The magic of magnets
The combination of rolling bearings and magnetic bearings increases durability and speed.

The productivity of machine tools can be improved by raising the load capacity and increasing the range of RPM in rotary tables. Incorporating passive magnetic bearings into rotary tables has proved to be an impressive innovation in this area. Can the performance of rotary tables be significantly enhanced by introducing magnetic-repelling forces at acceptable technical and economical costs? In a development project, The Schaeffler Group examined this approach for its benefit. The results were clear-cut: The combination of roller bearings and magnetic bearings in rotary tables is technically and economically feasible, and it offers great potential for many additional applications.

The concept

Preliminary concepts envisioned the following bearing design; several rings of permanent magnets circularly arranged near the perimeter of the rotary table, placed on the base as well as on the underside of the faceplate. These magnetic rings are oriented with reverse polarization and repel each other. For instance, when static weight and processing forces are applied to the rotary table from above, the magnetic repelling force will counteract the load and reduce the load reflected to the rotary table bearing significantly.

In a simulation, a load spectrum with high speed-load ratios was applied which represents actual rotary machining. In this trial setup, the rotary table bearings used an INA ZKLDF series double-row axial angular contact ball bearing and an IDAM torque motor with external rotor and a direct angular position measurement system. The purpose of this design was to explore the benefits of the magnetic load relief using modern (direct) drive components.

Significantly longer lifecycle and suitability for rotary machining tables

Simulation and testing revealed considerable application benefits, compared to the conventional rolling bearing arrangement when using magnetic load relief. Specifically, there was potential for a significant rise in the bearing’s durability. In addition, the benefits of magnetic load relief open up a variety of new applications for rotary tables. Combining smaller bearings with magnetic load relief could result in an increase in maximum RPM capabilities without a corresponding loss of table capacity or life.

Excellent rigidity, holding force and isolated magnetic flow

The rigidity of rotary tables with magnetic load relief was examined using FEM (finite element methods), taking into consideration high moment loads and eccentric forces applied to the table. According to the results, the magnetic repulsive force has a supporting effect on the faceplate, and thus lowers its tendency for deformation. Using further FEM analysis, the magnet arrangement was optimized, achieving maximized repelling forces, while the effect on drive torque and the magnetic field were minimized through the application of protective shields.

Significant testing, using elaborate sensor technology provided repeated verification of the simulation results.

System understanding is the key to success
Combining rolling element bearings with magnetic load relief requires an interdisciplinarily, mechanically and electronically precise development approach. The Schaeffler Group, as a bearing manufacturer with its own direct drive specialists (IDAM), is in an excellent position to execute such an undertaking.

The Schaeffler Group has developed and collaborated the necessary expertise, and now offers engineering/design support to OEM partners in the area of direct drive rotary tables. This is uncovering completely new system potentials and innovative possibilities for increasing performance and improved productivity of machine tools and production machinery. However, this technology can also be extended to other areas requiring higher load carrying and higher-speed capacities of rotating assemblies.

As a result, the innovative combination of rolling bearings and magnetic bearings provides greater bearing durability for the rolling bearing and a higher potential operating speed by using other types of bearings or by selecting a smaller size rolling bearing.

In view of the benefits derived from the magnetic load relief rotary table bearing approach for various applications, the solution of today could quite easily become the standard of tomorrow.
Creating standards!
“added competence” for machine tools

"Creating standards" – that was the Schaeffler Group Industry motto of the EMO 2007, which is one of the topics we will be reporting on in this issue.

"Tailored solutions for the textile machine" was the motto of the con-currently running ITMA, the leading textile machinery trade fair. But how do these two mottos fit together, do they not seem to be mutually exclusive? I believe that they are both perfectly suited for us.

Almost all currently successful INA and FAG products started life at some point as innovative special solutions or future-oriented ideas for a specific single application. Subsequently, these "new developments" proved to be convincing.

