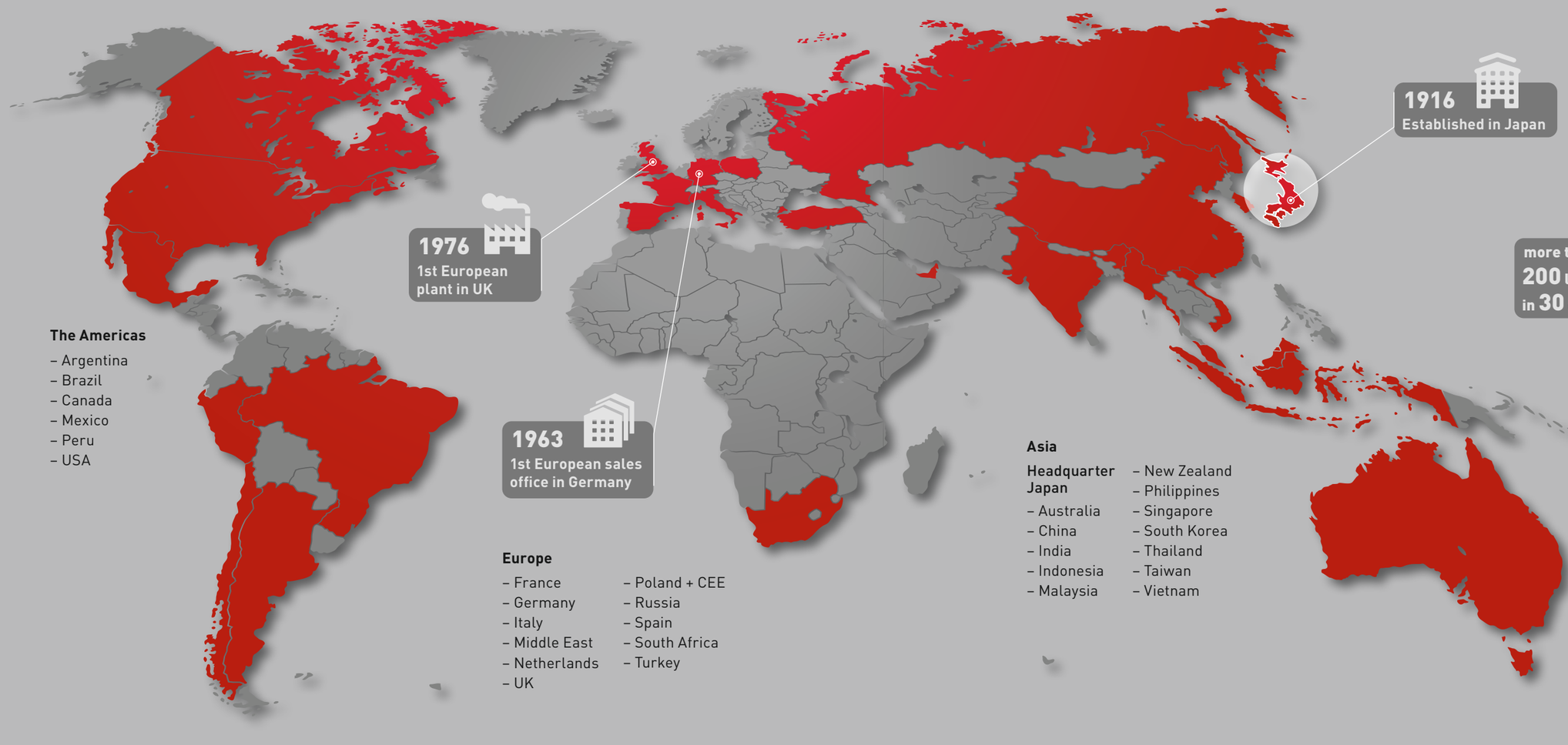
MOTION & CONTROL
NSK

FOOD & BEVERAGE

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.



The Americas
- Argentina
- Brazil
- Canada
- Mexico
- Peru
- USA

Europe
- France
- Germany
- Italy
- Middle East
- Netherlands
- UK
- Poland + CEE
- Russia
- Spain
- South Africa
- Turkey

Asia

Headquarter Japan
- Australia
- China
- India
- Indonesia
- Malaysia
- New Zealand
- Philippines
- Singapore
- South Korea
- Thailand
- Taiwan
- Vietnam

Sector Brochure

"Solutions for the Food and Beverage industries"

MOTION & CONTROL™
NSK

SOLUTIONS FOR THE FOOD AND BEVERAGE INDUSTRIES

Food and Beverage Industry

As one of the biggest rolling bearing manufacturers worldwide, NSK has a wide range of rolling bearings specifically for the food and beverage industry, whose construction features include, amongst others, rustproof materials, sealed construction with lifelong lubrication, and foodstuffs-compatible lubricants.

Continuous high-speed operation, the most stringent of hygiene standards and operating conditions where heat, cold and damp are the norm – these call for bearings that you can rely on to take extreme conditions in their stride, as well as making cost-effective production possible. NSK bearings for the food and beverage industries are robust, made of corrosion-resistant stainless steel and lubricated for life.

For trouble-free operation, bearings should be perfectly adapted to the relevant machines and production processes. Apart from the extensive product range specially developed for the food and beverage industries, engineering also plays an outstanding role. This way, we can work together with you to analyse possible weak points in the production process, measure and monitor efficiency and, where necessary, propose alternative products. Experts work ceaselessly in the NSK research laboratories to improve products and lubricants.

How can rolling bearings guarantee outstanding performance despite having to stand up to high temperatures, water and chemicals? How is foodstuffs contamination prevented safely and reliably? Through which measures can maintenance-free operation be achieved? We will be pleased to give you the correct answers to all these questions. Because, in everything we do, every single day, we strive for Total Quality.

Apart from long operating runs, hygiene, health and safety are the key factors in the food and beverage industries. This means that sealing discs on the belt drive bearings and sheaves must not be distorted during high-pressure cleaning. Bearings and their cages must be corrosion-resistant and lubricants should not leak.

This brochure highlights core products for this industry. We are also showing a selection of products made for special environments. On the following pages we present a generic process in the food and beverage industry.

Solutions for the Food and Beverage industries

Needs in Food Processing Lines

Raw Material Process

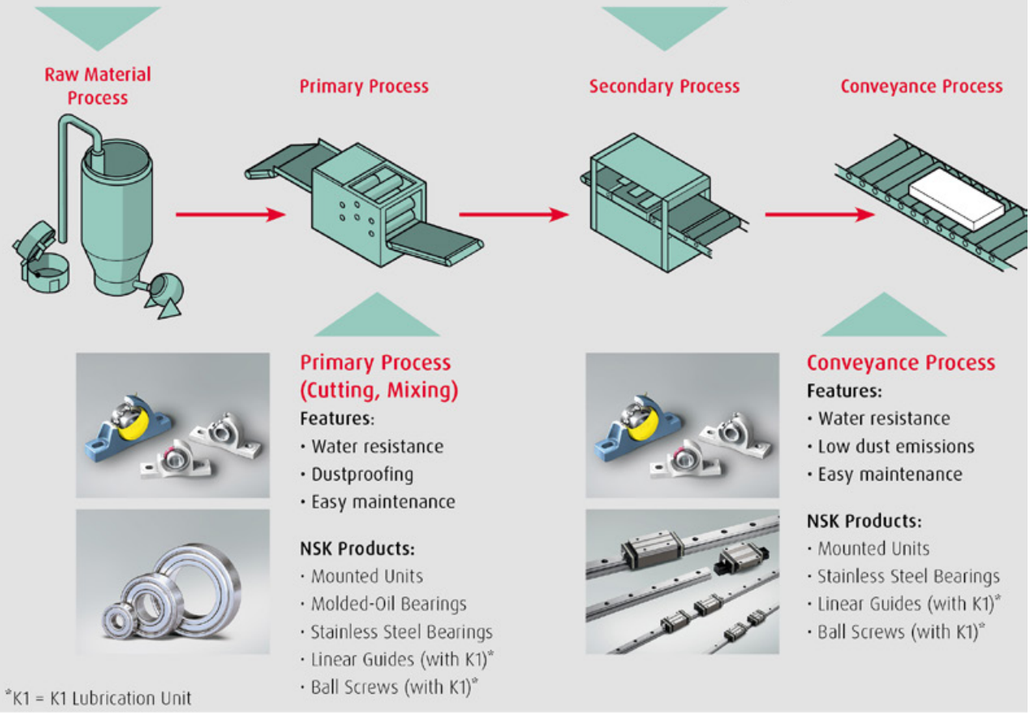
Features:
- Water resistance
- Dustproofing
- Easy maintenance

NSK Products:
- Stainless Steel Bearings
- Molded-Oil Bearings
- Linear Guides (with K1)*

Secondary Process (Molding)

Features:
- Water resistance
- Dustproofing
- Low dust emission
- Easy maintenance

NSK Products:
- Mounted Units
- Molded-Oil Bearings
- Stainless Steel Bearings
- Linear Guides (with K1)*
- Ball Screws (with K1)*
- Clean Grease (LG2 / LGU)



Primary Process (Cutting, Mixing)

Features:
- Water resistance
- Dustproofing
- Easy maintenance

NSK Products:
- Mounted Units
- Molded-Oil Bearings
- Stainless Steel Bearings
- Linear Guides (with K1)*
- Ball Screws (with K1)*

Conveyance Process

Features:
- Water resistance
- Low dust emissions
- Easy maintenance

NSK Products:
- Mounted Units
- Stainless Steel Bearings
- Linear Guides (with K1)*
- Ball Screws (with K1)*

*K1 = K1 Lubrication Unit

Inspection Process

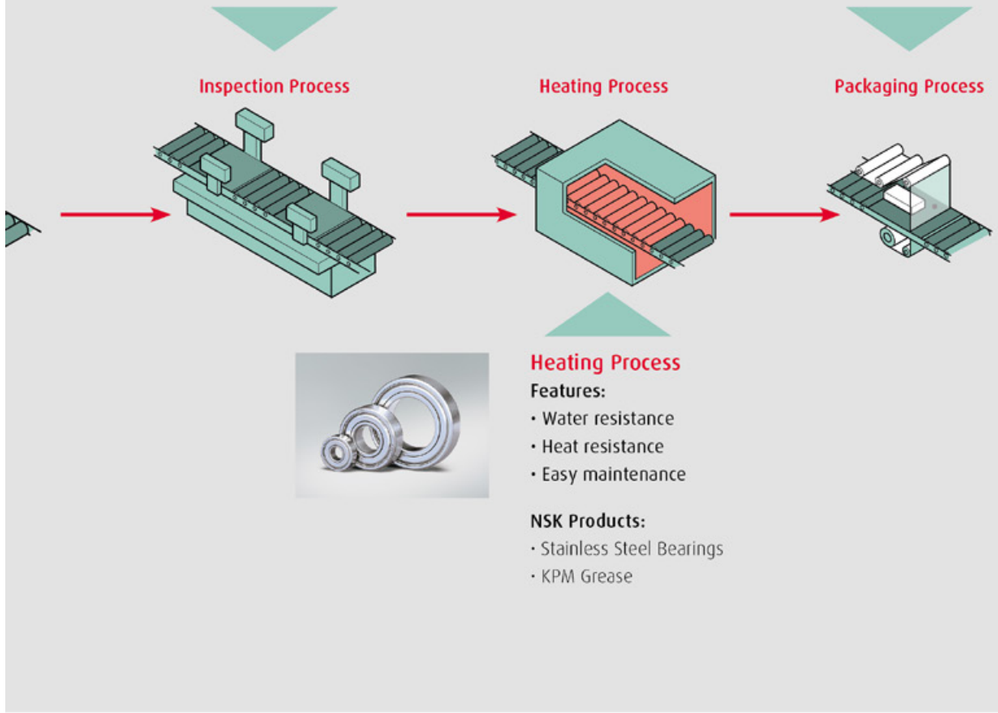
Features:
- Water resistance
- Easy maintenance
- High accuracy

NSK Products:
- Mounted Units
- Stainless Steel Bearings
- Molded-Oil Bearings
- Linear Guides (with K1)*
- Ball Screws (with K1)*

Packaging Process

Features:
- Low dust emissions
- Easy maintenance
- High speed

NSK Products:
- Mounted Units
- Molded-Oil Bearings
- Stainless Steel Bearings
- Linear Guides (with K1)*
- Ball Screws (with K1)*
- Clean Grease (LG2 / LGU)



Heating Process

Features:
- Water resistance
- Heat resistance
- Easy maintenance

NSK Products:
- Stainless Steel Bearings
- KPM Grease

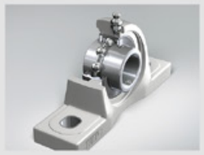
Solutions for the Food and Beverage industries

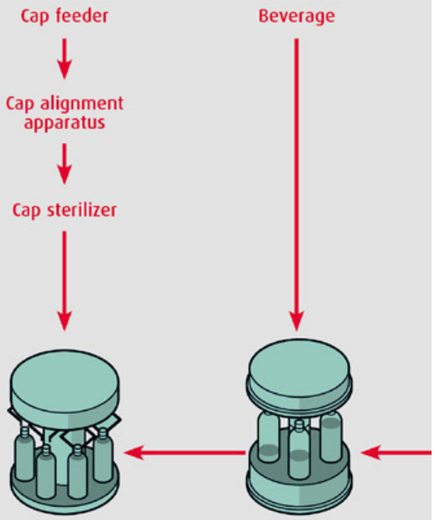
Needs in Beverage Processing Lines

Filling and Sealing Process

Features:
- Dustproofing
- Waterproof
- Low dust emission
- Easy maintenance

NSK Products:
- Silver-Lube
- Life-Lube
- Molded-Oil Bearings
- Stainless Steel Bearings
- Linear Guides (with K1)*
- Clean Grease (LG2 / LGU)

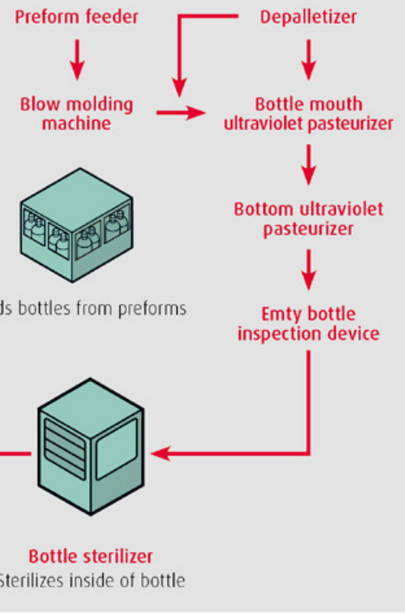




Bottle Molding Process

Features:
- Dustproofing
- Water resistance
- Low dust emission
- Easy maintenance

NSK Products:
- Silver-Lube
- Life-Lube
- Stainless Steel Bearings
- Aqua Bearings
- Linear Guides (with K1)*

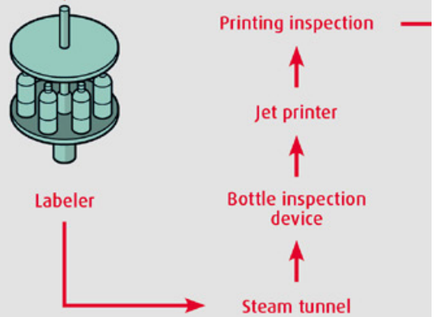


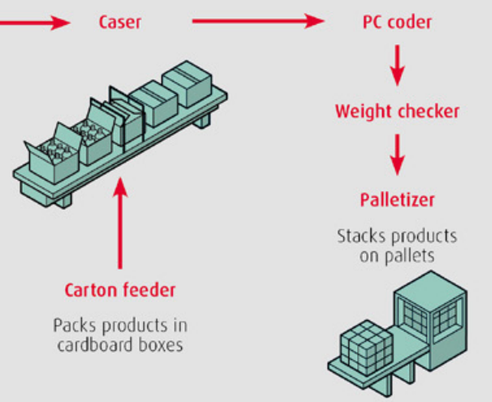
FILLING PROCESS

Inspection Process

Features:
- Waterproof
- High speed
- Easy maintenance

NSK Products:
- Silver-Lube
- Life-Lube
- Molded-Oil Bearings
- Stainless Steel Bearings
- Linear Guides (with K1)*
- Ball Screws (with K1)*





Packing Process

Features:
- High speed
- Easy maintenance
- High-load operation

NSK Products:
- Self-Lube
- Molded-Oil Bearings
- NSKHPS Deep Groove Ball Bearings
- Linear Guides (with K1)*
- Ball Screws (with K1)*

