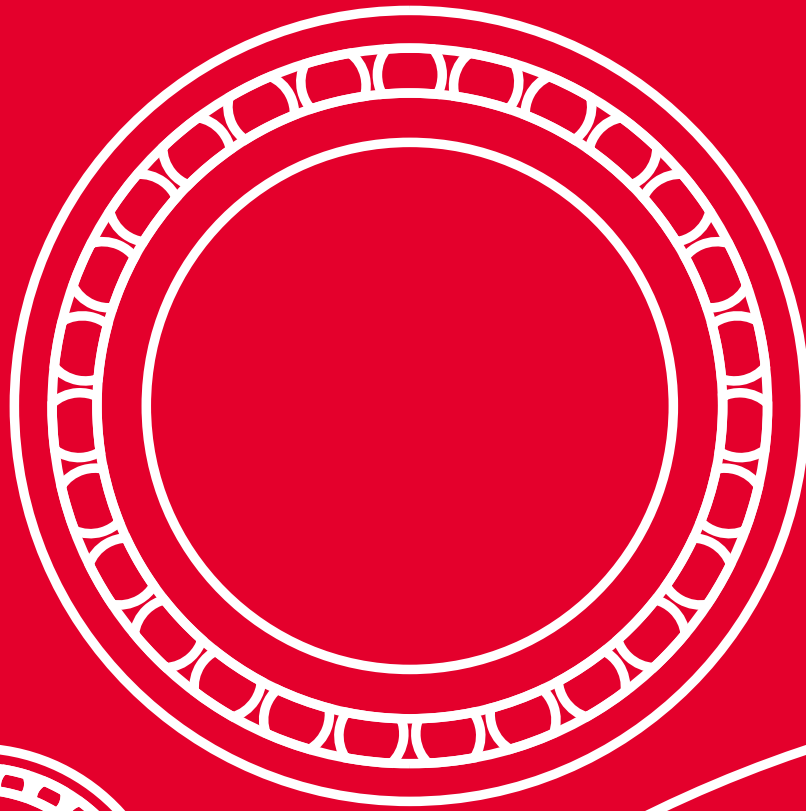
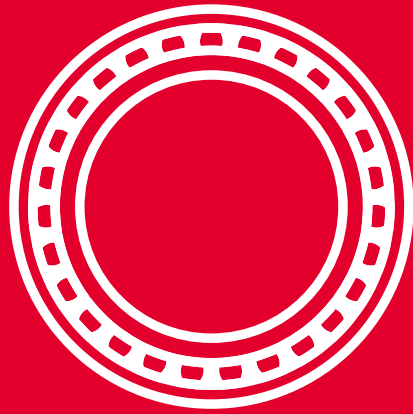


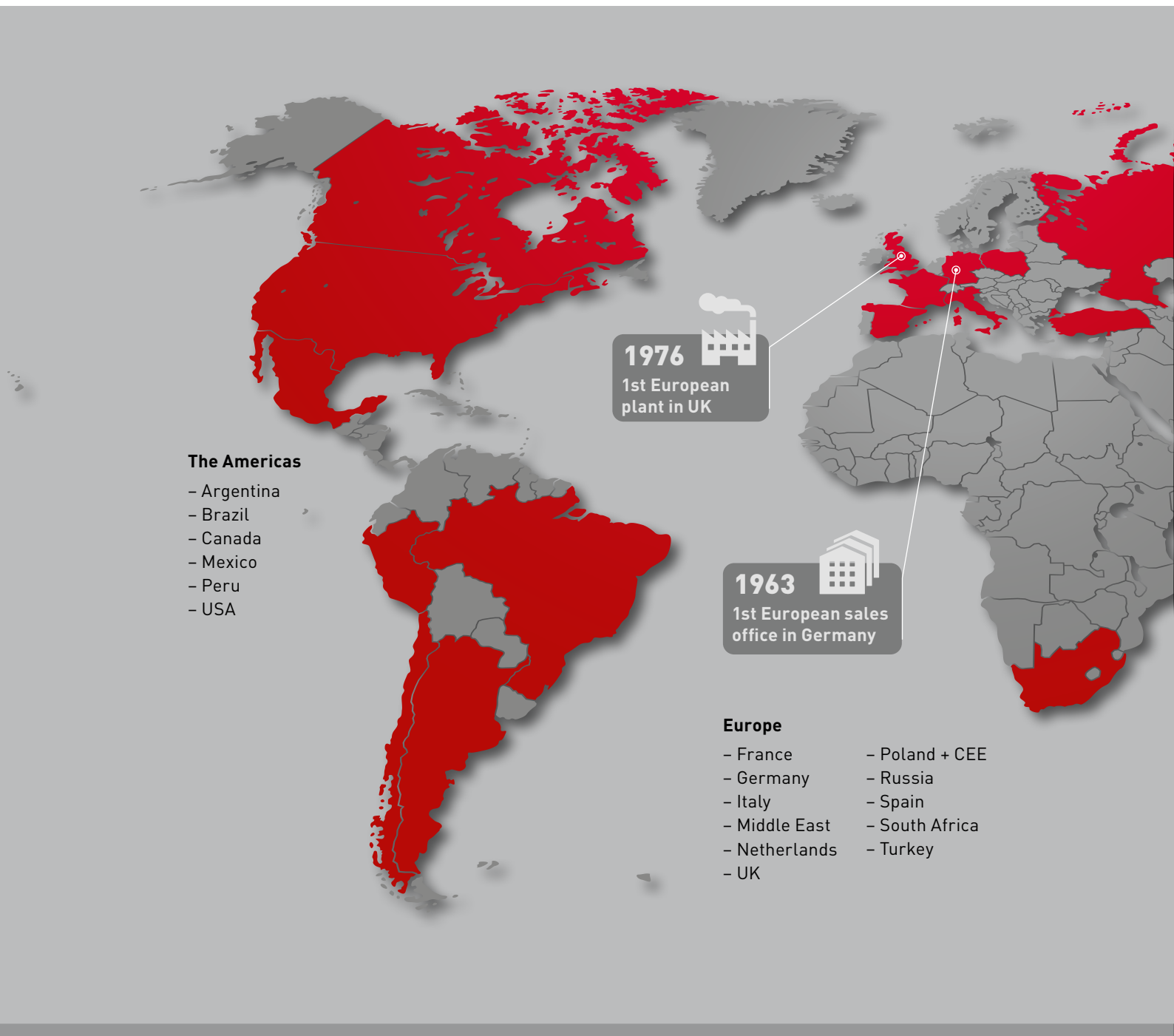
# QUARRYING & MINING

MOTION & CONTROL™  
**NSK**



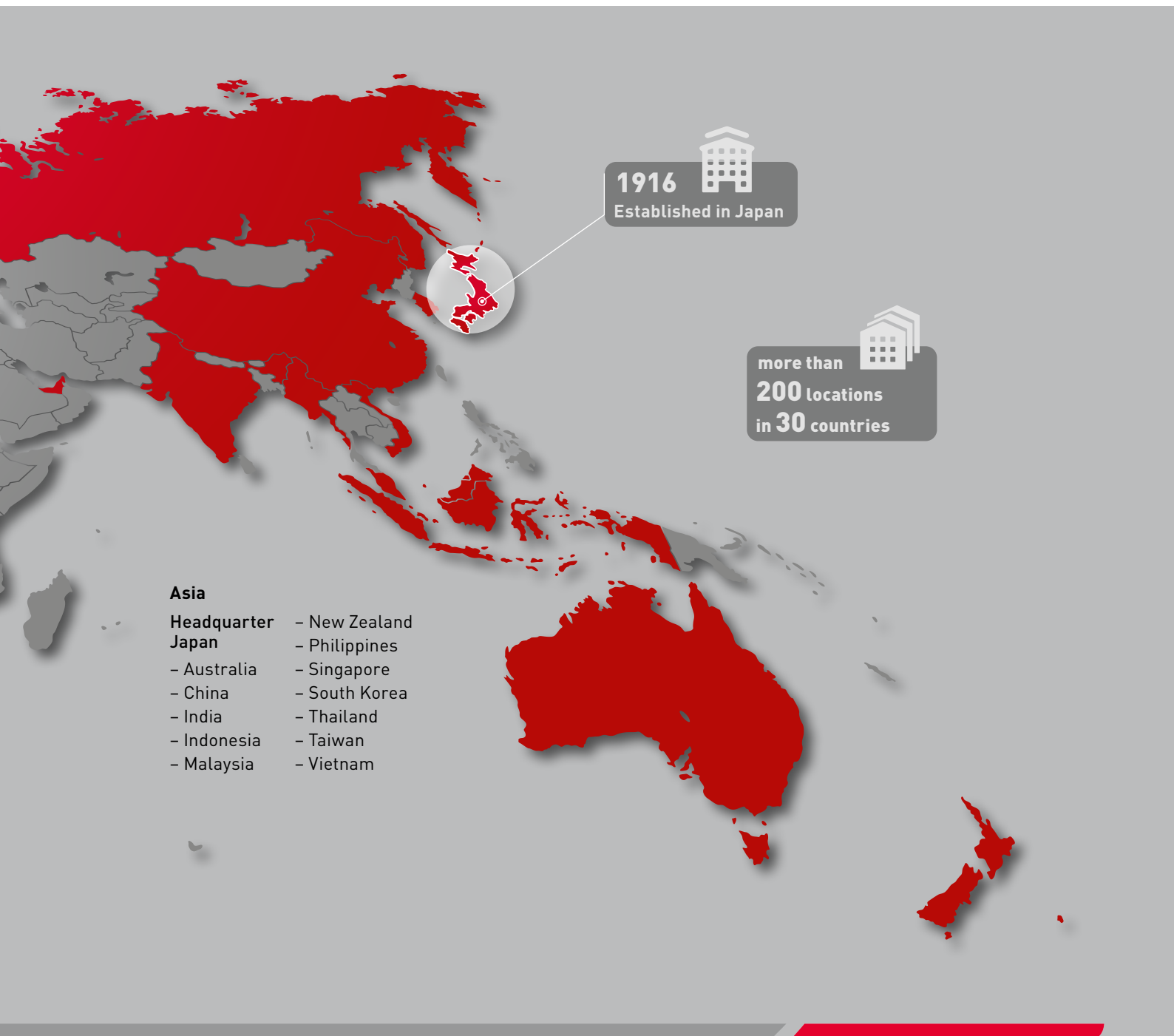
# OUR MOST IMPORTANT PRODUCT: OUR CUSTOMERS' SATISFACTION

We are among the leading manufacturers worldwide for rolling bearings, linear technology components and steering systems. One reason for this is that our products are reliable and energy efficient in demanding environments and even under the harshest conditions. To achieve this, we do research in core technology areas such as material engineering and tribology, we are always optimising every process phase in terms of quality and our products undergo continuous development for applications



in a wide variety of industries. One thing motivates us here: we want to help you increase the reliability of your vehicles and equipment, not only with excellent products, but above all with excellent service. Our experienced engineers have a deep understanding of systems – together with you, they work to optimise products and processes and develop solutions for the future. The goal that we are dedicated to every day is ensuring that you remain competitive over the long run.

Dr. Ulrich Nass, CEO of NSK Europe Ltd.





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# Sector Brochure

Bearings for the Quarrying  
and Mining Industries





BEARINGS FOR THE QUARRYING  
AND MINING INDUSTRIES



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.



