

Deep Groove Ball Bearings for a wide range of applications

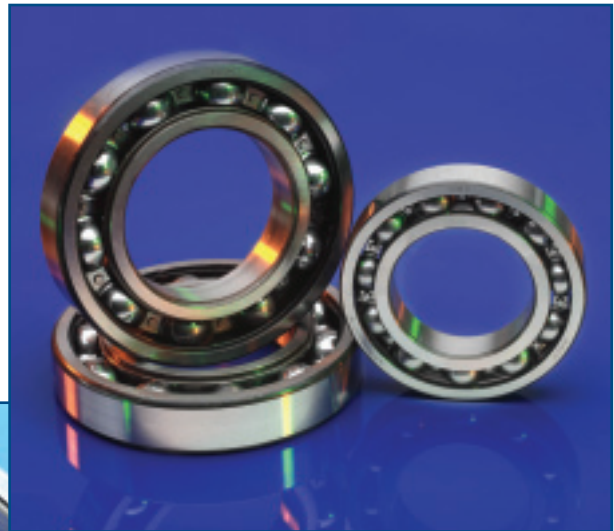


NSK is a **World Leader** in **Deep Groove Ball Bearings**

We have achieved our position over a number of years by pushing this product beyond that of any other manufacturer. By extending the normal boundaries of performance and functionality we are able to offer deep groove ball bearings that extend machine life and provide years of trouble free service.

As one of the World's largest manufacturers, we have developed an extensive range of products.

You can choose from the range or contact our sales team who will help you find the right product for your application.



Why?

We understand the problem

Our experience of bearing applications enables us to understand the key issues faced by designers and manufacturers.

We can provide the answer

With an extensive range of products and world class Research & Development facilities, NSK can find a bearing solution for your application.

