the TGV world record run as proof of the company's excellent work.

Although the FAG-branded cylindrical roller bearings, four-point bearings and tapered roller bearings used in the train's gearboxes and traction motors have been tailored for railway applications, they were not manufactured specifically for the TGV record run itself, but came from normal series production, which makes their faultless operation all the more impressive.

The French rail network has been revolutionised by the TGV (Train à Grande Vitesse). These trains whisk passengers safely and smoothly to more than 60 destinations across France at speeds of around 186mph. So reliability and performance are critical when selecting suitable drive systems and bearings.

Weighing in at 234 tonnes and measuring 100 metres in length, the V150 train is no ordinary TGV, but was specially configured for the record run. Both ends of the train are equipped with new TGV-POS power cars. Located between these two cars, the train itself comprises three TGV Duplex based railcars.

The centre carriage shares the motorised bogies – borrowed from the latest ALSTOM development AGV – with the two adjacent carriages. The traction equipment is located underneath the bar car in the middle of the train, so that it can drive the adjacent AGV-based bogies.

The performance data shows just how reliable the bearings in the traction motors and gearboxes actually were. The bearings had to transmit 19.6MW (25,000hp) of drive power onto the rail with as little friction as possible.

For many years now, FAG has supplied ALSTOM and SNCF with drive bearings for the various generations of TGV. The bearings were originally designed to operate for normal traffic only, when the TGV is operated at just half the power. Since the FAG bearings performed excellently during the TGV record run, the bearings have proved they are more than capable of offering reliable performance during normal train operation. ■

Elsewhere in Europe, Schaeffler Austria is to supply Siemens Transportation Systems with all the bearing sets for all gearboxes of the 34, six-axle type DE 20 locomotives.

Having an output of 2,000 kW, these diesel locomotives are based on the 'EuroRunner' platform for diesel locomotives developed by Siemens.

CHINA ORDER FOR 410 BEARING SETS

SCHAEFFLER'S RAILWAY PRODUCTS DIVISION HAS ALSO BEEN ACTIVE IN THE FAR EAST. THE COMPANY HAS RECENTLY SECURED A LARGE CONTRACT IN CHINA.

As part of the preparations for the Olympic Games in 2008, the entire metro network in Beijing is being comprehensively redeveloped. Schaeffler received an order for 410 bearing sets for traction motors from Bombardier Transportation Systems. These will be installed in the 192 cars for Line Four of the metro system.



The construction of the line, which is 28km long and has 24 stops, is the first metro project that is being completed as a public and private partnership on the Chinese mainland. The planned completion date is the end of 2007.

Schaeffler China has also received a €2.8 million order from the Dalian Locomotive and Rolling Stock Works. Schaeffler is to supply all axlebox bearings and axle suspension bearing supports for type DJ3 locomotives. These locomotives are designed for freight traffic and reach top speeds of 120 kilometres per hour. ■



SCHAEFFLER GROUP AUTOMOTIVE DRIVES INNOVATION FORWARD

SCHAEFFLER UK RECENTLY HOSTED A SUCCESSFUL TECHNOLOGY FORUM AT TWO FORD SITES IN THE UK. THE AIM OF THE TECHNOLOGY FORUM, WHICH WAS HELD EXCLUSIVELY FOR ENGINEERS FROM THE FORD GROUP OF COMPANIES AT BOTH THE TECHNICAL CENTRE IN DUNTON AND THE DAGENHAM DIESEL CENTRE, WAS TO RAISE AWARENESS OF THE COMPREHENSIVE RANGE OF INNOVATIVE PRODUCTS AND SYSTEMS RELATING TO THE REDUCTION OF CO₂ EMISSIONS AND BIOFUEL TECHNOLOGY.

The event was sponsored by Dr Thomas Gruenert from Ford of Europe and supported by several experts from Schaeffler Group Automotive.



Not only were engineers from across the Ford Group able to view at first hand the latest in automotive engine, chassis and drivetrain technology, but they were also able to attend a series of free technical seminars on a range of topics from coatings, to variable valve train components, start-stop technology and the latest in double-clutch innovations.

If delegates then wanted to put these technologies to the test, a fleet of 6 demonstration vehicles was also available for test drive, with Schaeffler experts on hand to answer any technical queries and offer advice.

"I was very encouraged by the positive reaction to our Technology Forum", commented Henry Haase, Schaeffler's Global Key Account Manager for Ford.

"All attendees seemed genuinely interested to hear how the latest Schaeffler Group automotive technology can help reduce CO₂ emissions and contribute to improved fuel efficiency.

We are delighted to be planning further meetings to take discussions to the next stage". ■



SCHAEFFLER UK HOSTS 6TH GLOBAL FORD KEY ACCOUNT MEETING

THE PARK INN IN ESSEX WAS THE VENUE FOR THE 6TH FORD GLOBAL KEY ACCOUNT MEETING FOR SCHAEFFLER GROUP AUTOMOTIVE.

Delegates from around the Schaeffler world met up in the UK to discuss a number of key issues relating to sales and engineering activities with its customer Ford Motor Company. Richard Hall, General Manager of the Automotive Division at Schaeffler UK commented, "It was a very useful forum for exchanging ideas and bringing everyone up to date on our latest developments with Ford around the world. Following a very successful Technology Forum held at Dunton and Dagenham the week before, we certainly had plenty to discuss and we look forward to bringing many new projects to fruition over the coming months." ■



▲ L-R: Richard Hall, UK; Marcus Heise, Germany; Mario Camargo, Brazil; Adrian Horne, UK; Peng Ran, China; Mike Evans, UK; Sascha Lutkic, UK; Roger Evans, UK; Philip Jelinek, US; Uwe Abraham, Germany; Henry Haase, Germany; Michael Kern, Germany; Ashi Uppal, UK; Wolfgang Christgen, Germany; Martin Wroz, Germany; Richard Trojak, South Africa

NEW SCHAEFFLER RESIDENT ENGINEER AT FORD UK

THE SCHAEFFLER UK AUTOMOTIVE TEAM HAS BEEN STRENGTHENED BY THE APPOINTMENT OF ALEKSANDAR LUTKIC TO THE POSITION OF RESIDENT ENGINEER FOR SCHAEFFLER GROUP AUTOMOTIVE, BASED AT THE FORD OF EUROPE'S TECHNICAL CENTRE IN DUNTON, ESSEX.



Aleksandar, or Sascha as he likes to be known, relocated to the UK in September from his home in Germany to take up a 3 year secondment as a Schaeffler employee within the Ford organisation. His role is one of on-site support and assistance for Ford engineers, helping them to select the right Schaeffler products and services to be used in the next generation of Ford motor vehicles. He has an impressive engineering background, having joined the Schaeffler Group back in 1979 as an INA apprentice. Upon completing his toolmaking apprenticeship, Sascha spent the next nine years working in the sample shop on deep drawn parts. After completing his engineering degree at night school, he was

appointed to the role of CAD designer. Then, eight years later, he became Project Manager for belt drive systems for Porsche, a role he held until his move to the UK in September 2007. He is currently based in Colchester with his wife and two of his three children. Commenting on his relocation to the UK, Sascha comments, "I am really looking forward to spending the next 3 years in the UK. As a family we are looking forward to exploring the country from the south all the way up to the far north as we find the different landscapes and the history very interesting. I am also hoping to be able to improve my golf and to sample as many different varieties of beer while I am here, although not at the same time!" ■

NEW PRODUCT

IDEAL FOR ASSEMBLY, AUTOMATION AND HANDLING TASKS



MKUVE20-KGT

SCHAEFFLER UK HAS EXTENDED ITS LINEAR ACTUATOR RANGE TO INCLUDE A UNIT WITH A LINEAR BALL BEARING GUIDEWAY AND BALLSCREW DRIVE, OFFERING HIGH POSITIONAL ACCURACY AND SPEEDS OF UP TO 2.5m/s, IDEAL FOR AUTOMATION, HANDLING, ASSEMBLY AND SHEET METAL FORMING APPLICATIONS.

The new unit extends the 'MKUVE' series of linear actuator modules with a unit that comprises a linear ball bearing guideway assembly and ballscrew drive. The units are easily interchangeable with other linear components in Schaeffler's range.

The new 'MKUVE20-KGT' module is ideal for moving moderate loads with high

positional accuracy (up to a maximum speed of 2.5m/s), while supporting high moment loads about all three axes. The module incorporates a recirculating ball guidance system with two carriages. This enables the movement of moderate loads with high rigidity. The actuator unit is protected using bellows. The module is driven by a ballscrew drive, which has a nominal spindle diameter of 20mm a pitch of 5mm, 10mm, 20mm or 50mm.