#### The NSK company

NSK commenced operations as the first Japanese manufacturer of rolling bearings back in 1916. Ever since, we have been continuously expanding and improving not only our product portfolio but also our range of services for various industrial sectors. In this context, we develop technologies in the fields of rolling bearings, linear systems, components for the automotive industry and mechatronic systems. Our research and production facilities in Europe, Americas and Asia are linked together in a global technology

network. Here we concentrate not only on the development of new technologies, but also on the continuous optimisation of quality – at every process stage.

Among other things, our research activities include product design, simulation applications using a variety of analytical systems and the development of different steels and lubricants for rolling bearings.



## Partnership based on trust – and trust based on quality

Total Quality by NSK: The synergies of our global network of NSK Technology Centres.  
Just one example of how we meet our requirements for high quality.

NSK is one of the leading companies with a long tradition in patent applications for machine parts. In our worldwide research centres, we not only concentrate on the development of new technologies, but also on the continual improvement

of quality based on the integrated technology platform of tribology, material technology, analysis and mechatronics.  
**More about NSK at [www.nskeurope.com](http://www.nskeurope.com) or call us on +44 (0) 1636 605 123**



QUARRYING AND MINING INDUSTRIES 3

## Quarrying and Mining Industries

Worldwide, NSK is the acknowledged leader in advanced motion and control technology, rapidly driving major developments in materials, mechanical design, lubrication and sealing to downsize bearings and reduce costs without compromising machine performance.





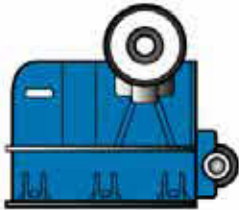
Leaders in our field, we are not content simply to supply a range of products to meet the needs of today. At NSK we go much further: constantly challenging accepted thinking, exploring new and better methods of design and manufacture and, above all, looking beyond the needs of today to meet customer requirements in the future. Severe environments demand outstanding performance. NSK bearings provide the toughness required above all else. Dust, mud, and tremendous loads – these are the challenging conditions under which quarrying machinery must operate. Unlike typical passenger cars, quarrying and mining machinery must, first and foremost, be tough. Based on proprietary state-of-the-art technology, NSK has exceeded the limits of conventional bearings in terms of long operating life and high limiting speed. NSK continues to deliver the reliability required of mining machinery around the world.

#### **NSK Versatility – Moving Mountains**

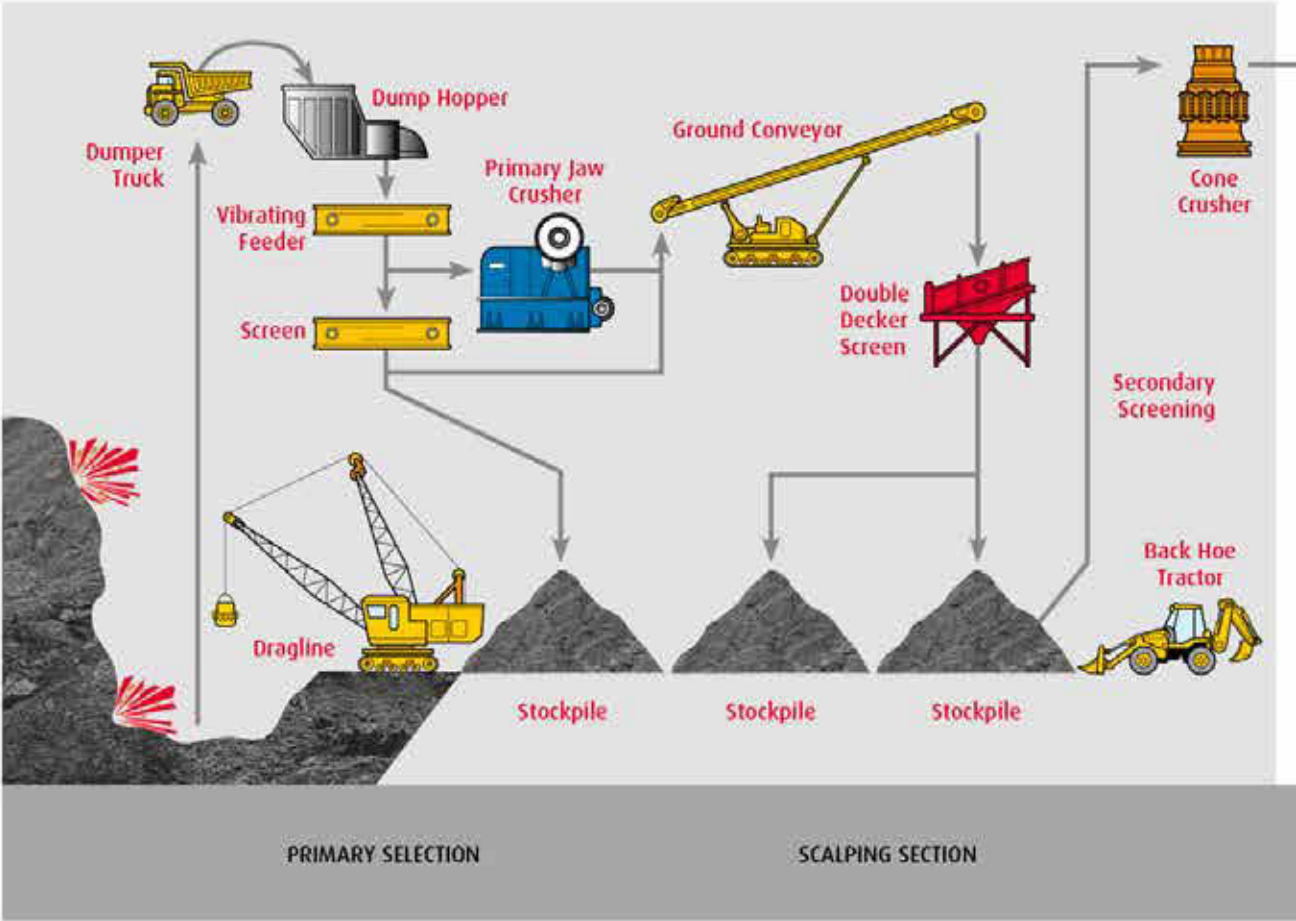
NSK bearings offer Quarry and Mine operators longer service life under the most challenging operating conditions to maximise uptime and reduce maintenance costs for improved productivity at mining sites. Durability and reliability are of paramount importance for mining machinery operating in remote locations such as mountains and deserts, where failure of a single component can impact the entire mining operation. NSK has applied state-of-the-art technology to exceed the life and limiting speed of conventional bearings. Our superior bearings offer high performance with robust design giving longer operating life, thereby reducing maintenance costs for mine operators.



# Quarrying and Mining Process



**Jaw Crusher**  
Work material is crushed between two opposing jaw plates. One plate opens and shuts, crushing raw material against the stationary jaw plate.

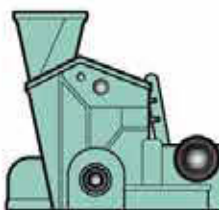
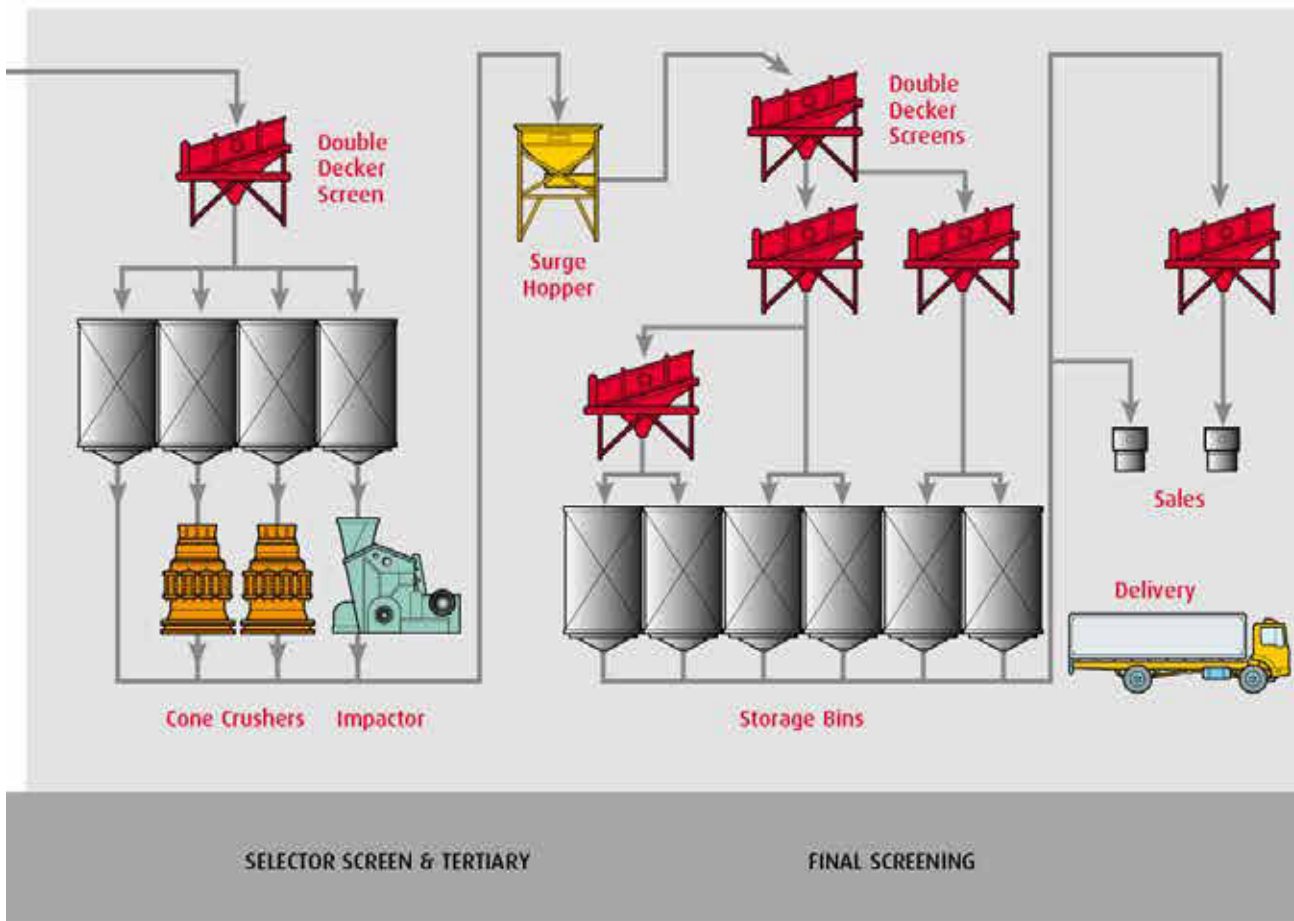


**Cone Crusher**  
Material is fed into the crusher cavity and processed by the eccentric rotating action of the inner cone against the outer cone. Product can be reduced to a diameter ranging from 50mm to 100mm.



#### Vibrating Screen

The vibrating screen consists of a case with a shaft and housing installed inside, with springs supporting the case. The swing and rotation of the shaft is produced by the attached unbalanced weight, which generates vibration. This vibration sifts the material set on the screen.



#### Impact Crusher

As indicated by its name, this machine crushes ore through impact and steadily reduces the size of the crushed particles through sharp, repeated impact with a rapidly spinning hammer, steel plate or bar.



# Quarrying and Mining Bearings



## Bespoke Bushings

Rigorously designed and fully tested to meet exacting customer specifications, bespoke bushes in hardened bearing steel offer longer service life and superior resistance to wear, seizure and heat.