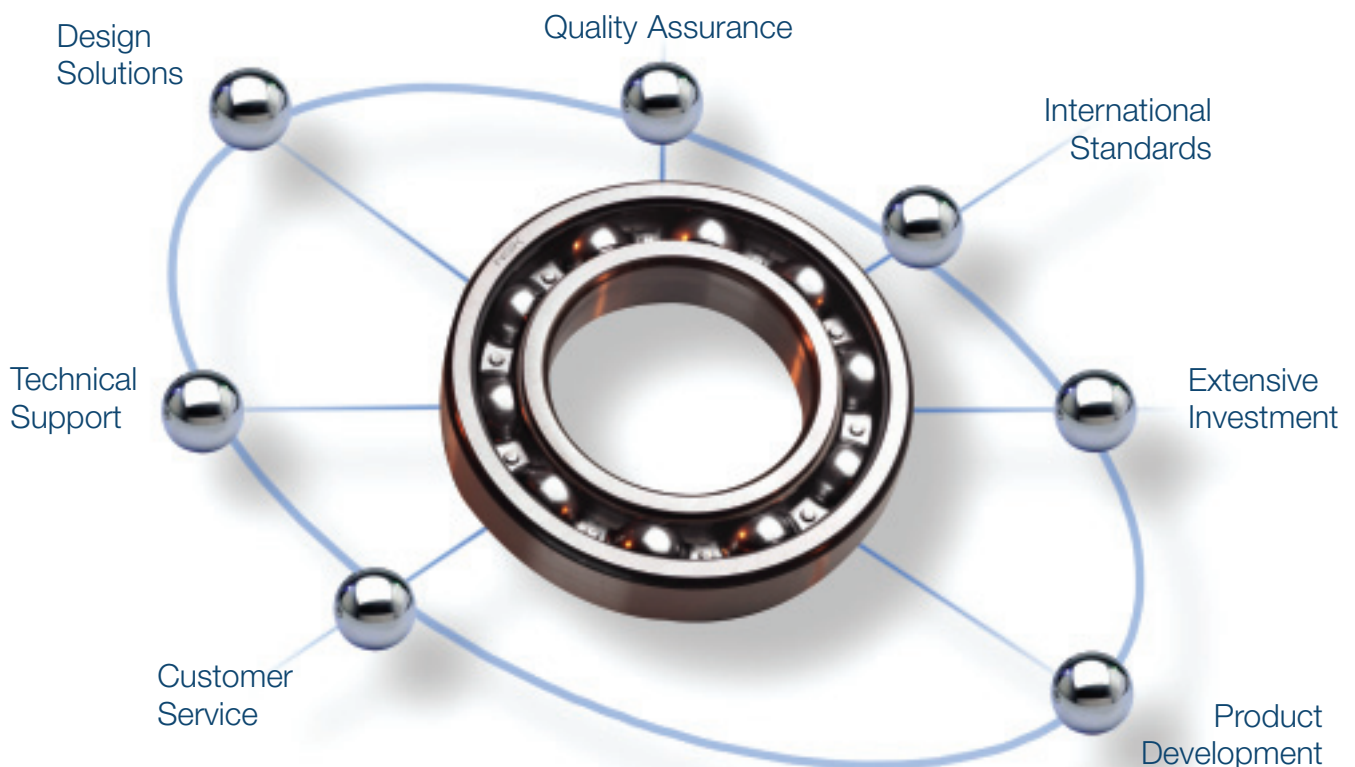
We bring an extra dimension

Our commitment to you extends beyond the product. We provide a full package of services from sales support to on-line technical information including an Interchange Database.

www.eu.nsk.com

We are looking to the future

NSK is committed to safeguarding the future of our environment. We are actively developing new products and processes that minimize our reliance on natural resources and impact on the environment.



The Benefits

Quality Assured

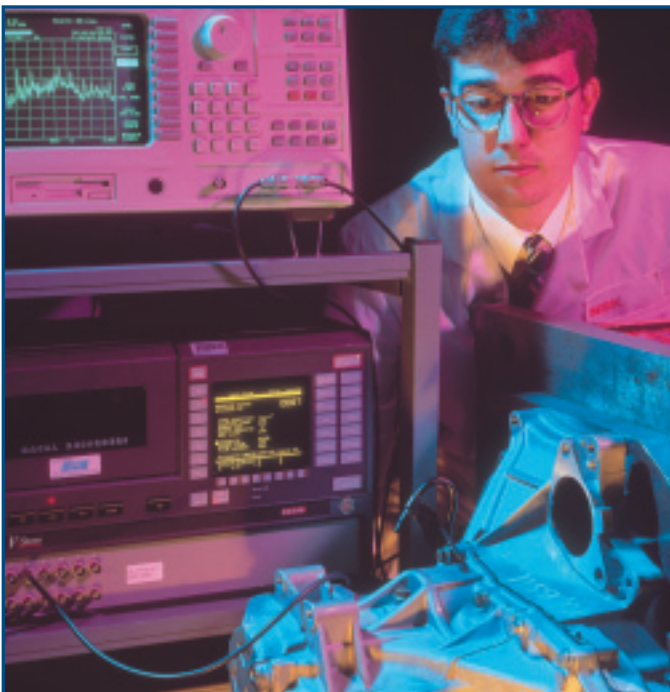
NSK ensures the highest level of product quality on production lines that can achieve unrivalled process accuracy. Every bearing component is checked dimensionally several times using automated gauging and every assembled bearing is 100% noise tested to ensure total product quality.

Extensive Investment

We invest more than any other manufacturer in Research & Development to ensure that our products are at the forefront of design and specification. Our network of Technology Centres extends through Japan, Europe, China and the USA. Together they are committed to delivering new bearing technology to our customers.

Product Development

NSK has pioneered the development of cleaner bearing steels and pushed the limits of new materials technology with our SPACEA™ series. We are also developing the next generation of environmentally friendly products such as low torque bearings to reduce energy consumption and a range of EXCELLA GREEN™ lubricants.