WRAPPING PROCESS

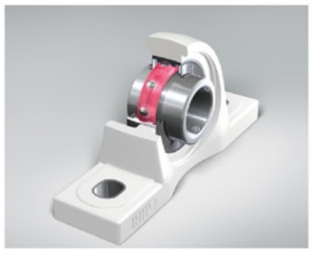
*K1 = K1 Lubrication Unit

Core Products for the Food and Beverage Industry

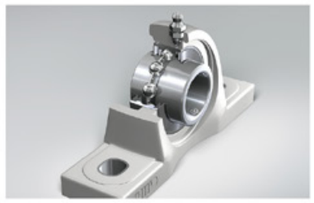
Mounted Units
- Range of diverse casting and pressed steel housings
- Inserts - 3 main locking arrangements and 2 inner ring length options
- 3 main sealing options: standard, triple lip, flinger
- Positively located steel end cap available for units up to 60 mm shaft
- All cast iron housings supplied with regreasing facility

Triple-lip sealed inserts
- Inserts interchangeable with standard items
- Longer bearing life through superior sealing performance
- Extended relubrication intervals
- Suitable for areas with strong dust or water pollution

NSKHPS Single Row Deep Groove Ball Bearings
- Suitable for the use under radial loads
- Can withstand moderate axial loads in either directions
- Low torque
- Suitable for applications where high speed and low power loss is required
- NSKHPS - High Performance Standard



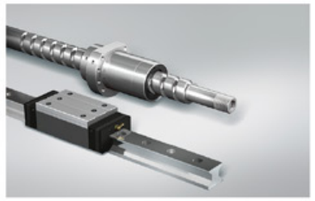
Life-Lube
- Combine corrosion resistance of Silver-Lube housing with sealing and lubricating attributes of Molded-Oil Bearings
- Suitable for wet environments
- Suitable for areas with process fluids and chemicals



Silver-Lube
- High grade stainless steel bearing-rings, cage & balls, seal core & grub screws, grease nipple & holt hole liners
- Nitrile rubber seals and stainless steel flingers
- Thermoplastic polyester resin housing; plastic end covers available
- Factory filled with a wide temperature USDA H1 food grade grease
- Silver-Lube is available in four different geometries

Molded-Oil Bearings
- Excellent performance in water and dust contaminated environments
- Environmentally friendly
- Low torque

Stainless Steel Bearings
- Stainless Steel ES1
- Higher corrosion resistance than ordinary steel
- Available as open, shielded and contact-seal type
- Suitable for wet and damp environments
- Grease Lubrication



Linear Guides
- Excellent running characteristics - friction optimised, smooth and accurate
- Highest Load capacity and best rigidity values

Ball Screws:
- Large product range
- Minimal dynamic torque variation
- High reliability and precision

K1 Lubrication Unit
- Long-term, maintenance-free operation
- Available in accordance with the FDA
- Effective sealing function
- Applicable to all the linear guide models

Solutions for the Food and Beverage industries

Products for special environments

Aqua Bearings
- Corrosion resistant in water, alkali, acid environments
- Self lubricating special fluoresin for inner, outer ring and cages

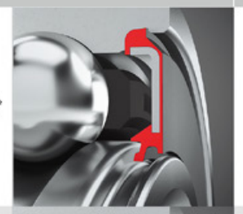
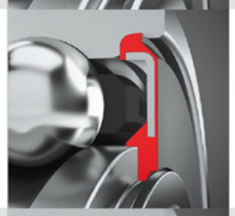
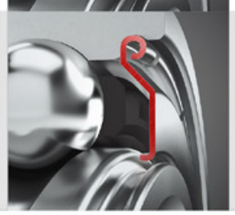
Corrosion-Resistance through Nickel-Plating
- Nickel coating on outer and inner rings
- Suitable for alkaline and midly acidic environments
- Suitable for applications with water rinsing

Chrome-Plated Corrosion Resistant Bearings
- Extremly high corrosion resistant through chrome plating
- Suitable for constant underwater operations

Sealing Technology

NSK offers several different seal/shield designs and materials, each developed to meet specific needs of your application. As an example, we offer seals with varying degrees of contamination resistance and drag characteristics, including our full-contact DU seals, light-contact DW seals and non-contact V seals.

Seals and shields comparisons

		Dustproofing	Waterproofing	Torque	Constant revolutions	Protection against lubrication leakage
DU/DDU*		Excellent	Excellent	Normal	Normal	Excellent
DW/DDW*		Excellent	Normal	Low	Good	Excellent
V/VV*		Good	Unsuitable	Very low	High	Good
Z/ZZ*		Normal	Unsuitable	Very low	High	Normal

* double sided seals / shields

Solutions for the Food and Beverage industries

Molded-Oil Technology

The difference is in the lubrication: NSK's patented Molded-Oil grease is specifically developed for situations requiring high levels of hygiene, such as in the food and beverage industries. As such, the Molded-Oil lubricant is transported by a substance that releases the lubricant gradually. This way, the required amount of lubrication is provided to the bearing over a long period of time. At the same time, the risk of oil leakages is minimised, making the bearings outstandingly smooth-running. Optionally, lubricants with USDA H1 (L21) certification can be used.

Features of Molded-Oil Bearings

› **Excellent performance in water- and dust-contaminated environments**
The bearings are designed to prevent liquids such as water (which can wash the lubricating oil out) and dust from getting inside the bearings. Sealed types can be used in environments exposed to water and dust.*

› **Environmentally friendly**
Because they can be lubricated with minute quantities of oil that exudes from Molded-Oil, the bearings are able to minimise oil leakage.

› **Low torque**
Packing with Molded-Oil after providing the bearing surface with special treatment realises smooth rotation of rolling elements.

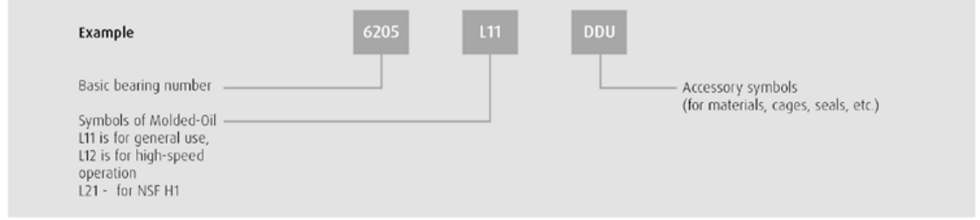
› **Optimal composition and molding methods enable high-speed operation of Molded-Oil bearings**
Optimisation of composition and molding method of Molded-Oil improves strength and enables high-speed operation of Molded-Oil bearings.

Applications

› **Food-processing equipment**
› **Steel mill equipment**
› **Paper mill equipment**
› **Liquid crystal display and semiconductor manufacturing equipment**
› **Agricultural machines**
› **Cleaning equipment and lines**
› **Conveying equipment**

* Water and dust dramatically accelerate bearing damage. In order to realise stable operation, we recommend using seals to prevent water and dust from getting into the bearing.

Combination of model numbers



Model numbers				
Bearing types		**Molded-Oil types**	**Model numbers**	**Remarks**
Deep groove ball bearings	●	For general use	6205L11DDU	-
			6001L11-H-20DDU	Stainless steel bearing
	●	For high-speed operation	6205L12DDU	-

Thanks to Molded-Oil technology, a snack foods manufacturer saved more than €50.000 a year
A snack foods manufacturer in the UK was experiencing a short service life of only 4 months in standard deep groove ball bearings used in a 7-lane food-processing conveyor system.

Key Facts

- Food conveyor system
- Frequent washdown cycles using agressive cleaning fluids causing standard bearings to fail prematurely
- 84 bearings used within the equipment, replaced 3 times per year – totalling 252 bearings annually
- Maintenance time of 24 hours per breakdown (2 engineers working for 12 hours)
- Loss of production: 14 hours per breakdown
- Standard bearings replaced with Molded-Oil deep groove ball bearings increased bearing life from 4 to 12 months

Breakdown of cost savings			
Before	**Cost p.a.**	**NSK Solution**	**Cost p.a.**
Deep groove ball bearings, replaced 3 times per year	€684	Stainless steel Molded-Oil deep groove ball bearings replaced once annually	€4,253
Engineering costs	€3,218	Engineering costs	€1,073
Potential profit loss	€53,627	Potential profit loss	€0
Total costs	**€57,529**		**€5,326**

Solutions for the Food and Beverage industries

Greases for Food Processing Machinery

NSK has developed the world's first 100% food-derived grease lubricant, 'EXCELLA GREEN FOOD GRADE GREASE H3G', and adapted it to bearings for food-processing machinery. H3G grease is NSF-certified under category H3. H3G grease has low torque, excellent water resistance and little leakage in environments where the machine is exposed to water. H3G grease can be used up to 90°C, H1R grease up to 120°C and H1B grease up to 200°C. H1R grease and H1B grease are certified according to Muslim halal and Jewish kosher standards.

NSF lubricant categories for food-processing machinery

Safety High ↑ Low

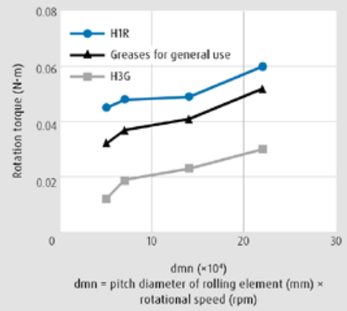
H3: Lubricants intended for food contact.

H1: Lubricants used in locations where the lubricant may accidentally come into contact with food.

H2: Lubricants used in locations where there is no possibility that the lubricant will come into contact with food.

NSF (National Sanitation Foundation) International: US-based third-party certification body that is internationally recognised in the field of public health and safety.

H3G grease has lower torque than greases for general use.



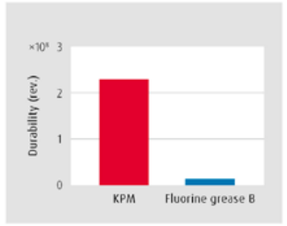
Heat-Resistant Grease (KPM)

- Heat resistance: can be used up to 200°C
- Life: about 5 times longer than commercially available fluorine greases

Durability

KPM life is very long, about five times longer than fluorine greases on the market.

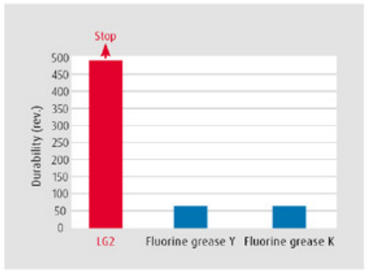
Test bearing: 6305
Rotational speed: 10,000 rpm
Axial load: 1,500N
Temperature of outer ring: 200°C
In normal atmosphere



All greases are not available as a standard grease from NSK.
Please contact NSK for more information.

Clean Grease (LG2, LGU)

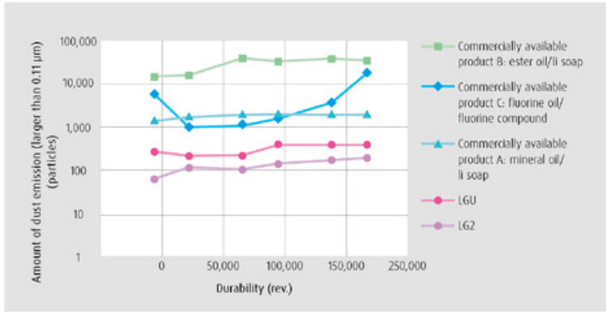
- Low dust emissions: lower than other fluorine greases on the market
- Life: over 10 times longer than other fluorine greases on the market



Durability in the atmosphere

LG2 and LGU greases have longer life in normal atmosphere.

Test bearing: 608
Rotational speed: 1,000 rpm
Rotation direction: forward/reverse rotation
Axial load: 196 N
In normal atmosphere
Temperature: normal temperature



Dust emission in the atmosphere

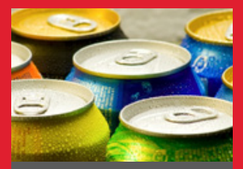
The dust emissions of LG2 and LGU greases are lower in normal atmosphere.

Test bearing: 695VV
Rotational speed: 3,600 rpm

Table of greases

Name	Operating temperature range, °C	Feature	Base oil kinematic viscosity (40°C), mm²/s	Consistency
H3G	0–90	For food-processing machinery (NSF category H3)	14.8	255
H1R	0–120	For food-processing machinery (NSF category H1)	150	280
H1B	0–200	For food-processing machinery (NSF category H1)	415	280
NS Hi-Lube	−40 – +130	Wide-range grease	26	250
LG2	−20 – +70	Clean grease	32	199
LGU	−40 – +120	Wide-range clean grease	96	201
KPM	−20 – +230	Grease for high-temperature use	420	290

Success Stories



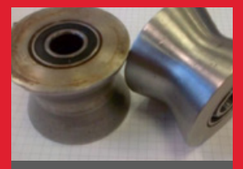
Aluminium Can Manufacturer

Baby Leaf Harvester

Barrel Washer

Belt Tensioner

Biogas Plant



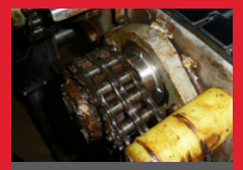
Bleed Shackle Roller

Bottle Overwrapper

Carrot Washer

Confectionary Washing Process

Conveyor Belt

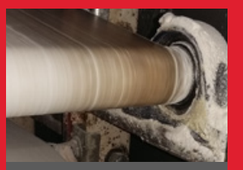


Conveyor System

Conveyor Tail Drum

Cutter line

Dip Tank Conveyor Nose Roller



Dough Prove

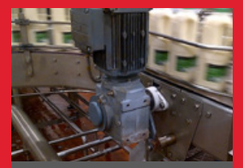
Feed Conveyor

Food Production Conveyor

Germination Vessel – Stirrer Units

Meat Slicer Machine

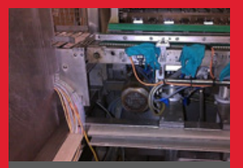
Mecatherm Dough Mixer



Milk Bottle Conveyor

Milk Processing Plant

Oven Fan Unit



Pick & Place Unit

Potato Washer

Success Story

Industry: Food and Beverage

Application: Aluminium Can Manufacturer

Cost Savings: 240,000 euros

Introduction

The world's largest can manufacturer (soft drinks, isotonic drinks, beers, etc.) was experiencing regular, unexpected, production stoppages due to premature failure of the bearings fitted to the spray head inside coating machines. This was causing significant disruption to production and high downtime costs. NSK conducted a full evaluation of the application including grease analysis and found that the bearings were seizing due to grease being ejected from the bearing by high pressure air that was needed for the process. NSK proposed its non-contact VV seals together with a change to bearing geometry resulting in good grease retention and a dramatic increase in bearing life.

Key Facts

- High volume can production line
- Repeated problems with spray head spindle bearings
- Bearing seizure resulted in significant downtime costs
- NSK grease and bearing analysis showed lubricant ejection caused by inadequate sealing
- Machine design required that air is passed through the bearings
- NSK proposed VV Seals and C3 internal clearance deep groove ball bearings
- These have good grease retention properties whilst allowing air flow through the bearing
- Bearing life increased from 7 to 110 days operation
- Large cost saving generated by improving production efficiency

↑ Aluminum Beverage Cans

Value Proposals

- Investigation of the failed bearings showed that they had failed due to lack of grease
- An application analysis discovered that the high pressure air that is needed for the process was passing through the bearings and the existing seal was not retaining the grease (ZZ Shields)
- NSK proposed a trial with its none contact VV sealed deep groove ball bearings with C3 clearance
- This proved successful as the VV seal has excellent grease retention capabilities
- Bearing lifetime was increased from 7 days to over 110 days when routine maintenance took place. Customer benefited from increased productivity and reduced maintenance costs resulting in a €240 K cost saving.

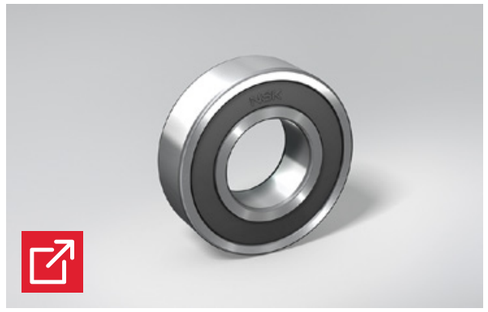
aip SS-GB-7013

NSK Europe - https://www.nskeurope.com

Aluminium Can Manufacturer

Product Features

- C3 Internal clearance
- VV Seals
- -This innovative design seals effectively without increasing
- either torque or operating temperature
- -The non-contact lip design reduces drag in the bearing - an
- important advantage where power loss is critical
- - Longer bearing life through superior seal performance
- - Excellent grease retention and effective distribution to maintain performance
- E class (noise level): Reduced noise level class for electrical applications
- High performance in contaminated environment
- Low torque bearing design



↑ VV - Sealed Deep Groove Ball Bearing

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Cost Saving related to extended product life	€150.000		
	Cost Saving due to downtime and production loss reduction	€90.000		
Total Costs		**Before**		**€240.000**

aip SS-GB-7013

NSK Europe - https://www.nskeurope.com

Aluminium Can Manufacturer

Success Story

Industry: Food and Beverage

Application: Baby Leaf Harvester

Cost Savings: 63,300 euros

Introduction

A processor of food products harvests baby leaf products for sale to leading supermarkets. Its leaf harvester machine had a variety of low cost mounted unit bearings to support shafts of various sizes. During the harvesting season, the machine was subject to frequent bearing failures due to ingress of dirt and water. When a failure occured the harvesting machine was stopped whilst repair work was carried out, leading to production losses and in some cases to spoilt crops. NSK experts were invited to review the application and working conditions. To help combat the ingress issues, they recommended that the mounted unit bearings were replaced with Silver-Lube with improved flinger seal arrangement and Stainless Steel Bearings. During the season after the replacement, only two failures occured, leading to productivity improvement and a significant reduction of costs caused by production losses.