For 5mm and 10mm pitch sizes, a preloaded double nut is available. The spindle is supported by an axial angular contact ball bearing. The guidance system and drive are integrated in an extremely rigid support rail that can be easily matched to the customer's machine or production equipment using simple T-slots, making life easier for machine builders and systems integrators. ■

NEW PRODUCT

SPEEDS OF UP TO 10m/s PLUS IMPROVED SERVICE LIFE

THE LINEAR TECHNOLOGY DIVISION OF THE SCHAEFFLER GROUP HAS DEVELOPED AN INNOVATIVE, MODULAR, HIGH-SPEED LINEAR GUIDANCE SYSTEM, WHICH REDUCES THROUGHPUT TIMES IN HIGH-SPEED HANDLING AND AUTOMATION TASKS, WHILE OFFERING A 30% HIGHER SERVICE LIFE OVER COMPETING PRODUCTS.

In order to produce or assemble products faster, manufacturers require faster machines and highly automated production systems.

Linear drive technologies, including linear motors and linear guidance systems, are therefore required that can meet the demand for higher operating speeds and improved dynamics.

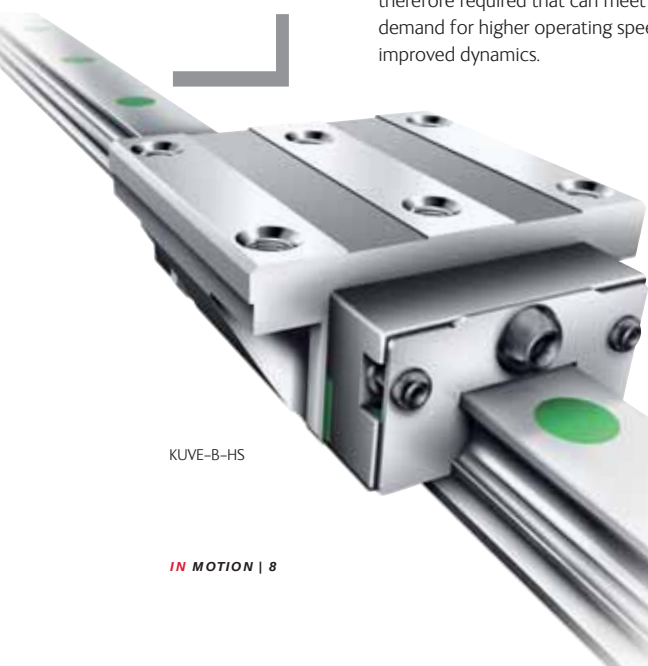
While there are linear guidance systems on the market today that are capable of reaching speeds of around eight metres per second by using hybrid ceramic rolling elements, the Schaeffler Group's Linear Technology Division has developed a linear guide that operates on steel rolling elements and is capable of reaching even higher speeds – up to 10m/s. No hybrid technology was used at all in the design of these new linear guides. What is more, compared to competing products, Schaeffler's new high-speed linear guides offer a 30% higher basic rating life. The new 'KUVE-B-HS' high speed version of Schaeffler's 'KUVE-B' linear guidance range is a four-row, linear recirculating ball bearing and guideway assembly.

The system was unveiled for the first time to visitors to the Schaeffler Group's stand at the recent Hannover Fair exhibition in Germany. With such high speed and acceleration capabilities, the new guides offer machine builders

and systems integrators faster throughput times and improved dynamics for their customers.

The guides are ideal for highly automated production environments, semiconductor manufacture and high-speed pick-and-place applications. The fact that the new guides use steel rolling elements rather than ceramic balls means that load carrying capacity and rigidity are equivalent to standard full complement KUVE-B guides of the same size and variant. The KUVE-B-HS guides are robust, reliable and safe. The carriages run on INA standard 'TKVD' guideways and so are easily interchangeable with other carriage variants.

The units have a design envelope that corresponds to those specified in DIN 645 and guides are compact for screw mounting. Five variants of the KUVE25-B-HS are available now, with more versions in the development pipeline. ■



KUVE-B-HS

7TH SUCCESSIVE VARIAN AWARD FOR SCHAEFFLER



SCHAEFFLER UK HAS BEEN AWARDED A 'SUPPLIER OF THE YEAR' AWARD FROM MEDICAL DEVICE AND EQUIPMENT MANUFACTURER VARIAN MEDICAL SYSTEMS FOR THE SEVENTH SUCCESSIVE YEAR, FOR CONSISTENTLY HIGH QUALITY AND SERVICE PERFORMANCE.



Schaeffler (UK) Ltd is one of seven suppliers to have been awarded a 'Supplier of the Year Award' from Varian Medical Systems (VMS) UK, in recognition of consistently high supplier performance over the last 12 months. Schaeffler UK supplies a range of linear guidance systems for various high precision applications.

VMS UK uses a vendor rating scheme to measure supplier performance and reports the results back to companies

on a regular basis, as a tool for further improving quality and service.

A range of criteria is measured, including on-time delivery; parts per million (PPM) defects; quantity reliability; technical support; and a range of 'soft' factors such as cost, environmental and general service performance. Awards to suppliers do not rely solely on the vendor rating system. As Derek Flanagan, Manufacturing Manager at VMS UK explains: "To be in contention for an award, a supplier needs to be of an

'A' standard, but this still will not guarantee an award in itself. Out of our 107 production suppliers this year, Schaeffler UK achieved the highest overall vendor rating and so thoroughly deserves the award.

"Schaeffler has been supplying us for several years now and our working relationship is very good. Varian and Schaeffler's cultures are very similar; we think the same way and always look for continuous improvements in everything we manufacture."

Receiving the award on behalf of Schaeffler UK the company's Managing Director, Kate Hartigan, commented: "We were absolutely delighted to receive a seventh VMR award this year, and we will continue to work closely with the Varian team to ensure that we support their business. Varian is a very progressive and innovative company and we value its consistent and timely vendor rating feedback." ■

LOONAM LEADS THE LINE AT SCHAEFFLER UK

JOHN LOONAM HAS BEEN APPOINTED AS LINEAR PRODUCT SPECIALIST AT SCHAEFFLER (UK) LTD, SPEARHEADING THE COMPANY'S DRIVE TO INCREASE ITS LINEAR MOTION BUSINESS IN THE UK AND IRELAND.

John will be responsible for overseeing the growth of INA linear motion sales, organising and coordinating the engineering, product support, sales and marketing of all linear products sold in the UK and Ireland. He brings a wealth of engineering and sales experience to the new role, including six years as a regional sales engineer at Schaeffler UK, as well as previous roles at a power transmission company and a construction vehicle business.



"INA's Linear portfolio is second to none," he said.

"My focus will be on both emerging, niche markets in the UK and on the more traditional markets for our linear motion products, including medical, power generation, machine tools, rail, construction, packaging, electronics manufacturing and machine building.

"As a design engineer at a previous company, I used to regularly specify INA bearings, which were renowned for their quality and reliability. To now be responsible for selling the INA linear range in the UK is an exciting challenge for me."

The Schaeffler Group offers the most comprehensive range of linear guidance products available from a single source.

"This is an exciting time to be spearheading Schaeffler's linear business in the UK"

In the UK, Schaeffler's 'Linear Quick Centre' at its manufacturing plant in South Wales provides customised, assembled linear bearings and guidance systems, including cutting and machining of shafts. ■

FAREWELL TO JOHN TAYLOR AFTER ALMOST 35 YEARS



AFTER 42 YEARS WORKING IN THE BEARINGS INDUSTRY, 35 OF THESE FOR SCHAEFFLER UK, AUTOMOTIVE DIRECTOR & GENERAL MANAGER, JOHN TAYLOR, HAS RETIRED.

Former German colleagues said a fond farewell to John in traditional German style when he officially

retired from the Company in April this year. Colleagues who had worked closely with John over the years attended a farewell meal in the

Wirtschaft von Johann Gerner in the village of Hessdorf, close to Schaeffler Herzogenaurach. There were also fond farewells from colleagues in the UK...



(L-R Richard Hall, Hellmut Adler, Michael Haas, Juergen Schulenburg, Hans-Joachim Renner, Reinhart Malik, John Taylor, Bernhard Geier, Wolfgang Steinberger, Joerg Wagner)



John receives his retirement gift from Kate Hartigan.

SPEAKING AT A DINNER HELD IN HIS HONOUR JOHN RECALLED SOME OF HIS FOND MEMORIES FROM THE PAST 35 YEARS AND EXPLAINED HOW THE COMPANY AS A WHOLE HAS HAD TO ADAPT AND IMPROVE IN ORDER TO SURVIVE IN WHAT IS NOW A TRULY GLOBAL AUTOMOTIVE INDUSTRY.

There have been some very bright moments in my time here at Schaeffler. The 1990s, for example, were very dynamic and exciting years for the Automotive Division. We were winning all potential tension pulley and valve train business – long hours, stressful times, but our team was very successful,” he said. “But there were some genuine disappointments too. The demise of the Rover Group, for example, was a difficult time for us here in the UK. In some ways it was expected, but we tried not to think about the worst actually happening.

In my time here, I have been privileged to know personally and work with both Wilhelm and Dr Georg Schaeffler and admire their foresight and skills that enabled the company to grow and become one of the largest, private companies in Germany. More recently, we have seen many changes, some brought about by acquisitions, but the whole of our customer base is

changing and we must change with them in order to survive.”