Customer Service

We are actively developing new service offerings such as the latest Web enabled business systems. These provide online interaction with NSK to offer benefits in product selection and ordering. In addition, we can provide new interactive training software to help customers to get the most from our products.

Technical support

Our experienced sales team and engineers can assist with any technical aspects, from product selection to providing advice on fitting or removal of bearings. In addition, you can

find an extensive range of product information and resources available through our interactive Website at

www.eu.nsk.com

Design Solutions

With a product range of nearly 150,000 bearings, we can often find an existing solution for most applications. If a suitable bearing does not exist, however, then our Technology Centres can get involved with the design and development of new products. From corrosion resistant bearings for the chemical industry to dent resistant bearings for fan motors, we have the ability to meet the specific needs of our customers.



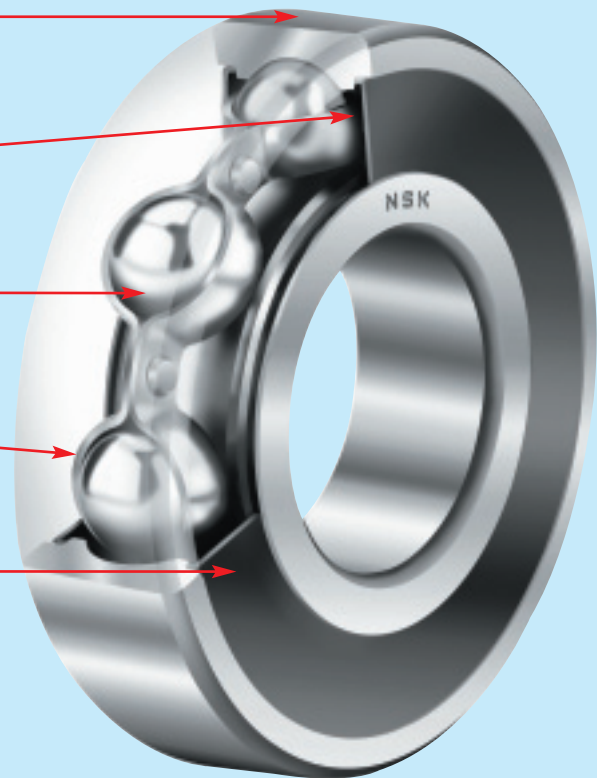
The Product

NSK manufacture a full range of deep groove ball bearings. These are the most common type of rolling bearing and used in a wide variety of applications. Not only are they capable of supporting radial loads but also moderate axial loads in either direction.

Due to their low torque, they are suitable for applications where high speed and low power loss is required. The secret lies in their simplicity. Easy to mount and suitable for many different configurations, the deep groove ball bearing is the ideal solution.

Product **Features** and **Benefits**

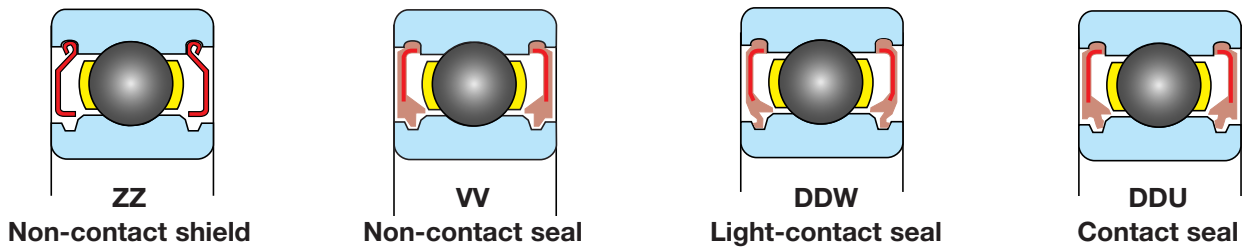
- **High Quality Steel**
 - Ultra clean steel to extend bearing life by up to 80%
- **Advanced Grease Technology**
 - NSK lubricants that can extend grease life and performance
- **High Grade Balls**
 - Quiet and smooth operation even at high speed
- **Super Finished Raceways**
 - Specially honed to minimise noise
 - Improves lubricant distribution and life
- **Patented Seals**
 - Provide resistance to contamination in the toughest environments
- **Quality Assured**
 - 100% testing ensures total product quality



Shields and Seals

NSK is a world leader in bearing sealing technology and our range of shields and seals can provide years of trouble free service in the toughest environments. Tightly controlled clearances and patented labyrinth designs not only provide high level sealing performance but also minimum torque and power loss.