Key Facts

- Baby Leaf Harvester
- Low cost bearings used
- Early bearing failure due to water and dirt ingress
- NSK Solution : Silver-Lube and flinger seal stainless steel bearings
- Vast reduction of bearing failure
- Cost savings for bearings and maintenance works leanding to a productivity improvement

↑ Baby Leaf Harvester

Value Proposals

- NSK reviewed the bearing application and operating conditions and concluded ingress of water and dirt caused early failure
- NSK solution was to fit Silver-Lube housing and flinger seal stainless steel bearings
- The bearings were fitted for the new season
- After replacement, only two bearing related failures were reported for the whole of the season
- Major reduction of maintenance costs
- Significant improvement on productivity

aip SS-GB-2078

NSK Europe - https://www.nskeurope.com

Baby Leaf Harvester

Product Features

- High grade stainless steel bearing-rings, cage & balls, seal core & grub screws, grease nipple & holt hole liners
- Nitrile rubber seals and stainless steel flingers
- Thermoplastic polyester resin housing; plastic end covers available
- Factory filled with a wide temperature USDA H1 food grade grease
- Silver-Lube® is available in four different geometries
- Resistant to cleaning agents and chemicals thus resistant to corrosion & peeling paint
- Long life / low cost of ownership
- Superior resistance to regular washdowns & chemical attack due to effective & efficient sealing arrangement
- Relubrication is possible for long trouble-free life, minimising maintenance, maximising productivity
- Approved to NSF, temperature scale from -20°C to +90°C

↑ Silver-Lube Bearing Units

Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
Lost production costs	€ 126.600	Lost production costs	€ 63.300
Total Costs	**€ 126.600**		**€ 63.300**

aip SS-GB-2078

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Barrel Washer

Cost Savings: 56,600 euros

Introduction

A producer of machine for vegetable treatment was experiencing problems on its barrel washers. With the rotation of the washer drum, bearings were under water once per rotation. Due to water washout and corrosion, it was necessary to replace the bearings installed every 3 months. This involved high costs. NSK engineers investigated the problem and offered Triple-Lip Sealed Bearings. This solution resulted in a significant lifetime extension to more than 7 months.

Key Facts

- Barrel washer for vegetables cleaning
- Water washout and corrosion
- Bearing replacement every 3 months
- NSK Solution: Triple-Lip Sealed Inserts
- Lifetime improvement from 3 months to over 7 months
- Significant reduction in bearing replacement and maintenance costs achieved

↑ Barrel Washer

Value Proposals

- NSK engineers investigated the problem and proposed a bearing solution providing a better sealing performance
- The bearings were replaced with special triple-lip sealed bearings
- Triple-lip sealed inserts are perfect for applications where bearings are exposed to water contamination
- The customer benefited from an increase of bearing lifetime and a reduction in maintenance cost

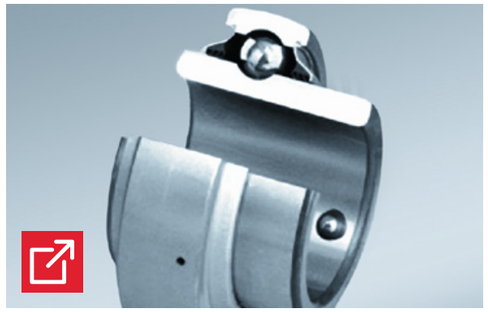
aip NSK experts SS-GB-5008

NSK Europe - https://www.nskeurope.com

Barrel Washer

Product Features

- Nitrile rubber triple lip, bonded to protective pressed steel shield
- Available for both setscrews 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 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



↑ Triple-Lip Sealed Inserts

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Bearing replacement costs during 6 months operation	€ 45.000	Cost of bearings for initial assembly, no additional costs in 7 months	€ 400
	Maintenance costs during 6 month	€ 12.000	No maintenance costs during 7 months	€ 0
Total Costs		**€ 57.000**		**€ 400**

aip NSK experts SS-GB-5008

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Belt Tensioner

Cost Savings: 15.360 Euro

Introduction

Key Facts

- Frequent bearing failures occuring every 4 weeks
- Water ingress from frequent wash down resulting in lubricant degradation, seal damage and corrosion of the rolling elements and raceways
- NSK Solution: Stainless Steel Bearings with Molded-Oil lubrication
- Significiant life time increase

↑ Production line of frozen pizza

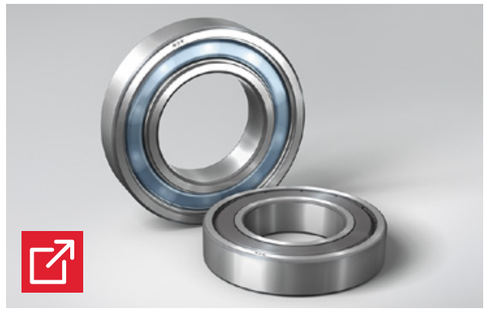
Value Proposals

- NSK Application Review determined the bearing failure was due to degradation of the lubricant and ingress of water
- NSK recommended the use of Stainless Steel Bearings with Molded-Oil lubrication
- Molded-Oil bearings use an oil impregnated polymer as the lubricant instead of grease
- The polymer matrix slowly releases oil to lubricate the bearing, while at the same acting as a barrier to protect the bearing from contamination. The lubricant cannot be washed out as with standard greases and therefore the life of bearings in wet environments can be increased significantly
- A trial resulted in a substantial increase in bearing life and a reduction of the machine down time

Belt Tensioner

Product Features

- Molded-Oil provides continuous supply of lubricant
- Grease-free property with no oil refilling keeps operating environments clear
- 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 through constant supply of lubricant; availble for high speed applications
- Available in ball bearings, spherical and tapered rolling bearings
- Stainless steel for corrosive environments



↑ Molded-Oil bearings

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Bearing replacement every 4 weeks	€ 2.160	Bearing cost	€ 1.800
	Relubrication of bearings	€ 600	No relubrication	€ 0
	Maintenance costs	€ 14.400	No maintenance costs	€ 0
Total Costs		**€ 17.160**		**€ 1.800**

aip NSK experts SS-GB-5006

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Biogas Plant

Cost Savings: 19,205 euros

Introduction

A vegetable preparation manufacturer in the UK was experiencing frequent breakdowns with their Biogas plant due to bearing failures within a rotary screen. Two Deep Groove Ball Bearings were mounted within each wheel, with two wheels per rotary screen. On average the bearings failed every 6 weeks, taking 1 hour each time to replace and incurring a significant loss of production per day. The bearings were failing due to ingress of contamination behind the seals. NSK engineers performed an Application Review and recommended that the existing bearings be replaced with Stainless Steel Molded-Oil Deep Groove Ball Bearings with DDU seals.

Key Facts

- Biogas Plant - rotary screen
- Bearing replacement every 6 weeks (8 times per year)
- Contaminated environment
- NSK solution: Stainless Steel Molded-Oil Deep Groove Ball Bearings with DDU seals
- Bearing replacement reduced to 3 times per year
- Significant cost saving on downtime and maintenance.

↑ Biogas plant

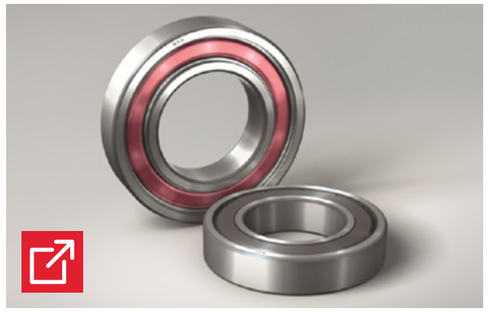
Value Proposals

- The customer experienced many failures in a Biogas Plant rotary screen application.
- NSK engineers performed a Failed Bearing Analysis which showed ingress of contaminants from the production process as the cause
- An Application Review showed that the existing 2RS sealed Deep Groove Ball Bearings were inadequate
- NSK recommended Stainless Steel Molded-Oil Deep Groove Ball Bearings with DDU seals
- Since introduction the bearing life and machine performance has been significantly improved, which has resulted in reduced maintenance and downtime, providing a large cost saving for the customer.

Biogas Plant

Product Features

- Molded-Oil provides continuous supply of lubrication oil
- Stainless steel for corrosive environments
- 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



↑ Deep Groove Ball Bearing with Molded-oil

Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
Bearing Cost: Total 32 replaced per year	€ 134	Bearing Cost:Total 12 replaced per year	€ 992
8 breakdowns per year51€ maintenance costs per breakdown	€ 408	3 breakdowns per year51€ maintenance costs per breakdown	€ 153
1,5 hours lost production per breakdown2.641 € costs per hour	€ 31.692	1,5 hours per breakdown2.641 € costs per hour	€ 11.884
Total Costs	**€ 32.234**		**€ 13.029**

aip NSK experts SS-GB-2058

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Bleed Shackle Roller

Cost Savings: 27,263 euros

Introduction

Key Facts

- Bleed Shackle Roller
- 4 Deep Groove Ball Bearings used per roller
- Failures occured between 1 day and 14 days
- Brinelling damage was root cause of failure
- NSK Solution: Cylindrical Roller Bearings, two different types
- Application lifetime significantly increased, over 6 months

↑ Bleed Shackle Roller

Value Proposals

- NSK engineers performed an Application Review together with a Failed Bearing Analysis
- As a result, it was recommended to replace the deep groove ball bearings in use with cylindrical roller bearings which are more accommodating impact loading
- A trial of NSK Cylindrical Roller Bearings in the application showed over 6 months lifetime
- Significant reduction of replacement costs and downtimes
- Cost savings realised

aip SS-GB-2071

NSK Europe - https://www.nskeurope.com

Bleed Shackle Roller

Product Features

- High strength & wear resistant pressed steel cage
- Cage pocket design gives superior roller guidance
- Cage strength increased 1.5 – 2 times
- Cage symmetry reduces noise
- Controlled contour rollers
- Up to 30% increase in load Rating
- Longer operating life – up to twice the bearing life
- 10 - 25% higher limiting speed than conventional series
- 30 - 40% noise reduction (3 - 7dB quieter) & vibration reduction

↑ Cylindrical Roller Bearings - EW series

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Bearing replacement costs	€ 26.699	Bearing replacement costs	€ 4.015
	Downtime costs	€ 4.602	Downtime costs	€ 1.198
	10 new shackles	€ 1.175	No costs for new shackles	€ 0
Total Costs		**€ 32.476**		**€ 5.213**

aip SS-GB-2071

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Bottle Overwrapper

Cost Savings: 10.874 €

Introduction

A drinks company in the UK were experiencing premature bearing failures due to an unknown reason, believed to be contamination. Bearing lifetime was 1 week. NSK was contacted to evaluate the source of failure. NSK engineers identified the true cause of failure was due to residual magnetism causing Eddie Current Braking. The source of the magnetism could not be changed. Therefore an alternative bearing or design was needed. NSK solution resulted in bearing lifetime increase : from 1 week to 1 year.

Key Facts

- Premature bearing failure
- Mass Production, high speed
- NSK Solution : DGBB with T1X cage, C5 clearance and shields
- Increased lifetime x52 times

↑ Drinks Bottling Plant

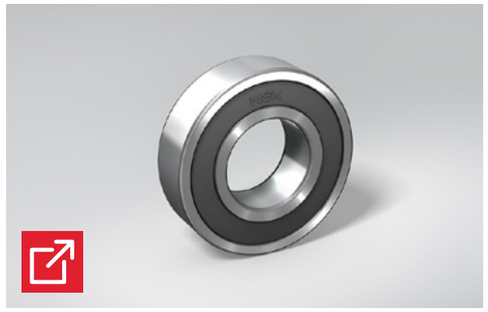
Value Proposals

- NSK Engineers performed Application Review
- Bearing failing due to residual magnetism
- DGBB with T1X cage, C5 clearance and shields

Bottle Overwrapper

Product Features

- DGBB with T1X cage, C5 clearance and shields
-



↑ Deep Groove Ball Bearing with T1X cage

Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
Annual bearing cost 3328 x 1.58€	5.283 €	Annual bearing cost 64 x 2,81€	180 €
59€ per hour x 2 people x 52 time per year	5.772 €		0 €
Total Costs	**11.055 €**		**180 €**

aip NSK experts SS-GB-2086

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Carrot Washer

Cost Savings: 12,139 euros

Introduction

A premium vegetable processing company was experiencing frequent bearing failure on a vegetable wash application causing significant downtime and reduced production. NSK carried out a bearing failure analysis revealing ingress of contamination leading to significant reduction in life time. NSK recommended NSK Life-Lube with Molded-Oil inserts. A trial was conducted demonstrating improved bearing life which reduced downtime, maintenance costs and increased productivity generating a significant cost saving to the customer.

Key Facts

- High volume vegetable cleaning line
- Frequent bearing failure causing significant production down time and high costs
- Water and hard particle ingress
- NSK Solution: Life-Lube with Molded-Oil inserts
- Bearing life increased from 1 1/2 months to over 12 months
- Productivity improvement
- Cost saving generated

↑ Carrot wascher

Value Proposals

- NSK engineering conducted a Bearing Failure Analysis showing ingress of contamination into the bearing causing washout of lubricant from the bearing and subsequent failure
- NSK engineering conducted a Process Mapping exercise of the application identifying problematic bearing areas
- NSK engineering conducted an Application Analysis of the washer application and proposed NSK Life-Lube units with Molded-Oil inserts
- A trial was agreed which resulted in an increase of bearing life from 1 1/2 months to over 12 months
- The customer benefited from increased productivity and reduced maintenance costs

Product Features

- PBT thermoplastic resin housing
- Molded-Oil inserts (with solid lubricant)
- Martensitic stainless steel
- Nitrile rubber seals
- Available in Pillow Block, 2 and 4 bolt flanges and take-up unit housings
- Bore size 20mm - 40mm
- Corrosion resistance
- Paint free housings, preventing chipping & flaking
- Resistant to contamination increasing operating life
- Ideal for operations where fluid process is unavoidable
- No need for re-lubrication

↑ NSK Molded-Oil insert

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Loss of production due to unplanned stoppages	€11.491	Continuous operation without failure. No down time costs in 12 months	€0
	Cost of maintenance: 2 persons €18/hr for 2 hrs x 9 stoppages per year	€648	No breakdowns and no maintenance costs	€0
Total Costs		**€12.139**		**€0**

aip NSK experts SS-GB-2048

NSK Europe - https://www.nskeurope.com

Carrot Washer

Success Story

Industry: Food and Beverage

Application: Confectionary Washing Process

Cost Savings: 94,664 euros

Introduction

A confectionary manufacturer was experiencing short service life (only 3 months) from deep groove ball bearings used in a Dürr Head Wash application. Due to the high levels of water used in the process, water ingress into the bearings caused their premature failure. This resulted in costly downtime and loss of production. NSK recommended the use of Stainless Steel bearings fitted with Molded-Oil lubrication. These are designed to perform well in wet applications. Regular monitoring of the application showed that the bearing lifetime was extended to over 18 months which represented a significant improvement on the original design.

Key Facts

- Wash Application in a Confectionary Manufacturer
- Wet Environment causing standard bearings to fail prematurely
- Unplanned failure of the machine resulted in loss of production
- Service life only 3 months
- Maintenance time of 4 hours for each failure
- NSK Stainless Steel Molded Oil bearings trialled
- Resultant performance increased to greater than 18 months

↑ Head washing

Value Proposals

- Investigation of the application showed that water ingress was causing premature bearing failure
- NSK recommended using stainless steel Molded-Oil deep groove ball bearings to prolong the bearing life
- The new bearings were installed and monitored with no failures for 18 months
- With these results a subsequent cost saving was presented and signed by the customer for €94.700
- Customer benefited from increased productivity and reduced maintenance costs on his production line

Confectionary Washing Process

Product Features

- Complete stainless steel bearing assembly ideal for corrosive environments Molded-Oil Lubrication System provides a sealed for life bearing solution
- 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 environment
- High integrity contact-seal type
- 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

↑ Molded-Oil Bearings

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Bearing costs	€114	Bearing costs	€370
	Engineering costs: 2 men @ € 33/h each × 4 hours repair time × the qty of bearing replacements over the period	€1.584	Engineering costs: 2 men @ €33/h each × 4 hours repair time	€264
	Potential lost sales profit: € 3.900 per hour × 4 hours downtime over the period	€93.600		
Total Costs		**€95.298**		**€634**

aip NSK experts SS-GB-2034

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Conveyor

Cost Savings: 9,315 euros

Introduction

A German vegetable-processing company was experiencing repeated ball bearing failures on one of its transport systems. NSK was commissioned to investigate the problem. During the investigation it was determined that a large amount of water was entering the bearings and washing out the grease fill. Therefore, NSK suggested the use of sealed, corrosion-resistant Molded-Oil Bearings, thus increasing the bearing life from approximately 2 weeks to over 9 months.