## Crane Sheave Bearings

By virtue of the line contact between rolling elements and raceways, these bearings have high radial load capacity and are suited to high-speed applications. With a patented high strength cage design in pressed steel, machined brass or polyamide, they also can be supplied in a range of advanced special materials.



## Cylindrical Roller Bearings

By virtue of the line contact between rolling elements and raceways, these bearings have high radial load capacity and are suited to high-speed applications. With a patented high strength cage design in pressed steel, machined brass or polyamide, they offer low noise and heat generation and, for more arduous applications, can be supplied in a range of advanced special materials.



## Molded-Oil™ Bearings

Designed to be maintenance free, NSK Molded-Oil™ bearings provide excellent performance in water and dust contaminated environments. Oil is released from the internal Molded-Oil system on demand and there is no need for relubrication.



## Mounted Units

NSK Bearing Units consist of a sealed single-row ball bearing with spherical outside diameter and extended inner ring mounted in a pillow block or flanged housing. The spherical fit accommodates initial misalignment. The NSK Bearing Units also feature 'fingers' that keep contaminants away from the bearing and improve the sealing performance. Housings are available in ductile cast iron, cast steel or stainless steel with a variety of shaft locking mechanisms.





#### **Mounted Units - Self-Lube**

RHP Self-Lube® units come in pillow block and flange mounted configurations with one-piece cast iron and triple lip seal available for very arduous applications.



#### **Spherical Roller Bearings CAM-VS**

Specifically engineered to withstand the harsh vibrating applications and tough working environments of the mining & quarrying industry. These bearings feature a one-piece machined brass cage and can accommodate varying degrees of misalignment. CAM-VS are specially designed to resist seizure and wear vibration, misalignment and shock load conditions.



#### **Spherical Roller Bearings EVB**

Heat stabilised for operating conditions up to 200°C, EVB bearings have a one-piece machined brass cage with special ring tolerances as part of their extra capacity design.



#### **Taper Roller Bearings Single Row**

Capable of taking high radial loads and axial loads in one direction, they are also available in two and four row versions to support axial loads in either direction.



#### **Plummer Blocks**

To ensure effective sealing, plummer blocks are available with a variety of special seal options and end covers. The benefits include a facility for easy mounting and dismantling of pre-assembled shafts.

### Move



#### Bearing Selection:

Ball Bearings  
Cylindrical Roller Bearings  
Tapered Roller Bearings

### Crush



#### Bearing Selection:

Spherical Roller Bearings

### Grind



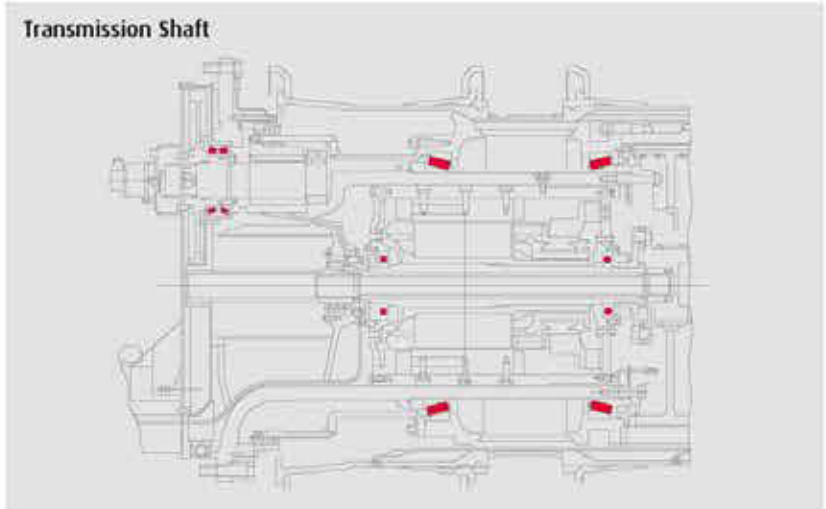
#### Bearing Selection:

Cylindrical Roller Bearings  
Tapered Roller Bearings

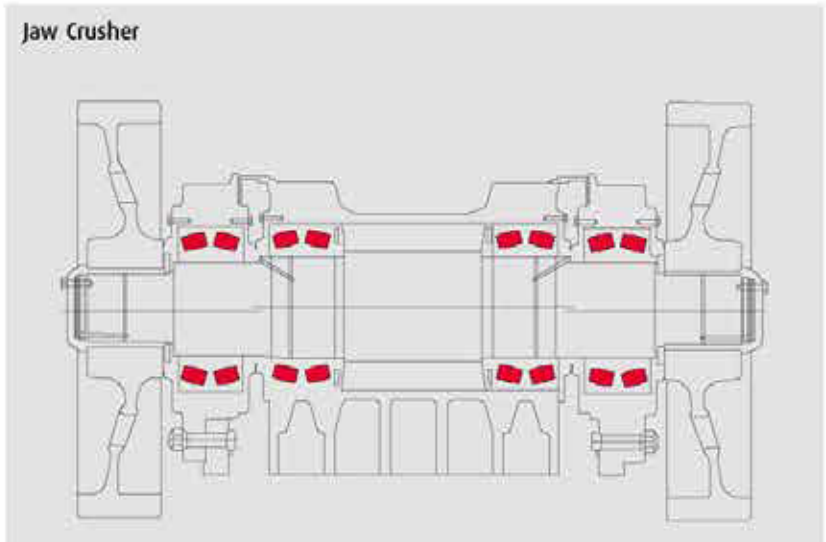
#### Also available:

High strength cages  
Shock resistant raceway materials

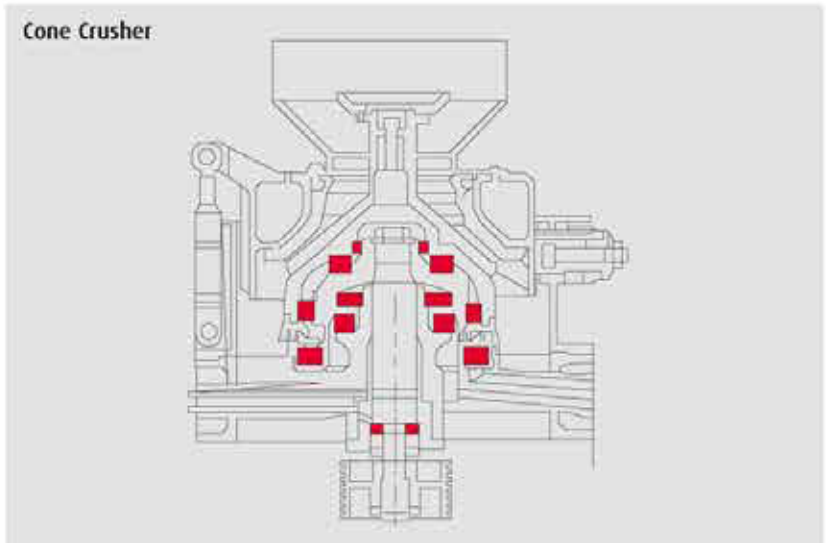
### Transmission Shaft



### Jaw Crusher



### Cone Crusher

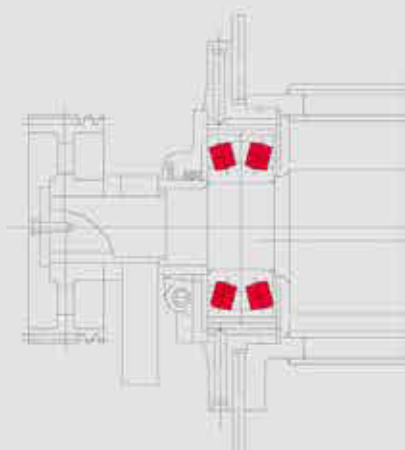


## Screen



**Bearing Selection:**  
Spherical Roller Bearings  
(machined brass cage)

## Vibrating Screen

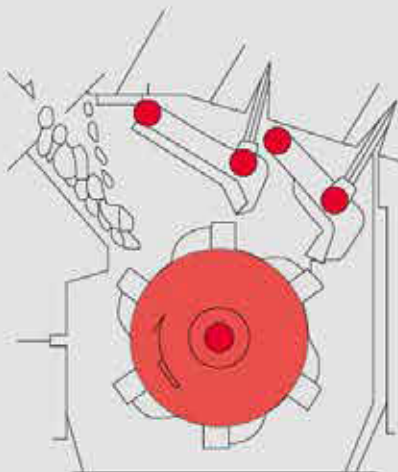


## Impact



**Bearing Selection:**  
Spherical Roller Bearings (machined  
brass cage)  
**Also available:**  
Shock resistant raceway materials

## Impact Crusher

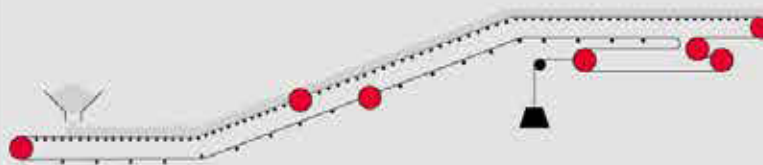


## Move



**Bearing Selection:**  
Spherical Roller Bearings (HPS)

## Conveyor



## Mobile Plant Bearings



### ● HPS™ Spherical Roller Bearings

HPS series bearings are double-row self-aligning spherical roller bearings capable of carrying heavy radial loads with moderate axial loads in either direction. The spherical profile of the rollers, the inner ring raceway and the outer ring raceway, enable a self-aligning function that allows full capacity loading. The HPS series offers standard-size (steel-cage) and large size (brass cage) bearings with longer operating life and higher limiting speeds than conventional bearings.



### ● EM/EW Series

EM and EW bearings are cylindrical roller bearings capable of carrying particularly large radial loads and are suitable for high speed applications. The EW series features a pressed steel cage and the EM series features a one-piece machined brass cage. Both cages offer high-load capacity for standard-size bearings, in addition to excellent functionality and longer operating life.



### ● HR Series Tapered Roller Bearings

HR series bearings are tapered roller bearings capable of taking combined heavy radial loads and axial loads in one direction. The HR series features tapered rollers guided by the large rib face of the inner ring, which allows for a greater number of larger rollers for superior high-load ratings.





#### ● **Hi-TF Bearings**

Hi-TF bearings were developed with innovative materials and heat treatment technology for increased durability under harsh conditions. They combine long service life with good resistance to wear and seizure even under contaminated lubrication to achieve outstanding cost performance.



#### ● **TM Series Sealed Deep Groove Ball Bearings**

TM series bearings are deep groove ball bearings capable of carrying radial and axial loads in either direction. The low frictional torque of these bearings enables use in high-speed applications and feature low noise and reduced vibrations. The TM series features a special sealed lip structure that allows the flow of lubricant while preventing the entry of foreign matter in an oil bath situation.



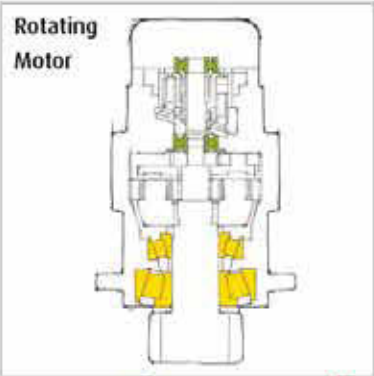
#### ● **Needle Roller Bearings**

Needle roller bearings incorporate rollers that are three to ten times longer than their diameter and exhibit a relatively large radial load capability. The M-type cage and roller assemblies for construction machinery applications contain controlled contour rollers to deliver high durability even under heavy loads or misaligning operating conditions. The resin cage and roller assemblies afford a higher load capacity than conventional machined cages by securing cage strength at higher oil temperatures using a resin cage made of nylon 46.