NSK shields and seals are of an environmentally friendly construction. The standard seal material is nitrile rubber but other high temperature materials are available on request. Choose from the range below or contact our sales team if assistance is required with selecting the most suitable option.



Shield and seal comparisons				
	ZZ	VV	DDW	DDU
Dust Resistance	Moderate	Good	Excellent	Excellent
Splash Resistance	Unsuitable	Unsuitable	Moderate	Excellent
Torque	Very Low	Very Low	Low	Moderate
Speed Capability	Excellent	Excellent	Good	Moderate
Grease Retention	Moderate	Good	Excellent	Excellent

Cages

Within our deep groove ball bearings, there are a number of different cage types to choose from. The most common type is a pressed steel cage. Our close coined cage pockets and tightly controlled clearances reduce friction and ensure even distribution of lubricant. These pressed steel cages also have the advantage of high temperature resistance.

For high-speed applications, NSK offer cages made from advanced engineering plastics. These can help to extend grease life and reduce noise and power loss in the bearing. In addition, plastic cages offer excellent resistance to shock or misalignment.

Grease Technology

In conjunction with our range of shields and seals, NSK can provide the latest lubricant technology as part of the bearing package. We have worked for many years directly with major manufacturers to develop a range of lubricants that offer ultimate

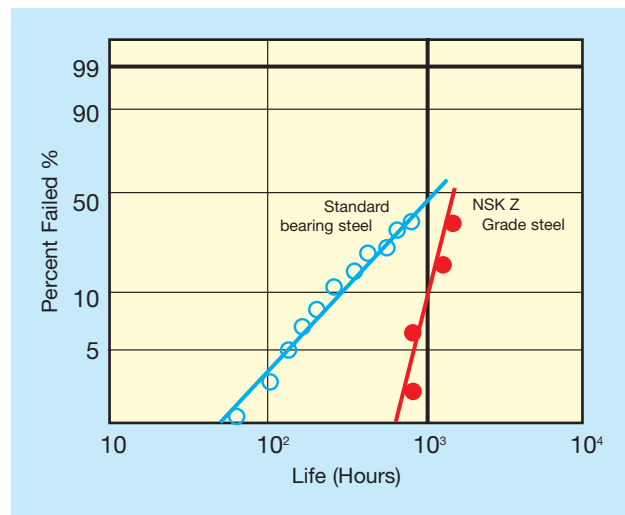
performance. We are now also enhancing this with a new range of environmentally friendly EXCELLA GREEN™ lubricants. Select from the range below or contact one of our engineers to discuss your requirements.

NSK Grease	Operating Temp (°C)		Typical Application	Key Features
	Min	Max		
NS7	-40	+130	Motors, Fans, Pumps, Compressors	Excellent low torque and low noise performance particularly at low temperatures.
NSC	-30	+140	Motors, Fans, Pumps, Compressors	Superior low noise performance for long periods with higher temperature durability.
ENS	-40	+160	Engine Accessories, Motors	High temperature resistance and speed capability with good resistance to water and contamination.
EA3	-40	+150	Vacuum Cleaner Motors, Power Tools	Superior sealing against contamination with excellent low torque and low noise performance.
EA5	-40	+160	Washing Machines, Pumps, Compressors	Excellent water resistance and rust prevention with good performance under high loads.
EA6	-40	+160	Induction Motors, Compressors, Fans	Superior long life at high temperatures with good wear resistance and rust prevention.