Key Facts

- Conveyor Belt
- Processing of vegetables (foodstuffs)
- Frequent failure of the standard bearings
- Service life of the standard bearings only 2 weeks
- Increased service life required
- NSK solution: Molded-Oil Bearings
- Result: Bearing lifetime increased from 2 weeks to over 9 months

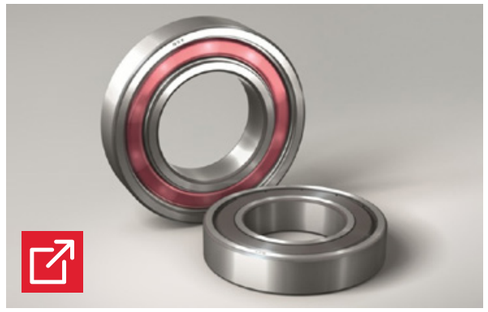
↑ Conveyor Belt

Value Proposals

- The investigation carried out by NSK revealed that severe water ingress was causing problems (grease being washed out of the bearings)
- Use of corrosion-resistant Molded-Oil bearings
- Service life was significantly increased
- Cost saving realised

Product Features

- Molded-Oil provides continuous supply of lubrication oil
- Stainless steel for corrosive environments
- Grease-free property with no oil refilling keeps operating environments clean
- Operating life more than twice as long as grease lubrication, in water or dustcontaminated 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



↑ Molded-Oil Bearings

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Costs for Lubrication	€ 6.377	No Lubrication costs	€ 0
	Costs for mounting and dismounting the bearings	€ 2.938	No costs for mounting and dismounting of the bearings	€ 0
Total Costs		**€ 9.315**		**€ 0**

aip NSK experts SS-GB-1022

NSK Europe - https://www.nskeurope.com

Conveyor

45

Success Story

Industry: Food and Beverage

Application: Conveyor

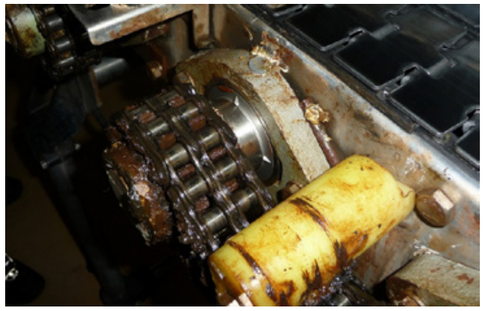
Cost Savings: 5,080 euros

Introduction

An international drinks producer had repeated problems with mounted-unit inserts failing prematurely. Cleaning the equipment with water and chemicals was destroying the bearing seals and washing out the grease pack. As a result, the mounted-unit inserts had to be replaced every 5 to 6 months and re-greased every 3 weeks. NSK was asked to find a solution to this problem in order to improve the service life.

Key Facts

- Drive/conveyor system (sorting plant)
- Premature failure of a competitor's mounted-unit inserts
- Frequent relubrication
- Service life only 5 to 6 months
- NSK's solution: replacing the mounted-unit inserts with NSK's Molded Oil mounted-unit inserts
- No bearing failures in the first year
- No additional regreasing



↑ Conveyor drive

Value Proposals

- Failed bearing investigation showed the seals to be destroyed by the washing process resulting in wash out of the grease pack
- Doubling the service life after supplying successful samples
- 100% reduction in servicing intervals (bearings previously lubricated 17 times a year)
- Ordering and fitting another 12 Molded Oil mounted-unit inserts

aip NSK experts SS-GB-1014

NSK Europe - https://www.nskeurope.com

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 mounted unit insert

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Relubrication	€4.080	No relubrication	€0
	Replacement & modification	€1.000	No modification necessary	€0
Total Costs		**€5.080**		**€0**

aip NSK experts SS-GB-1014

NSK Europe - https://www.nskeurope.com

Conveyor

Success Story

Industry: Food and Beverage

Application: Conveyor Tail Drum

Cost Savings: 192,600 euros

Introduction

An internationally renowned Italian Food Company was experiencing problems with its fixed tail drum conveyor bearings. Operating in a damp environment the bearings had a life of only 6 months. The company asked NSK to analyse the application and propose technical solutions to increase the bearing life and reduce maintenance costs, which had become excessive due to frequent bearing failures. NSK proposed a heavy duty Spherical Roller bearing fitted with Molded-Oil lubrication system. Resultant performance was increased improving machine reliability and reducing maintenance costs.

Key Facts

- Food Production with frequent wash downs
- Conveyor Tail Drum Application
- Regular failure of existing bearings due to water ingress
- NSK analysed the application to find the best solution
- Spherical Roller bearings with Molded-Oil Lubrication
- Improved reliability, reduced maintenance costs

↑ Tail Drum Conveyor

Value Proposals

- Failed bearing analysis and application review
- NSK proposed Molded-Oil Spherical Roller Bearings to replace the existing double-row ball bearing with grease lubrication
- Increased load capacity and Molded-Oil lubrication resulted in 15 months maintenance free operation
- Improved machine reliability allowed maintenance intervals to be increased
- New tests are on-going in order to verify the possibility of increasing the bearing life even more
- Cost saving calculation based on reducing maintenance costs and stopping unplanned failures was valued at €193.000

Product Features

- High Capacity Spherical Roller Bearings with Machined Brass Cage Molded-Oil lubrication system provides a maintenance free bearing solution
- 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 environment
- 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

↑ Molded-Oil Bearings

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Bearing replacement costs (per year)	€2.160	Bearing Costs	€1.800
	Production loss due to bearing replacement operations:6 production lines × 3 maintenance stops × 3 hours × €3.500/h	€189.000	No production stoppages. The bearings can be replaced during standard maintenance – bearings are still running after 15 months	€264
	Costs due to maintenance operations: 6 production lines × 3 maintenance stops × 2 persons × 3 hours × €30/h	€3.240	No maintenance costs	€0
Total Costs		**€194.400**		**€1.800**

Success Story

Industry: Food and Beverage

Application: Cutter line

Cost Savings: 134,478 euros

Introduction

A major producer of snack foods was experiencing frequent failures of bearings on their cutter line. This was investigated by NSK and found to be caused by grease wash out following the line wash down process. Routine planned maintenance was carried out every 6 weeks which included changing the bearings to prevent unplanned stoppage. However failure did also occur before this maintenance was carried out resulting in loss of production. NSK engineers proposed to replace the current bearings with NSK Life-Lube housed units which achieved a vast improvement in the bearing lifetime resulting in the reduction of maintenance costs and lost production costs.

Key Facts

- Cutter line application
- Bearing failure occurring due to wash down processes
- High maintenance costs and loss of production
- NSK solution: Life-Lube housed units
- Significant improvement in bearing lifetime
- Reduction of downtime, parts and maintenance labour

↑ Cutter line

Value Proposals

- NSK reviewed the application following a process map survey of the site and discovered the issue of grease wash out
- A trial on one line using NSK Life-Lube product was proposed
- Trial bearings were fitted and monitored
- After one year the bearings were still performing well with no failures
- This success is now being transferred to the other two lines

aip NSK experts SS-GB-2061

NSK Europe - https://www.nskeurope.com

Product Features

- PBT thermoplastic resin housing
- Molded Oil inserts (with solid lubricant)
- Martensitic stainless steel
- Nitrile rubber seals
- Available in NP, SF, SFT & ST equivalents
- Bore size 20mm - 40mm
- Corrosion resistance
- Paint free housings, preventing chipping & flaking
- Resistant to contamination increasing operating life
- Ideal for operations where fluid process is unavoidable
- No need for re-lubrication

↑ NSK Life-Lube with Molded-Oil bearings insert

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Costs of bearings across all three lines	€ 5.512	Costs of Life-Lube housing units across all three lines	€ 1.571
	29 x 1,5 hours fitting costs; €72 per hour across all three lines	€ 3.088	4,5 hours fitting costs at €72 per hour across all three lines	€ 319
	2 x 2,5 hours lost production; €426 per minute across all three lines	€ 127.768	No costs of lost production	€ 0
Total Costs		**€ 136.368**		**€ 1.890**

aip NSK experts SS-GB-2061

NSK Europe - https://www.nskeurope.com

Cutter line

Success Story

Industry: Food and Beverage

Application: Dip Tank Conveyor Nose Roller

Cost Savings: 80,493 euros

Introduction

A large producer of chewing gum and sweet products was experiencing repeated bearing failures on their Dip Tank Conveyor Nose Roller. The customer was changing bearings approximately every 7 weeks which involved high maintenance costs and regular unplanned machine down time. NSK investigated this problem and discovered the bearing Arrangement comprised three Deep Groove Ball Bearing Units assembled together flush, one set each side of the roller. The bearings were not designed to operate in this type of arrangement as they did not share the load and were also affected by axial preload. NSK proposed placing a spacer between each bearing to separate them to aviod axial loading. A trial was initiated which resulted in an immediate improvement and significant lifetime extension.

Key Facts

- Frequent bearing failures occuring approximately every 7 weeks
- Approximately 8 hours of manpower needed to replace failed bearings annually
- Substantial machine down time, 1 hour per roller and bearing set change
- NSK solution: separate each bearing from another with a spacer
- Significant lifetime improvement resulting in no failures over a 1 year period
- Productivity improvement
- Large annual cost saving achieved

↑ Dip Tank Conveyor Nose Roller

Value Proposals

- Following repeated and costly failures the customer requested a solution to their problem on the Dip Tank Conveyor Nose Roller Application
- NSK performed an Application Review and discovered the three bearings fitted to each side of the roller were not designed for flush mounting. Spacers were placed between each to separate them to avoid axial preload
- A trial was proposed using spacers and new sets of bearings
- This resulted in a reduction of machine downtime and maintenance costs and a significant annual cost saving as roller service life was extended to 1 year

Product Features

- Cage made of steel, solid brass or plastic
- Electrically insulated roller bearings available
- Outer diameters up to 2500 mm
- Ultra pure steel - Bearing's life increasement by up to 80%
- Smaller axial loads in both directions
- Very high speed
- High grade balls for quiet and more consistent operation at higher speeds
- Bearing Spacer Shims
- Spacer allow two or more bearings to be flush mounted which are originally not designed for this use
- Prevent axial preload and ensure bearings better share loads applied to them

↑ Deep Groove Ball Bearing

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	8 hours loss of production	€ 86.400	1 hour loss of production	€ 10.800
	- Bearings- Spacer- Shaft & Roller	€ 2.888	- Bearings- Spacers- Shaft & Roller	€ 361
	8 hours labour costs	€ 2.704	1 hour labour costs	€ 338
Total Costs		**€ 91.992**		**€ 11.499**

aip NSK experts SS-GB-2065

NSK Europe - https://www.nskeurope.com

Dip Tank Conveyor Nose Roller

aip NSK experts SS-GB-2065

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Dough Prove

Cost Savings: 54,665 euros

Introduction

A Tortilla Wrap manufacturer was experiencing short service life on its pillow block bearing units mounted in the multiple belt dough prove section of the process line. Two bearing units were replaced every 6 weeks with resultant shaft damage, leading to high production downtime, maintenance and part replacement costs. Investigations by NSK engineering attributed the failures to ingress of particulates and set screw loosening due to vibration. NSK recommended replacing the standard pillow block units with Self-Lube Bearing Units with Triple Lip Seals and eccentric locking collars. A trial was implemented and the recommended bearings have successfully extended life from 6 weeks to over 1 year resulting in significant cost savings.

Key Facts

- Multiple belt Dough Prove conveyor
- Harsh environment, exposed to flour particulates and dough
- Frequent bearing failure resulting in two bearings and one shaft being replaced approximately every 6 weeks
- Significant number of man hours needed to replace failed bearings and shaft
- Substantial machine downtime leading to costly loss of production
- NSK Solution: Self-Lube Bearing Unit with Triple-Lip Seal and eccentric locking collar
- Increased bearing life resulting in significant downtime reduction, with improved efficiency and equipment reliability
- Cost saving realised

↑ Dough Prove

Value Proposals

- NSK Application Review determined the bearings had failed due to ingress of contamination, combined with shaft creep
- NSK recommended replacing the standard Pillow Block mounted bearing units with Self-Lube Bearing Units with Triple Lip Seals and eccentric locking collars
- A trial was conducted using the NSK recommendations with zero failures in a 12 month period
- This resulted in a substantial increase in bearing and shaft life, with a significant reduction in downtime, improved efficiency and improved equipment reliability
- Zero loss of production increased profitability and realised a significant cost saving.

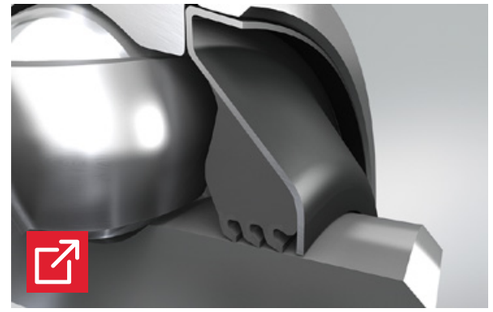
aip NSK experts SS-GB-2085

NSK Europe - https://www.nskeurope.com

Dough Prove

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
- 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
- Eccentric collar reduces insert loosening in service without damaging shaft



↑ Self-Lube Bearing Units with Triple Lip Seals

Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
Bearing Costs: 2 bearings replaced 9 times per year	€ 660	Bearing costs: replacement of all prove bearings	€ 3.295
Downtime Costs: €2950/hr x 2hr replacement time x 9 times per year	€ 53.100	Downtime costs	€ 0
Replacement shaft costs	€ 3.180	Replacement shaft costs	€ 0
Fitting costs: €170/hr x 2 hrs per replacement x 9 times per year	€ 3.060	Initial Fitting Costs: €170/hr x 12 hrs	€ 2.040
Total Costs	**€ 60.000**		**€ 5.335**

aip NSK experts SS-GB-2085

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Feed Conveyor

Cost Savings: 13,309 euros

Introduction

A customer reported regular bearing failures on the feed conveyor in their animal feed production plant. These premature failures led to costly downtime while engineers replaced the units. Investigations by NSK attributed the failures to ingress of hard particulates and moisture from process materials. NSK recommended the customer to replace the standard Self-Lube Units used with Triple-Lip Sealed Units. A trial was implemented and new bearings have been operating successfully for about 1 year resulting in significant cost savings.

Key Facts

- Feed conveyor in animal feed production plant
- Frequent bearing failure resulting in bearings being changed approximately every 4 months
- Significant number of man hours needed to replace failed bearings
- Substantial machine downtime leading to costly loss of production
- NSK Solution: Self-Lube Triple-Lip Sealed Unit
- Productivity improvement
- Cost saving realised

↑ Animal Feed Plant Conveyor

Value Proposals

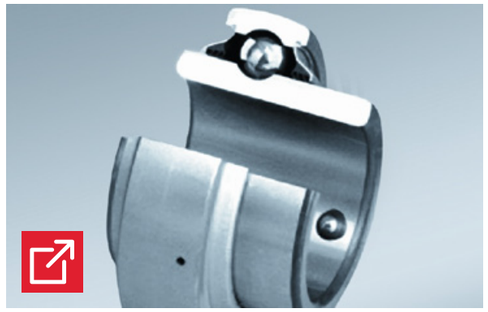
- NSK Application Review determined the bearings had failed due to ingress of moisture and hard particulates
- Having completed the Review, NSK recommended to replace the standard Self-Lube Units used with Units equipped with Triple-Lip Sealed Inserts
- A trial was conducted using Self-Lube Units with Triple-Lip Sealed Inserts
- The trial resulted in a substantial increase in bearing life and reduction of machine downtime

aip NSK experts SS-GB-2076

NSK Europe - https://www.nskeurope.com

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
- 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



↑ Triple-Lip Sealed Inserts

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Standard Self-Lube Units costs	€ 506	Costs of Self-Lube Units with Triple-Lip Sealed Inserts	€ 238
	Lost production costs	€ 12.960	Lost production costs	€ 0
	Engineering costs	€ 81	Engineering costs	€ 0
Total Costs		**€ 13.547**		**€ 238**

aip NSK experts SS-GB-2076

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Food Production Conveyor

Cost Savings: 69,826 euros

Introduction

The customer was experiencing failures every 4 – 6 weeks with ball bearing inserts on a food production conveyor line. Regular high pressure wash-downs led to corrosion, seal damage and grease wash-out from the bearings, resulting in regular maintenance and production downtime. NSK reviewed the bearing application and were able to recommend NSK Life-Lube® as a solution. Trial bearings were purchased and applied. This resulted in significant improvements in bearing life with no failures during the trial period.
This solution increased reliability and reduced unplanned downtime resulting in a large cost saving.