# Mobile Plant Bearings

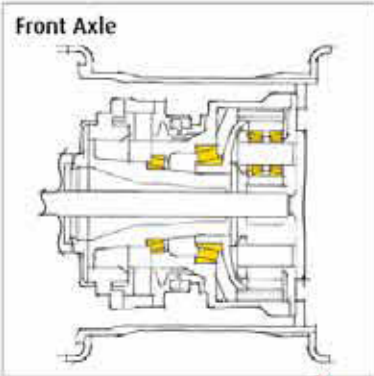
**Bearings typically used:**

- Tapered Roller Bearings
- Deep Groove Ball Bearings
- Needle Roller Bearings



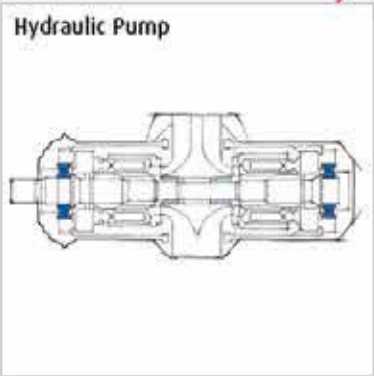
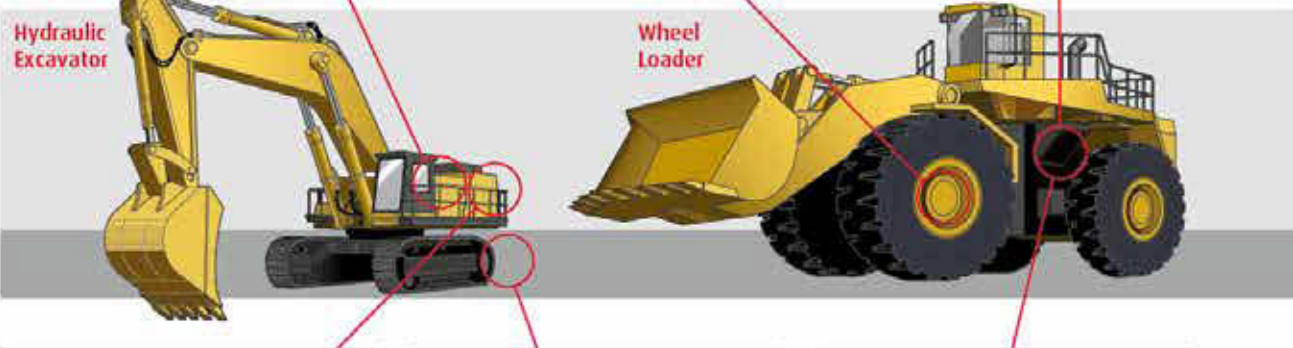
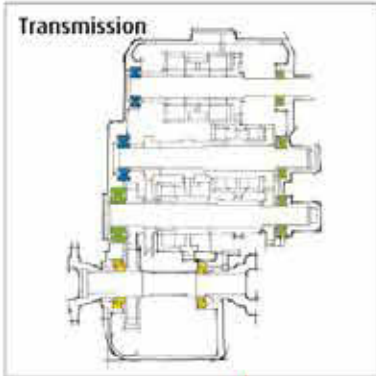
**Bearings typically used:**

- Tapered Roller Bearings



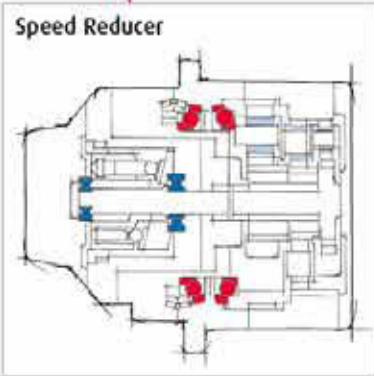
**Bearings typically used:**

- Cylindrical Roller Bearings
- Tapered Roller Bearings
- Deep Groove Ball Bearings



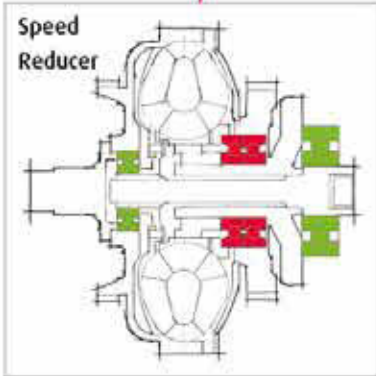
**Bearings typically used:**

- Cylindrical Roller Bearings
- Needle Roller Bearings



**Bearings typically used:**

- Cylindrical Roller Bearings
- Needle Roller Bearings
- Angular Contact Ball Bearings

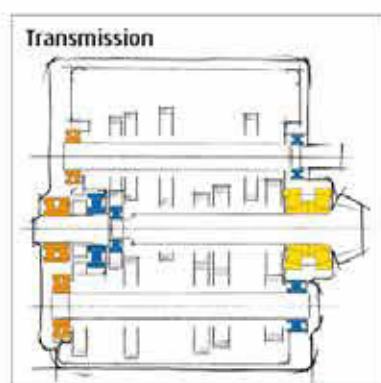


**Bearings typically used:**

- Deep Groove Ball Bearings
- Angular Contact Ball Bearings

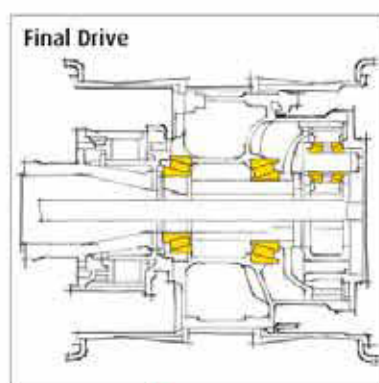
### Bearings typically used:

- Cylindrical Roller Bearings
- Tapered Roller Bearings
- Spherical Roller Bearings



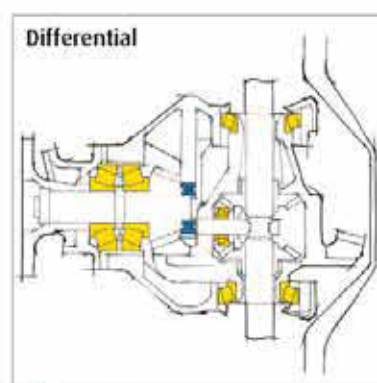
### Bearings typically used:

- Tapered Roller Bearings



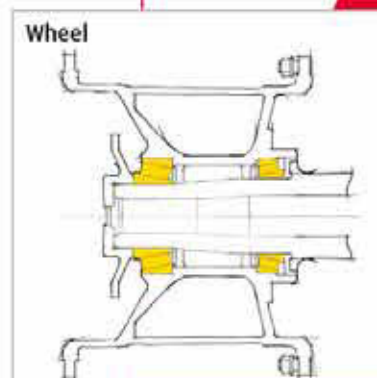
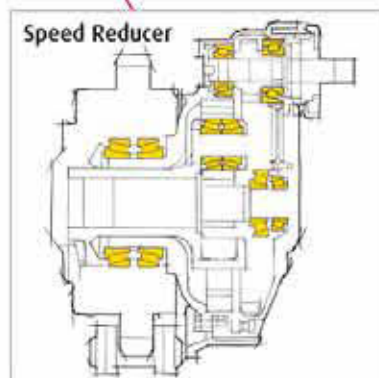
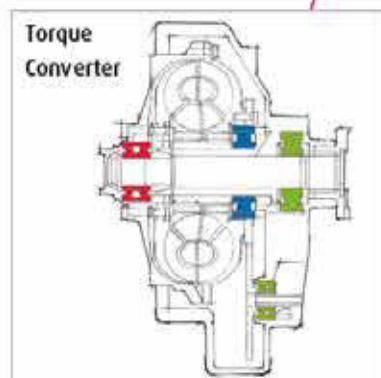
### Bearings typically used:

- Cylindrical Roller Bearings
- Tapered Roller Bearings



Crawler Dozer

Off-highway Truck



### Bearings typically used:

- Cylindrical Roller Bearings
- Deep Groove Ball Bearings
- Angular Contact Ball Bearings

### Bearings typically used:

- Tapered Roller Bearings

### Bearings typically used:

- Tapered Roller Bearings



## Increasing efficiency – with AIP, the value-added programme from NSK

Incorrectly applied or selected bearings can lead to anything from a reduction in machine performance to failure of an entire system. We support you in solving these technical problems. The value-added programme AIP incorporates a comprehensive service package which enables you to design both productive operation and maintenance processes with increased efficiency and consequently better profitability. With AIP, you reduce your costs at every value-added stage.

### Concentrated knowledge, many years of experience

Thanks to their in-depth technical knowledge and industry know-how, the experienced NSK application engineers are able to identify profitability potential and recommend appropriate measures. Our experts work according to a procedure which has been tested in practice and standardised – the value cycle. The ideally coordinated solution for your application is developed in close cooperation with them.

### AIP services made to measure

The comprehensive range of AIP services is purposely designed to enhance efficiency and competitiveness. Your NSK expert will advise you about which measures can be derived from the examination results and will support you in implementing them. An app developed specially by NSK helps to collect data quickly on site and to perform calculations. Another app presents success stories from various branches of industry.



### AIP NSK Solutions

Example success stories show how profitability and reliability can be increased using tried and tested practices.



### Cost Saver App

The cost savings calculator app enables potential cost savings to be calculated rapidly.





## SURVEYS

- › Stores Survey
- › Workshop Survey
- › Process Map
- › Bearing Cross Referencing

## SELECTION

- › Application Reviews
- › Machine Design Support
- › OEM Part Conversion
- › Diagnostics

## TRAINING

- › Product Training
- › Application of NSK Bearings
- › AIP Training
- › Industry Specific Training

## INSPECTION

- › Bearing Condition Analysis
- › Failed Bearing Analysis
- › Lubrication Analysis
- › Material & Dimensional Analysis

Discover how you can increase your profitability with the help of our value-added AIP programme and our high-quality products. **We will be pleased to send you our complete AIP brochure or contact you personally. Please email your enquiry to us at: [aip@nsk.com](mailto:aip@nsk.com)**

# Bearing Maintenance and Inspection

## Maintenance

Bearings and operating conditions must be periodically inspected and maintained to maximise bearing life to prevent mechanical failure, ensure reliable operation, raise productivity, and enhance cost performance. Maintenance should be performed regularly according to work standards that may vary according to machine operating conditions. Operating conditions should be monitored, lubricant replenished or changed, and the machine periodically disassembled and overhauled.

### 1. Inspection under operating conditions

Review lubricant properties, check operating temperatures, and inspect for any vibrations and bearing noise to determine bearing replacement periods and replenishment intervals of the lubricant.

### 2. Inspection of the bearing

Be sure to thoroughly examine the bearings during periodic machine inspections and part replacement. Check the raceway for any damage and confirm if the bearing can be re-used or should be replaced.

## Inspection points

Items to be checked while the machine is running should include bearing noise, vibrations, temperature, and lubricant condition.

### 1. Bearing noise

Sound detection instruments can be used during operation to ascertain the volume and characteristics of bearing rotation noise through sound patterns that are readily distinguishable, which can reveal the presence of bearing damage such as slight flaking. Three typical noise conditions are described in the table on next page.