John joined Schaeffler UK (then INA Needle Roller Bearings Ltd) back in August 1972, and was put in charge of the Applications Department. He then progressed to Engineering Manager in 1988, before being promoted one year later to UK Director & General Manager Automotive Division.

“I guess the biggest change for me in my time here has been the automotive market itself and how truly global in nature it has become. You can no longer talk about the UK automotive market or even the European market.

So companies like Schaeffler have had to adapt and innovate to survive. With the likes of Kia now manufacturing in five or six countries, we have to compete with the local suppliers to those manufacturing plants”. He considers that Schaeffler is in a very strong position to survive these global competitive pressures. “We’re very proactive now as a group. We take our new ideas to the customer, rather than waiting for them to come to us. Of course, sometimes you don’t need to do this, because a company such as Ford, may come to us and tell us its proposed strategy for powertrain development.

“Many second tier suppliers today, for example brake, suspension or steering system suppliers, have seen a gradual move of manufacturing into lower labour cost countries, such as India and China. We therefore have to innovate more to survive,” said John. “The number of patents we issue as a Group each year is incredible and is proof of our ability to innovate.

“As an organisation, we’ve had to adapt and improve in order to better support our automotive customers. There are now huge time-to-market pressures on the OEMs, and so our project management skills have had to improve, on a global basis, in order to work with these companies. “The pressures in the global automotive market are there for everybody to see. OEMs need to develop cleaner, quieter engines, in order

to meet current and future emissions legislation, while also improving passenger safety. This is a difficult process, because while they try to reduce CO₂ emissions from the engine, by making the vehicle lighter, improving the safety of the car for the passengers, usually means adding weight elsewhere.

“I suppose the really exciting times for me were in the early-to mid-1990s, when almost everything Schaeffler UK achieved was 80% down to our own input and effort. The focus is now about working more closely and collaborating with the customers, to improve relationships and offer better technical support. The customer wants us to do more of the development and testing to reduce time to market. We now have to offer a much better package of development support, and more value-added services. When we need support from our own commercial or technical departments, the service is first class.

Compared to other automotive suppliers, Schaeffler is very different, primarily because it is a private, family-owned company. We don’t have shareholders to please, so every penny earned in profit is ploughed back into the organisation. You do have a feeling of being part of a very close-knit family. This comradeship comes from being part of the Schaeffler Group.

“I am proud and privileged to have contributed to the success of this company and I wish my colleagues all the best for the future” he concluded. ■

ENERGY EFFICIENT TWIN TANDEM WHEEL BEARING CUTS FUEL CONSUMPTION AND EMISSIONS



The Schaeffler Group has developed an innovative, energy efficient four-row, angular contact ball bearing to replace conventional tapered roller wheel bearings, resulting in reduced fuel consumption and emissions on trucks, SUVs and light vans; it could potentially also be developed for use in other heavy engineering applications.

The innovative ‘twin tandem’ wheel bearing unit reduces friction by around 50% over conventional tapered roller wheel bearings. The result is an approximate 1.5% reduction in fuel

consumption on trucks, light vans and SUVs. A recent demonstration of the new bearings comprised a complete wheel assembly, with a conventional tapered roller wheel bearing on one end of the axle and the new twin tandem unit on the other. When the power was cut off, the conventional tapered roller wheel bearing continued to rotate for around six to seven revolutions. However, the twin tandem unit continue to rotate freely for between 48 to 50 revolutions – proving its reduced friction properties.

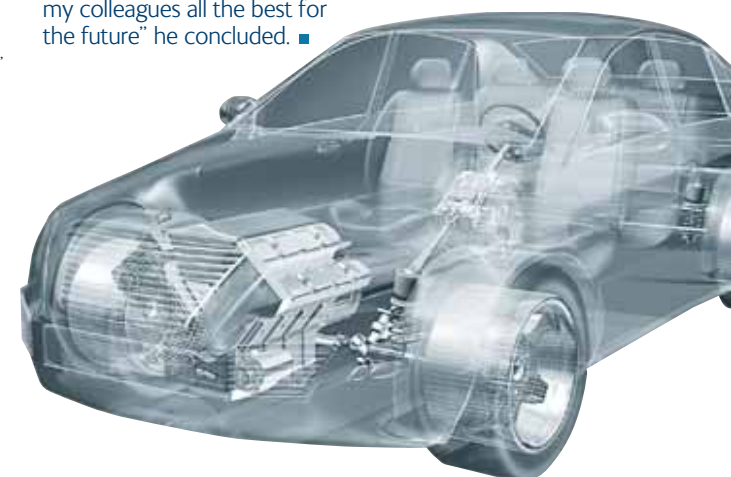
The twin tandem design concept is based on replacing the rows of tapered roller bearings with two rows of ball bearings in each case. A double-row tapered roller bearing therefore becomes a four-row ball bearing. Replacing the line contact of the tapered rollers with the point contact

of the balls eliminates rib friction and reduces overall friction by 50%. The twin tandem bearing also has a lower operating temperature compared to conventional tapered roller units, therefore improving the service life of the lubricants. Cornering stiffness is also increased.

The twin tandem was developed initially for trucks, light vans and SUVs, where the 1.5% reduction in fuel consumption and emissions will have the greatest benefit. However, Schaeffler will continue to develop the twin tandem for the passenger car market and similar energy efficient design concepts are currently under development with customers in other manufacturing sectors, including heavy industries, such as steelmaking, machine tools, paper and wind energy.

Schaeffler has also carefully considered interchangeability of the new twin tandem with conventional tapered units. The twin tandem is designed to cater for the use of sensors (such as ABS sensors) and installation in the wheel carrier is identical for conventional tapered roller wheel bearings.

Assuming a vehicle emits 300g/km of CO₂ over a distance of 15,000 km per year, the reduction in CO₂ emissions resulting from the twin tandem unit will be 67.5kg per year per vehicle. Fuel consumption is also reduced by 1.5%, giving a reduction of 40 litres per year for an average light truck travelling 15,000 km per year.



BEARING RECONDITIONING AN ECONOMICAL ALTERNATIVE TO REPLACEMENT

BY RECONDITIONING LARGE ROLLING BEARINGS, RATHER THAN REPLACING THEM, SCHAEFFLER UK CAN SAVE CUSTOMERS TIME AND MONEY, WHILE ENSURING THAT THE BEARING IS RESTORED TO AN ACCEPTABLE, FUNCTIONALLY RELIABLE CONDITION.



When it comes to large rolling bearings, reconditioning or reworking the bearing rather than replacing them can be more cost effective and save valuable time for the customer.

As a machine element responsible for transmitting forces, the defect-free functional capabilities of a rolling bearing are a decisive factor in influencing the overall availability of machinery and plant. However, for safety reasons, many rolling bearings are still dismantled and replaced as part of routine maintenance activities, particularly on machinery and plant that is deemed critical. But what some companies do not realise is that, in many cases, the bearings can be restored to a completely acceptable, functionally reliable condition using appropriate cleaning and repair techniques. With its repair service for the reconditioning of large rolling bearings, such as those used in steel and aluminium rolling mills, papermaking machinery, mining and quarrying machinery, mineral processing equipment, the wind energy sector or in shipbuilding, Schaeffler UK can offer customers a significant cost saving.

15 to 70% of the cost of new bearings

Reconditioning costs for a large rolling bearing typically amount to between 15% and 70% of the cost of a new bearing, depending on the actual repair or level of maintenance involved.

Average costs are around 50% of new purchases. Each planned bearing repair is preceded by an in-depth damage diagnosis that helps to decide whether the repair is worth carrying out and is economically viable for the customer.

In the repair of large rolling bearings, all the negative effects of wear and plastic deformation on the working surfaces are removed. This work, is carried out at the FIS Service Centre in Wuppertal, Germany which provides modern production and measurement facilities for the whole of Europe.

If certain components cannot be repaired, they are completely replaced. Reconditioning can be applied to all types of rolling bearings, including back-up rollers for Sendzimir roll stands, radial spherical roller bearings with an outside diameter of more than 500 mm, cylindrical roller bearings with a bore code of 68 or higher, and tapered roller bearings. Once the specialists at the Wuppertal repair centre have carried out the appropriate processing, the repaired rolling bearings not only provide the same performance as new bearings, but also, after careful assessment and damage diagnosis, the customer can also, in certain cases, be given the same 24-month warranty as for a new bearing. ■



Lead time reduction at Siemens

For many customers, it is not only the lower costs that are attractive – lead times are also crucial. In the case of large bearings, reconditioning frequently offers a significant time saving compared to purchasing a new one. On average, larger bearings are reconditioned within three months.

However, the reconditioning of large rolling bearings can in some cases be carried out even faster than this. In a recent reconditioning contract with the Automation & Drives Division of Siemens AG in Nuremberg, Germany, damage was discovered on a bearing, which had an outside diameter of 1,120mm. The application was on a vertical boring and turning mill for the machining of cast housings for electric motors.