Key Facts

- Food production conveyor
- Corrosion, seal damage and grease wash-out from the bearings due to high pressure wash-downs
- NSK Solution: Stainless steel Molded-Oil bearing inserts
- 12 month trial on 10 bearings
- Highly increased life-time: No failures even after 12 months of operation
- Cost reduction for bearings, lubrication and maintenance
- Productivity improvement

↑ Conveyor belt

Value Proposals

- NSK reviewed the bearing application and discovered that bearing corrosion and grease wash out were the main issues
- A trial was proposed using Stainless steel Molded-Oil bearing inserts
- After 12 months the bearings were still performing well with no failures
- From this trial the solution was applied to other similar applications generating significant cost savings
- This success was then transferred to further production sites of this customer

Food Production Conveyor

Product Features

- PBT thermoplastic resin housing
- Molded-Oil inserts (with solid lubricant)
- Martensitic stainless steel
- Nitrile rubber seals
- Available in Pillow Block, 2 and 4 bolt flanges and take-up unit housings
- Bore size 20mm - 40mm
- Corrosion resistance
- Paint free housings, preventing chipping & flaking
- Resistant to contamination increasing operating life
- Ideal for operations where process fluid is unavoidable
- No need for re-lubrication

↑ Molded-Oil Bearings

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Regular bearing failures every 4-5 weeks on two key process lines. Annual bearing costs: €922 per line × 2	€1.844	No bearing failures in 12 months, resulting in inventory reduction. €533 per line × 2	€1.066
	Maintenance costs per line, including re-lubrication, labour, overheads: €1.644 per line × 2	€3.288	No re-lubrication needed, reduced labour costs	€0
	Lost production downtime (12×/year). €32.880 per line × 2	€65.760	No production lost to unplanned downtime	€0
Total Costs		**€70.892**		**€1.066**

aip NSK experts SS-GB-2003

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Germination Vessel - Stirrer Units

Cost Savings: 53,807 euros

Introduction

A supplier for a major UK Brewery was experiencing regular failure of bearings for their grain stirrer application which is used in the germination vessels. Bearings needed to be replaced regularly resulting in high costs and loss of production. NSK reviewed the application and advised that a Spherical Roller Bearing would be better suited to the application. This bearing change resulted in longer bearing life and reduced unplanned downtime.

Key Facts

- 4 Germination Vessels
- 22 Stirrer Units per Vessel
- Vertical Application
- Competitor Self Aligning Ball Bearing failing regularly due to application conditions
- NSK solution: To replace Self Aligning Ball Bearing with SWR series Spherical Roller Bearing
- Bearing life extended by 3 to 4 times

↑ Germination Vessel - Stirrer Unit

Value Proposals

- NSK Engineers performed an Application Review together with a Failed Bearing Analysis
- A recommendation of NSK Spherical Roller Bearings was made which have a larger load capacity
- A trial of NSK SWR series Spherical Roller Bearings resulted in 3 to 4 times longer bearing life

aip NSK experts SS-GB-2066

NSK Europe - https://www.nskeurope.com

Product Features

- Improved material strength of outer ring.
- Ability to use with or without seals.
- Improved wear resistance – three times compared to AISI 52100 bearing steel.
- Minimized outer-ring friction to extend flaking life.
- Improved flaking life property – five times compared to AISI 52100 bearing steel.
- Material strength improved to prevent breakage of the outer ring after the occurrence of flaking - five times compared to AISI 52100 bearing steel.
- SWR can replace standard SRB without modifying the axle boxes.

↑ SWR series Spherical Roller Bearing

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Bearing costs x 4 vessels	€ 15.270	Bearing costs x 4 vessels	€ 14.625
	Initial labour costs 50/hr x 13hr x 4 vessels	€ 49.769	Initial labour costs 50/hr x 22 Units x 8hr x 4 vessels	€ 49.769
	Downtime costs 50/hr x 13hr x 4 vessels	€ 7.352	No downtime costs	€ 0
	Replace damage parts x 4 vessels	€ 45.810	No replacement of damage parts	€ 0
Total Costs		**€ 118.201**		**€ 64.394**

aip NSK experts SS-GB-2066

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Meat Slicer Machine

Cost Savings: 30,471 euros

Introduction

A leading producer of pork products was facing repeated bearing failures on 14 Meat Slicer Machines. The customer needed to change bearings on each machine monthly, leading to high maintenance costs and lengthy machine down time. NSK investigated this problem and identified that the bearings were damaged by ingress of water and hard contaminants which were entering the bearing due to daily machine wash down. NSK proposed a trial with NSK Molded-Oil bearings resulting in a significant lifetime extension and cost saving.

Key Facts

- Frequent bearing failures occuring every month across all 14 machines.
- Approximately 168 man hours needed to replace failed bearings annually.
- Substantial machine down time, 3 hours per bearing and shaft change per machine.
- NSK solution: Deep Groove Ball Bearings with Molded-Oil lubrication.
- Significant lifetime improvement resulting in no failures over a 4 month period on each machine.
- Productivity improvement.
- Significant annual cost saving achieved.

↑ Meat Slicer Machine

Value Proposals

- Following repeated and costly bearing failures, the customer requested a solution to the problem on their Meat Former/Classifier/Slicing Machines.´
- A Failed Bearing Analysis determined that the failures were due to water and hard particle ingress resulting in lubrication breakdown/washout.
- A trial was proposed using NSK Molded-Oil Deep Groove Ball Bearings which proved to be successful. Bearing service life was extended significantly.
- Molded-Oil bearings are now being installed in all 14 machines. A reduction in machine down time and maintenance costs are expected to yield significant annual cost savings.

aip SS-GB-2067

NSK Europe - https://www.nskeurope.com

Meat Slicer Machine

Product Features

- Available for high speed applications
- Available in ball bearing, spherical roller bearing and tapered roller bearings types
- Rust-proof - Stainless steel for corrosive environments
- Grease-free property with no oil refilling keeps operating environments clean
- Operating life more than twice as long as grease lubrication, in water or dustcontaminated 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

↑ Deep Groove Ball Bearings with Molded-Oil

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Bearing costs	€ 11.021	Bearing costs	€ 34.478
	Lost production costs	€ 23.520	Lost production costs	€ 5.880
	Labour costs	€ 15.120	Labour costs	€ 3.528
	Ancillary components costs	€ 32.928	Ancillary components costs	€ 8.232
Total Costs		**€ 82.589**		**€ 52.118**

aip SS-GB-2067

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Mecatherm Dough Mixer

Cost Savings: 47,987 euros

Introduction

A major UK bakery was facing regular bearing failures on their Mecatherm Dough Mixer. Bearings needed to be replaced every 2 to 3 months resulting in high costs of maintenance and loss of production. NSK reviewed the bearing application and recommended NSKHPS Spherical Roller Bearings. This improved bearing life significantly by 3 to 4 times and therefore reduced unplanned downtime resulting in a large cost saving.

Key Facts

- 2 Mecatherm Dough Mixers in use
- Dough Mixer application requires heavy load capacity together with bearings that can also accomodate swashing caused by shaft deflection
- Original bearings only lasted between 2 & 3 months due to application conditions
- NSK Solution: NSKHPS (High Performance Standard) Spherical Roller Bearings ideal for heavy loads
- Bearing life extended by 3 to 4 times
- Reduced maintenance requirement resulted in a significant cost saving generated

↑ Dough Mixer

Value Proposals

- NSK Engineers reviewed bearing application including an analysis of the failed bearings
- Recommendation of NSKHPS Spherical Roller Bearings
- A trial of NSKHPS bearings resulted in life improvements 3 to 4 times that of before

Product Features

- Highest load rating SRB's
- 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
- High load rating enables downsizing

↑ NSKHPS Spherical Roller Bearings

Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
Lost production: 12hrs x 600 €/hr x 8/year	€57.600	Lost production: 12hrs x 600 €/hr x 2/year	€14.400
Labour cost: 22 €/hr x 24hrs x 8/year	€4.224	Labour cost: 22 € x 24 hrs x 4/year	€2.112
Bearings costs	€864	Bearings costs	€432
Engineering support	€2.243	Engineering support	€0
Total Costs	**€64.931**		**€16.944**

aip NSK experts SS-GB-2047

NSK Europe - https://www.nskeurope.com

Mecatherm Dough Mixer

Success Story

Industry: Food and Beverage

Application: Milk Bottle Conveyor

Cost Savings: 7,625 euros

Introduction

Key Facts

- Frequent bearing failures occuring approximately every 16 weeks across 5 conveyors
- Approximately 20 man hours needed to replace failed bearings every 5 years
- Significant machine down time, 1 hour per bearing change
- NSK solution: Silver-Lube housed bearing units
- Significant lifetime improvement resulting in no failures over a 5 year period
- Productivity improvement
- Substantial cost saving achieved

↑ Milk Bottling Conveyor

Value Proposals

- Following repeated and costly bearing failures the customer requested a solution to their problem on 5 Milk Bottling Line Conveyors
- After performing an Application Review it was discovered that water was getting into the bearings causing the corrosion.
- NSK recommended the customer to use Stainless Steel Silver-Lube bearings to eliminate the problem
- A trial was proposed and implemented on all 5 conveyor systems
- This resulted in a reduction of machine downtime and maintenance costs and a significant annual cost saving as bearing service life was extended to more than 5 years

aip NSK experts SS-GB-2070

NSK Europe - https://www.nskeurope.com

Product Features

- PBT thermoplastic resin housing
- Martensitic stainless steel
- Nitrile rubber seals
- Available in Pillow Block, 2 and 4 bolt flanges and take-up unit housings
- Bore size 20mm – 40mm
- Corrosion resistance
- Paint free housings, preventing chipping & flaking
- Resistant to contamination increasing operating life
- Ideal for operations where process fluid is unavoidable

↑ NSK Silver-Lube

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Costs for bearings	€ 2.804	Costs for bearings	€ 748
	Engineering labour costs	€ 1.925	Engineering labour costs	€ 481
	Lost production costs	€ 4.125	No lost production costs	€ 0
Total Costs		**€ 8.854**		**€ 1.229**

aip NSK experts SS-GB-2070

NSK Europe - https://www.nskeurope.com

Milk Bottle Conveyor

Success Story

Industry: Food and Beverage

Application: Milk Processing Plant

Cost Savings: 13,304 euros

Introduction

The customer was experiencing regular bearing failure on their conveyor at a Milk Processing Plant. The bearings were in an inaccessible area and were difficult to lubricate. The customer had to change the bearings every 10 weeks, resulting in down-time of 3 hours at least twice a year. NSK reviewed the bearing application and suggested that Stainless steel bearing inserts fitted with Molded-Oil would give a better service life. They combined these with the additional benefits of Silver-Lube® polymer housings to provide the Life-Lube® combination. Trials showed that bearing life was extended from 10 weeks to over 1 year.

Key Facts

- Milk processing plant
- Customer had to change the bearings every 10 weeks
- NSK solution: Life-Lube® Housings with Molded-Oil Bearing insert
- Reduced downtime
- Productivity improvement
- Cost saving and zero maintenance

↑ Milk processing

Value Proposals

- NSK application review highlighted poor bearing life and difficult maintenance
- NSK recommended Molded-Oil inserts and Silver-Lube® plastic housings
- Increased corrosion resistance and Molded-Oil Lubrication resulted in over 12 months lifetime
- Additional benefit gained due to not having to replace shaft after bearing failure
- Technical support provided for fitting new Life-Lube® units

Product Features

- PBT thermoplastic resin housing
- Molded-Oil inserts (with solid lubricant)
- Martensitic stainless steel
- Nitrile rubber seals
- Available in Pillow Block, 2 and 4 bolt flanges and take-up unit housings
- Bore size 20mm – 40mm
- Corrosion resistance
- Paint free housings, preventing chipping & flaking
- Resistant to contamination increasing operating life
- Ideal for operations where process fluid is unavoidable
- No need for re-lubrication

↑ Life-Lube® housing with Molded-Oil bearing insert

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Old bearing design:	€140	New bearing design:	€136
	Labour: 2 fitters × 3 hours@ €25/h, 5 × year	€750	No maintenance	€0
	Downtime: 3 hours @ €2.055, 2 × year	€12.330	No downtime	€0
	2 x shafts replaced @ €110 each	€220	No replacement shafts	€0
Total Costs		**€13.440**		**€136**

Milk Processing Plant

Success Story

Industry: Food and Beverage

Application: Oven Fan Unit

Cost Savings: € 34 907

Introduction

A leading UK Bakery was experiencing regular, unexpected production stoppages, due to premature failure of pillow block ball bearing mounted units, fitted to a high tempertaure oven re-circulation fan unit. This resulted in significant disruption to production, high downtime costs and spoilt product. NSK conducted a full evaluation of the application incl. failed bearing analysis and concluded that the bearings were seizing from excessive pre-loading and incorrect lubrication selection on installation. NSK proposed Plummer Blocks with high capacity Spherical Roller Bearings and Labyrinth seals, and recommended the correct bearing location and lubrication. This solution resulted in an immediate improvement and significant service life extension by a factor of 4.5 times.

Key Facts

- High temperature oven re-circulation fan unit - vertical orientation and belt driven
- Existing bearings not adequate for operating conditions
- Frequent bearing failure occuring every 6 weeks
- Bearing failure resulted in substantial machine downtime and costly loss of production
- NSK proposed SNN Plummer Blocks with high capacity Spherical Roller Bearings and Labyrinth seals, with recommendations on correct bearing location and lubrication
- Bearing life extended form 6 weeks to 27 weeks
- Large cost saving generated by improving production efficiency and equipment reliability

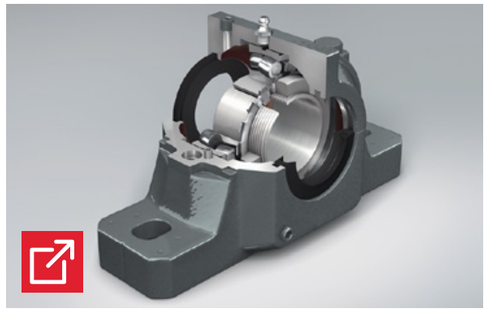
↑ Oven Re-Circulation Fan Unit

Value Proposals

- Following repeated and costly bearing failures the customer requested a solution to their problem on an over re-circulation fan unit.
- NSK Application Review determined the bearings had failed from excessive pre-loading and inadequate lubrication.
- NSK proposed SNN Plummer Blocks with HPS Spherical Roller Bearings and Labyrinth seals, with recommendations on correct bearing location and lubrication.
- A trial was conducted using the NSK recommendations with a 4.5 times life extension.
- This resulted in a reduction of machine downtime and maintenance costs and a significant annual cost saving

Product Features

- Equipped with 2 lubrication holes and 1 draining hole
- Solid corners in the base for locating pins
- Square shape and centre marks
- Easy assembly, easy alignment, low maintenance costs
- 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



↑ Plummer Blocks with high capacity Spherical Roller Bearings and Labyrinth seals

Cost Saving Breakdown

Before	Cost p.a.	NSK Solution	Cost p.a.
2 bearing units replaced 9 times per year	€ 14 171	Initial installation plus 2 bearing units replaced twice per year	€ 2 873
€ 550/hr x 5 hr replacement time x 9 breakdowns per year	€ 24 750	€ 550/hr x 5 hr replacement time x 2 breakdowns per year	€ 5 500
2 Maintenance Technicians x 5 hrs/breakdown x 9 breakdowns/yr	€ 2 565	2 Maintenance Technicians x 5 hrs/breakdown x 2 breakdowns/yr	€ 855
Spoiled product	€ 3 406	Spoiled product	€ 757
Total Costs	**€ 44 892**		**€ 9 985**

aip NSK experts SS-GB-2063

NSK Europe - https://www.nskeurope.com

Oven Fan Unit

Success Story

Industry: Food and Beverage

Application: Pick & Place Unit

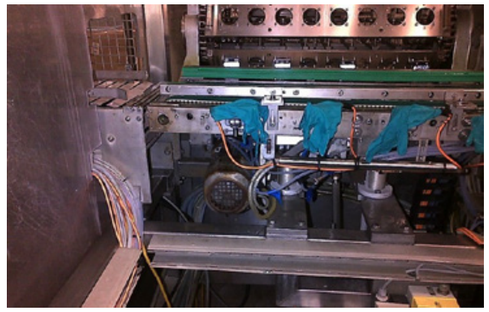
Cost Savings: € 41.791

Introduction

A company in the Food & Beverage industry was experiencing repeated bearing failures on a Pick & Place Unit Roller. Approximately 4 bearing sets were being changed annually due to the roller failing approximately every 3 months. A review by NSK showed the cause to be an ingress of water and process materials. NSK recommended replacing the standard bearings with NSK Molded-Oil units. A trial was implemented and since then commissioning failures have been significantly reduced. For approximately one year there had been no failures. The result was an improved productivity through reduced machine downtime.