High Quality Steels

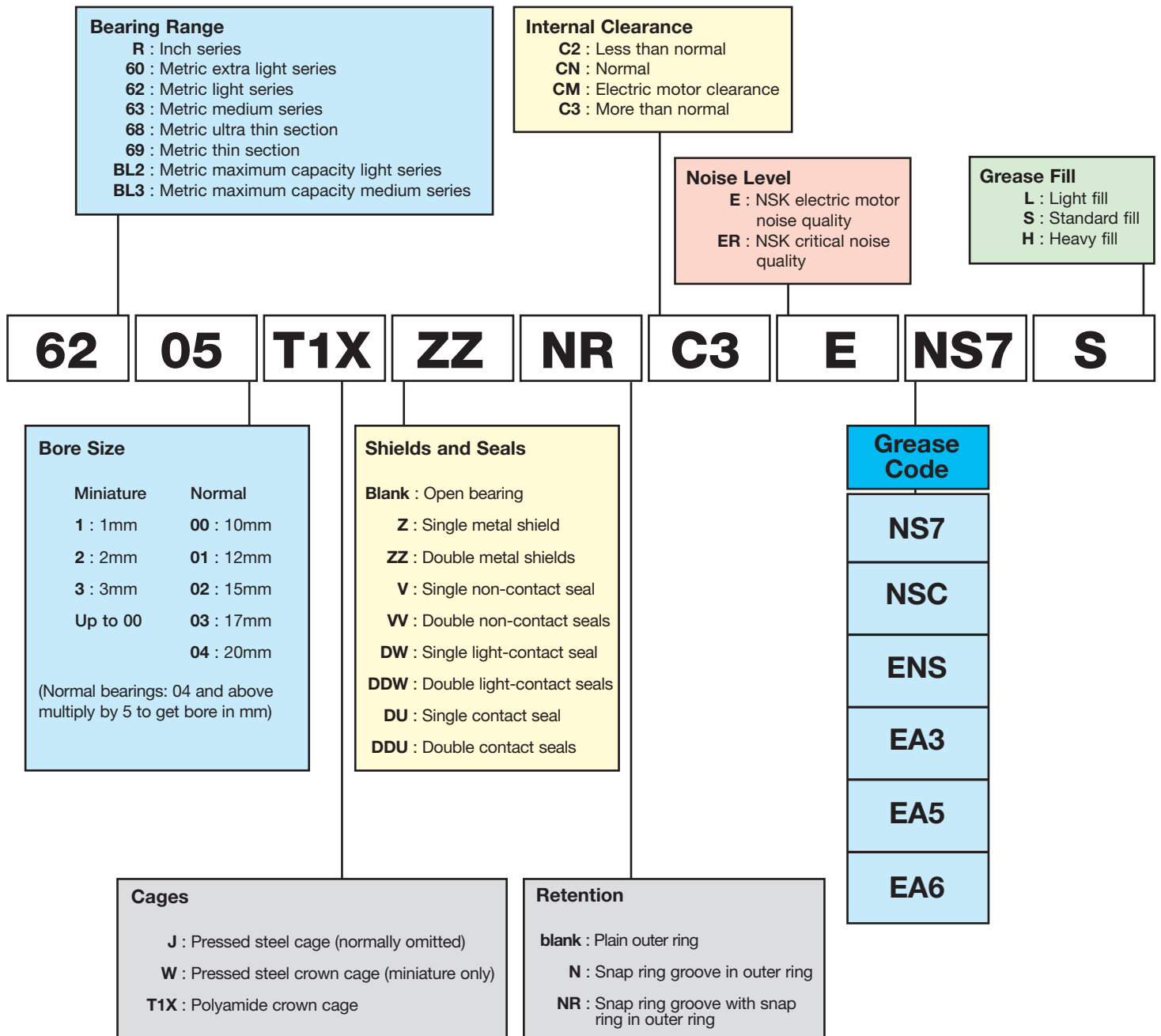
The key to bearing life lies beyond what can be seen with the naked eye. Cleaner bearing steel results in longer fatigue life and it is this principle that has led NSK to develop unrivalled steel cleanliness. For example Z grade is a vacuum-degassed steel that is so free from impurities that bearing life can be extended by up to 80% over conventional steels.