### 2. Bearing vibration

Bearing irregularities can be analysed by performing a quantitative analysis of vibration amplitude and frequency using a frequency spectrum analyser. Measured data varies depending on the operating conditions of the bearing and the location of the vibration pick-up. Therefore, this method requires the determination of evaluation standards for each measured machine.





Irregularities		Possible Causes	Countermeasures
Noise	Loud Metallic Sound	Abnormal load	Correction of fit, internal clearance, preload, position of housing shoulder, etc.
		Incorrect mounting	Correction of alignment of shaft and housing, accuracy of mounting method.
		Insufficient or improper lubricant	Replenish lubricant or select proper lubricant.
		Squeaking noise	Replacement by low-noise bearings, selection of small clearance bearings.
		Sliding of balls	Adjustment of preload, selection of small clearance bearings, or adoption of softer grease.
		Contact of rotating parts	Correction of labyrinth seal, etc.
	Loud Regular Sound	Flaws, corrosion, or scratches on the raceways	Replacement of bearing, cleaning, improvement of seals, and usage of clean lubricant.
		Brinelling	Replacement of bearing and careful handling.
		Flaking on the raceways	Replacement of bearing.
	Irregular Sound	Excessive clearance	Correction of fit and clearance and correction of preload.
		Penetration by foreign particles	Replacement of bearing, cleaning, improvement of seals, and relubrication using clean lubricant.
		Flaws or flaking on the ball surfaces	Replacement of bearing.
		Excessive amount of lubricant	Reduce amount of lubricant, select stiffer grease.
Abnormal Temperature Rise	Insufficient or improper lubricant		Replenish lubricant or select proper lubricant.
	Abnormal load		Correction of fit, internal clearance, preload, position of housing shoulder.
	Incorrect mounting		Correction of alignment of shaft and housing, accuracy of mounting, or mounting method.
	Creep of fitted surfaces, excessive seal friction		Correction of seals, replacement of bearing, correction of fit or mounting.
Vibration	Brinelling		Replacement of bearings and careful handling.
	Flaking		Replacement of bearing.
	Incorrect mounting		Correction of squareness between shaft and housing shoulder or side of spacer.
	Penetration by foreign particles		Replacement of bearing, cleaning, correction of seals.
Leakage or Discoloration of Lubricant		Too much lubrication, Penetration by foreign particles or abrasion chips	Reduce amount of lubricant, select stiffer grease. Replace bearing or lubricant. Clean housing and adjacent parts.

If you require anymore information about other NSK products, please visit our website: [www.tec.nsk.com](http://www.tec.nsk.com)





# Success Stories



Autoclave Bogie



Band Saw



Ceramic Roof Tile



Concrete Drilling



Concrete Floor



Conveyor



Conveyor Tail Drum



Jaw Crusher



Overland Conveyor



Shaker Screen



Vibrating Drum



Vibrating Screen



Vibrating Screen

## Success Story

Industry: Quarrying, Mining and Construction

Application: Autoclave Bogie Wheel Assembly

**Cost Savings: € 138 382**

### Introduction

A customer was experiencing constant bearing failure within an Autoclave bogie wheel assembly, using Deep Groove Ball Bearings. The failures resulted in damage of surrounding hardware ( housings and axles) and high labour and parts cost, as components needed regular replacement. NSK Engineers examined the application and determined that ingress of hard particulates and moisture, combined with excessive load was the root cause of premature bearing failure. NSK recommended changing to NSKHPS Spherical Roller Bearings, which gave better service life and greater reliability, as NSKHPS roller bearings carry greater loads and operate at higher temperatures. This resulted in eliminating continuous ongoing contractors maintenance and substantially reducing colateral damage to surrounding components.

### Key Facts

- Autoclave Bogie - wheel Assembly
- High loads and high temperature combined with contaminated environment causing standard deep groove ball bearings to fail prematurely
- Constant bearing failure resulted in damage to surrounding hardware and high labour costs
- Bearings within 10 axles replaced every 2 - 3 weeks
- NSK Solution: NSKHPS Spherical Roller Bearings
- Extended lifetime resulted in zero maintenance requirements and significant reduction in hardware colateral damage



↑ Autoclave Bogie Wheel Assembly

### Value Proposals

- The customer experienced constant failures in a Autoclave Bogie wheel assembly
- NSK engineers performed a Failed Bearing Analysis which showed ingress of contaminants from the production process, moisture and excessive load as the cause
- An Application Review showed that the existing Deep Groove Ball Bearings were inadequate
- NSK recommended NSKHPS Spherical Roller Bearings
- Since introduction, the bearing life has significantly improved, which has resulted in significant reduction of Hardware damage and eliminating maintenance, providing a large cost saving for the customer.

## Product Features

- Highest load rating SRB's which enables downsizing
- Optimum raceway design & surface finishing
- Brass cage design (CAM) or strengthened steel cage (EA)
- High cleanliness Z-steel
- Temperature stability: up to 200° C
- 40 mm to 260 mm bore size
- Up to twice the operating life
- Up to 20% higher limiting speed
- Dynamic load rating: 25% higher
- Lower maintenance cost and improved productivity



↑ NSK HPS Spherical Roller Bearing

## Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
 Bearing Costs: Deep Groove Ball Bearings	€ 15.142	Bearing Costs: NSK HPS Spherical Roller Bearings	€ 3.120
 Annual Maintenance Costs: 2040 hours @ €26/hour	€ 53.040	Annual Maintenance Costs:	€ 0
 Annual Hardware Costs: Replacement of damaged bearing housings and axles	€ 77.220	Annual Hardware Costs: Bearing housings and axles	€ 3.900
<b>Total Costs</b>	<b>€ 145 402</b>		<b>€ 7 020</b>



## Success Story

Industry: Quarrying, Mining and Construction

Application: Band Saw

**Cost Savings: € 648 880**

### Introduction

A market leading manufacturer of insulation products for the construction industry had recently completed commissioning of a new automated production line. Production was however reported as being erratic due to repeated failures of bearings used on the blade guide rollers of the band saws. The situation had become critical with daily bearing changes becoming necessary; in some cases bearings were only lasting 3 hours. The impact was costly downtime and increased maintenance. NSK was contacted on behalf of the band saw manufacturer to help identify root cause for the failures and offer solutions.

### Key Facts

- Premature failure of bearings was causing daily machine downtime
- Root cause of failure was due to ingress of contaminant into the bearing internals
- Unplanned machine downtime resulted in loss of production
- NSK solution was to recommend DDU type seals
- Resultant performance reduced bearing changes from daily to 3- 4 months (during planned maintenance schedules)
- Significant improvement on machine efficiency



↑ Saw blade guide rollers - Band Saw Application

### Value Proposals

- NSK engineers inspected the application at the customers site and performed a Failed Bearing Analysis revealing that the bearing failures were due to ingress of contaminant
- The NSK engineering team suggested to use Deep Groove Ball bearings with high performance DDU sealing, using a patented triple lip mechanism
- A trial showed a significant improvement in bearing life and by this a very high cost saving for the customer







## Product Features

- Deep Groove Ball Bearing with double seal DDU
- Contact seal designed for maximum protection against all contaminants
- Patented triple lip mechanism for excellent dust and water protection
- For lower speed and temperature limits where maximum sealing is usually critical
- Constant friction torque
- Good grease retention



↑ NSK DDU Seal - Deep Groove Ball Bearing

## Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
 1/3 of bearings changed daily	€ 16.930	Complete bearing sets Changed 4 times per year During planned maintenance	€ 1.060
 Replace bearings at band saws Part bearing sets only 3 band saws 4 times per week	€ 24.320	Installation of bearings on 3 band saws	€ 380
 15 minutes per bearing 3 band saws (part bearing sets) 4 times per week	€ 607.800	No unplanned downtime	€ 0
 Damaged saw blades	€ 1.270	No bearing failure causing saw blade damage	€ 0
<b>Total Costs</b>	<b>€ 650 320</b>		<b>€ 1 440</b>

## Success Story

Industry: Quarrying, Mining and Construction

Application: Ceramic Roof Tile Manufacturer

**Cost Savings: € 4 950**

### Introduction

A premium roof tile manufacturer was using considerable labour resources on a weekly basis in order to re-grease the ball sliders assembled in their handling machinery in many different locations around the factory. This situation resulted in high maintenance costs, repetitive problems and inconsistent performance ending in lost production.

### Key Facts

- High labour costs, manual process
- Contamination and dust ingress
- Poor lubrication
- Fixed preload and smooth linear motion requirement



↑ Slide with solid lubrication K1 system

### Value Proposals

- Application review highlighted lubrication and sealing needed improving
- Introduced the solid lubrication system K1
- Improved sealing and protection
- Preload maintained longer due to reduced wear
- Reduced running friction resulting in reduced actuator pressure needed for same operation ( 6 to 4 bar)




## Product Features

- Long-term, maintenance-free operation
- Available in accordance with the FDA
- Effective sealing function
- Applicable to all the linear guide models
- Regardless of the mounting orientation the operation of K1 units is always guaranteed
- Designed to operate in highly polluted environments



↑ Internal structure of K1 system

## Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	€550/ machine x 6 machines	€3.300	€475/ machine x 6 machines	€2.850
	52 re-greases x 30min / machine x 6 machines x 30€ hour / operation	€4.680	2 re-greases x 30min / machine x 6 machines x 30€ hour / operation	€180
	52 re-greases x 30min / machine x 6 machines = 156 hours		2 re-greases x 30min / machine x 6 machines = 6 hours	
<b>Total Costs</b>		<b>€ 7 980</b>		<b>€ 3 030</b>

## Success Story

Industry: Quarrying, Mining and Construction

Application: Concrete Drilling Bolter Machine

**Cost Savings: € 12 660**

### Introduction

A mining and metal company was experiencing repeated failures on their fully mechanised bolting jumbo for rock reinforcement in their underground mines and tunnels. Due to a very harsh environment, exposed to water and abrasive particles, they were having short life of only two months from Deep Groove Ball Bearings used in the gear mechanism of bolter. NSK assessed the situation and found hard contaminants were entering the bearing causing failure. They proposed a trial with NSK Molded-Oil bearings which resulted in immediate improvement and 3 times longer lifetime for both the bearings and gears of the machine.