Key Facts

- Frequent bearing failure resulting in approximately 8 bearings being replaced annually
- Significant number of man hours needed to replace failed bearings
- Frequent machine down time leading to costly lost production
- NSK Solution: Molded-Oil Ball Bearings
- Productivity improvement
- Cost saving realised



↑ Pick & Place Unit

Value Proposals

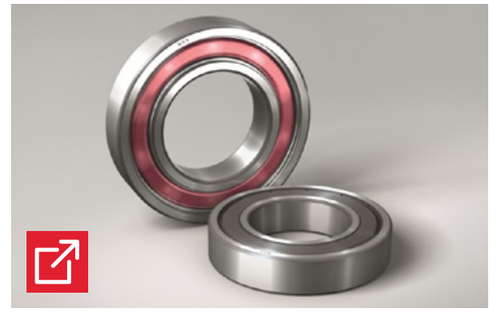
- NSK Application Review determined the bearings had failed due to the absence of lubrication and ingress of water and process materials
- Having completed the Review, NSK recommended the use of Molded-Oil Ball bearings
- A trial using Molded-Oil Ball Bearings was implemented
- The trial resulted in a substantial increase in bearing life and a reduction in machine down time

aip NSK experts SS-GB-2075

NSK Europe - https://www.nskeurope.com

Product Features

- 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 dustcontaminated 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
- Stainless steel for corrosive environments



↑ NSK Molded-Oil Deep Groove Ball Bearing

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Bearing Costs	€ 172	Bearing Costs	€ 501
	Labour Costs	€ 3.240	Labour Costs	€ 0
	Lost Production Costs	€ 38.880	Lost Production Costs	€ 0
Total Costs		**€ 42.292**		**€ 501**

aip NSK experts SS-GB-2075

NSK Europe - https://www.nskeurope.com

Success Story

Industry: Food and Beverage

Application: Potato Washer

Cost Savings: 22,250 euros

Introduction

A premium snack processing company was experiencing frequent bearing failures on a potato wash application causing significant downtime and reduced production. NSK carried out a bearing failure analysis revealing ingress of contamination leading to significant reduction in life time. NSK was asked to find a solution to this problem in order to improve service life. A trial was agreed which resulted in an increase of bearing life by 2 times.

Key Facts

- High volume potato cleaning line
- Frequent bearing failure causing significant production downtime and high costs
- Water and soil particle ingress
- Application indoor and outdoor (climatic influences)
- NSK's solution: replacing standard ball bearing with NSK's Molded-Oil ball bearing
- No bearing failures for more than 8 months
- Productivity improvement
- Cost saving generated

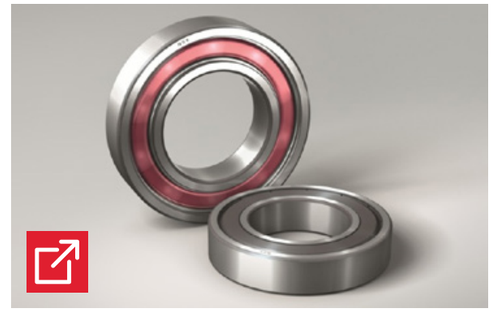
↑ Potato washing application

Value Proposals

- NSK engineering conducted a Bearing Failure Analysis showing ingress of contermination into the bearing (Water / Soil)
- Replacing the standard ball bearings with Molded-Oil ball bearings
- A trial was agreed which resulted in an increase of bearing life from 4 months to over 8 months
- The customer benefited from increased productivity and reduced maintenance costs
- No need for re-lubrication

Product Features

- Molded-Oil provides continuous supply of lubrication oil
- Stainless steel for corrosive environments
- 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



↑ Molded Oil Bearing

Cost Saving Breakdown

Before		Cost p.a.	NSK Solution	Cost p.a.
	Engineering costs	€ 2.500	Engineering costs	€ 250
	Lost of production	€ 20.000	No modification necessary	€ 0
Total Costs		**€ 22.500**		**€ 250**

aip NSK experts SS-GB-1016

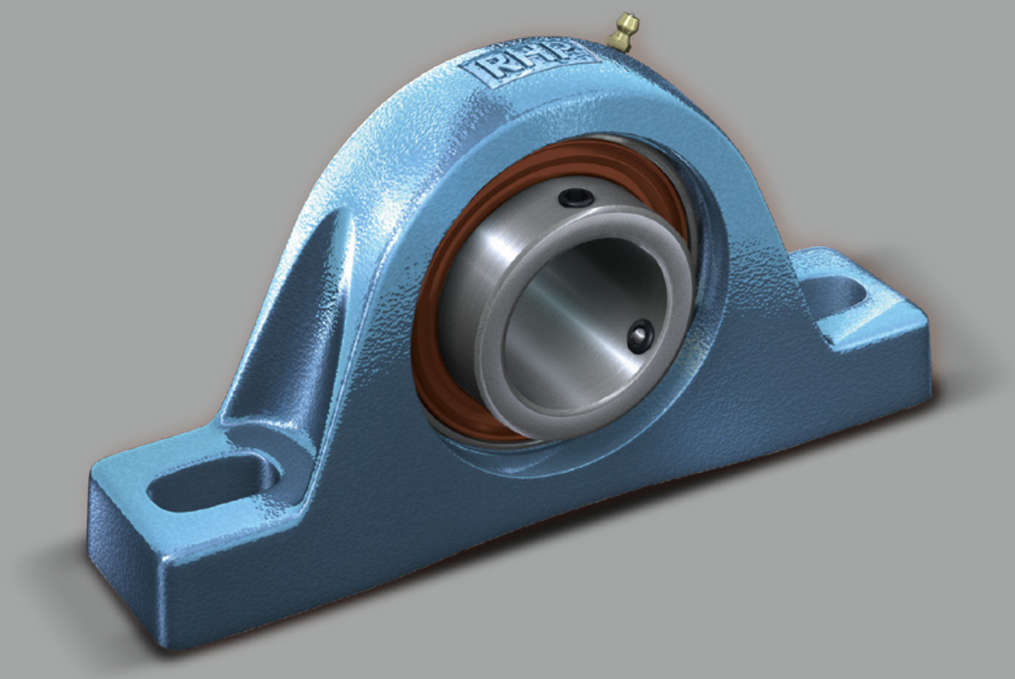
NSK Europe - https://www.nskeurope.com

Presentations

Self-Lube® Bearing Units

Solutions for the Food and Beverage industries

Self-Lube®
Bearing Units



NSK product range

Self-Lube® Bearing Units

Date: January 12, 2021
Place: Musterstadt
Moderator: Max Mustermann

Introduction

Did you know

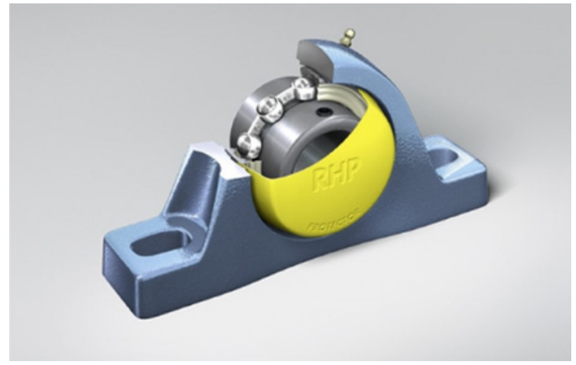
that Self-Lube® Bearing Units are designed to provide an easy and quick solution for mounting bearings without the need for complex housings and special shaft arrangements?

What are Self-Lube® units?

These bearing units were designed to provide a convenient engineering solution with all the features needed to easily attach a bearing both to a frame and onto a shaft.

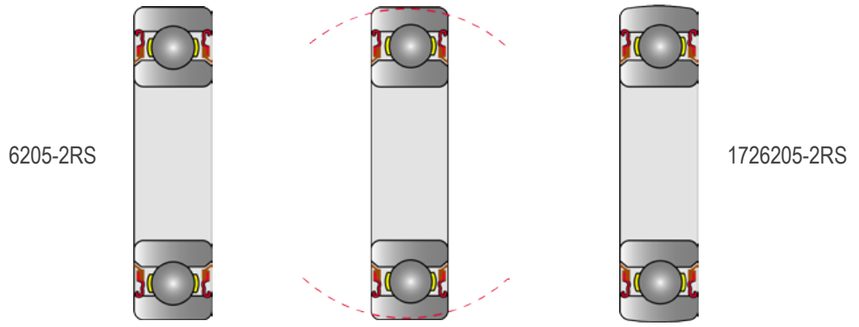
They fulfill three functions:

- Sealed to prevent ingress of contaminants
- To counter any initial misalignment during fitting
- Ease of fitting and removal with the emphasis on time and convenience



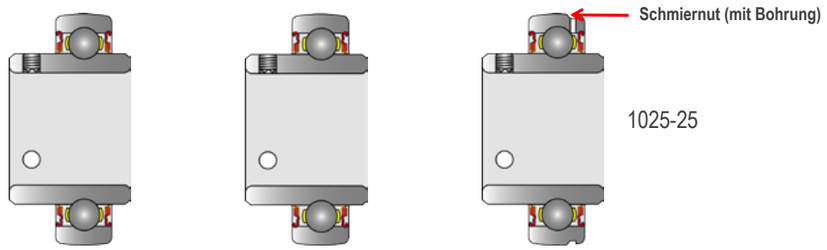
The evolution of Self-Lube® units

- Self-Lube® inserts are based on 6200 series single-row ball bearings
- Two seals are fitted to retain grease and prevent ingress of foreign matter
- The first development stage involved machining a sphere on the outer ring



The evolution of Self-Lube® units

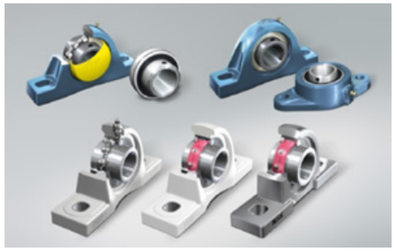
- The inner ring is then extended in both directions to support the shaft
- The bore is slightly larger to allow easy fitting onto the shaft
- A standard locking arrangement involves 2 threaded holes at 120° from each other using set screws to clamp onto the shaft
- The outer ring has a machined grease groove and hole allowing grease to travel into the bearing internals. The grease is applied via a grease nipple fitted into the housing



The evolution of Self-Lube® units

The original concept of this bearing type was to provide a fully engineered solution including a housing and shaft locking mechanism. This included superior bearing sealing and sufficient lubrication for life hence Self-Lube®.

Most applications do not require re-lubrication but this feature was added as a later development for extreme conditions.



Self-Lube® Sealing

The standard Self-Lube® seal runs directly on the ground surface of the inner ring for a good sealing mechanism.

- Bei The standard seal is a black nitrile rubber seal bonded to a steel retainer
- The flexible sealing lip contacts the fine ground finish of the inner ring to give low friction with effective sealing
- The overall temperature range is -20°C to +110°C
- This seal is fitted to the outer ring using a metal forming process. This means it is firmly located and will not be dislodged during re-greasing.

Self-Lube® Sealing

For applications with a high degree of contamination, the specially developed RHP triple-lip seal is recommended.

- The triple-lip seal is excellent in severe conditions like high dust, sand, water and slurry
- Three sealing lips offer improved bearing life compared to standard seals, however speed is affected due to higher friction
- The prefix T is added to the bearing reference to designate the seal e.g. T1025-25G

Self-Lube® Sealing

Where good sealing performance is needed but speed is also important, a flinger seal can be added to the standard sealing arrangement.

- The flinger has a flexible nitrile lip which stops large particles
- It has a secure location on the inner ring and at speed dirt and water are flung by centrifugal force away from the bearing
- This is also excellent at stopping wrap around on the shaft which would normally destroy standard seals

Alternative Shaft Locking arrangements

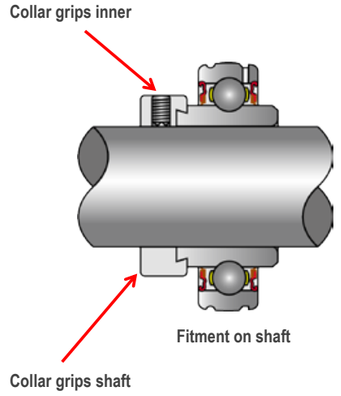
Set screw locking

- Consists of two knurled cup-point located 60° apart on the extended inner ring
- The knurled self locking design securely locates onto the shaft
- For additional security, spot drilling the shaft increases the set screw location

Set screw tightening torques and maximum axial loads

Set screw size	Socket/Allen key size (across flats)	Recommended maximum tightening torque	
		newton metres (Nm)	lbf-inches
1/4 UNF	1/8"	6.8	60
5/16 UNF	5/32"	12.4	110
3/8 UNF	3/16"	22.6	200
7/16 UNF	7/32"	31.6	280
1/2 UNF	1/4"	45.2	400
5/8 UNF	5/16"	53.9	477
M6 x 0.75	3mm	5.7	50
M8 x 1.00	4mm	12.4	110
M10 x 1.25	5mm	27.1	240
M12 x 1.50	6mm	38.4	340
M16 x 1.50	8mm	53.9	477

Alternative shaft locking arrangements

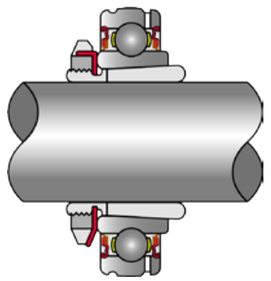


Fitment on shaft

Eccentric locking collar

- In circumstances where vibration may occur, set screws may ‘back-off’, i.e. vibrate loose
- A different locking method is then employed, called an eccentric collar
- Corresponding eccentric grooves are machined into the inner ring and collar
- By rotating the collar in the direction of shaft rotation the shaft is clamped between the collar and the inner ring
- This locking arrangement is only suitable for single direction rotation

Alternative shaft locking arrangements



Fitment on shaft

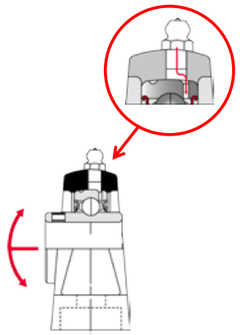
Taper sleeve locking

- In vibration situations where a shaft may also be reversible, the reversal may cause the collar to unlock. A taper sleeve locking device will overcome this.
- The tapered bore of the bearing fits into a split sleeve with an opposing taper which is mounted on the shaft
- As the nut on the end of the sleeve is turned, the split sleeve is pulled through the bore of the bearing

Lubrication

How it works

- Grease is pumped via a grease nipple in the housing
- It then passes through a port in the housing to a groove in the insert
- This groove then transfers the grease to a small hole in the bearing outer ring
- Grease is then delivered at the side of the raceway where it is needed



When to re-lubricate

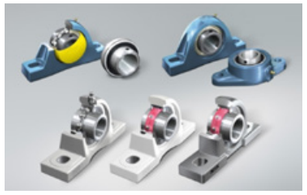
- Under normal conditions it is not necessary to relubricate these bearings
- The exceptions are when operating at extremes of temperature, speed and loading, or where excessive wet or dirty conditions exist

Considerations

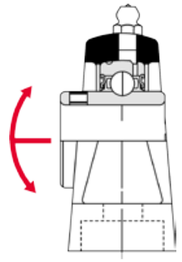
- There is a maximum misalignment limit of the insert to ensure grease is not cut off
- Any replacement grease must be compatible with the existing grease fitted
- Do not overfill with grease especially when the bearing is operating at high speeds

Self-Lube® housings

Self-Lube® units are made from two components, an insert and a housing. Self-Lube® housings are manufactured from many materials and in many shapes to allow for mounting in multiple arrangements.