In order to achieve this, we have worked for many years directly with steel makers to refine the processes and conditions. Contact one of our engineers to discuss your requirements and select the most appropriate steel for your application.



NSK References

Single Row Deep Groove Ball Bearings



Bearing Solutions for Industry

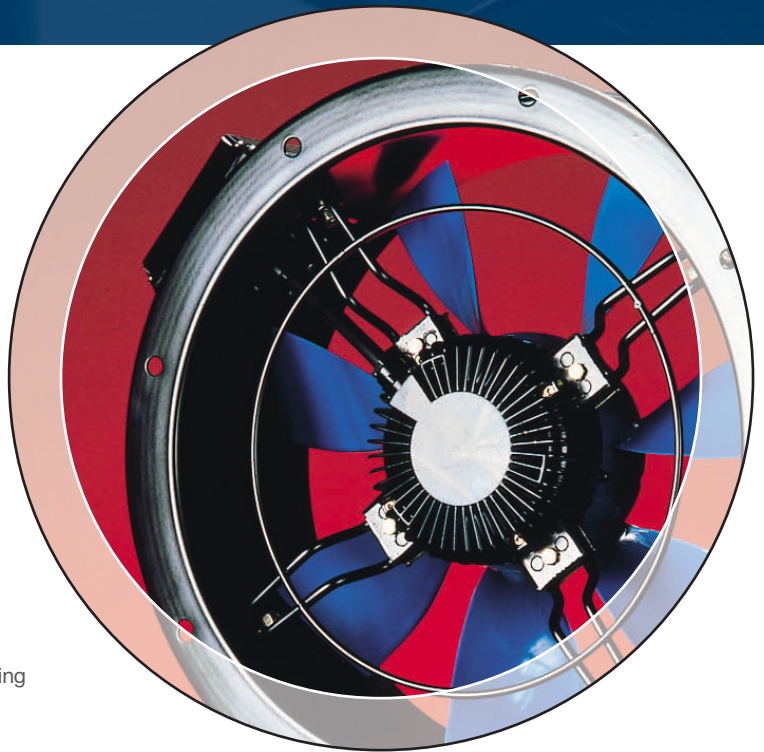
Whatever the application or industry, NSK can offer a bearing solution. We work directly with customers or through our network of Authorised Distributors to provide bearings that meet the needs of industry.

Electric Motors

For electric motor manufacturers and those involved with the refurbishment of motors, deep groove ball bearings will be a familiar sight. Not every motor, however, is the same and selecting the right bearing can make a big difference.

NSK provides deep groove ball bearings for a wide range of electric motors produced by major manufacturers. As part of this range, we offer bearings with a controlled CM clearance to ensure smooth running and improved efficiency.

We can also offer bearings to our E class noise standard, which are specifically manufactured and tested to ensure quiet operation. In addition, from our extensive range of lubricants we can provide low torque greases, such as NS7 or NSC, to minimise power loss. It is these features and others that make NSK bearings the first choice for electric motors.