Today, they represent the industry standard in machines tools. This applies in equal measure to the INA linear systems and the FAG spindle bearings, the INA rotary table bearings, the ball screw support bearings and increasingly IDAM, our direct drive technology specialty. Creating standards is also what we wish to claim in the area of productronics. In this publication, you can also read about the Schaeffler Group highlights at the last "Productronica" and about the demanding profession of the mechatronic engineer. In addition to lots of useful industry information, you can expect contributions, particularly in this issue, which give you insight into the industry beyond the conventional and into our world of "added competence", which combines the existing with the standards of tomorrow.

We hope that you enjoy reading this issue of our newspaper!

Sincerely yours,

ppa. Helmut Bode
President / Production Machinery

Tailored solutions at the ITMA 2007
INA and FAG products for textile machines

A combined experience of 160 years in the textile machine industry make the INA and FAG brands a leading development partner for the textile machine industry. For this reason, Schaeffler Group product innovations were a hit at the ITMA, the world’s largest textile machine trade fair, which is held every four years.

Tailored yarn spindle

Low noise output, smooth operation, and high efficiency were the focus in the development of a complete twister spindle, specially tailored to the specifications of a German customer for the Asian market. Structure borne measurements permitted the targeted reduction of noise and oscillations. The unbalance of the installed belt tensioning rollers was reduced by approximately 50 percent.

Cylinder roller bearings with new cage

For FAG cylinder roller bearings, which are used in weaving machine gearboxes for example, the Schaeffler Group Industry has developed new JP3 sheet steel cages and massive solid-brass cages. The new design of the sheet steel cages considerably improve the lubrication through out and hence lower the bearing temperature. The improved geometry of the cage bars has a positive impact on the lubricating film formation.

The optimized massive solid-brass cage for applications with strong vibrations and high acceleration also reduces the operating temperatures within the bearing. At the same time, the component’s strength is increased and the weight reduced. In addition to this, one more roller could be integrated into the majority of the cages. For the customer, this means a greater load capacity for the same installation space.

The benefits of direct drive technology for the textile machine are clearly evident. There is no need for a gearbox or belt drive. The integrated drive results in a compact design. This means a high degree of precision, dynamics, safety, flexibility, and efficiency for the movement of the axes. Potential examples include applications in which threads or sheets of fabric must be kept under tension with a defined force or where rollers need to be accurately positioned or synchronized with each other.

Linear and rotating movements with a high degree of precision and a high degree of dynamics are also potential direct drive technology applications. Through its 100%-owned subsidiary IDAM, the Schaeffler Group offers solutions that are perfectly geared towards each other and to the application itself. Who would not want to own a perfect-fit tailored suit?
Productronica 2007: mechatronics competence – state of the art

Innovative INA tri-ring bearing for handling robots

The electronic manufacturing industry fair in Munich from November 13 thru Nov 16, 2007 drew 1,484 exhibitors from 35 countries. The Productronica is the undisputed leading industry trade fair in this sector.

As a mechatronic solutions and direct drive development partner, the Schaeffler Group had a valued presence at this trade fair. In addition to IDAM direct drive solutions, there were highlights for robots and assembly systems.

Intelligent tri-ring bearing for shear kinematics robots saves space and cut assembly time and cost.

At the Productronica fair, the Schaeffler Group presented a development study for a tri-ring bearing. Introduced was a simplified construction of a handling robot equipped with shear kinematics, making it much more economical. With these newly developed tri-ring bearings, the robot’s wrists, center bearing, and ankles can be replaced.

Highly accurate printed circuit board positioning using new belt tensioning roller for assembly systems

The (toothed) belt in assembly systems for electronic components must transport and position the printed circuit boards with a very high degree of accuracy. Standard belt rollers are not well suited to do this with regard to tilting clearance, frictional torque, durability and dimensions, etc. For these applications, the Schaeffler Group has developed a belt-tensioning roller that is considerably more accurate than products used to date, and are designed to work in the smallest of spaces. This results in increased tilting rigidity and a small and steady frictional torque. The high load rating, the large lubrication reservoir, and the integrated seal fulfill the stringent demands for performance and cleanliness. The installation – a modular design, is another reason for its success.