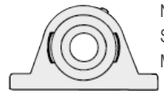
- Housings have a spherical bore or inside surface
- Inserts are rotated into this bore by means of two loading slots
- This allows for a sphere on sphere location, providing the means for small alignment adjustments to be made



Self-Lube® housings

Pillow Blocks

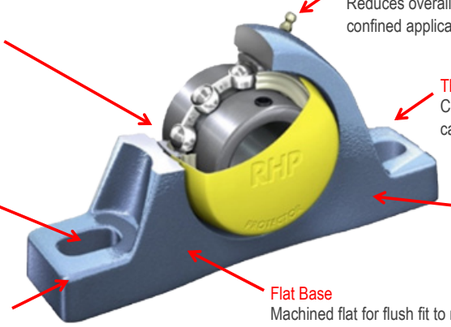
- This is the most common type of housing and has many advanced features



Strengthening Webs
Material efficient cross-section gives optimum balance between load capacity and position adjustment

Elongated Holes
Allows adjustment of housing position

Dowel Pin Dimples
For fine adjustment of housing position to prevent misalignment



Off-Centre Lubrication Point
Reduces overall height of housing to fit into confined applications

Thick Metal Casting
Consistent material thickness from slot to casting edge improves durability

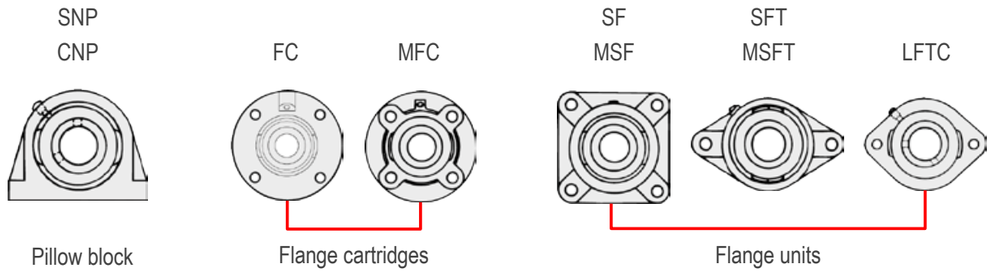
High Quality Cast Iron
Greater rigidity and load capacity

Flat Base
Machined flat for flush fit to mounted surface, preventing formation of hard to clean crevices between housing and mounted surface

Self-Lube® housings

Alternative Pillow Block & Flange Housings

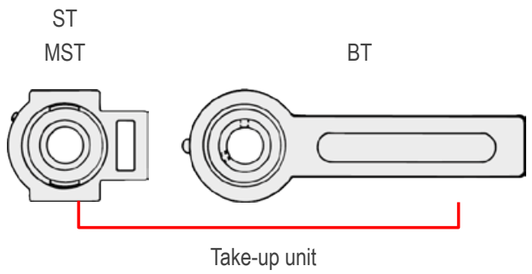
- The range of cast iron housings is extensive for all applications
- These units are designed for face mounting on machine sides



Self-Lube® housings

Take-Up Units & Tensioners

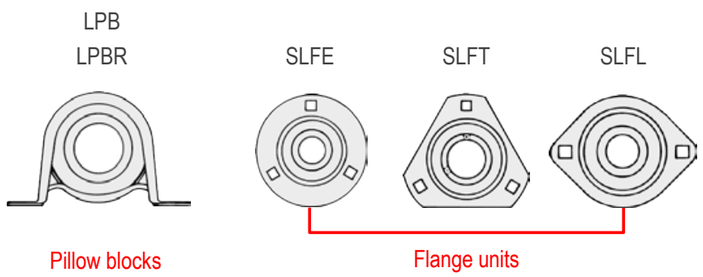
- These units are designed to be applied to belt and conveyor systems



Self-Lube® housings

Pressed Steel Housings

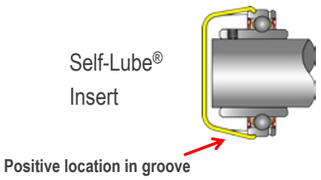
- These units are designed for lighter applications and are zinc plated to resist corrosion

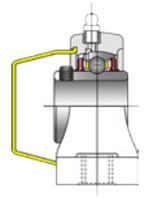


Shaft End Protectors

Standard Self-Lube® inserts have a locating groove to fit a protector cover

- This is an optional accessory and easily clips into place on the insert outer ring
- The Silver-Lube® and Life-Lube® housings have the ability to fit an end cap which locates in the housing, rather than the insert outer ring
- Not only does this provide protection from rotating components for personnel, it also provides a degree of protection for the bearing from external contamination





Housing & Insert Combinations

There are many combinations of inserts and housings to meet a vast array of bearings

Housing & Insert Combinations

MOTION & CONTROL NSK

Insert type

Housing type	1000G	1000DECG	1200G	1200ECG	T1000G	T1000DECG	1000GFS	1000DECGFS	1000-KG
Cast iron one piece	NP SL MP	NP-DEC SL-DEC	NP-A SL-A	NP-EC SL-EC	TNP TSL TMP	TNP-DEC TSL-DEC	NP-FS SL-FS MP-FS	NP-DECFS SL-DECFS	NP1000-K MP1000-K
	SNP CNP	SNP-DEC CNP-DEC	SNP-A CNP-A	SNP-EC CNP-EC	TSNP TCNP	TSNP-DEC TCNP-DEC	SNP-FS CNP-FS	SNP-DECFS CNP-DECFS	
	SF MSF	SF-DEC	SF-A	SF-EC	TSF TMSF	TSF-DEC	SF-FS MSF-FS	SF-DECFS	MSF1000-K
	SFT MSFT	SFT-DEC	SFT-A	SFT-EC	TSFT TMSFT	TSFT-DEC	SFT-FS MSFT-FS	SFT-DECFS	MSFT1000-K
	LFTC	LFTC-DEC	LFTC-A	LFTC-EC	TLFTC	TLFTC-DEC	LFTC-FS	LFTC-DECFS	

Housing & Insert Combinations

MOTION & CONTROL NSK

Insert type

Housing type	1000G	1000DECG	1200G	1200ECG	T1000G	T1000DECG	1000GFS	1000DECGFS	1000-KG
Pressed steel two piece	SLFE	SLFE-DEC	SLFE_A	SLFE-EC	TSLFE	TSLFE-DEC	SLFE-FS	SLFE-DECFS	
	SLFT	SLFT-DEC	SLFT-A	SLFT-EC	TSLFT	TSLFT-DEC	SLFT-FS	SLFT-DECFS	
	SLFL	SLFL-DEC	SLFL-A	SLFL-EC	TSLFL	TSLFL-DEC	SLFL-FS	SLFL-DECFS	
	LPB LPBR	LPB-DEC LPBR-DEC	LPB-A LPBR-A	LPB-EC LPBR-EC					

Housing & Insert Combinations

MOTION & CONTROL NSK

Insert type

Housing type	1000G	1000DECG	1200G	1200ECG	T1000G	T1000DECG	1000GFS	1000DECGFS	1000-KG
Cast iron one piece	FC	FC-DEC	FC-A	FC-EC	TFC	TFC-DEC	FC-FS	FC-DECFS	
	MFC				TMFC		MFC-FS		
	ST MST	ST-DEC	ST-A	ST-EC	TST TMST	TST-DEC	ST-FS MST-FS	ST-DECFS	MST1000-K
	BT		BT-A	BT-EC	TBT		BT-FS		
	SLC MSC	SLC-DEC	SLC-A	SLC-EC	TSLC TMSC	TSLC-DEC	SLC-FS MSC-FS	SLC-DECFS	
	SCHB SCH				TSCHB TSCH		SCHB-FS SCH-FS		

Self-Lube® selection guide

MOTION & CONTROL NSK

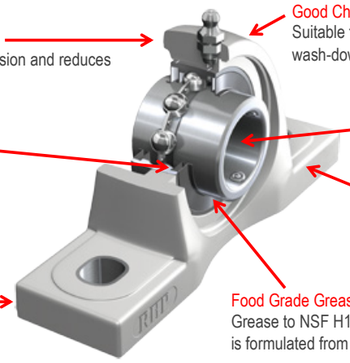
This is a basic selection guide for metric sizes of Self-Lube® units showing part numbers

Self-Lube® Bearing Units

Self-Lube® for special environments

Silver-Lube®

- Polymer housings and stainless steel parts make it suitable for wet and dirty environments, especially for the Food & Beverage industry



Smooth Finish
Prevents dirt adhesion and reduces wash-down time

Good Chemical and Detergent Resistance
Suitable for high-care environments with harsh wash-down regimes

High Performance Silicon Rubber Seal
Complete with stainless steel flinger to prevent ingress of bacteria and resist impact damage to seal

Stainless Steel Insert
Improved corrosion resistance for wet environments

Polymer Housing
Eliminates foreign matter contamination risk from painted or coated surfaces

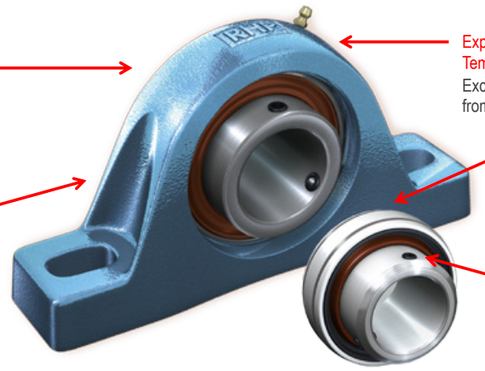
Cavity Free Design
No crevices or "bug traps" that can harbour mould or bacteria

Food Grade Grease
Grease to NSF H1 standard is certified for incidental food contact and is formulated from a USDA-approved list of ingredients.

Self-Lube® for special environments

HLT Units

- Special seals, grease and internal clearance make them suitable for extremes of temperature between -40°C and +180°C



Special Grease
Maintains good lubrication and bearing performance at extreme temperatures

Expanded Operating Temperature Range
Excellent performance from -40°C and +180°C

Silicon Seal
Protects internal features and lubricant at extreme temperatures

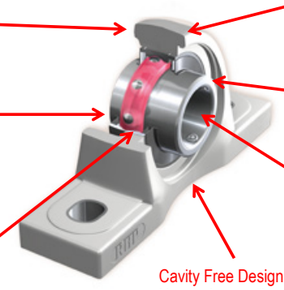
Larger Internal Clearance
Allows bearing rings to expand or contract without creating preload

Special Heat-Treated Bearing Steel
Maintains hardness at elevated temperatures

Self-Lube® for special environments

Life-Lube® Units

- Polymer housings and stainless steel parts combined with Molded-Oil lubrication are ideal for wet and dirty environments, especially for the Food & Beverage industry, as no re-lubrication is necessary



Smooth Finish
Prevents dirt adhesion and reduces wash-down time

Polymer Housing
Eliminates foreign matter contamination risk from painted or coated surfaces

Molded-Oil
Insert cavity is completely filled with lubricating oil and polyolefin resin, preventing ingress of dirt/water and leakage of lubricant

No Re-Lubrication
Self-contained lubrication system contains a lifetime of oil and does not need to be re-lubricated

Stainless Steel Insert
Improved corrosion resistance for wet environments

Lip Seal Flinger
Provides excellent protection to prevent ingress of bacteria and protect Molded-Oil filled cavity

Cavity Free Design
No crevices or "bug traps" that can harbour mould or bacteria

Selection based on environment

Selection guide showing suitability based on different environments

Conditions	Self-Lube®			Silver-Lube®	Life-Lube®	HLT
	Standard	Triple Lip Seal	Flinger Seal	Standard	Standard Range	Standard
DryDust	**	***	**	**	***	*
Wet	*	***	*	**	***	*
WetDust	*	***	**	**	***	*
Submerged	-	**	-	-	***	-
Temp 0 ~ 80 °C	***	**	***	***	***	***
Temp 80 ~ 180 °C	*	*	*	*	-	***
Temp 180+ °C	-	-	-	-	-	-
Low Temp -18 ~ 0 °C	*	*	*	*	*	**
Starch	*	**	*	**	**	*
Abrasive Wet	*	**	*	**	***	*
Chemical	-	-	-	**	-	-
Acidic	-	-	-	**	-	-
High Speed	*	-	**	*	-	*

Solutions for the Food and Beverage industries

Introduction

Did you know

that the high amount of water in the Food & Beverage Industry causes the most machine breakdowns?

Key drivers for the industry

Hygiene

- To meet the requirements of ISO22000 on Food Safety regulations, the elimination of any conditions that could lead to the creation of food borne illnesses is imperative.

Safety

- Reducing the risk of injuries as a result of slippery surfaces, manual handling and heavy lifting or other common tasks.

Energy

- Reduction and optimisation of energy consumption from all rotating assets and other equipment.

Waste

- Reduction of all wastes associated with the manufacturing and maintenance processes to ensure compliance with increasingly demanding environmental legislation.

Productivity

- Improving the efficiency and effectiveness of all production, other assets, processes and personnel for maximum productivity.

Five common environments

- Diverse operating conditions found in the Food & Beverage industries provide extremely difficult conditions for rotating equipment and other auxiliary equipment.
- Hot, cold and moist environments have an adverse effect on many machine components, leading to recurring failures, hazardous work conditions and costly downtime.
- The range of processes and machinery is vast however these can be grouped into the following:

Wet Conditions | **Clean or Food line Conditions** | **Dirty / Gritty Conditions** | **Hot Conditions** | **Cold Conditions**

Solutions for the Food and Beverage industries

Common environments

Wet conditions

Arduous environments – Wet conditions

Wet conditions are the most common cause of bearing failure for Food & Beverage applications

Why?

- Most food preparations involve large amounts of water for cleaning of the product.
- Most food plants require cleaning of the machinery to meet hygienic and sanitary standards. This involves hot and cold water at high pressure plus cleaning products such as soap or caustic soda.

Arduous environments – Wet conditions

Conditions where machinery is subjected to constant or intermittent water / process fluids

Typical applications:

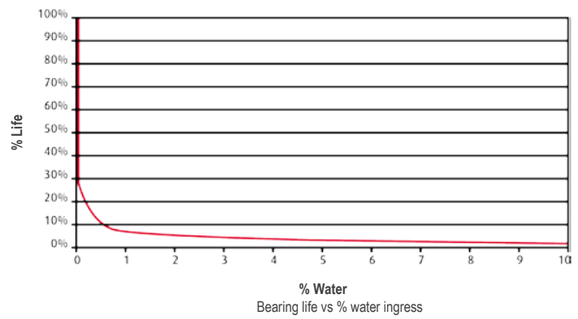
- Conveyors
- Washing systems (fruit and vegetables)
- Sanitary wash down
- Mixers & Filling plants

Arduous environments – Wet conditions

What happens to bearings in wet conditions?

- A small amount of water entering a bearing can have a significant effect on its lifetime

For example if a bearings' calculated life is 4 years then with only 1% by volume water ingress the life would be reduced to 3 months.



Bearing life vs % water ingress

Arduous environments – Wet conditions

Reasons for water causing bearing failure

Corrosion

- This happens to the internal surfaces of the bearing as the water displaces the lubricant particularly when the bearing is static due to capillary action..
- Machines run in the day time and are then washed down. This means that, as the machine cools down, the bearing will “breathe”, creating a negative pressure and drawing in any water present..
- Once corrosion happens then the internal surfaces are damaged and rapid wear will occur.

Arduous environments – Wet conditions

Reasons for water causing bearing failure

Lubricant breakdown

- Most lubricants when mixed with water will emulsify losing their properties failing to separate the metallic components of the bearing.
- Generally the emulsified grease will wash out of the bearing leaving the bearing unprotected.

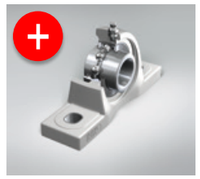
Arduous environments – Wet conditions

Reasons for water causing bearing failure

Contamination

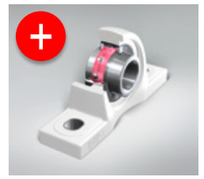
- Most processes involve small particles which are present in the water. Once a bearing seal is breached then the particles can enter the bearing causing rapid wear.

Arduous environments – Wet conditions



1. Silver-Lube®-Bearing Units
Polymer housings and stainless steel constructions make them corrosion proof

2. Molded-Oil Bearings
Lubricant oil is held in a solid matrix which resists water ingress and forms a solid barrier

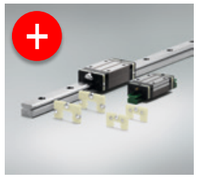


3. Life-Lube® Bearing Units
This product combines the benefits of the Silver-Lube® product with the performance of Molded-Oil lubrication

4. Stainless Steel Bearings
Stainless steel construction makes them corrosion proof combined with many sealing options

5. Triple-Lip Seals
The robust triple lip design resists ingress of contaminants
3 times longer

Arduous environments – Wet conditions



6. Stainless Steel Linear Guides with K1 Lubrication
Stainless Steel construction with Molded-Oil K1 lubrication resists water & corrosion damage

7. Stainless Steel Ball Screws with K1 Lubrication
Molded-Oil K1 lubrication with stainless steel construction resists water & corrosion damage

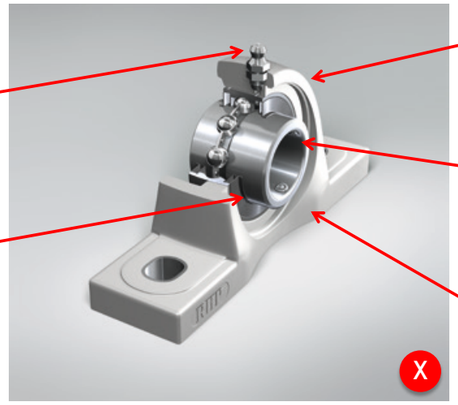
8. Miniature Linear Guides PU Series
Miniature linear guides for outstanding stability in wet and corrosive environments

Arduous environments – Wet conditions

1. Silver-Lube® Bearing Units

Re-greasing facility allows displacement of any moisture

High performance silicon rubber seals with stainless steel flinger resists fluid ingress



Good detergent and chemical resistance

Corrosion resistant stainless steel parts

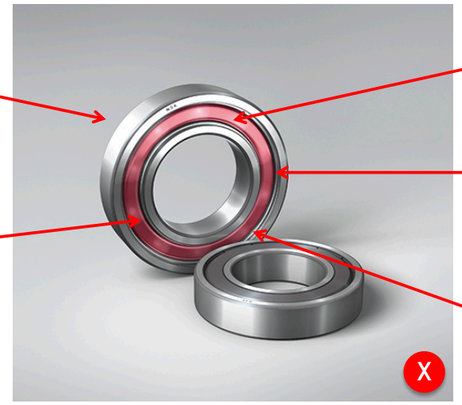
Polymer housing will not corrode

Arduous environments – Wet conditions

2. Molded-Oil Bearings

High corrosion resistance stainless steel bearings

Significant increase in bearing life by avoiding lubrication washout in application



Polyolefin body containing up to 50% by volume lubricating oil. Large reservoir of lubricant available.