### Key Facts

- Special bolter machine working underground
- Harsh environment, exposed to water and abrasive particles
- Frequent bearing failure occurring every 2 months across 3 machines
- Premature wear in gears due to bearing failures
- High cost due to changing of gears
- NSK solution: Molded-Oil bearings increasing bearing life from 2 to 6 months
- Cost saving due to increase in gear changing period



↑ Fully mechanised bolting jumbo machine

### Value Proposals

- After a couple of site visits, customer requested a solution in order to increase the life time of their bearing
- Application assessment and Failure Analysis showed highly abrasive conditions like water and hard particle Ingress negatively impacting the lubrication
- A trial was proposed using NSK Molded-Oil Deep Groove Ball Bearings which proved to be successful with a longer lifetime up to 3 times
- Molded-Oil bearings were fitted to all 3 machines resulting in a reduction in machine down time and extension in gear changing period leading to a considerable annual cost saving




## Product Features

- Stainless steel for corrosive environments
- Molded-Oil provides continuous supply of lubrication oil
- Grease-free property with no oil refilling keeps operating environments clean
- Operating life more than twice as long as grease lubrication, in water or dust contaminated environments
- Contact-seal type available in standard inventory for ball bearings
- Achieves extended maintenance-free performance as Molded-Oil provides a continuous supply of lubricant
- Available for high speed applications
- Available in ball bearing, spherical roller bearing and tapered roller bearing types



↑ Deep Groove Ball Bearings with Molded-Oil

## Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
 Bearing costs:- Deep Groove Ball Bearings- Bearings replaced 6 times per year	€ 120	Molded-Oil Deep Groove Ball Bearings, replaced twice a year	€ 360
 6 replacements/year x 3 machines x Manpower x €25/h	€ 1.350	2 replacements/year x 3 machines x Manpower x €25/h	€ 450
 Gear failure costs:- Gear cost x 3 machines x 6 times/year	€ 18.000	Gear failure costs:- Gear cost x 3 machines x 2 times/year	€ 6.000
<b>Total Costs</b>	<b>€ 19 470</b>		<b>€ 6 810</b>

## Success Story

Industry: Quarrying, Mining and Construction

Application: Concrete Floor Manufacturing Unit

**Cost Savings: € 68 607**

### Introduction

The customer was experiencing regular bearing failure on a concrete floor manufacturing machine. This caused extensive downtime with associated lost production and high maintenance costs. This was of serious concern to management and a solution was needed urgently. NSK investigated the machine and found that the main problem was with the cassettes due to poor wheel design, incorrect bearing selection and ingress of contamination. NSK produced a complete redesigned wheel hub and stub axle assembly including a sealed roller bearing assembly which was specifically selected for the loads in the machine. As a consequence failure rates reduced from 20 a year to zero.

### Key Facts

- High value manufacturing process with arduous conditions
- Regular failure of the machine causing high maintenance and lost production costs
- Current bearing incorrectly selected allowing ingress of contaminants
- NSK designed a complete new hub assembly including a sealed roller bearing unit
- The customer re-designed the machine to accept the new assembly
- Failures reduced from 20 a year to zero



↑ Concrete Floor Manufacturing Unit

### Value Proposals

- Investigation of failed bearings showed that the cause of failure was incorrect selection and ingress of contamination
- NSK conducted a machine design review and produced a new hub assembly proposal
- By incorporating NSK Full Complement sealed bearing units, secured by circlips in the outer ring, the load rating was increased and the integral seals provided increased protection for the bearings
- The customer followed NSK design proposals and produced a new shaft and housing
- NSK also provided on site consultation detailing lubrication and assembly best practice
- Machine failures were reduced from 20 per year to zero.

## Product Features

- Improved contact seals
- High load rating
- Highly corrosion resistant phosphate coating
- Easier grease re-lubrication due to inner and outer ring re-lubrication holes
- Bearings pre-greased with Lithium grease
- Can be fitted with DIN 471 snap rings
- Contact seals prevent ingress of foreign particles or water
- Increased radial and axial capability
- Re-lubrication holes for easy maintenance and grease replenishment
- Can be used in external environments due to phosphate coating
- Snap ring (DIN 471) can be applied to the outer ring



↑ Full complement Cylindrical Roller Bearing Unit with seals

## Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
 Lost production: 20 hrs / year @ €3.083	€61.650	No lost production costs	€0
 Parts cost, old bearings + 16 hub & stub axle units	€5.732	Parts cost, new bearings	€296
 Maintenance costs: (€ 41,10/h @ 20 hrs) + technical support & engineering time	€1.850	Maintenance costs: (€ 41,10/hr @ 8 man hrs) Technical support & engineering time no longer required	€329
<b>Total Costs</b>	<b>€ 69 232</b>		<b>€ 625</b>

## Success Story

Industry: Quarrying, Mining and Construction

Application: Conveyor Application for a Quarrying & Mining Company

**Cost Savings: € 14 389**

### Introduction

An important Quarrying & Mining Company were having reliability issues with a conveyor application. The bearing inserts were operating in a very harsh environment, exposed to water and abrasives particles. Located 5 meters above the ground, inspection and maintenance tasks were especially problematic, which created difficulty predicting premature failure. NSK assessed the situation and proposed the use of Molded-Oil inserts and the result showed that bearing life was increased by 9 times.

### Key Facts

- Conveyor application with remote access (5m above ground) and difficult maintenance
- Harsh environment, exposed to water and abrasive particles
- Regular failures with difficult replacement procedure and large downtime costs
- NSK Molded-Oil bearings proposed which are excellent for remote applications
- Additional benefits of improved sealing with flinger, lip seal and molded oil providing a barrier to contamination ingress
- Bearing lifetime significantly increased from every 2 months to 19 months



↑ Conveyor Application

### Value Proposals

- NSK engineers reviewed the application and discovered that the main problems were contamination, water and maintenance difficulties due to the remote location
- NSK Molded-Oil bearing inserts were proposed which do not need to be re-lubricated and have better sealing due to the barrier created by the molded oil polymer
- The bearings were trial fitted to the conveyor and lifetime was increased from 2 months to 19 months
- Customer benefited from increased productivity and reduced maintenance costs resulting in a €14.389 cost saving






## Product Features

- Molded-Oil inserts (with solid lubricant)
- Ideal for remote applications
- Martensitic stainless steel
- Integral Flinger seal and Nitrile rubber seals
- Bore size 20mm – 40mm
- Corrosion resistance
- Resistant to contamination increasing operating life
- No need for re-lubrication



↑ Molded-Oil Bearings

## Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
 Replacements per year × employees time × €30/h	€540	Less than 1 replacement per year × employees time × €30/h	€63
 Downtime costs: 250ton/h × €7/ton × time × replacements per year	€15.750	Downtime costs: 250ton/h × €7/ton × time × replacements per year	€1.838
 Life: 2 months approximately (440h)		Life: 19 months approximately (4140h)	
<b>Total Costs</b>	<b>€ 16 290</b>		<b>€ 1 901</b>

## Success Story

Industry: Quarrying, Mining and Construction

Application: Conveyor Tail Drum

**Cost Savings: € 6 272**

### Introduction

A quarrying company was experiencing short service life on its conveyor tail drum take-up unit. Located in an inaccessible area beneath a shaker screen, the unit's bearings were subjected to particularly arduous conditions due to their exposure to the elements. This situation was compounded by the fact that regular re-greasing was a difficult task due to the remote bearing location, subsequently leading to regular bearing failure and costly conveyor downtime. NSK analysed the bearing application and found that water and grit were entering the bearings and causing failure. A trial was suggested using RHP Self-Lube® with Triple Lip Seals. This proved very successful and extended the service life from 4 months to over 1 year.

### Key Facts

- Quarry conveyor tail drum
- Highly abrasive conditions including water and grit
- Failure of the bearing resulted in seizure and conveyor downtime with consequential loss of production
- NSK solution: Self-Lube® housing with triple lip seal bearing inserts designed for high impact and heavily contaminated environments
- Increased life-time resulting in reduced downtime and improved efficiency
- Cost savings generated based on reduced maintenance costs



↑ Quarry conveyor tail drum assembly

### Value Proposals

- Failed Bearing Analysis showing root cause as ingress of water and grit
- Application assessment showed highly abrasive conditions
- Trial of RHP Triple lip seal Self-Lube® bearings showed increase in life
- Best practice re-lubrication regime applied
- Technical support provided for improved bearing performance




## Product Features

- Three high integrity nitrile seal lips with lubrication traps to stop ingress of contaminants
- High strength steel outer case resists impact to seal and provides a primary dust trap
- Available for both setscrew and eccentric locking collar insert options
- Large size range offered, including imperial options
- Inserts interchangeable with standard items
- Longer bearing life through superior seal performance
- Extended re-lubrication intervals, greatly reducing maintenance costs and increased productivity of machinery
- Simple implementation; ready replacement for existing bearing units
- Mounting on the shaft with balled setscrew, providing much greater resistance to loosening



↑ Self-Lube® with triple lip seal bearing insert

## Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
 Old bearings per conveyor	€174	New bearings	€63
 Bearing life: 4 months. 3 hours loss of production on failure @ €960/h (3 per year)	€8.629	Bearing life: Ongoing. Loss of production since build	€2.876
 Maintenance costs: 3 x €68/h (3 per year)	€616	Maintenance costs (original build)	€205
<b>Total Costs</b>	<b>€ 9 419</b>		<b>€ 3 144</b>

## Industry: Quarry, Mining & Construction

### Application: Jaw Crusher Main Bearings

### Cost Savings: EUR 1,976,160

#### Introduction

A customer in United Arab Emirates was experiencing premature failures on the main Jaw Crusher bearings, The bearings were failing every 12 months, leading to disruptive and costly downtime. During a site visit to evaluate the failures, the investigation discovered the bearings were failing for several reasons including; poor lubrication and installation practices, and the inadequate performance of the bearings under high temperatures. The result has been a dramatic improvement in the bearings operating life which have now been in service for 5 years without signs of degradation, resulting in a cost saving of nearly 2 million Euros per annum.



↑ Quarrying Mining Industries

#### Key Facts

- A crusher in United Arab Emirates was experiencing premature failures in the main Jaw Crusher Bearings
- The bearings failed every 1 year leading to disruptive and costly downtime
- The competitor spherical bearings were failing due to several factors including lack of proper lubrication, installation procedures not followed properly
- NSK and the local distributor investigated that the process to install the large bearings were inadequate along with lubrication not provided in proper manner
- A lubrication study and optimization with shaft & housings modifications, training & supervision on NSK bearings installation were provided along with a heat stabilized bearings up to 200 °C degrees
- The result was outstanding as the bearing is running for 5 years without any signs of degradation resulting in savings of nearly 2 million Euros on an annual basis

#### Value Proposals

- NSK application engineers made several recommendations to eradicate the failures including:
- Upgrading the bearings to NSK CAM Spherical Roller Bearings
- The bearings were fitted and performed for 5 years without any intervention
- Contaminant ingress reduced and lubrication reduced, giving greater savings to the customer



### Product Features

- Optimum raceway design & surface finishing
- Up to twice the operating life
- Highest load rating SRB's
- Temperature stability: up to 200° C
- Up to 20% higher limiting speed
- Lower maintenance cost and improved productivity



↑ Spherical Roller Bearings - CAM Series

### Cost Saving Breakdown

Previous Solution	Costs p.a.	NSK Solution	Costs p.a.
 Bearing costs	€ 3,360	Bearing costs	€ 12,000
 Engineering costs	€ 39,600	Engineering costs	€ 13,200
 Cost of lost production	€ 2,448,000	Cost of lost production	€ 489,600
<b>Total Costs</b>	<b>€ 2,490,960</b>		<b>€ 514,800</b>

## Success Story

Industry: Quarrying, Mining and Construction

Application: Overland Conveyor Head Pulley

**Cost Savings: € 4 538 304**

### Introduction

A quarrying company was experiencing bearing failures due to contamination on each side of the conveyor head pulley. This caused increased maintenance cost, reduced lifetime of the bearing and a downtime in production every 18 months. NSK analysed the bearing and recommended to use bearings in High Tough steel (HTF). After the bearings were put into service they lasted 6 years.