SORALUCE – outstanding European milling technology

Successful development partnership

SORALUCE is one of the leading European companies for the design and manufacturing of milling machines and milling centers.

The DANOBAT Group, the owner of SORALUCE, generated a turnover of 193 million Euro in 2006 with 1,200 employees. However, 80% was achieved by its subsidiary BIMATEC:SORALUCE, which has a high export ratio and specializes in milling technology. Soraluce operates both nationally and internationally, focusing on the investment commodity, molding tools, railway, transport, and aerospace industries.

For over two decades, SORALUCE and the DANOBAT Group have been collaborating with the Schaeffler Group on projects ranging from design to the development phase. One of the most recent joint development projects is the model FV 6000 HSC milling center with its portable stand. It was unveiled at the EMO in Hanover in September 2007.

The FV-HSC series milling centers are the fastest of their type on the market. They permit complete parts processing, from the preliminary grinding, through to the secondary and final processing stages. At its main axes, this machine is equipped with the new generation of the X-life RUE high-precision profile rail guides, which ensure a high path speed rate, extra sturdiness, increased vibration damping and lower lubrication costs.

As a spindle bearing, the ZKLF...2RS 2AP angular contact ball bearings ensure increased rigidity and a high degree of accuracy during the spindle’s operational movements. The direct-drive milling head with an IDAM (INA Drives & mechatronics) torque motor is particularly ground breaking. This new drive system with INA YRTS series rotary table bearing permits speeds and accuracies achieved that were impossible up until now, using conventional systems.

**Market information**

SORALUCE was founded in 1962 and is part of the DANOBAT Group. Since 1986, it has operated in its own 4,000 m² R&D technology center (IDeko); with more than 100 engineers.

The DANOBAT Group, in turn, is part of the tool machine division of MCC (Mondragón Corporación Cooperativa), the Basque Region’s largest private holding company, and one of the most important in Spain. They own 218 companies and business units which generated a turnover of 13,390 million in 2006 with a total of 83,600 employees.
The roller bearing-forum for Machine Tools – “relocated”

“Technical Symposia” at the Schaeffler Haguenau / France site

The “Technical Symposium” for machine tools has chosen to take an alternative route for this season’s venue. Instead of having the conference at its usual location in Schweinfurt, Germany; the sixth “roller bearing forum” for machine tools elected to move its venue to Haguenau, France.

The decision for moving this event to the Alsace region of France was mainly to utilize this Schaeffler KG site, established in 1959. Haguenau, near Strasbourg, is a large production site for linear systems and rotary bearings. Included are manufacturing facilities for special bearings, such as belt tensioning rollers and tripod rollers for the automotive sector, along with precision blanking parts for the automotive and other industries. This includes complete internal gearshift systems for automotive transmissions and our line of linear guidance systems, for all industries, especially for machine tools and robots. This site employs 2,500 of the Schaeffler Group staff. Since the linear systems in machine tools are a major part of this facility, it made great sense to let participants have a closer look at the production of components and systems. The participants eagerly took advantage of the opportunity to tour the manufacturing facilities on the day before the conference. Other workshops, like the assembly of linear systems, Bearinx-calculations, and the simulation of rotary axes bearings also proved very popular.

Detailed solution – systematic success
The motto of the conference – “added competence for the machine tool: detailed solution – systematic success” – was presented by Helmut Bode, Head of Production Machines, after welcoming the participants. This was followed by presentations on the topics of linear bearings, rotary bearings, spindle bearings and ball screw-support bearings, as well as the new IDAM direct drive solutions.

Linear workshop within the “Technical Symposium”

Guest presentation on China
“Learning to swim with sharks – doing business with China” was the title of this year’s guest presentation, by Dr. Andreas Blume, former Head of the China Competence Center of the Pallatinate Chamber of Commerce. He focused on the significance and development of the business activities of German companies in China, examining the opportunities, risks, and options in dealing with Chinese business partners, especially relating to the industry of production machines.