Following telephone discussions between Siemens and engineers at the Wuppertal repair centre and checking whether the necessary balls were in stock, a promise of prompt reconditioning was given. The bearing was delivered by the customer at 6 pm on a Thursday evening. Just nineteen hours later, the bearing had been inspected, the raceways reconditioned by grinding, new balls had been fitted and the bearing had been packed. At about 1 pm on the Friday, Siemens was able to start shipping the repaired bearing back to site. After a special weekend shift by the maintenance crew at Siemens, production was restarted on the Monday. The costs of production downtime were kept to a minimum! ■



FAG

SYMUD YMLAEN

50th Anniversary Supplement

50 YEARS

LLANELLI



1957
2007

LLANELLI PLANT CELEBRATES 50 YEARS OF MANUFACTURING IN WALES

LLANELLI PLANT CELEBRATES...

50 YEARS OF MANUFACTURING IN WALES

SCHAEFFLER UK'S MANUFACTURING PLANT IN BYNEA, LLANELLI RECENTLY CELEBRATED ITS 50TH ANNIVERSARY OF MANUFACTURING IN WALES. GUESTS AT THE CELEBRATION DAY INCLUDED DR PLEUS, PRESIDENT ENGINE SYSTEMS DIVISION AT THE SCHAEFFLER GROUP, AND MEMBERS OF THE WELSH ASSEMBLY GOVERNMENT AND WELSH AUTOMOTIVE FORUM.

DR PLEUS PRESENTS TRAINING AWARDS TO LLANELLI STAFF



▲ Donna Williams-Bevan NVQ LIII in Business Improvement Techniques



▲ Ann Jones NVQ LII in Polymer Processing and Related Operations



▲ Huw Jenkins NVQ LII in Polymer Processing and Related Operations



▲ Darren Sadler Leadership Foundation Programme



▲ Mark Bevan NVQ LII in Polymer Processing and Related Operations

Speeches from Roger Evans, Dr Pleus (President, Engine Systems Division at the Schaeffler Group), Tim Williams of the Welsh Automotive Forum and Mark James, Chief Executive of Carmarthenshire County Council, were followed by presentations to Schaeffler employees, a tour of the factory and lunch.

In his presentation to guests and Schaeffler employees, Roger Evans commented: "Today is an important milestone in the history of this plant. We have seen many changes over the years, but in the last six years we've seen perhaps the greatest change. During this period, we have been able to transform our plant performance at all levels. Our employees have made this happen and over the last six years they've worked hard at improving productivity and quality, whilst learning new skills and competences, and it's through them that we gain success."

Dr Pleus said that the Bynea plant was "a high quality workplace run by high quality employees". He also commended the company for its "proactive approach in meeting the challenges it had faced over the last six years."

In his speech, Tim Williams of the Welsh Automotive Forum said: "The importance of manufacturing in Wales cannot be stressed enough, as it provides almost a quarter of the country's GDP." He added that the employees at Bynea plant were "dedicated, well-trained and flexible, with an eagerness to learn new skills and are led by managers with a clear vision and determination to succeed."



▲ The commemorative plaque is unveiled

He also announced that Roger Evans had been chosen to lead the Welsh Assembly Government's new 'Manufacturing Forum for Wales', which aims to address the issues of today and tomorrow in order to sustain the country's position. Following the speeches, a new plaque was unveiled, to mark 50 years of manufacturing at the Bynea plant.

Eighteen Schaeffler employees were then presented with training and qualification awards, including Jamie Davies, who was awarded an MSC in Procurement. Gordon Taylor was also presented with a certificate and cheque to celebrate 25 years of service at the company.

Guests on the day included Helga Rother Simmonds, Honorary Consul for Germany in Wales; Eleanor Marks, Tony Mizen and Huw Davies from the Welsh Assembly; Nia Griffith, MP for Llanelli; Ian Smith, Sector Skills Advisor, SEMTA; Paul Byard, Manufacturing Advisory Service (MAS) Cymru; Tim Williams of the Welsh Automotive Forum; Mark James, Chief Executive, Carmarthenshire County Council; and Tim McCaffrey of the University of Wales, Swansea.

Through a combination of inspired leadership and an experienced, well-motivated and well-trained workforce, the Bynea plant has gone from strength to strength in recent years. Part of the plant's success is due to an ongoing culture change initiative, which started in 2001. This programme has already proved so successful

that the plant has not only managed to avert the threat of production being transferred to Eastern Europe, but has also managed to become a production location of choice within the Schaeffler Group. The plant has also managed to sustain its business with UK-based automotive customers.

The culture change programme started with the plant's vision and the inherent company values that had to be adopted by all employees in their day-to-day activities, namely Integrity, Innovation, Respect, Commitment and Passion.



Every member of the workforce was interviewed by the senior management team, to explain the vision and to provide an opportunity for feedback from each employee.

A skills, knowledge and experience 'gap' was identified between what the plant wanted to achieve and what the staff were actually capable of delivering.



Increased investment in training was therefore provided in order to raise overall skill levels at the plant and to foster an environment of life-long learning and continuous improvement. As Roger Evans put it: "You have to put in place training programmes that ensure the rate of learning is always greater than the rate of change."

The longest-serving member of the current workforce at Bynea is John Davies, Goods Inwards. Now 60 years of age, John has worked for the company for more than 44 years, starting at the plant in September 1963. As John states: "Reaching 50 years of manufacturing in Wales is a tremendous achievement for this plant. It's a great company to work for."

"Communication is good between management and shop floor. The training provided is excellent and I've recently completed a computer-training course for the new goods inwards software, SAP. I look forward to working here until I retire."

At the other end of the age scale is Geraint Kemp, an apprentice in the maintenance department who says that the best part of his job is the learning aspect. "I've worked here for over a year and the training has been excellent," he said. "We're constantly encouraged to improve our skills and knowledge. I've recently completed a forklift truck training course, an NVQ Level III and I've started German language lessons. I also attend the local college one day each week."



Since the culture change programme was introduced, the plant has seen some formidable improvements. Around 89% of operators have now achieved NVQ Level II in 'Performing Manufacturing Operations' – the aim is to reach 100%. Many operators have also requested to proceed to NVQ Level III and all employees at the plant have now undergone training in 5S Workplace Organisation. "Employee morale is high and demand for learning is greater now than it has ever been," said Roger Evans. "Team working, cooperation and communication have all improved, as has the trust between management and the workforce."

The launch of the company-wide 5S programme has also contributed to the success of the plant. Improvements in housekeeping and workplace organisation have been made, as well as improvements in a range of key performance indicators. Scrap levels have been reduced; accidents have been slashed by around 60%; absenteeism has dropped significantly; and defects have been reduced by more than 90%.

Added value per employee, another key measure at the plant, has also improved dramatically. "We've also implemented Six Sigma and Kaizen projects, which have resulted in cost savings of around €500,000," said Roger. "But the real difference has been the workforce, who now show a greater willingness to learn and to take responsibility for their own development. More than 100 employees, for example, have voluntarily enrolled on our 'Learn Direct' courses and use our new Learning Centre." ■



▲ Dean Williams Information Technology Level 1



▲ Jonathan Griffett NVQ LIII Business Improvement Techniques



▲ Steven Williams NVQ LII in Polymer Processing and Related Operations



▲ Keith Hallett NVQ LII in Polymer Processing and Related Operations



▲ Gordon Taylor NVQ LIII in Business Improvement Techniques. In addition Gordon was presented with his 25 years long service award



▲ Jamie Davies MSC in Procurement

50 YEARS

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AN INIVERSARY

50
YEARS

STUDENT AUTOMATION PROJECT TO SAVE £32,000 PER YEAR AT LLANELLI

1957
2007

AN INNOVATION

BY DESIGNING A NEW AUTOMATED PROCESS FOR CHAMFERING BEARING COMPONENTS, A TEAM OF A LEVEL PHYSICS STUDENTS FROM WALES WILL HELP SAVE £32,000 PER YEAR SCHAEFFLER UK'S COMPONENT MANUFACTURING PLANT IN LLANELLI.

By automating the process of chamfering a new high volume ball bearing, a team of young engineers from Ysgol Gyfun Gŵyr School in Wales will help Schaeffler save more than £32,000 per year. The engineering project was so successful that it was recently awarded the 'Best Innovative Solution' at this year's EESW (Engineering Education Scheme Wales) 'Work of Excellence' exhibition.

The team comprised seven sixth form A-Level Physics students and their teacher David Wheeler (see picture right), working in close partnership with engineers at Schaeffler UK's manufacturing plant in Bynea, Llanelli.

The objective of the project was to design an automated process for chamfering a specific type of ball bearing manufactured at the Schaeffler plant. The existing process at Bynea was a manual one, with one operator dedicated to the operation. The team's brief was to create a machine that would automate this task and the factors the students had to consider included cost, productivity, health and safety, quality, reliability and process efficiency.