### Key Facts

- Conveyor Head Pulley
- Highly abrasive conditions including water and grit
- Failure of the bearing through contamination with consequential loss of production
- NSK Solution: bearings in High Tough Quality (HTF)
- Changing to bearings in HTF steel increased the life time circle to 6 years
- Cost savings generated based on reduced maintenance and downtime cost



↑ Quarry Conveyor

### Value Proposals

- NSK performed a bearing analysis showing root cause as ingress of water and grit
- Application assessment showed highly abrasive conditions
- Technical support provided for improved bearing performance
- NSK recommended to replace the bearings by products with HTF material
- HTF Bearings were put into service and lasted 6 years instead of 18 months

## Product Features

- NSK High Tough Steel (HTF) bearings have been designed for outstanding toughness under harsh conditions
- Longer service life and superior resistance against wear, seizure and heat
- Resistance with contaminated lubrication
- Innovative heat treatment technology
- HTF material can be applied for cylindrical, tapered and spherical roller bearings
- Up to 7 times service life with contaminated lubrication compared to conventional bearings
- Up to 20 % improvement of seizure resistance



↑ Bearings in High-Tough Quality (HTF)

## Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
 6 People, working 12 hours @ 32 € per hour	€ 2.304	No mentainance necessary	€ 0
 7,000 tons per hour x 12 hour stoppage x 4 times x 13.5 € per ton	€ 4.536.000	No lost production stoppages	€ 0
<b>Total Costs</b>	<b>€ 4 538 304</b>		<b>€ 0</b>

## Success Story

Industry: Quarrying, Mining and Construction

Application: Shaker Screen

**Cost Savings: € 16 800**

### Introduction

A large OEM manufacturer of quarry and mining equipment used NSK products within their machinery. The nature of the application is very high vibration used to separate out product on a shaker screen. The bearing condition is very difficult to ascertain, so often they run to fail. These failures can incur loss of production and replacement part costs. NSK provided CMS service to analyse the condition of the bearing using our multi channel analyser which was able to distinguish between the machine natural vibration frequencies and the bearing frequencies, thus enabling NSK to determine the bearing health without stopping the machine.

### Key Facts

- Bearing and motor details for the CMS analysis was as follows:
- The shaker screen motor is rated at 12.5Kw
- The shaker screen speed is adjustable, this ran at 1030 rpm
- The combined bearing cartridge assembly was supplied with NSK spherical roller bearings
- NSK Solution: Condition Monitoring Service (CMS) with detailed analysis to identify bearings and associated components health. NSK performed a full analyse of the shaker screen while it was in cycle
- The CMS service indicated there were no concerns, the bearings were in good health



↑ Shaker Screen

### Value Proposals

- An NSK expert performed an Condition Monitoring Service (CMS) on the running shaker screen
- The test indicated there was no issue of concern from the bearings within the SX units
- Regular monitoring of the bearing units will allow bearing health to be trended
- 2 days to strip the shaker screen and investigate the potential bearing problem was avoided, along with the associated loss of production



## Product Features

- Live assessment of a machine's condition and health while the machine is still in operation
- Predicted life of the critical components inside a machine allowing the customer to plan maintenance more accurately.
- Early warning of problems occurring in machinery. Condition Monitoring is the most sensitive and long reaching method of detecting the signs of machine wear.
- On-site support from NSK Engineers.
- Assurance that NSK as a full range supplier can help with the provision of critical bearing and linear motion spares.



↑ NSK CMS Service

## Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
 1 engineer to strip/refit the machine	€ 800	No need for maintainance	€ 0
 Machine runs for 10 hrs/day @800/hr production cost	€ 16.000	No lost production cost	€ 0
<b>Total Costs</b>	<b>€ 16 800</b>		<b>€ 0</b>

## Success Story

Industry: Quarrying, Mining and Construction

Application: Vibrating Drum

**Cost Savings: € 2 970**

### Introduction

A company related to the Quarry & Mining industry was having frequent reliability problems with the bearing units assembled in a vibrating drum. These bearings worked under severe environments and were exposed to large amounts of sand, which often covered the units completely. Due to the nature of the application and its difficult access, the regularity and increasing cost of maintenance was an issue.

### Key Facts

- Vibrating Drum
- Harsh environment, exposed to sand
- Regular failures with difficult replacement led to high cost of maintenance
- NSK Solution: Self-Lube housings with Triple Lip Seal Supports - ideal for remote applications
- Increased life-time by 10 times
- Cost Saving generated



↑ Vibrating Drum

### Value Proposals

- NSK Engineers visited the site to assess the application
- Failed Bearing Analysis showed that fine sand particles were entering the bearing causing early failure
- A trial of Self-Lube triple lip sealed bearings resulted in life improvements 10 times than before




## Product Features

- Three high integrity nitrile seal lips with lubrication traps to stop ingress of contaminants
- High strength steel outer case resists impact to seal and provides a primary dust trap
- Available for both setscrew and eccentric locking collar inserts options
- Large size range offered, including imperial options
- Inserts interchangeable with standard items
- Longer bearing life through superior seal performance
- Extended re-lubrication intervals, greatly reducing maintenance costs and increased productivity of machinery
- Simple implementation; ready replacement for existing bearing units
- Mounting on the shaft with balled setscrews, providing much greater resistance to loosening



↑ Self-Lube

## Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
 Replacement per year × No. of engineers × €30/hr	€360	Less than 1 replacement per year × No engineers × hours × €30/hr	€36
 Downtime costs: 70ton/hr × 7€/ton × hours × No. of replacement per year	€2.940	Downtime costs: 70ton/hr × 7€/ton × hours × No. replacements per year	€294
 Bearing Life: 2 months approximately (440hrs)	€0	Bearing Life: 19 months approximately (4.400hrs)	€0
<b>Total Costs</b>	<b>€ 3 300</b>		<b>€ 330</b>

## Industry: Quarry, Mining & Construction

### Application: Vibrating Screen

**Cost Savings: EUR 73,012**

#### Introduction

A customer in Central America, in the Quarrying and Mining industry, was experiencing reliability problems due to recurring bearing failures in its vibrating screens. The existing bearings failed after only 8 months. NSK engineers worked closely with the customer, analysing the failure, and recommended the VS series of bearings, designed to withstand aggressive operating conditions.



↑ Vibrating Screen

#### Key Facts

- The bearings work in a vibrating screen under the severe environment of vibration and contamination.
- The bearings failed every 8 months.
- This caused production stoppages of more than 8 hrs for each bearing failure
- NSK engineers analysed the application together with the customer in order to increase the reliability of the application.
- NSK recommended the use of Spherical Roller Bearing - VS series which are designed to withstand aggressive operating conditions.
- After NSK bearings VS series had been installed, the application bearing life that bearing life was increased twice

#### Value Proposals

- NSK supported the customer during the bearing inspection
- NSK provided an objective failure analysis with root cause identification and recommendations
- It was recommend to exchange the exiting bearings by NSK Spherical Roller Bearings - VS series
- Twice the service life of conventional bearings
- With an improved bearing performance and equipment reliability
- This led to significant annual cost savings



### Product Features

- Spherical Roller Bearings - VS series are manufactured from ultra clean steel for optimal fatigue resistance and long life
- Precision machined tough one piece brass cage, contoured roller pockets
- Improved surface roughness on rollers & inner & outer ring
- Special heat treatment rollers, prevent cracks from vibrations & shock loads
- Self aligning ability with floating guide ring, controlled roller skew
- Internal radial clearance set at 2/3 ISO standard bearings
- Outer dimensions set at 1/2 of ISO standard bearings
- 40mm - 200mm bore diameter



↑ Spherical Roller Bearing - Vibrating Screen Series

### Cost Saving Breakdown

Previous Solution	Costs p.a.	NSK Solution	Costs p.a.
 Bearing costs	€ 1,222	Bearing costs	€ 1,018
 Engineering costs	€ 35	Engineering costs	€ 0
 Cost of lost production	€ 72,774	Cost of lost production	€ 0
<b>Total Costs</b>	<b>€ 74,031</b>		<b>€ 1,018</b>

## Success Story

Industry: Quarrying, Mining and Construction

Application: Vibrating Screen

**Cost Savings: € 117 000**

### Introduction

A Vibrating Screen manufacturer was experiencing difficulties with consistency of the bearing mounting in their shaker box assembly. At the same time they were looking for opportunities to save manufacturing cost and improve the overall performance of their machines. NSK engineers worked closely with this manufacturer and proposed that a complete bearing assembly be designed such that the resultant unit could simply be bolted down to the machine frame without complex assembly of bearings, seals and lubrication.

### Key Facts

- Manufacturer of Vibrating Screen Machines
- Severe environment requiring special bearings
- Pressure to reduce manufacturing costs
- NSK employed special vibratory screen bearings
- NSK bespoke design for supply of complete housing, bearing and sealing solution
- Resultant bolt on complete solution
- Reduced need for complex fitting



↑ Vibrating Screen

### Value Proposals

- NSK design review of the original machine
- Bespoke design created with full CAD drawings for approval by the customer
- NSK took over the manufacture and assembly of the complete housing, seals and bearing assembly
- Product supplied to the customer as a built unit, packed and pre-greased ready to run
- NSK worked with the customer to develop a simple bolt on assembly process
- Significant reduction in manufacturing costs documented
- Bearing performance and reliability improved

## Product Features

- Bespoke housings
- High strength SG iron housing
- Vibratory specification bearings - CAM-VS
- Labyrinth and contact seals included
- Pre-greased and ready to fit with bearing location features
- Integrated assembly reduces need for customer to manufacture sub components
- Vibration and noise level reduced by 50-60%
- Increased fatigue strength against vibration & shock loads, wear and corrosion
- Installation ease and benefits reduce manufacturers in-house costs
- Can be re-greased



↑ Integrated Bearing Assembly

## Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
 Annual cost of manufacturing housings in-house, together with bearing purchase and assembly cost	€273.000	Annual cost of pre-assembled bearing housings from NSK	€156.000
<b>Total Costs</b>	<b>€ 273 000</b>		<b>€ 156 000</b>

# Innovative Products

NSKHPS Spherical Roller Bearings

Spherical Roller Bearings –  
Long-life Vibrating Screen SRB

TF Series Bearings

NSKHPS Cylindrical Roller Bearings

Cylindrical Roller Bearings –  
EMM-VS Series



# Innovative Products

Cylindrical Roller Bearings –  
Full Complement CRB for  
Crane Sheaves

Self-Lube<sup>®</sup> Units

Triple-Lip Sealed Inserts

Plummer Blocks and  
Accessories – SNN Series

Molded-Oil Bearings

## NSKHPS Spherical Roller Bearings

NSKHPS Spherical Roller Bearings are state-of-the-art material technology bearings, suitable for high speeds & loads. They can enable equipment downsizing and are suitable for a wide variety of applications. Available with steel or brass cage.

### Product Features

- Highest load rating SRB's
- Optimum raceway design & surface finishing
- Brass cage design (CAM) or strengthened steel cage (EA)
- High cleanliness steel
- Temperature stability: up to 200° C
- 40 mm to 260 mm bore size

### Benefits

- Up to twice the operating life
- Up to 20% higher limiting speed
- Dynamic load rating: 25% higher
- Lower maintenance cost and improved productivity
- High load rating enables downsizing

### Condition Description

- High Load
- High Speed
- High Temperature
- Misalignment

### Industries

- Fans and Blowers
- Food and Beverage
- Industrial Pumps and Compressors
- Material Handling
- Medical and Health Care



232	36	CA	M	K	E4	C3	S11	*H*
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#### Description

232	Bearing type and series
36	Bore
CA	Internal Design
M	Cage
K	Design of Rings
E4	Design of Rings
C3	Radial Internal Clearance
S11	Special Specification
*H*	NSKHPS

# Spherical Roller Bearings - Long-life Vibrating Screen SRB

NSK's Long-Life Vibrating Screen Series of Spherical Roller Bearings are engineered specifically to withstand the harsh working environments and frequent vibration of the mining, quarrying and construction industries. (Supersedes the CA series VS bearings).

