

MOTION REQUIRES PRECISION

ROLLING BEARINGS, LINEAR COMPONENTS, AUTOMOTIVE



Keep getting better or stop being good

As one of the world's leading manufacturers of rolling bearings, linear technology components and steering systems, we can be found on almost every continent – with production facilities, sales offices and technology centres - because our customers appreciate short decision-making channels, prompt deliveries and local service.



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Continuously optimising production processes, delivering innovative products in perfect quality, expanding the range of services – opportunities for improvement come in many forms. And we at NSK make good use of them all, because as a leading supplier in the field of Motion & Control we are determined to achieve our goal:

Being number one in Total Quality.

This integrated approach drives us every day so that you, our customer, reap direct and sustainable benefits. This is due to the fact that a quality advantage involves many beneficial effects: low maintenance costs, faster time-to-market for your products, less downtime for your equipment, and accurately fitting, highly efficient solutions. In association with experts throughout the global NSK Group and on-site at our customer's location, we are committed to meeting the challenge of ensuring top quality in all of our operations, because we see ourselves as a reliable partner and problem solver who provides precise solutions for your requirements.

You can take our word for it.

Sincerely, Norbert Schneider
CEO NSK Europe Ltd.

About NSK

Individually tailored solutions without compromising on quality

Products and solutions from NSK are everywhere where things are in motion – even under the toughest conditions. Our high-precision rolling bearings are used in wind turbines and machine tools, our linear components are found in production lines while our automotive components are installed in the vehicles of almost every well-known automaker.

A worldwide reputation built on rolling bearings. NSK went into business as the first Japanese manufacturer of rolling bearings back in 1916. Ever since then, we have been continuously expanding and improving not only our product portfolio but also our range of services for various industrial sectors.

Planning right from the outset

Right from the very beginning, our customers involve us in the development process because we can contribute expertise and experience, relying on the close-knit network of NSK research laboratories and working side by side to develop the best possible solution.

Great performance under all conditions

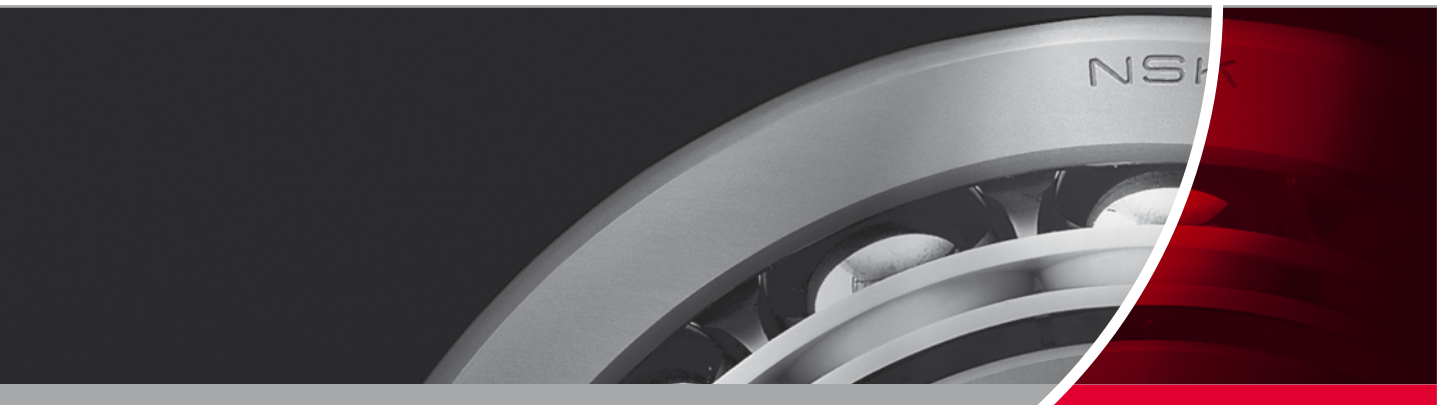
Extremely robust rolling bearings that ensure precision operation in steelworks, even at temperatures of 1500°C. Ball screws that run virtually maintenance-free in high-speed machine tools. Multi-sensor wheel hub units that reduce fuel consumption and enhance safety, even in extremely hot or cold conditions. There are many examples of how NSK products demonstrate their quality even under the most demanding and difficult of situations.

International means local

Size should be used wisely if it is to have maximum impact. At more than 200 NSK service and production centres around the world, some 24,000 employees work in close cooperation with our customers.

Experience pays off

Our products and services are precisely matched to specific industrial sectors and segments. We understand the demands in the principal industries; we know what drives our customers in mechanical engineering.