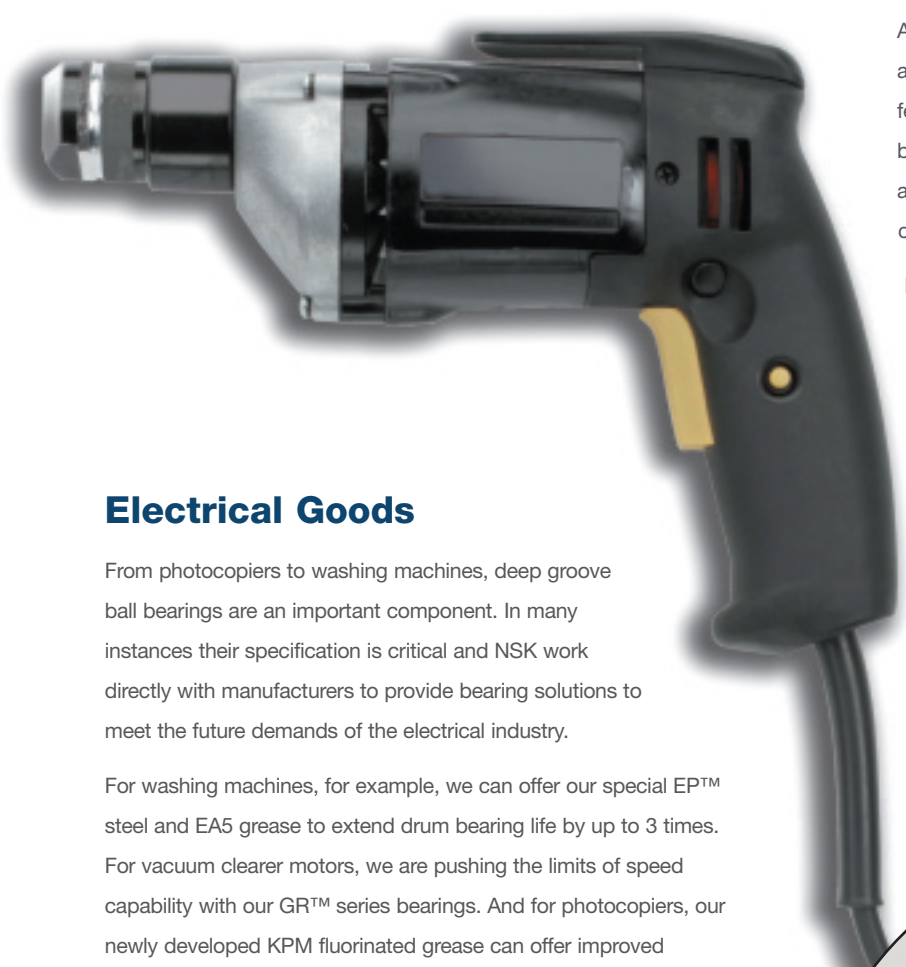


General Machinery

Compressors, pumps, gearboxes and fans are amongst the many other machines that are reliant on deep groove ball bearings. In each case, however, the demands on the bearing may be very different.

NSK recognises this fact and understands the needs of each application. In this way, we can help select the right combination of materials, sealing and lubrication.

If a solution does not exist already, then NSK is at the forefront on new product development. For bearings used on air conditioning equipment, for example, we have developed NSA grease to eliminate the problems caused by vibration damage when the bearings are stationary. Similarly, for fan motor bearings we have developed a new dent resistant steel to prevent the problems sometimes caused during assembly.



Electrical Goods

From photocopiers to washing machines, deep groove ball bearings are an important component. In many instances their specification is critical and NSK work directly with manufacturers to provide bearing solutions to meet the future demands of the electrical industry.

For washing machines, for example, we can offer our special EP™ steel and EA5 grease to extend drum bearing life by up to 3 times. For vacuum clearer motors, we are pushing the limits of speed capability with our GR™ series bearings. And for photocopiers, our newly developed KPM fluorinated grease can offer improved performance and life at temperatures up to 200°C. These are just some of the many examples where NSK is helping to push the limits of bearing technology in electrical products.

Automotive

NSK is a major automotive supplier and actively support the after-market through our network of Authorised Distributors. From the transmission to the alternator, deep groove ball bearings are a key feature in any motor vehicle. The demands on these bearings can exceed those of any other applications and performance is required in the harshest conditions.