The final model, presented to a panel of Schaeffler staff, consisted of sloped tracks of low friction material, so that gravity could be used to move the



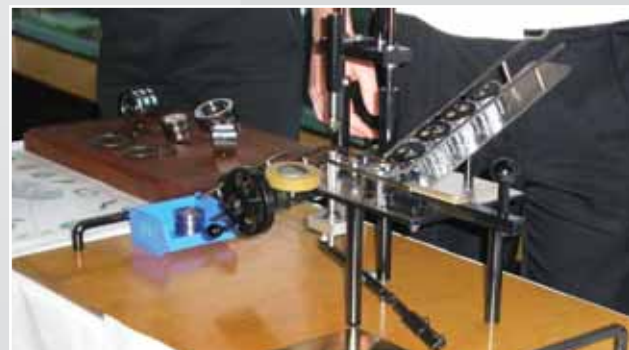
components to a pre-determined point, where a pneumatic cylinder was then used to move the parts individually into the correct location for chamfering. To align the part, a wheel-type mechanism was then used to rotate the component. During the rotation process, two location dowels were raised by a spring in order to lock the part in the correct position, before chamfering the hole perfectly.

The solution was not only very efficient – reducing the time taken for chamfering by 20 per cent – but was also projected to save the plant more than £32,000 per year. Schaeffler UK was so impressed that a full-scale construction of the model is currently being manufactured at the Bynea plant.

The students chose the solution because it had low running costs (based on a low power input) and a 10% to 20% reduction in operation time. Payback time for the machine was expected to be just two months. Jeff Guest, Maintenance/Development Manager at Schaeffler UK was involved in supporting the students throughout

the project. He commented: "We had to point the students in the right direction on a couple of occasions and ensure that they didn't over-engineer the solution. But we were particularly pleased to see how the students tackled the engineering problems they were faced with. Their enthusiasm, interest and overall willingness to learn new skills was a delight to see and should serve them all well in their future careers."

David Wheeler commented: "I am extremely proud of the students. They have worked diligently over the last few months, giving up their spare time and lunch times in order to work on this project. This was their first attempt to compete at a national level. Even though there were more than 100 experienced teams competing, they won the most important award. I would like to thank Schaeffler UK for its time, expertise and dedication over the last few months in helping the pupils achieve their goal. Not only did the students win the award, but they also gained new skills and it has opened up engineering as a career prospect." ■



EXPANDING PORTFOLIO OF PREMIUM PRODUCTS



NEW AXIAL SPHERICAL ROLLER BEARINGS

IDEAL FOR HARSH OPERATING ENVIRONMENTS, INCLUDING CONSTRUCTION MACHINERY, ROLLING MILLS & LIFTING GEAR, SCHAEFFLER'S NEW X-LIFE AXIAL SPHERICAL ROLLER BEARINGS NOW OFFER MORE THAN DOUBLE THE LIFE.

L launched at this year's Hannover Fair, Schaeffler's new premium grade, X-life E1 spherical roller thrust bearings now boast significant improvements, including increased load ratings (static +10%, dynamic +35%), limiting speeds (+50%) and fatigue limiting load (+70%). A revolutionary achievement is the bearing's 170% increase in bearing rating life.

The technical benefits of the bearing are numerous: operating life has more than doubled under the same loads or similar operating life is achieved under significantly higher loads; suitable for high speed applications due to lower friction levels; improved guidance and vibration characteristics due to very high running accuracy; less wear due to optimised lubricant film formation; and the lubricant is subjected to less strain due to lower bearing temperatures. For the customer, these benefits translate into higher machine

availability, new design possibilities, more economical bearing supports due to downsizing; and lower operating costs due to reduced energy consumption.

The most up-to-date kinematics technology and software was used to develop the new 294 and 293 series bearings, which are made from superior quality materials. The performance improvements were made possible by modifying and improving the bearing contact geometry and bearing kinematics.

This included adding longer rollers with larger diameters, which results in higher load ratings. Surface improvements on the rolling elements also enable a lubrication film that is capable of supporting even higher loads. Improved osculation conditions and additional profiles further optimise the rolling contact. Modified osculation and precise rib geometry increase the load carrying capacity of the rib contact.

A new sheet metal cage with improved roller guidance and lubrication support, reduce wear and extend the life of the bearing.

Higher axial load carrying capacity and lower bearing temperature as well as improved resistance to wear have enabled a further increase in operational reliability and economic efficiency. Moreover, the new X-life E1 spherical roller thrust bearings offer an even better price/performance ratio. Users also benefit from higher machine availability and lower operating costs through reduced energy consumption. Totally new opportunities have been opened up for design engineers: They can either achieve higher performance with unchanged bearing dimensions or they can realise more cost-effective downsized solutions. ■



NEW X-LIFE YOKE & STUD TYPE TRACK ROLLERS

BY OPTIMISING THE RACEWAY GEOMETRY AND OUTER RING MATERIAL ON ITS RANGE OF X-LIFE YOKE AND STUD TYPE TRACK ROLLERS, SCHAEFFLER HAS INCREASED THE BASIC RATING LIFE BY UP TO 30% AND IMPROVED LOAD CARRYING CAPACITIES BY UP TO 50%.

By modifying the material of the outer ring and by optimising the geometry of the raceways, the new X-life PWTR and PWKR yoke and stud type track rollers now offer up to 50% higher load carrying capacities and up to 30% longer basic life ratings.

In addition, the optimised lateral surface profile and the improved surface quality of the outer ring mean there is reduced overall stress on the mating track. This provides a highly robust bearing support with an extended service life and higher efficiency for the customer's application.

By optimising the raceway geometry, Schaeffler has increased the effective load carrying length

of the rolling element. Even at high loads, edge stresses are prevented. This leads to increased effective dynamic load ratings (by up to 9%) and increased effective static load ratings (by up to 30%). The basic rating life is therefore up to 30% higher with the new range.

The outer ring material was modified from case-hardened steel to through-hardened steel. Increased fatigue strength under reversed bending stress therefore leads to higher permitted dynamic ring load (by up to 50%).

Increased proof stress leads to higher permitted static ring load (by up to 30%).

The quality of the outside surface of the outer ring track is also improved by around 40%, giving increased protection of the mating track. X-life yoke and stud type track rollers are based on double row cylindrical roller bearings and are fitted with lip seals to protect them against contamination. Separated by a central rib, the cylindrical rollers provide axial guidance of the outer ring. Stud type track rollers are equipped with a hexagonal socket on both sides of the roller stud. Customers can also request all-round corrosion protection in the form of Schaeffler's chromium-free Corrotect® anti-corrosion coating, or with a special TRIONDUR coating for high-level anti-wear protection. ■



X-LIFE INNOVATION

APPLICATIONS BIG BIKES...

TRIUMPH IS BRITAIN'S ONLY REMAINING MOTORCYCLE MANUFACTURER AND THE COMPANY HAS BEEN A CUSTOMER OF SCHAEFFLER UK SINCE 1987, USING BEARINGS AND TAPPETS IN MANY OF ITS ENGINE, FRAME AND TRANSMISSION APPLICATIONS. SCHAEFFLER CURRENTLY SUPPLIES AROUND 31% OF ALL BEARINGS ON TRIUMPH MOTORCYCLES AND IS CONSTANTLY WORKING ALONGSIDE TRIUMPH'S DESIGN ENGINEERS TO HELP TO CUT ENGINE WEIGHT, FRICTION AND FUEL CONSUMPTION.

Schaeffler bearings and components are used in the following motorcycle applications:

Crankshaft

Schaeffler's low friction, high precision FAG ball bearings (with optional integrated seal) and cylindrical roller bearings are helping motorcycle manufacturers keep noise levels and fuel consumption to a minimum. INA needle roller and cage assemblies guided on the outside diameter (crank pin cages) can be used for the connecting rod bearing supports. The dry-running characteristics are significantly improved by the use of coatings.

Piston pin bearings keep the radial internal clearance as small as possible. INA needle roller and cage assemblies guided on the inside diameter (piston pin cages) have proved to be an ideal solution in wear-resistant designs with extreme temperatures.



Belt Drive

Mechanical and hydraulic chain tensioners with tensioner blades and chain guides can be used to dampen the vibrations from the timing chain. This can reduce noise levels from the motorcycle and increase operating life.

The camshaft can run with low friction in maintenance-free needle roller bearings or ball bearings.

In the valve train, rocker arms, finger followers and end pivot rocker arms or bucket type tappets with mechanical or hydraulic valve lash adjustment elements, can ensure optimal valve performance on the engine.

Transmission

For drive shafts and output shafts, motorcycle manufacturers can use FAG ball bearings with optimised load ratings and INA space-saving drawn cup cylindrical roller bearings. Schaeffler can also supply low noise, high speed gear bearing supports with lightweight, split plastic cages, which increase the life of the transmission system as they minimise the risk of false 'brinelling'.

Clutch

Durable release bearings with formed rings can provide high load carrying capacity in a small design space such as a motorcycle engine.

Gearshift

Low friction FAG ball bearings and INA needle roller bearings make gear shifting much easier on motorcycles. In contrast to steel-steel or steel-aluminium solutions, these rolling bearings offer consistent, low radial internal clearance for the shift drum and wear-free operation.