	Principal industries	Processing industries	Processing Machinery	Consumer goods	Automotive
Ball bearings	●	●	●	●	●
Rolling bearings	●	●	●	●	●
Bearing units	●	●	●	●	○
Linear components	●	●	●	●	●
Automotive products	○	○	○	○	●

NSK products at a glance

Ball bearings:

Deep groove ball bearings, single and double row angular contact ball bearings, self-aligning ball bearings, thrust ball bearings, super precision ball bearings and SPACEA ball bearings

Rolling bearings:

Spherical rolling bearings, cylindrical rolling bearings, taper rolling bearings, super precision rolling bearings, thrust rolling bearings and needle rolling bearings

Bearing units:

Plummer blocks, mounted bearing units and accessories

Linear components:

Ball screws, support units for ball screws, ball guides, rolling guides, monocarriers and megatorque motors

Automotive components:

Steering systems, wheel hub units and transmission bearings as well as bearings for engines and accessories.

Innovation & Quality

Our research is always focussed
on finding new and better solutions



Hall of Fame

- › BSH Supplier Award 2008
- › Bosch Supplier Award 2007
- › Brammer Award
- › Continental Supplier Award 2006
- › Volkswagen Group Award 2004
- › Toyota Award
- › Achievement Award: 1998/1996/1995
- › Certificate of Recognition: 2008/2006/2005/2004/2001/2000/1999/1998
- › Project Management Award: 2007
- › Superior Performance Award: 2000/1997



Among the group of companies that submit patent applications for machinery components, NSK is one of the leaders and can look back over a long tradition. In this regard, we not only concentrate on the development of new technologies, but also on the continuous optimisation of quality – throughout the entire process.

Bundled know-how in worldwide technology centres

At our research centres in Europe, America and Japan & Asia, we are working on the technologies and solutions of tomorrow and on details which may seem minor but which lead to major savings in terms of money and energy. Our research activities include product design, simulation applications using a variety of analytical systems and the development of different rolling bearing steels and lubricants.

Four core technologies

By continuously expanding our core technologies – tribology, material engineering, analysis technology and mechatronics – we are establishing an integrated technology platform for the development of advanced products. And you can rest assured that we continue to test our innovations until they're also absolutely reliable in everyday operation.

- › **Tribology** – Lubrication is crucial for rolling bearings and linear components designed to support linear and rotary motion. Improved lubricant formulations and surface treatment processes enable us to develop even faster, quieter and longer-lasting rolling bearings which are also able to withstand the highest levels of stress.
- › **Material engineering** – Materials science is the subject of continuous further development aimed at improving the functionality and strength of rolling bearings. And NSK ranks among the leaders. Our research concentrates on the fields of material composition, heat treatment, performance evaluation

and analytical assessment. The results of this research are then applied to new products.

- › **Analysis technology** – In product development, analytical studies – primarily computer simulations – are indispensable. We used them to simulate the behaviour of products under extreme ambient conditions and gain valuable insights relating to product design and manufacturing processes.
- › **Mechatronics** – This combination of mechanics and electronics is creating new, groundbreaking solutions for high performance engines, control system technology, precision sensors and biomedical micro-electro-mechanical systems. Mechatronics also play a role in assembly technology for applications that call for high temperatures, power density and reliability.

We pursue the same goal in all areas: Total Quality

Innovative developments mark the start of a process chain aimed at becoming number one in Total Quality. To that end, we have established state-of-the-art manufacturing centres for the quality-optimised fabrication of our products and complete systems. The NSK quality management system encompasses all of the services we provide – from consulting services to training courses right up to engineering tools.

Principal industries

Well-grounded solutions for impressive results

Whether in steel and iron works, utilities or the paper industry – the demands are high and the operating environment is sometimes harsh. NSK rolling bearings provide extremely reliable, efficient and eco-friendly performance, even under the most unfavourable conditions. In preparatory testing, our bearings have been subjected to even more stress than they ever actually have to withstand in “real life”.



NSK is a leading developer of sealed bearings – an additional seal protects bearings from becoming contaminated and this helps to prevent unscheduled machine stoppages.

Ready for anything

In the iron and steel industry, operating conditions are harsh: large temperature variations, heavy contamination, conveyor belt speeds of up to 2000 m per minute, vibrations and impact loads. NSK rolling bearings can withstand these stresses throughout the entire process, starting from raw material preparation to the smelting of the steel right through to the final rolled product.

In every wind and weather

Wind turbines generate electricity under hostile and constantly changing conditions, both onshore and off. This places extremely high demands on every component of the system, especially the rolling bearings. NSK rolling bearings have earned an excellent global reputation for long service life, reliability, mechanical resistance and intelligent design. For example, our rolling bearings are integrated into the gearbox design

in a way that generates less friction. And it's no secret that lower friction leads to higher turbine output.