Desired insider-forum for all bearings in machine tools
Throughout its almost 15-year history, the “Technical Symposium” has developed into an important forum for all matters relating to bearings in machine tools and their sub-systems. To maintain the formal and exclusive character of the conference, each new “Technical Symposia” conference, conducted on three separate days, is identical in content each day. This limits the number of participants to promote a more personal and individualized environment. To exemplify just how attractive this forum has become, these conferences have been fully booked within a matter of weeks for several years running.

The next “Technical Symposium” conference, with its three days of events, is scheduled for the fourth quarter of 2008, and will be returning to its usual location in Schweinfurt, Germany.

Technical Symposia conquer India

Machine Tool Symposium in Bangalore


The “added competence for Machine Tools” symposium opened with the ceremonial lighting of the lantern. This traditional ceremony in India is for important occasions and symbolic for the conveyance of wisdom and success. The great honor of lighting the ceremonial lantern is given to the customer. (picture)

Detailed presentations on the subjects of ball screw-support bearings, linear, rotary and spindle bearings, and on the F’IS Service for machine tools, proved to be of great interest and were well attended. The detailed seminar materials, the lottery on the application-specific questionnaire, and in particular, the personal certificate presented daily to each participant at the end of the event, also generated huge interest.

“Technical meetings” organized by the management for production machines, is offered for its key clients in Germany, Italy, Spain and China and has been successful for many years now.
High-performance packaging machine with INA linear modules

Successful development – partnership with VSM (Vium Smede- og Maskinværksted A/S)

Traditional Danish company with an innovative twist

The Danish company Vium Smede-og Maskinværksted A/S (VSM), founded in 1884, has been predominantly producing special machines for the EPS industry (EPS = expanding polystyrene) since 1965. These include cutting machines, packaging machines, internal conveyor systems and stacking systems as well as specialty machinery for the PUR industry (PUR = polyurethane foam) vacuum presses, injection/spray robots and milling machines. The design of these machines requires close teamwork with the customer as the machines and control systems are produced in the customer’s production facilities. VSM, with its chief markets in Scandinavia and Germany, currently employs a staff of 60.

High-performance packaging machine development project

A project was initiated in November 2006 for two identical high-performance packaging machines with the customer’s specifications for only the size and performance requirements. These units had to be suitable for use within a larger production and packaging system comprising two conveyor belt lines. In a group effort with Schaeffler Denmark, the result was the development of two machines with impressive performance, which easily could be the basis for the “perfect” linear technology-training program.

Powerful servo motors and toothed belt drives ensure the highest speeds and acceleration. Each machine included six INA toothed belt modules, each with three toothed belts and a six-row ball-recirculation guidance system. Two horizontal linear modules measuring 3.5 m (11.5 ft) in length are moving the locking latch/carriage with the tooling to the vertical linear modules, each measuring 2 m (6.5 ft). The two vertical linear modules ensure that the work piece is clamped and the foil is sealed. The horizontal insert carriages have a maximum stroke of 2,800 mm (110 in), although the actual stroke is dependent on the size of the work piece. With a load of 450 kg (990 lbs) and a center of gravity at 650 mm (25.6 in) above the linear modules, the total travel is 5.6 m (18.4 ft) from end to end. This travel occurs within 2 seconds at a top speed of 110 m/min (360 ft/min) and an acceleration of about 12 m/s² (40 ft/s²). Such cycle time ensures the completion of the entire packaging process within about 5 seconds. The partial process, in which the locking latch descends and locks the work piece in place, the bonding latch descends and the blade cuts the film, takes less than one second. This places large demands on, among other things, the toothed belt modules, and the servo motor programming. In addition to the linear modules, the machine includes a large number of INA profile rails. To assure a variety of products to be processed, the insert carriages have six, four row linear guidance systems with re-circulating linear ball bearings (KUVE 25) that consist of twelve total carriages. The cutting blade that cuts the film following bonding is also transported by a KUVE25. The KUVE25, operated at 300 m/min (1,000 ft/min), is running at its maximum. Four miniature linear guides control the lateral swelling of the bonding wire.

Both machines are now running to the complete satisfaction of the customers and are extremely maintenance-friendly and almost completely maintenance-free. A great example of our joint “added competence”!