Chassis and Steering

Safety factors are critical on the chassis and steering system and so Schaeffler can provide ball bearings with integrated seals that are lubricated for life and which offer good shock resistance and smooth operation. Their low wear and low friction characteristics also contribute to fuel savings. Sealed needle roller bearings are also used for special swing arm designs. Sealed, adjustable tapered roller bearings, angular contact ball bearings or angular needle roller bearings can be used to support axial and radial loads in the steering head. Schaeffler's 'ELGES' plain bearings can be used for forks and suspension struts.

Propshaft

INA deep drawn bearings can be used as bearing supports in the universal joints. These transmit power through the drive shaft. 'Staked retention' is an efficient method developed by Schaeffler that can enable the universal joints to be mounted axially without clearance. This means excellent symmetry and a reduction in vibration and engine noise.

ABS

If a motorcycle wheel locks, an INA sensor ring can be used to trigger the ABS control system. High pitch accuracy requires manufacturing

precision and the coatings on the ring protect the component from corrosion during the operating life.

Accessories

Schaeffler can also provide motorcycle manufacturers with a number of bearings for other motorcycle parts, including lightweight, small drawn cup needle roller bearings with open ends for starter motors and durable needle roller bearings or ball bearings for oil pumps. ■



...AND LITTLE BIKES

CUSTOM BEARINGS FOR HIGH PERFORMANCE BRITISH MANUFACTURED MOUNTAIN BIKE COMPONENTS

BY SWITCHING TO CUSTOM-DESIGNED SEALED BEARINGS FROM SCHAEFFLER, UK-BASED MOUNTAIN BIKE MANUFACTURER HOPE TECHNOLOGY HAS ELIMINATED BEARING FAILURES ON ITS HEADSETS.

"After switching to custom-made, deep groove bearings from Schaeffler for all our hubs and headset assemblies, we've not had a single bearing failure," said Ian Weatherill, co-founder of Hope Technology, a UK-based company that dominates the European market for the supply of high performance bike components and sub-assemblies to mountain bike enthusiasts.

"We started using INA bearings around three years ago because we were having quality problems with supplies from the Far East," explained Ian.

"We even tried manufacturing our own bearings for a short period to try to overcome the problem, but after switching to INA bearings, our quality, reliability and availability of bearings has improved dramatically."

Established 18 years ago, Hope Technology is not a typical mountain bike manufacturer. Based in Barnoldswick in Lancashire, the company is world-renowned for supplying high-end mountain bike components, designed to enhance the performance and reliability of the bike. Its 60 staff, most of them engineers and skilled machinists, are also mountain bike enthusiasts themselves and are fiercely proud of their

heritage and the fact that they manufacture 90% of the components themselves in the UK. Hope Technology doesn't manufacture complete bikes, but makes thousands of different variations of bike components, including wheel hubs, disc brakes, brake calipers, hand finished wheel sets, lighting, stems, seat pins and clamps.

The company even produces its own screws, nuts and spacers. The idea is to provide bike enthusiasts with the opportunity to upgrade and enhance their experience by investing in high-end products from Hope. "It means buyers of mountain bikes can customise the bike to suit the way they ride it," explained Ian Weatherill.



Hope now holds a consignment stock of custom-made, deep groove steel and stainless steel cartridge bearings from Schaeffler for all its hubs and head sets. Schaeffler will also lend its technical bearings design expertise to Hope's next project – a new, integrated headset bearing and a new stainless steel hub assembly, due to be launched in the near future.

"What I really liked about dealing with Schaeffler, is that they respected us as a company, even though we are quite a small manufacturer," said Ian Weatherill. "Paul Healey, Schaeffler's account manager, is always extremely helpful with new designs we are working on."

When it comes to design innovation, Hope Technology and Schaeffler share a very similar vision. As Paul Healey pointed out: "Most of Hope Technology's staff are bike enthusiasts themselves and are actively encouraged to bring new design ideas to the table and discuss them with the management team. Similarly, at Schaeffler, we encourage innovation and try to work as closely with the end customer as possible, preferably early in the design process, to help improve the overall design arrangement." ■



BEARING SOLUTIONS CUT COSTS, POWER AND WEIGHT IN CONSTRUCTION EQUIPMENT

FROM BEARINGS FOR ARTICULATION JOINTS, HOSE REELS AND VIBRATORY ROLLERS, THROUGH TO BEARINGS FOR WIRE ROPE SHEAVES ON MOBILE CRANES, SCHAEFFLER'S RANGE PROVIDES CONSTRUCTION EQUIPMENT MANUFACTURERS WITH CORROSION-RESISTANT, MAINTENANCE-FREE, EFFICIENT, HIGH PERFORMANCE SOLUTIONS.

Construction equipment and heavy vehicles are now designed to meet strict European environmental standards and emissions targets. The engines that drive these vehicles, for example, are designed to reduce both CO₂ emissions and noise levels.

Schaeffler has been working closely with construction vehicle and equipment manufacturers for many years and by getting involved early in the design process, Schaeffler engineers have helped develop more innovative, efficient and cost effective bearing solutions.

One area where construction vehicles can help the environment is by eliminating the use of lubricants and engineers at Schaeffler have developed ELGOGLIDE®, a range of maintenance-free bearings that require no lubrication.



construction equipment is endured due to the solid and moisture-resistant combination of the sliding layer and the steel support body. Overall, the customer receives a bearing solution that offers a well-balanced combination of high load capacity, excellent wear and frictional behaviour, as well as outstanding dry running characteristics.

Easy-to-Mount

The maintenance work and time consuming mounting operations involved in installing bearings to construction equipment and vehicles, interrupts construction work unnecessarily. For this reason, Schaeffler has developed a range of ready-to-mount bearing support systems that incorporate ELGOGLIDE® high performance plain bearings.

These bearings are easy to mount, with all components – pins, tensioning system and plain bearings – fitting together perfectly. The units are pressed into housings and frames and require no additional axial location. Implementing the appropriate surface treatment

considerably reduces the formation of rust on exposed bearing components.

For wire rope sheaves in mobile cranes, Schaeffler's range of INA SLO4.. RR, full complement cylindrical roller bearings are designed to withstand high loads. Lip seals, special grease and Schaeffler's rust-resistant surface coating, Corroctec®, also offer highly effective protection from contamination and water splash.

The bearings are easy to mount in wire rope sheaves. Due to annular grooves, the outer rings are simply located with retaining rings.

Schaeffler's four-point contact ball bearings and ELGES spherical plain bearings are used to support articulation joints on construction vehicles. This combination offers a rugged, compact design for torsional and steering motion. The four-point contact ball bearing has a high load rating, is very stiff and easy to mount. With its clearance-free, preloaded raceway system, this bearing is more than a match for the requirements in these types of applications.



The maintenance-free ELGES bearings are designed for high shock loads and alternating loads.

Contact pressure is up to 300N/mm² (dynamic), or 500N/mm² (static). Schaeffler offers radial, thrust and angular contact spherical plain bearing types, all with excellent load-weight performance ratios.



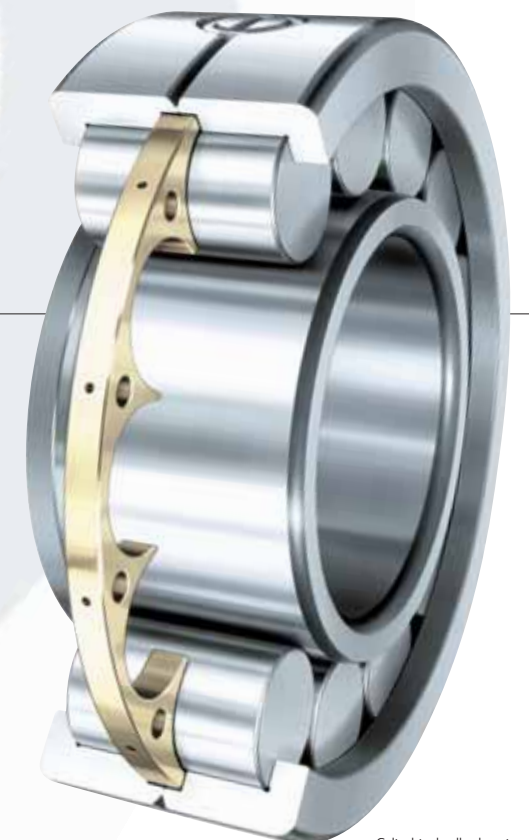
Premium Quality

Schaeffler also provides standard and custom-designed bearing solutions for manufacturers of vertical crushers and for vibrators in vibratory compacting equipment and sheet pile drivers. These bearings must withstand high shock loads and radial acceleration in the smallest possible design space. Misaligned bearings and shaft deflections put extra strain on the bearings and ambient conditions are often unfavourable.

In many cases, because conventional cylindrical bearings cannot meet these high requirements, Schaeffler can offer customers its premium-grade, X-life range of bearings.

These include Schaeffler's FAG single row cylindrical roller bearings (NJ) with brass cages. For these bearings, the X-life version results in 18% higher load carrying capacity, which increases the basic rating life of the bearing by more than 70%.