We make paper fly

Papermaking machines have to operate at the highest performance levels – and they must do so under conditions that are anything but easy. Heat, moisture and high speeds are especially hard on rolling bearings. In this case, the Achilles' heel is the calendar roll. The widening of the inner races can cause cracking, thereby leading to machine shutdowns. NSK rolling bearings for papermaking machines are well prepared for such applications. These bearings are designed to meet specific requirements, thereby satisfying all demands – for high performance operation without interruption.

Principal industries:

Mining and extraction technology, construction, agriculture and forestry, steel industry, cellulose and paper, energy production, utilities



Optimised lubrication – using less grease means going easier on the environment and your pocket

Staying in motion also helps to trim costs

Unscheduled stoppages cost thousands of millions of euros every day. In order to ensure production without interruption, bearings must be precisely matched to manufacturing processes and machines. That's why engineering plays a key role at NSK, going hand in hand with our comprehensive product range. After all, potential weaknesses have to be analysed before precision products can be developed and implemented for your application.

High temperatures, high load ratings

In complex industrial processes such as those used in petroleum refineries, pump failures can lead to expensive malfunctions or even complete plant shutdowns. Whether it involves cages made of brass, polyamide or NSK's patented L-PPS, NSK's new HPS angular contact ball bearings are leaders when it comes to load ratings. The L-PPS plastic cage in particular is also able to withstand constant temperatures of up to 190°C – even in contact with the most commonly used lubricants and process gases.

Individual cases – wood and metal processing

A wide variety of machines, equipment and tools are used in wood and metal processing. And operating conditions also vary dramatically from one application to the next. While wood processing often entails harsh conditions whereby sawdust and wood chips must not be allowed to impair the function of the bearings, metal processing calls for high performance machining and precision. NSK provides optimal rolling bearing configurations for every application. We will also be glad to help you design your machines, carry out failure analyses or optimise your processes.

Lubrication makes all the difference

Most processes used to manufacture food and beverages are completely automated and operate under conditions that typically involve cold, heat and moisture. Long machine downtimes are essential in order to ensure efficient and economical operation. But high pressure cleaning of the machinery often causes bearings to fail. NSK bearings on the other hand are robust, protected against corrosion and permanently lubricated – e.g. with special Molded Oil® solid lubricant which is suitable for hygiene-sensitive areas like the food industry.

K1 lubrication units, a worldwide patent of NSK, achieve maintenance-free intervals of up to 50,000 km, depending on the application. They serve a dual function by providing a form-fitting face seal while releasing lubricant at the same time.



Bearing solutions from NSK are used in all types of packaging machines, bottling plants and equipment in the food and packaging industry.

Processing industries:

Food & beverage industry, packaging & bottling machines, automotive assembly, petroleum products, wood and metal processing, cement, chemicals, pharmaceuticals, ceramics & glass, gypsum processing, concrete, rubber & plastics, textile & leather processing, printing & publishing, semiconductors



Power where you need it – for greater productivity

We have been working in close cooperation with many well-known manufacturers of machinery and plant equipment for many years now. These partnerships have resulted in individual solutions that ensure greater productivity. As varied as the products may be, they all have one thing in common: high reliability with an above average service life. That's the difference NSK makes – and that's something you can depend on.

For smooth operation

Smooth-running and long-lasting bearings are key criteria in pumps and compressors – criteria that all of NSK's ball bearings and rolling bearings fulfil. This applies both to our standard products and our special bearing models designed for specific applications. Screw compressors would be just one example: in this case we provide a cage made of special plastic that withstands high temperatures and features outstanding chemical resistance to lubricants and process gases.

Reliability in electric motors and generators

NSK is the first choice for many of the world's leading manufacturers of electric motors and generators. This is thanks to the fact that our bearings easily meet the requirements for reliability, high quality, low operating noise and low frictional torque. NSK rolling bearings are also used in servo motors as they function smoothly even when subjected to strong vibrations.

Applications that call for precision – machine tools

Drilling, milling, grinding and turning require solutions designed to meet demanding performance specifications which ensure uncompromising quality based on specialised technical expertise. Spindle bearings for machine tools that also operate precisely at high speed, low noise spindles that provide more than 20,000 hours of maintenance-free operation, long-lasting bearings and linear components for rotary and linear motion that can be installed right off the shelf – there are many good examples of innovative solutions made by NSK.

The compact ball screws of the BSS series are particularly well-suited for use in light machine tools. The newly designed ball recirculation mechanism ensures uniform movement with significantly reduced natural vibration and lower noise.