“Fascinating fibers” thanks to INA deep groove ball bearings

INA godet bearing in spinning systems ensures quality

Whether you are a biker, a mountaineer, or simply a pedestrian – none of us would like to give up today’s practical clothing. Light and strong, waterproof, yet breathable, today’s clothing contrived from industrial generated fabrics replaces cotton, leather and other traditional materials.

Such apparel is using mainly man-made filament fibers. These fibers are created on systems that cover all process stages, from granulate feeders to the mixing of the polymer melt, the spinning, and drawing, all the way through to the winding of the finished yarns. Drawing and processing these filament yarns improves their strength and mechanical properties. During this process, the filaments are lead across several mandrels, which depending on the filament type, are either cold or heated. The desired fiber quality is the result of the various speed settings of the guides and the specific temperature applied to the mandrels. Smooth and even operation, high speed, and resistance to temperature fluctuations are important considerations for the bearings of these mandrels.

The mandrels shafts rotate between two deep groove ball bearings, arranged in X-formation. These mandrels are specially heat treated and lubricated with a high-temperature lubricant to endure the diverse range of operating temperatures. The length compensation at the moveable bearing, which is fixed in a bushing, is permitted by a preload spring. The bearings are sealed and lubricated “for life”.

Godets with specially heat-treated INA deep groove ball bearings
World rail record set with FAG roller bearings

TGV high-speed train reaches 574.8 km/h

Last year, when the V150, (abbreviation for 150 meters per second) high-speed train set a new world record with a speed of 574.8 km/h (357.16 mph) on rails, the Schaeffler Group was ecstatic! The reason for this excitement was that the cylindrical roller bearings, the four point contact bearings, and the tapered roller bearings used in the gearboxes and motors of this train, are all manufactured by FAG! However, these were standard serial production bearings and not special designs for this record performance. FAG has been supplying ALSTOM and SNCF with the driveline bearings for the various TGV generations for many years now. Just how reliable the bearings in these traction motors and gearboxes actually are, is revealed by the performance data. After all, these bearings had to transfer the enormous driving power of 19.6 Megawatt (around 25,000 bhp) for the 234-ton and 100-meter long record-breaking train onto the tracks with as little friction as possible. To really appreciate this data; under normal operation conditions, for which the bearings were originally designed, the TGV is merely operating at half the power. The employees at the Schaeffler KG railway bearings division are extremely happy with this performance. For the FAG bearing, this record setting run was an impeccably completed performance test. If these standard bearings perform effortlessly under twice the normal load, then they will perform extremely reliably under normal operating conditions!

“added competence” creative technology for experts, part 15

Metaplan-technique

How individual ideas become structured solutions through visualization.

Developing innovative business strategies and new product potentials require fresh ideas, different approaches, and understanding market needs. However, to ensure a productive flow process of all these ideas coming together, a structured setting is of importance. Implementing the visualization tool “Metaplan technique” is ideal for this requirement!

The Metaplan-technique, developed in the 1960s by its founders Wolfgang and Eberhard Schnelle, is an excellent communications planning tool. Based on a form of moderating, the discussion contributions of the participants, recorded on cards, are subsequently visualized and evaluated. Reviewing these notes, particular attention is given not only to the recording of the results of these discussions, but also to the entire subject base with all its arguments and counter-arguments. This way, it is possible to discuss even very complex or controversial topics in a structured manner, resulting in orderly correlations any time thereafter as the notes can always be reworked or reused, for new and creative approaches. In addition to visualizing the contributions, the most important features of the Metaplan technique are interactive teamwork and good moderation. The ideas for the end solution, derived from a special group questionnaire, include open and challenging questions. This can open up a much larger scope for problem solving. Hierarchy differences between the participants are quite desirable but eventually are rendered equal through moderator intervention.

Special rules of the Metaplan technique:

Butler rule: each meeting participant is simultaneously a co-thinker and a helper. All participants are for example, responsible for providing meeting materials and beverages, etc.