In addition, Schaeffler's range of low-friction cylindrical roller bearings LSL (with disk cage) and ZSL (with plastic spacers) are ideal for demanding requirements in terms of dynamics load carrying capacity. In vibratory compactors, for example, the bearing speeds can reach 2,500 rpm and accelerations can be up to 500m/s². ■



Cylindrical roller bearing (LSL) with brass disc cage



ELGES X-life Large Spherical Plain Bearing

Four point contact ball bearing with internal gear



REDUCING HEAVY PLANT OVERHAUL COSTS

SPLIT SPHERICAL ROLLER BEARINGS FROM SCHAEFFLER UK NOT ONLY HELP MINING AND QUARRYING COMPANIES REDUCE DOWNTIME, BUT ALSO SIMPLIFY MOUNTING AND HELP REDUCE ASSEMBLY AND MAINTENANCE COSTS.



Replacing or removing damaged or worn parts on heavy machinery and equipment can be a real headache for manufacturing companies, particularly those in the mining, quarrying and mineral processing sector, where the value of capital equipment and production machinery is normally high.

Repair and overhaul of components soaks up valuable time and resources, often resulting in costly production downtime, while the equipment or machinery is offline being repaired. The harsh operating environment may also result in more regular maintenance and overhaul being required on machinery.

Dismantling and assembly procedures can be complicated and often involve drives being disconnected, belts, pulleys, gears, bearings, couplings and shafts being disassembled or removed. Equipment such as bucket wheel excavators, winch drums, screw conveyors, mixers and stirrers, mills, crushers, rotary kilns, fans and blowers, drive and line shafts requires regular maintenance, repair and overhaul.

Where solid rather than split spherical roller bearings are used, companies should choose to fit the split type instead. Mounting of split bearings normally leads to a reduction of machinery downtime and maintenance costs. In many cases, split bearings can also reduce the cost of new designs, because the bearings simplify the assembly process and mounting procedure.



Split spherical roller bearings are particularly useful when several solid spherical roller bearings are being used to support a complex drive shaft, or where the bearing needs replacing but is located in a tight space on a machine, so access is restricted.

With split spherical roller bearings, the inner ring, outer ring and cage assembly are split. A cylindrical bore provides direct mounting onto the shaft. These bearings typically offer high thrust load capability and dynamically compensate for any misalignment.

With the FAG range of split spherical roller bearings from Schaeffler UK, the outside diameter, outer ring width and shaft seat diameter are identical to the dimensions of the standard spherical roller bearings range. This means customers can easily replace solid bearings with split versions with an adapter sleeve. The FAG range includes both glass fibre reinforced polyamide or brass cages, and for special applications, split bearings with separate clamping rings can be supplied. ■



LARGE SPLIT BEARINGS ON STEEL MILL REPLACED IN JUST THREE DAYS



FAG INDUSTRIAL SERVICES (FIS) HAS SUCCESSFULLY COMPLETED THE REPLACEMENT OF LARGE, SPLIT SPHERICAL ROLLER BEARINGS ON A CRITICAL 140-TONNE STEEL MILL CONVERTER WITHIN THREE DAYS.

This important maintenance work on a trunnion bearing was carried out on a 140-tonne steel mill converter at ThyssenKrupp's steel production plant in Terni, Italy.

While most of the plant's 3,500 employees were enjoying their annual Summer shutdown in 2006, engineers from FIS set about replacing the large, heavy, split spherical roller (trunnion) bearings on one of the plant's two, 140-tonne high-grade steel converters.

The shutdown is normally used to carry out important maintenance work, including relining and modification of the two mill converters.



ThyssenKrupp's fitters initially dismantled the drive and bull gear (a toothed gear wheel that enables tilting of the converter) on one of the converters, then took the opportunity of calling in FIS engineers to do some preventive maintenance on the FAG-supplied trunnion bearings. Hermann Eußner, chief fitter at FIS comments: "Prepared down to the very last detail and perfectly organised, the bearing replacement was carried out according to schedule within three days."

The bearings on the converter are from Schaeffler's FAG range of split spherical roller bearings. With an outside diameter of 1,180mm, a bore of 900mm and a weight of 800kg, these bearings are designed to withstand the high forces acting on the pressure ellipse of the loaded roller and the outer ring, which measures just a few square centimetres. The bearings also have to withstand extremely harsh conditions – high operating loads, dirt and high temperatures.

With split spherical roller bearings, assembly is simplified and mounting made easier, therefore the costs of production downtime, particularly on heavy plant and machinery, are reduced. FIS is also working closely with UK-based steelmakers to ensure that production downtime is kept to a minimum.

The Corus Group's steelmaking plant in Scunthorpe, for example, recently underwent major bearing replacement work. Corus Northern Engineering Services (CNES) worked closely with FIS to save at least five weeks of production.



The Scunthorpe plant uses three Basic Oxygen Steelmaking (BOS) plant vessels, which convert molten iron from the blast furnaces into steel. Each vessel weighs 1,300 tonnes, supported on two, 1.75m diameter spherical roller bearings from FAG. As Ian Taylor, business development engineer for plant condition monitoring at CNES says: "The delivery lead time for bearings of this magnitude can be as long as 12 to 18 months, with plant downtime for a planned bearing change requiring three weeks.

The relatively high cost of the bearing becomes almost insignificant compared to the overall production outage costs. By working closely with engineers from FIS, we removed the existing bearings and fitted the new bearings. This took just four days of the three-week planned outage, before the panels and screens were refitted, the supporting frame removed and the plant recommissioned." ■

SERVICE



PROTECTIVE MATERIALS AND COATINGS FOR HARSH ENVIRONMENTS

BY INVESTING IN A NEW DEVELOPMENT CENTRE FOR SURFACE COATINGS OF BEARING COMPONENTS AND BY CONTINUING TO INVEST IN R&D, THE SCHAEFFLER GROUP CAN OFFER CUSTOMERS A COMPREHENSIVE RANGE OF SPECIAL BEARING MATERIALS AND COATINGS, WHICH IMPROVE BEARING PERFORMANCE AND PROTECT PARTS FROM CORROSION, WEAR, FRICTION AND SLIPPAGE IN EVERY APPLICATION.

The new development centre, located at the Schaeffler Group's headquarters in Herzogenaurach, will research and develop new processes and combinations of unique materials and bearing coatings technologies. While Schaeffler's standard bearings guarantee customers optimum performance and long service life, in some harsh operating environments, a standard bearing material or coating may need to be upgraded.

Coatings are applied to the surfaces of rolling bearing components without forming a material bond, for example, by diffusion between the coating and base material. In many cases, it is sufficient to coat only part of the bearing or one of the parts that come into rolling contact. Schaeffler can advise customers when a coating is appropriate and what type should be used for a certain application.

As well as offering special corrosion-resistant coatings such as Corrotect®, Protect A and Protect B, Schaeffler can also provide a range of corrosion-resistant materials for rolling bearings that operate in corrosive environments.

While standard steel bearing materials provide satisfactory corrosion resistance in many applications, for higher performance requirements, highly corrosion-resistant, nitrogen alloyed martensitic HNS (high nitrogen) steels – such as Schaeffler's Cronidur® and recently developed Cronitect® steels – are also available.

Cronitect® is a new high-grade martensitic hardening steel, developed for rolling bearings, which offers maximum corrosion resistance under extreme conditions, for example, in dry running applications or when the bearings are in contact with aggressive media such as water, acids and cleaning agents.

Cronidur® and Cronitect® are superior to conventional corrosion-resistant steels for rolling bearings in terms of corrosion resistance, wear resistance and fatigue strength. They have very high corrosion resistance against aqueous media and heavily diluted acids, alkalines or salt solutions. Potential applications are clean rooms, electronic component manufacturing plants, pharmaceuticals and food production.

Other special materials include ceramic rolling bearing components, which provide excellent characteristics for certain applications. Silicon nitride balls, for example, are light and offer a longer operating life than standard steel ball elements.

High performance plastics such as PEEK can also be used for bearing components operating in corrosive environments. PEEK is resistant to high temperatures and, depending on the load, is suitable for operating temperatures of up to 250°C.

Schaeffler offers three special coatings that improve the corrosion-resistance and/or wear resistance of the surface.

Corrotect® is a relatively low cost, zinc alloy coating with cathodic protection, which is effective against condensation, rainwater, contaminated water and weak alkaline and weak acidic cleaning agents.

Protect A is a pure, matt grey coloured chromium coating with a pearly surface structure. Lubricant is retained between the pearls, therefore effective anti-wear protection is achieved, even under mixed friction or slippage conditions. During running-in, the rolling elements and seals burnish the surface, which leads to reduced friction coefficients. Protect A is resistant to various chlorides, oils, sulphur compounds, chlorine compounds and weak acidic media.

Ideal for aggressive atmospheres at high temperatures, Protect B is a coating comprising two layers: a thin chromium coating covered by a chromium mixed oxide layer, the latter providing corrosion-resistance by supporting the lubricant. The coating offers high anti-wear protection together with high anti-corrosion protection.