Machine and plant construction:

Machine tools, electric motors, transmissions, pumps, compressors, fans, blowers, generators, conveyors and other machines



Consumer goods

Quiet, efficient and reliable in everyday use

Whether for vacuum cleaners, washing machines or miniature electric motors in medical devices – many of the products we use every day contain rolling bearings from NSK. This is thanks to the fact that they operate quietly and economically while being extremely reliable. We offer a comprehensive range that includes both a wide variety of standard products and specially adapted solutions which we create in association with our customers' development engineers.

Electric motors – quiet please!

Low-noise operation is one of the most important requirements of electric motors. The high quality and fine craftsmanship of NSK's extremely compact deep groove ball bearings allied to perfectly matched lubrication reduce friction torque to a minimum. And that means high performance in the smallest spaces along with quiet operation even at high speeds. Our engineers will be glad to advise you on the material combination, lubricant and seals ideally suited for your product.

Maintenance-free white goods

For washing machines, dishwashers, dryers and many other household appliances, we supply high quality ball bearings that provide low-noise operation, optimised energy consumption and maintenance-free service. Our bearings are permanently lubricated and specifically matched to the product in terms of bearing clearance, lubrication and seals.

To make sure it stays nice and quiet: NSK ball bearings for Miele washing machines.

Virtually every well-known manufacturer in the consumer goods area works with NSK – we not only provide quality products but we can also supply them in high quantities.



Consumer goods:

Household appliances, power tools, computer hard drives, electric motors, medical devices and office equipment



Automotive

Progress in the automotive sector is based on intelligent systems

As a strategic partner to top automakers and suppliers around the world, we provide solutions that offer higher performance in a compact space. Intelligent steering systems, rolling bearings for drive train, engines and accessories - our products ensure efficient fuel consumption and enhance active and passive safety in vehicles.

Being light and strong

Stronger but also lighter – wheel hub bearings have to be both, because it's no secret that every gram makes a difference in a car. Our research laboratories have developed a new type of cold forging whereby the component is formed in a single step. The higher stability of the steel makes it possible to manufacture extremely reliable, lightweight and compact rolling bearings. Moreover, the process is eco-friendly, as high temperatures are not required.

Multi-sensors measure three-dimensional forces

NSK was the first company to develop a multi-sensor wheel hub unit that measures all suspension forces

and rotating directions. Computation of three-dimensional wheel forces makes it possible to achieve substantial improvement in both dynamic driving safety and driving comfort.

A steering system that feels the road

The extremely lightweight and compact EPS steering column system from NSK is suitable for use in a wide variety of vehicles – from the smallest subcompacts to passenger cars with 3-litre engines. The electronic steering system from NSK offers many advantages – steering response is more comfortable and road contact is conveyed better. In the process, the system compensates for rough patches such as potholes. As the steering system is assisted by an electronic motor, energy is only used when it's needed. And that translates into fuel savings of up to 4% and lower CO₂ emissions.

More comfort, less energy consumed

Windscreen wiper actuators, seat adjustment mechanisms, engine cooling systems – NSK rolling bearings are used in many electric motors on board vehicles. They operate reliably over a temperature range from -40 to 120°C and withstand moisture and mechanical stresses. We also work in close cooperation with automakers on hybrid technology. Special NSK ball bearings help reduce CO₂ emissions in electric motors, for example.

Safe and efficient: wheel hub unit with integrated sensors for Anti-lock Braking Systems (ABS) and Anti-Slip Regulation (ASR) systems.



Products:

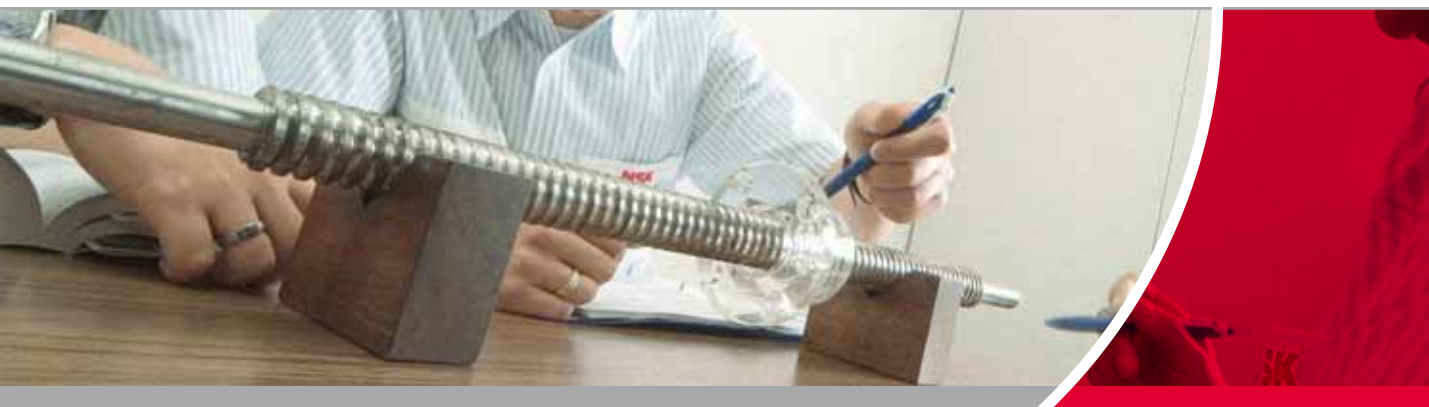
Steering systems, wheel hub bearings, engine bearings, bearings for automatic and manual transmissions as well as for differential gears and propeller shafts.