30-second rule: Verbal contributions are limited to 30 seconds. However, the other participants may pin their ideas to the wall during contributions time.

The Metaplan technique procedure:

1. The moderator announces the problem or topic, and distributing handouts. (materials, like cards, pens, etc.).
2. The participants write their ideas, analysis, proposals and opinions using only key words on the cards (one idea per card). They only have a few minutes for this task.
3. The cards are collected and attached to a board or pin board. To save time, cards may be added to the board or pin board at any time during the writing process.
4. Led by the moderator, the group is jointly selecting and organizing the cards and arranging the cards in accordance to the topics on the board.
5. The various topics are reviewed by smaller groups, and subsequently presented to the entire group for further development.

How the Metaplan technique works:

The board, in its structured arrangement, is maintained for the entire meeting period and beyond, allowing all participants access to the information and permit its use in follow-up meetings.

The benefits of the Metaplan technique:

· The method permits equal opportunities for all participants.
· The resulting cards with the solution-proposals can at any time, be reviewed, revised and changed.
· Group work stimulates high levels of motivation among participants.
· Ideas are not lost, as the cards exist on the board until the end.
· The method permits a consecutive development of problem solutions.
· The time requirements are comparatively low even for larger groups.

As the Metaplan technique provides all participants with a high level of additional insights, it is perfectly suited for developing new corporate and product strategies.
TU Delft wins the Solar Challenge on Schaeffler bearings
3,000 kilometers through Australia – emission and fuel-free

The Schaeffler Group’s high precision, highly durable, and extremely low-friction bearings have made a decisive contribution to the victory in the World Solar Challenge 2007 by the team from the Technical University of Delft. This race for solar-powered vehicles covered 3,000 kilometers across Australia and regarded as one of the world’s toughest competitions!

The vehicles were powered exclusively by solar energy, harvested from six square meters of solar cells on the vehicle’s roof. The design team of the Technical University of Delft collaborated with the Schaeffler Group bearing specialists, for the first time, deploying ELGES plain bearings and joints in the wheels, suspension and steering. The solar-powered electric motor-driven wheel bearings played a particularly important role in the Delft team’s vehicle.

Standard automobile solutions were too big and too heavy for the weight-optimized vehicle. FAG ceramic-spindle bearings, normally selected for machine tools, where they function under extreme temperatures and high speed with an extraordinarily low level of friction, were now “assigned” a new task in Australia…

The Schaeffler Group is, of course, hugely proud of the Dutch students’ success. The teams of Berry Westerhof from Schaeffler Netherlands and Dr. Ralf Hund, Head of the Wheel Module Preliminary Development division at the Schweinfurt-based FAG plant, provided comprehensive support to the students in all matters relating to bearing technology and supplied them with the Schaeffler products. “It’s great that our very first involvement in this race has secured us first place”, exclaimed a happy Dr. Hund.

More than 40 teams from all over the world made it to the starting line in Darwin on Sunday, October 21, 2007, including many well-known automobile manufacturers were present. The team from Delft was the first to cross the finishing line four days later, – about 45 minutes ahead of its nearest rival! The vehicles look like flying carpets, but are actually elaborate, futuristic automobiles with astounding driving performance. The entire structure, all materials, and components are lightweight and designed for outstanding performance. At around 180 kilometers (397 lbs) total weight, the winning teams achieved an average speed of more than 90 km/h (55.9 mph) and reached top speeds in excess of 140 km/h (87 mph). Each day, the team covered up to 800 kilometers (497 miles) without a single drop of fuel! Could this have been a sneak preview of the standards of tomorrow?

Roller bearing lexicon:

Radial and axial preliminary tension

Pre-tension or Preload is an axial or radial bearing load, evenly distributed on all rollers of the bearing and not generated by external load. A radial preload can also occur due to assembly tolerances (including key/wedge), or while in operation, due to thermal or centrifugal forces, which can influence radial expansion. If the radial preload becomes too high, radial distortion occurs and results in overheating which can lead to premature bearing failure. This occurs mostly in cylindrical roller bearings, but is also relevant to deep groove ball bearings and spindle bearings with a 15° pressure angle.