Black oxidising coatings are also available, which are ideally suited to rollers and rings for bearings in wind turbines and rail traction motor bearings.

A copper coating is also available for emergency lubricant on bearing cages, whilst silver coatings are used for the same purpose on aerospace bearings. Titanium nitride offers the customer wear protection in jet engine bearings. As many rolling bearings are used in electric motors, the bearings must be electrically insulated to prevent passage of electric current. The outside diameters and the faces, or alternatively the bore and the faces, are coated with aluminium oxide.



NEW PRODUCT PROCHECK INTELLIGENT, ONLINE MONITORING

SCHAEFFLER UK HAS LAUNCHED A NEW ONLINE MONITORING SYSTEM, THE FAG PROCHECK, WHICH DETECTS PLANT OR MACHINERY FAULTS EARLY - PREVENTING COSTLY BREAKDOWNS, REDUCING PRODUCTION DOWNTIME AND IMPROVING MAINTENANCE PLANNING.

ProCheck enables maintenance teams to monitor vibration levels and diagnose faults on critical rotating plant and machinery, helping to prevent costly machine breakdowns and eliminating problems before they occur. ProCheck is suitable for use in virtually any industrial sector.

Ian Pledger, Field Service Engineer at FAG Industrial Services (FIS), commented: "What really differentiates ProCheck from other products is its inherent flexibility due to its modular design. This means the system can be easily integrated into a customer's existing control and automation environment."



ProCheck is intelligent, easy to set up and is both robust and reliable. In addition, the system's modular construction means it can easily cater for different maintenance and condition monitoring strategies employed across different industry sectors.

It is, for example, ATEX-certified and so can be used in hazardous or explosive environments.

The system has a range of communications interfaces so that it can be easily integrated with a company's existing plant management or production control and maintenance systems.

Once set up, the system will operate automatically and continuously to measure, record and analyse vibration data from rotating plant and, as a result, will detect changes in behaviour early and alert maintenance personnel to a potential problem before it actually occurs.

The ProCheck system can be easily expanded and customised through a new expansion slot system and digital filter algorithms.

The unit is therefore easy to integrate into an existing production data management system, statistical process control (SPC) system or PLC network.

Data recording

The sensors record data from rotating plant continuously and initial assessment is carried out by ProCheck. If defined alarm limits are exceeded, alert warnings are automatically generated and sent to defined interfaces, where they undergo further assessment. The stored algorithms process the data to extract the necessary information on the condition of the machine and this initial check is independent of the server PC. This means all ProCheck systems in a network can operate independently of a server connection and store their data on a permanent memory medium. The system can accommodate up to 16 sensor channels plus additional analogue and digital inputs and outputs, and so can be expanded from monitoring an individual machine, right up to monitoring complete production plants. Multiple ProCheck units can be connected to a network and managed using the same database. Further parameters such as temperature, pressure, load, speed, torque, oil status and oil quality can be recorded and correlated with the vibration data. ■

DISTRIBUTOR NEWS

RELIANCE CELEBRATES A MOVE TO A NEW HOME



THE RELIANCE BEARING AND GEAR CO LTD., SCHAEFFLER DISTRIBUTORS IN IRELAND, CELEBRATED ITS MOVE TO A NEW HOME IN LITTLE ISLAND, CO. CORK EARLIER THIS YEAR. THEIR PURPOSE-BUILT PREMISES WERE OFFICIALLY OPENED BY THE MINISTER FOR ENTERPRISE, TRADE AND EMPLOYMENT, MICHEÁL MARTIN, T.D.

The move is another step in the progress of the company, which was originally founded in Cork in 1925 by Horace Rhodes Kenworthy. The firm's expansion through the decades has mirrored the industrialisation of the country, as the company evolved its product range to service the requirements of the industrial and agricultural markets and latterly, the high value technological and pharmaceutical sectors. The current product portfolio provides a one-stop shop to customers for all their maintenance, repair and on-going operation requirements. As the firm vacates its city centre location to establish its new Headquarters at Little Island, Managing Director, Jack Walsh said, "This historic company has always embraced change when it is in the best interest of its customers. From its humble origins on Queen Street in the city centre, to this magnificent 25,000 sq ft facility in Little Island, Reliance has always been about quality and service."



(L-R: Jack Walsh, Micheál Martin)

The Kenworthy family's association with the company continues through Company Sales Director, Peter Creighton and Technical Director, Mark Kenworthy, both great grandson's of Horace Rhodes Kenworthy. Another interesting fact is that Jack Walsh has also celebrated 50 years of uninterrupted service with Reliance in 2007. Des Pattinson, National Sales Manager at Schaeffler UK who has known Jack for almost 25 years

comments, "INA, and latterly, Schaeffler UK has enjoyed a long association with Reliance in Southern Ireland for 25 of the 50 years that Jack has served with the Company.

We congratulate Jack on this tremendous milestone and in steering the Company towards the success it is enjoying today. We look forward to continuing this positive growth with Reliance in the future". ■

A BIG PUSH FOR CHILDREN IN NEED



Schaeffler UK was delighted to be one of the sponsors of a special effort to raise funds for 'Children in Need' by staff at the Jaguar and Land Rover Design Centre at Gaydon.

With Pudsey shouting encouragement, two teams, made up of Gaydon staff and representatives from sponsors, pushed a new Jaguar XF and a Land Rover Freelander 2 over a two-mile course at the Gaydon site.

The effort raised nearly £5000 for the Christmas charity. ■

Brad Voth (right), Captain of Cardiff Devils, sporting the INA logo on his sleeve, with (from the left) David Longstaff, Captain of Newcastle Vipers, Keelan Thomas, and Tracy Jones, of the Finance Department, Llanelli.



INA SPONSORS CARDIFF DEVILS

To promote the fact that LuK Aftermarket Services will be handling the INA portfolio of automotive aftermarket products, a sponsorship deal has been set up with the Cardiff Devils Ice Hockey team, which is based close to the INA automotive manufacturing plant in Llanelli. The sponsorship deal is also closely linked to the "Say No to Drugs" campaign, which

has already been successfully promoted by the Sheffield Steelers Ice Hockey team, and involves players visiting local schools to give youngsters an insight into how damaging drugs can be. Following the visit each school or club pupils are then invited to see the team in action. The Schaeffler initiative is now to be opened up to other teams in ice hockey and the local Hereford United Football Club is also taking part.



Pupils from Llanedeyrns School, one of the first visited under the new initiative, pictured at a Cardiff Devils match, all wearing T-shirts sponsored by INA.

TONY SLATER RETIRES

Tony Slater, sales engineer for the Heavy Industry and Industrial Distribution team, retired recently.

Tony joined FAG 8 years ago as a sales engineer for the York area, specialising in industrial gearboxes. Presenting him with his retirement gift is Des Pattinson, National Sales Manager.



NEW ARRIVALS...



Pictured is Charlie James Hall, son of Richard Hall, who is General Manager of the Automotive Division at Sutton Coldfield. Charlie was born on 12th May and weighed in at 7lb 10oz.



Pictured left is Lorna Rae Hopkins, second child of Leigh and Janet Hopkins (Leigh is Regional Sales Engineer for PT&R and Janet is a Business Analyst in the Commercial Department at Schaeffler UK's Sutton Coldfield offices). Lorna was born on 9th November and weighed in at 8lb 5oz.

IN-HOUSE NEWS

LONG SERVICE AWARDS

LLANELLI



A total of twenty members of the Llanelli team were recently presented with long service awards. They are pictured here at the award ceremony:

Front row (kneeling) David Warlow (10), Allan Edwards (15), Lee Pratt (10), Charles Bunyan (10)

Second row Francis Thomas (10), Judith Evans (10), Penny Edwards (10), Helen James (10)

Middle row Adrian Roberts, Maureen Jones (10), Richard Delve (10), Paul Owens (10), Roger Evans, Gordon Taylor (25), Clive Jenkins (10), Gilda de Gruchy (10), Tracy Jones (10)

Back row Keith Jones (10), Rob Harries (10), Jarrod Hughes (10), Dean Williams (15), Stuart Jenkins (10)

SUTTON COLDFIELD



Sutton Coldfield Long Service Awards were presented during the festive celebrations.

Picture shows left to right: Ann Sargent (10), Roger Evans, Claire Rhodes (15), Kate Hartigan, Richard Hall, Angela Powell (10), Adrian Roberts, Claire Griffin (15), Des Pattinson.

**FAG**

Application
Underground Train Door Slider
Solution
Linear Ball Bearing KS



First in Line

The World's largest range of linear systems

The range of linear motion products available from Schaeffler (UK) is the most comprehensive from a single source in the world.

The products include bearings, shafts, guideways, accessories and complete systems, providing machine builders with a one-stop-shop capable of meeting their linear guidance requirements across the complete spectrum of applications.

The range includes:

- Shaft guidance systems
- Track roller guidance systems
- Ball guidance systems
- Roller guidance systems
- Flat cage guidance systems
- Linear actuators and tables

Plus a full range of accessories and, where required, a range of special coatings design to further improve the performance of linear bearings.

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