For deep groove ball bearings for automotive applications we use specially developed materials, heat treatment, seals and greases. On transmission bearings, for example, our patented TM seals allow lubricant oil to pass through the bearing but filter out debris. And for alternators, where bearing flaking failure can occur due to high surface pressure microslip and vibration, we have developed HAB grease to prolong bearing life. Again, these are just some of the examples where NSK is helping to meet the needs of the automotive industry.



SPACEA™ Series

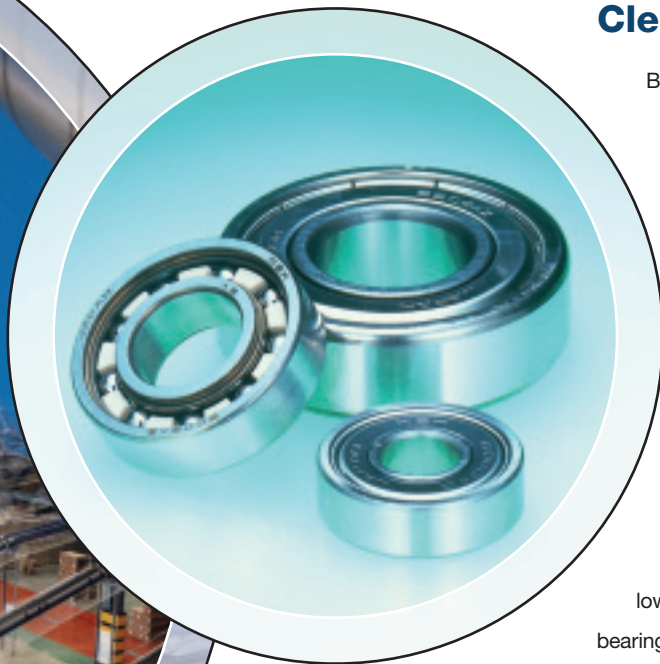
Pushing the **Limits** of **Materials Technology**

For more than ten years, NSK has been designing advanced motion and control products to support the increasingly sophisticated needs of high-tech industry. We have developed unique material, lubrication and surface treatment technologies that provide solutions for extremely severe conditions. Our efforts in this area have culminated in the creation of the SPACEA Series, a range of bearings for special operating environments. These include anything from outer space to clean rooms for semiconductor manufacturing, or other environments where highly corrosive chemical solutions are used.

Highly Corrosion-Resistant Ceramics

Silicon nitride bearings last about 10 times longer in water than stainless steel bearings. However, in etching and cleaning machines, where highly corrosive chemical solutions are used, even silicon nitride ceramic bearings can fail prematurely as a result of the dissolution of their binder by the corrosive agent. In response, NSK developed highly corrosion-resistant carbide-based and oxide-based ceramic. Carbide-based ceramic bearings have longer life than other ceramic bearings in corrosive solutions and are therefore used in etching machines and cleaning machines where highly corrosive agents are used. Oxide-based ceramic bearings are low cost and have longer life in water than carbide-based ceramic bearings. They are widely used in rinsing machines.





Clean-Room Grease

Bearings used in clean environments such as diffusion furnaces and steppers must not emit grease or wear particles. Fluorine based grease has been used in the past, but it presents problems with its high torque, limited resistance to wear and rust, and high cost. In response, NSK applied its extensive knowledge of grease and, ahead of other manufacturers, developed a new range of clean-room greases that offer longer life with lower torque and particle emissions. NSK's bearings for clean environments, widely used in LCD panel and semiconductor manufacturing equipment, are lubricated with this grease.



Lubricant Development Technology: Molded-Oil™ Bearings

Molded-Oil bearings were developed by applying the technology behind NSK K1 lubrication units for linear guides and ball screws. Developed by NSK, Molded-Oil is a solid compound consisting of polyolefin resin and at least 50% lubricating oil. In environments where conventional lubrication methods are not feasible (e.g., environments in which bearings are exposed to water and/or dust particles), Molded-Oil extends maintenance intervals, increases service life and can therefore help to reduce running costs.



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