Axial preload occurs from axial assembly pressure of bearings and/or through their geometric orientation. The level of the bearings preload depends on the bearing orientation, pressure angle and the bearing size. The values listed in the bearing tables of precision spindle bearing catalogs are nominal values and apply to non-installed bearing pairs arranged in O or X orientation. Alternately, the bearings can be elastically preloaded using pressure springs or hydraulics. Select a preload force that corresponds to the application requirements. (see for example, M in the bearing tables of the FAG Spindle Bearings Catalog, Publ. no. AC41 130/7 DA).

With increased preload, the bearing becomes more rigid, but in turn lowers its RPM capability. Excessive preload, in addition to very high speeds, will increase the risk of overheating. Rigidly preloaded bearings, particularly when arranged at close bearings distances, are very sensitively to temperature differences between the shaft and the housing. This makes the preload within the bearing set increase considerably. Rigid layouts with larger bearing spacing’s and elastically supported bearings, are less sensitive to temperature fluctuations.

In general, bearings with ceramic rolling elements have lower operating temperatures. The preload in a rigid system with ceramic balls rises less than in the same system with steel balls due to a smaller temperature change.

Rigidly preloaded bearings require the use of speed reduction factors (cf. e.g. Catalog AC 41 130/7 DA, Page 189). The speeds shown in bearing tables are only achieved with elastically supported bearings due to their lower thermal sensitivity.

Ball size/ ball material Bearing type Load Speed Service Life
Large/Steel 
R...
High Medium Good
Small/Steel HS...
Medium High Better
Large/Ceramic MC...
Medium High Much better
Small/Ceramic MC...
Low Highest Excellent
X-life ultra Lager XC...
Premium Premium Premium
WIN A PRIZE!!!

Win an iPod!

Our question:
Which INA bearing was in use in the trial set-up of magnetic load relief in rotary tables?

Please enter the correct answer on the adjacent coupon in the customer newspaper, complete the form, and return it to us:

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Production Machines division
IEBSWE-LSM
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D-97421 Schweinfurt
Fax: +49 (0) 97 21/91 14 35
Closing date is Dec. 31, 2008

There is no legal recourse.
Employees of Schaeffler KG and trading partners are not permitted to take part.

Yes, I would like to win an iPod!

SOLUTION: ____________________________________________
Last name, first name: ____________________________________________
Company: _______________________________________________________
Street/No.: _____________________________________________________
City/postal code: _________________________________________________
Tel.: ___________________________________________________________
Fax: ___________________________________________________________
E-Mail: _________________________________________________________

We would appreciate it if you would answer the following questions:
Did we get your address right? Please let us know of any changes we need to be
made. (Please print letters)

Who else in your company should receive “added competence”?

What improvements would you like to see at the Production Machinery division?

The winner of the 2006/2007 Issue competition

Mr. Rolf Konrad (right), from the company “Konrad Haluk Industriebedarf GmbH” in Elztal-Dallau is the happy winner of a satellite navigation system. It was presented to him by Mr. Alexander Youkhanis from the Schaeffler KG office in Stuttgart.

The least expensive compact car in the world, the “Tata Nano”, was a real crowd-pleaser at the New Delhi automobile show last year, primarily because of its incredibly low price.

Surprisingly, this Indian four-seater should soon be available for a bargain price of 1,700 Euro.

This bright-yellow dwarf-sedan also has several additional interesting details. Schaeffler Group Automotive, for example, supplies the rear-axle wheel bearings, and the bearings and the retaining pins in the transmission. The company anticipates production of up to 10 million vehicles per year by 2010. Will the Nano prove to be a Mega (hit)?

The Barden Corporation

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LAST BUT NOT LEAST

What? – “Made by Schaeffler” in Nano!?

“Technical Symposia”. In March of 2007, the Schaeffler Industry Management Production Machines was present, both as a participant, and as an exhibitor at the Göppingen Machine Construction Forum and this will also be the case at the AWK in Aachen in June 2008.

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