Services

Good partnership starts with service





Being a manufacturer and supplier of good products is not enough in today's world. We see ourselves as your responsible service partner providing a broad range of support activities. Our experienced NSK sales force works together with you on-site to develop individual solutions for smooth, efficient and profitable production processes in your business.

Increased profitability thanks to AIP

Reduce the frequency of machine and equipment failures. Cut costs without comprising on quality. With AIP (Asset Improvement Programme), a profit optimisation programme that has proven successful in practise, we can help you identify and exploit profit potentials. The programme combines NSK's latest technical findings with existing knowledge in your own field of expertise and your business processes.

Starting with an analysis of the current situation, we work together with you to prepare a structured catalogue of measures – and then we help you implement them. Results are monitored to ensure that you obtain the intended benefits within the agreed time frame.

Product training courses – theory and practise

Our training courses and technical seminars offer participants the opportunity of enhancing their existing levels of knowledge and practical skills with the latest expertise. Our trainers are highly qualified application engineers who are familiar with the requirements of various industrial sectors. Training courses and seminars can be conducted in our three training centres, in any of NSK's facilities or at your company's own premises.

NSK Service Centre

The NSK Service Centre carries out specialised maintenance and repair services for ball and rolling guides, ball screws, monocarriers and megatorque motor systems manufactured by NSK. In so doing, we process NSK ball and rolling guides and ball screws on the basis of customer drawings.

Online services – tailored to your needs

Whether it's a question of CAD drawings and technical data sheets for download, computation tools which can be used to carry out various bearing design calculations, convenient placement of orders for products in our online shop, or access to specific applications in our secure customer portal – our services are as varied as your needs. And they are being expanded continuously to enable us to offer you efficient, comprehensive and individual support.

Services at a glance:

- › **AIP profitability optimisation programme**
- › **Product training courses**
for rolling bearings and linear components
- › **NSK Service Centre**
for maintenance and repair services
- › **CAD drawings**
and technical data sheets available for downloading
- › **Calculation tools**
- › **Online shop**

We accept responsibility and rely on trust

The cornerstone of our business operations revolves around the use of innovative technologies to advance environmental protection while never losing sight of social factors. We see this as both an obligation and a responsibility.

Balance between man and nature

We promote environmentally friendly products with our know-how and resourcefulness. The minimisation of friction losses, for example, reduces energy consumption. In the same vein, our products are also exceptionally long-lasting and operate reliably.

With regard to our corporate sense of social responsibility, we would like to contribute to a higher quality of life throughout the world. This applies both within the company with programmes for work-life balance and the further development of employees, for example, and also in relation to partners, suppliers, customers, communities and future generations.

In this context, openness, trust and sustainability are the principles that guide our communication. They also form the basis for a number of projects that we have initiated, such as safe paths for children to take to school, health programmes and support for schools and universities.





NSK initiative for the reduction of CO₂ emissions

In our company, we not only manufacture products that help reduce energy consumption but we have also been optimising the manufacturing processes in our own production facilities since 1999 with the aim of minimising CO₂ emissions. To this end, we continuously invest in more advanced and eco-friendlier manufacturing facilities and have launched a global initiative for waste prevention. Our goal is to develop products that save more energy over the course of their life cycle than was needed to produce them.

Monitoring of hazardous substances

In our dual function as importer and processor of chemicals, we have undertaken to meet all of the requirements of the REACH programme. It goes without saying that all NSK products comply with statutory requirements such as the ELV and RoHS directives. Moreover, we maintain our own list of prohibited and restricted substances. This is based on the company's own standards for environmentally friendly procurement – the NSK Green Procurement programme.







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