## Product Features

- Precision machined tough one piece brass cage, contoured roller pockets
- Improved surface roughness on rollers & inner & outer ring
- Special heat treatment rollers, prevent cracks from vibrations & shock loads
- Self aligning ability with floating guide ring
- Controlled roller skew
- Internal radial clearance set at 2/3 ISO standard bearings
- Outer dimensions set at 1/2 of ISO standard bearings
- 40mm - 200mm bore diameter

## Benefits

- Twice the service life of conventional bearings
- Reduced maintenance costs
- High dynamic & static load ratings - load rating increased by 1.25 times
- Dampened vibration & highly resistant to heavy or shock loads
- High speed performance & low operating temperature rise
- Better roller guidance & smooth running - reduced bearing damage from slippage, surface fatigue, flaking

## Condition Description

- High Load
- Misalignment
- Vibration

## Industries

- Material Handling
- Oil and Gas
- Paper
- Quarrying, Mining and Construction
- Utilities



223	20	CAM	E4	-VS3(4)
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### Description

223	Bearing type and series
20	Bearing Bore
CAM	Cage
E4	Outer Ring with Groove & Oil Holes
-VS3(4)	Vibrating Screens + Special dimensional Tolerance + Radial Internal Clearance

## TF Series Bearings

NSK's TF Series Bearings have been designed for outstanding toughness under harsh conditions. They combine longer service life & superior resistance against wear, seizure & heat (also in contaminated lubrication).

### Product Features

- Special material.
- Innovative heat treatment technology.
- Outperforming standard bearing steel.
- TF, NTF, HTF STF, WTF – material to cater to all your environments.
- TF series materials can be applied to a wide range of bearings:
- Cylindrical & taper roller bearings
- Spherical roller bearings
- Deep-groove ball bearings
- Angular contact ball bearings

### Benefits

- Up to 10 times service life with contaminated lubrication.
- Up to twice the service life under clean lubrication.
- Up to 4 times the service life at 160°C.
- Less than one-third the rate of wear.
- 40% improvement in seizure resistance.

### Condition Description

- Contamination
- High Load
- High Temperature
- Lubrication

### Industries

- Material Handling
- Power Generation
- Power Transmission
- Quarrying, Mining and Construction
- Wind Energy



STF	509	kV	6551gS3
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Description	
STF	Super-TF
509	Bearing Bore
kV	Bearing Type
6551gS3	Basic Number

## NSKHPS Cylindrical Roller Bearings

The new range NSKHPS Cylindrical Roller Bearings for Industrial Machinery are offered with four types of cages for various general-purpose applications. The bearing life has increased up to 60% compared to conventional bearings. The NSKHPS bearings contribute to reducing maintenance cost and facilitate the downscaling of related equipment.

### Product Features

- Available with 4 different cages:
- 
- Pressed Steel Cage
- Machined Brass Cage
- Polyamide Resin Cage
- L-PPS Resin Cage

### Benefits

- Increased Bearing Life up to 60%
- Optimised Internal Design
- Reduction of maintenance Cost
- Downsizing of related equipment

### Condition Description

- Contamination
- High Temperature

### Industries

- Electric Motors
- Fans and Blowers
- Oil and Gas
- Paper
- Power Transmission



NU3 08 E T7 C3 U537

#### Description

NU3	Bearing
08	Bore
E	Internal Design
T7	Cage
C3	Internal Clearance
U537	NSKHPS



## Cylindrical Roller Bearings - EMM-VS Series

NSK's EMM-VS Series of Cylindrical Roller Bearings for Vibrating Equipment feature a high load-carrying capability, has an innovative outer-ring-guided machined brass cage and a special roller crowning accommodating heavy loads & misalignment.

### Product Features

- High strength & wear resistant machined brass cage
- One-piece cage gives higher strength under vibrating conditions
- Special cage pocket profiling helps guide rollers
- Large cage pocket corners relieve stress concentrations on the cage
- Special roller crowning to reduce generation of edge loading
- ISO standard sizes

### Benefits

- High rigidity with enhanced cage strength
- Improved grease & oil flow in cage pockets
- Improved lubricant dispersion dampens noise
- 30% higher load rating compared with conventional bearings
- Up to twice the bearing life

### Condition Description

- High Load
- Vibration

### Industries

- Material Handling
- Quarrying, Mining and Construction
- Utilities



NU3	08	E	M	C3	U537
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#### Description

NU3	Bearing
08	Bore
E	Internal Design
M	Cage
C3	Internal Clearance
U537	NSKHPS

# Cylindrical Roller Bearings - Full Complement CRB for Crane Sheaves

NSK's Full Complement Cylindrical Roller Bearings, with seals, for Crane Sheaves feature high performance seals, a highly corrosion resistant phosphate coating and overall fewer parts to improve cost performance.

## Product Features

- Improved contact seals
- High load rating
- Highly corrosion resistant phosphate coating
- Easier grease re-lubrication
- Inner and outer ring re-lubrication holes
- Bearings pre-greased with Lithium grease
- Can be fitted with DIN 471 snap rings

## Benefits

- Contact seals prevent ingress of foreign particles or water
- Increased radial and axial capability
- Re-lubrication holes for easy maintenance & grease replenishment
- Can be used in external environments due to coating
- Snap ring (DIN 471) can be applied to the outer ring

## Condition Description

- Contamination
- High Load
- High Speed
- Lubrication

## Industries

- Material Handling
- Quarrying, Mining and Construction



RS-50xx DS E7 NA S5 C3

### Description

RS-50xx	Basic Number
DS	Contact Seal
E7	Lubrication Groove in Outside Surface
NA	DIN 471 Compliant
S5	Phosphate Surface Treatment
C3	Radial Internal Clearance

## Self-Lube® Units

The Self-Lube® units are a versatile range of housings and inserts manufactured to NSK global specification for materials and quality - all cast iron housings supplied with regreasing facility, capable of taking up initial misalignment during assembly. The general housing types are pillow blocks, flange units, take-up units, cartridge units and hanger units. Suitable for a wide range of industry applications.

### Product Features

- Range of diverse casting and pressed steel housings (15 alternatives).\*
- Inserts - 3 main locking arrangements and 2 inner ring length options.\*
- Three main seal options - standard, triple lip & flinger/standard.
- Postively located steel end cap available for units up to 60mm shaft.
- All cast iron housings supplied with regreasing facility. <em>\* For all options see Self-Lube® catalogue</em>

### Benefits

- Simple cost effective bearing arrangement - units can be regreased.
- Can be used on fabricated and general engineering equipment.
- Secure shaft locking for all speed, load and vibration conditions.
- Effective sealing for all conditions and applications.
- Protects from the dangers of rotating shaft ends.

### Condition Description

- Arduous Environments
- Contamination
- Corrosive Environment
- High Temperature
- Misalignment

### Industries

- Agriculture
- Cement
- Fans and Blowers
- Food and Beverage
- Material Handling



(T)	NP	45	(DEC)	(FS)
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#### Description

(T)	Triple Lip Seal (optional)
NP	Housing
45	Bore
(DEC)	Locking options
(FS)	Seal Options

# Triple-Lip Sealed Inserts

NSK's Triple-Lip Sealed Inserts are perfect for applications where bearings are exposed to heavy dust and water contamination.

## Product Features

- Nitrile rubber triple lip, bonded to protective pressed steel shield
- Available for both setscrew and eccentric locking collar insert options
- Large size range offered, including imperial options
- Inserts interchangeable with standard items

## Benefits

- Longer bearing life through superior seal performance
- Extended relubrication intervals, greatly reducing maintenance costs and increased productivity of machinery
- Simple implementation; ready replacement for existing bearing units
- Mounting on the shaft with balled setscrew, providing much greater resistance to loosening

## Condition Description

- Contamination
- Corrosive Environment

## Industries

- Chemical and Pharmaceutical
- Food and Beverage
- Material Handling
- Packaging
- Textile and Leather



T	1045	1.1/4	DEC	G	HLT
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### Description

T	Prefix
1045	Type & Series
1.1/4	Bore size
DEC	Shaft lock type and inner ring length indicator
G	Lubrication facility
HLT	Suffix options

## Plummer Blocks and Accessories - SNN Series

NSK modular SNN housing range offers various technical options to match the needs of the most demanding applications. The components are easy to fit, remove and maintain. Equipped with NSK high performance bearings, SNN split housings will support you in achieving your cost reduction plans.

### Product Features

- Equipped with 2 Lubrication holes and 1 Draining hole
- Solid corners in the base for locating pins
- Square shape and centre marks
- High grade casting - allows 5 different sealing arrangements:- Double lips seals- V-ring seals- Felt seals- Labyrinth seals- Taconite seals

### Benefits

- Easy assembly, easy alignment
- High rigidity (minimises deformation of the bearing seat)
- Comprehensive range of sealing & arrangements to match all needs
- Good heat transfer
- Same housing can be used with both double row self-aligning ball bearings or double row spherical roller bearings
- Low maintenance costs

### Condition Description

- Contamination
- Fitting
- High Load
- Lubrication
- Misalignment

### Industries

- Cement
- Fans and Blowers
- Power Transmission
- Steel and Metals



SNN 511-609

Description	
SNN	Housing Code
511-609	Size



## Molded-Oil Bearings

Molded-Oil Bearings are lubricated with NSK's original oil-impregnated material, Molded-Oil, and are suitable for corrosive and dust-contaminated environments.

### Product Features

- Molded-Oil
- Stainless steel for corrosive environments

### Benefits

- Grease-free property with no oil refilling keeps operating environments clean
- Operating life more than twice as long as grease lubrication, in water or dust-contaminated environments
- Contact-seal type available in standard inventory for ball bearings
- Achieves extended maintenance-free performance as Molded-Oil provides a continuous supply of lubricant. Available for high speed applications
- Available in ball bearing, spherical roller bearing and tapered roller bearings types

### Condition Description

- Contamination
- Corrosive Environment
- Lubrication

### Industries

- Agriculture
- Chemical and Pharmaceutical
- Food and Beverage
- Material Handling
- Oil and Gas



6001	L11	-H20	ZZ (DDU)
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#### Description

6001	Basic Bearing Number
L11	Molded-Oil
-H20	Material
ZZ (DDU)	Shield (Seal)



# Product Catalogues

NSKHPS High Performance  
Standard

Long-Life Sealed  
Spherical Roller Bearings

Self-Lube<sup>®</sup>

Plummer Blocks and  
Accessories



## NSKHPS HIGH PERFORMANCE STANDARD

CYLINDRICAL & SPHERICAL ROLLER BEARINGS







## LONG-LIFE SEALED SPHERICAL ROLLER BEARINGS FOR CONVEYOR PULLEY IN THE MINING INDUSTRY





+ SELF-LUBE®







## PLUMMER BLOCKS AND ACCESSORIES – SNN SERIES AND SD SERIES





# NSK Academy

Training



# NSK Academy

NSK Academy provides you with a profound knowledge base for different applications of our products. It offers **courses, tutorials** and **online tools** that also provide ideas for **troubleshooting** and **solutions for demanding environments**. Taking part is very easy: create an account and you are good to go. The advantages of NSK academy are:

- › Gain profound knowledge of the applications of Bearings and Linear Motion Control
- › Learn more about the different industry sectors in which our products are used
- › Receive a certificate after passing an exam



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