Molded-Oil fills the entire bearing internals also acting as a seal

Maintenance free, no further lubrication necessary. Excellent performance in water environments.

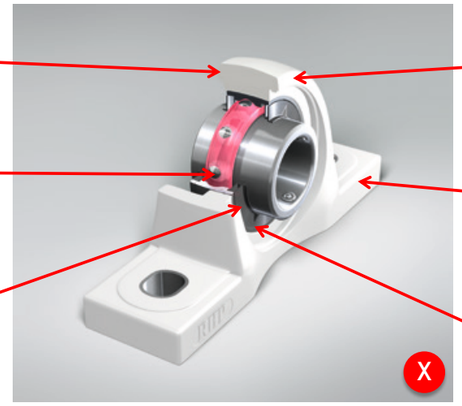
Arduous environments – Wet conditions

3. Life-Lube® Bearing Units

Ideal for operation when contact with water and process fluids is unavoidable

Molded-Oil inserts do not need to be relubricated

A triple sealing combination; lip seal, flinger combined with Molded-Oil filled cavity provides excellent protection to avoid ingress



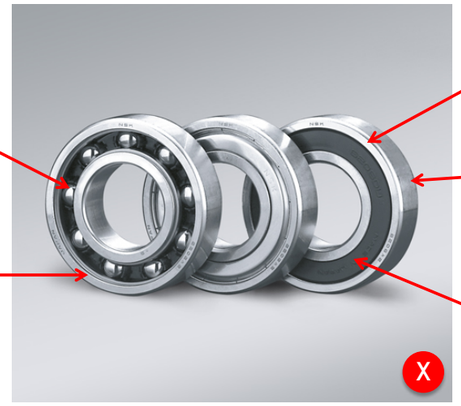
Paint free housings, preventing chipping or flaking to assist with wash down

High corrosion resistance using thermoplastic and stainless steel components

Significant increase in bearing life by avoiding lubrication washout

Arduous environments – Wet conditions

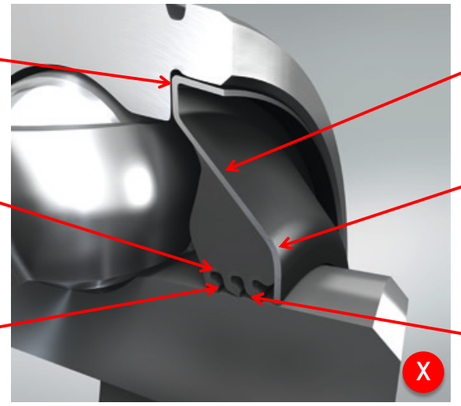
4. NSK ES1 Stainless Steel Ball Bearings



- High performance lithium based grease
- 5 times longer corrosion resistance than standard stainless steel
- Efficient range of standard sealing options such as DDU
- Good chemical resistance
- Efficient range of standard sealing options such as DDU

Arduous environments – Wet conditions

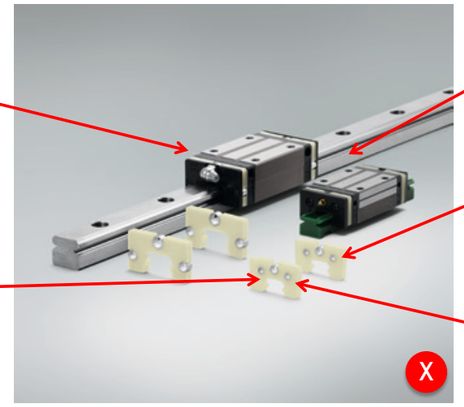
5. Triple-Lip Seals



- Positive metal to metal contact for firm seal
- Performance of the seal is enhanced as lubricant sits between lips
- 3 contact rubber lips provide greater resistance to water ingress allowing bearing to last longer in wet environments
- Robust outer guard plate resists impact damage
- Superior splash resistance
- Bearing re-lubricating facility allows purging of moisture back through the seals

Arduous environments – Wet conditions

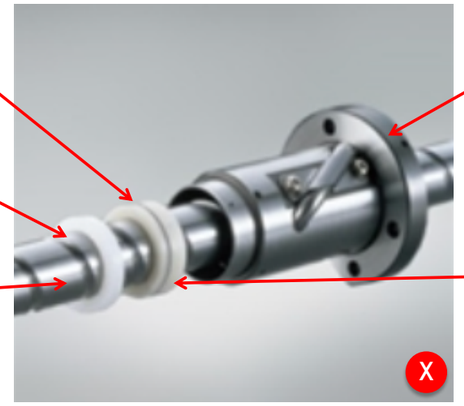
6. Stainless Steel Linear Guides with K1 Lubrication



- Maintenance free lubrication system due to large reservoir of oil
- Three times longer life in wet conditions
- Stainless steel components resist rusting in wet environments
- H1 lubrication oil of NSF standard used for K1 lubrication unit
- Superb water resistance and antirust capability

Arduous environments – Wet conditions

6. Stainless Steel Ball Screws with K1 Lubrication



- Maintenance free lubrication system due to large reservoir of oil
- Three times longer life in wet conditions
- Superb water resistance and antirust capability
- Stainless steel components resist rusting in wet environments
- H1 lubrication oil of NSF standard used for K1 lubrication unit

Arduous environments – Wet conditions

6. Miniature Linear Guides PU Series

Common environments

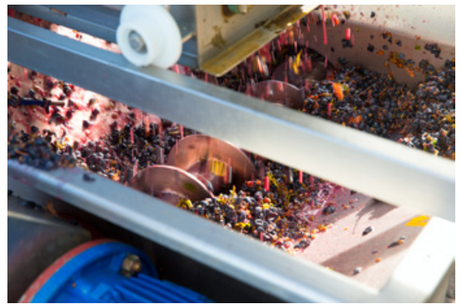
Clean or Food Line conditions

Arduous environments – Clean or Food Line conditions

Clean conditions or Food Line conditions present unique challenges to bearing applications

Why?

- There are stringent requirements so that any mechanical component can not contaminate the food products.
- There are frequent wash downs of equipment to clean the environment.
- Food products can be corrosive or may build up on rotating components breaching seals and causing premature failure.



Arduous environments – Clean or Food Line conditions

Applications where bearings are running on or close to the food line and cleanliness is imperative

Typical applications:

- Sorting or Screw Conveyors
- Coating
- Forming or Moulding machines
- Raw product preparation
- Filling & Bottling

Solutions for the Food and Beverage industries

Arduous environments – Clean or Food Line conditions

Reasons for bearing failure

Bearing collapse & Break up

- This catastrophic failure will be a result of an earlier cause like contamination, corrosion or lubrication problems.
- It must be avoided at all cost as anything contaminating the food product is extremely dangerous.

Arduous environments – Clean or Food Line conditions

Reasons for bearing failure

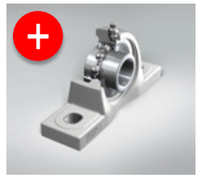
Seal failure

- Breach of the sealing system by cleaning fluids or food products will result in rapid failure of bearings.
- This is quite common in food applications particularly on applications such as screw conveyors, mixers and agitators where the bearing is exposed to the food material.

Lubricant issues

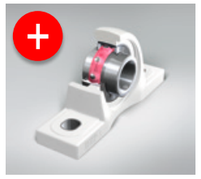
- Grease falling into the food line will cause contamination and must be avoided.
- Problems like emulsification can cause real issues both for the bearing and the process material.

Arduous environments – Clean or Food Line conditions



1. Silver-Lube® Bearing Units
Polymer housings and stainless steel construction with food grade grease make them ideally suited to food line

2. Molded-Oil Bearings
The special lubrication system is self contained and does not need replenishing



3. Life-Lube® Bearing Units
The polymer housing is combined with a stainless steel bearing containing the self contained Molded-Oil lubrication system

4. Stainless Steel Bearings
Stainless steel construction makes them corrosion proof combined with many efficient sealing options

5. Food Grade Grease
Food specification greases combined with stainless steel construction makes them applicable to many food applications

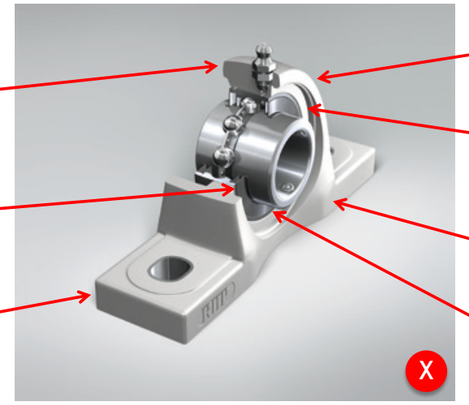
Arduous environments – Clean or Food Line conditions

1. Silver-Lube® Bearing Units

Special smooth surface resists dirt sticking

High performance silicon rubber seals with stainless steel flinger

Cavity free design that does not allow build up of mould or bacteria



Good chemical and detergent resistance

Corrosion resistant stainless steel parts

Polymer housing without paint or coating

Contains NSF H1 food grade grease

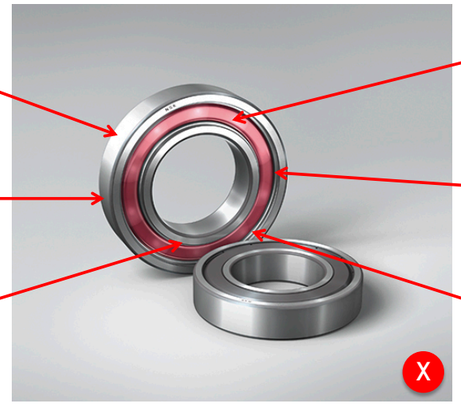
Arduous environments – Clean or Food Line conditions

2. Molded-Oil Bearings

High corrosion resistance stainless steel bearings

Lubricant is only released when necessary, any excess is drawn back into the polyolefin material

Lubrication washout during cleaning does not happen



Polyolefin body containing up to 50% by volume lubricating oil. Large reservoir of lubricant available.

Molded-Oil fills the entire bearing internals but will not break or fall out

Maintenance free, a self contained unit with no re-lubrication necessary

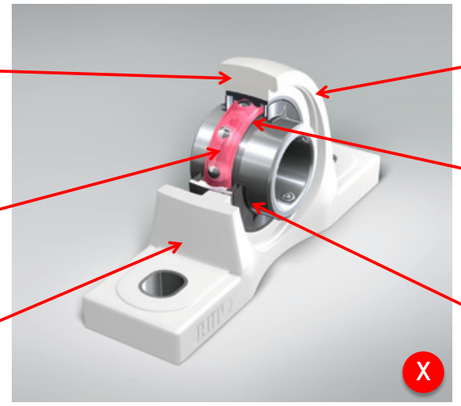
Arduous environments – Clean or Food Line conditions

3. Life-Lube® Bearing Units

Special smooth surface resists dirt sticking

Molded-Oil lubrication completely fills internal cavity and is solid so it will not leach or fall out during operation

High corrosion resistance using thermoplastic and stainless steel components



Paint free housings, preventing chipping or flaking to assist with wash down

Self contained lubrication system contains a lifetime of oil and does not need to be re-lubricated

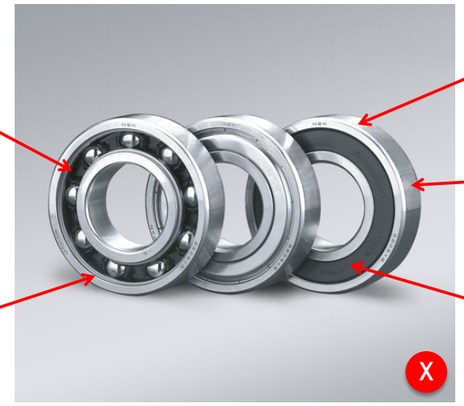
A triple sealing combination; lip seal, flinger combined with Molded-Oil filled cavity provides excellent protection to avoid ingress

Arduous environments – Clean or Food Line conditions

4. NSK ES1 Stainless Steel Ball Bearings

Range of greases available for different environments

5 times longer corrosion resistance than standard stainless steel



High corrosion resistant stainless steel ES1

Good chemical resistance

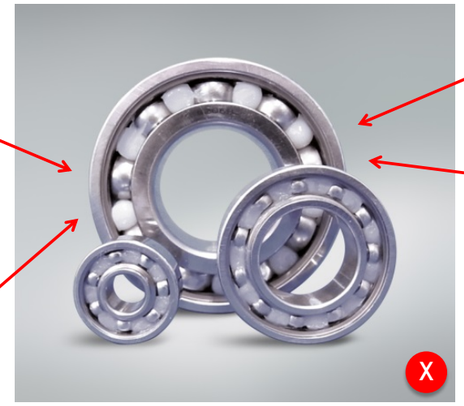
Sealed for life bearing with no need to relubricate

Arduous environments – Clean or Food Line conditions

5. Food Grade Grease

Range of seals & closures in alternative materials also available

Heat resistant (max 200°C) NSF H1 category rated food grade grease is also available



Food grade grease packed stainless steel bearings

Registered to NSF H1 and NSF H3

Common environments

Dirty / Gritty conditions

Arduous environments – Dirty / Gritty conditions

Many applications in food preparation involve dirty or gritty processes.
This can cause difficulties for bearings.

Why?

- Contamination of the internal environment in a bearing is the single largest reason for premature failure.
- Dirt or grit causes indentations in the bearing running surfaces known as pitting.
- Dirt also combines with the bearing lubricant creating an abrasive medium.
- Once a bearing is breached with contamination then permanent damage will occur leading to early failure.

Arduous environments – Dirty / Gritty conditions

Generally any application in which hard/soft particle contaminants are present in high concentrations.

Typical applications:

- Washing processors
- Breading or coating machines
- Peelers, shellers, pluckers or skinning machines
- Screw conveyors and lifters
- Mixers, millers or grinding operations

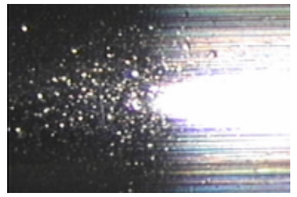
Arduous environments – Dirty / Gritty conditions

Reasons for bearing failure

Bearing contamination

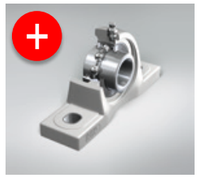
- Particles both hard and soft entering a bearing will cause indentations in the bearing running surface.
- Contamination also mixes with the lubricant destroying its properties and creating an abrasive medium.
- This leads to surface fatigue of the bearing as the indentations create high stress points and rapid wear follows.

Indentations on raceway



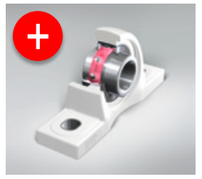
Typical example of "Cod eye" scratching

Arduous environments – Dirty / Gritty conditions



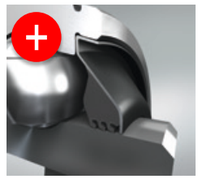
1. Silver-Lube® Bearing Units
Stainless steel components combined with a double seal arrangement resist ingress

2. Molded-Oil Bearings
Lubricant oil is held in a solid matrix which resits contaminant ingress and forms a solid barrier



3. Life-Lube® Bearing Units
This product combines the benefits of the Silver-Lube® product with the performance of Molded-Oil lubrication

4. DDU Seals
A high performing seal option with additional labyrinth for deep groove ball bearings



5. Triple Lip Seals
The robust triple lip design resists ingress of contaminants 3 times longer

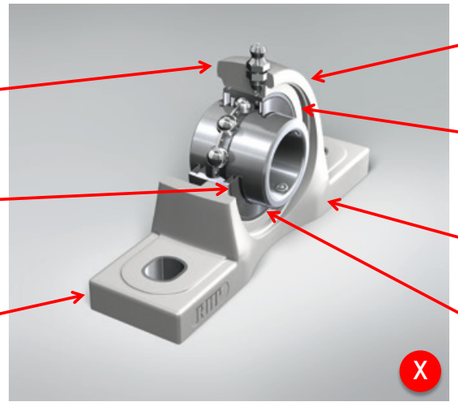
Arduous environments – Dirty / Gritty conditions

1. Silver-Lube® Bearing Units

Special smooth surface resists dirt sticking

High performance silicon rubber seals with stainless steel flinger

Cavity free design that does not allow build up of mould or bacteria



Good chemical and detergent resistance

Corrosion resistant stainless steel parts

Polymer housing without paint or coating

Contains NSF H1 food grade grease

Arduous environments – Dirty / Gritty conditions

2. Molded-Oil Bearings

High corrosion resistance stainless steel bearings

Grease free property keeps bearing internals clean with no oil refilling

Significant increase in bearing life by avoiding lubrication washout in application

Polyolefin body containing up to 50% by volume lubricating oil. Twice the operating life than greased bearings in dusty environments.

Molded-Oil fills the entire bearing internals also acting as a barrier to dirt ingress

Maintenance free, no further lubrication necessary. Excellent performance in dusty environments.

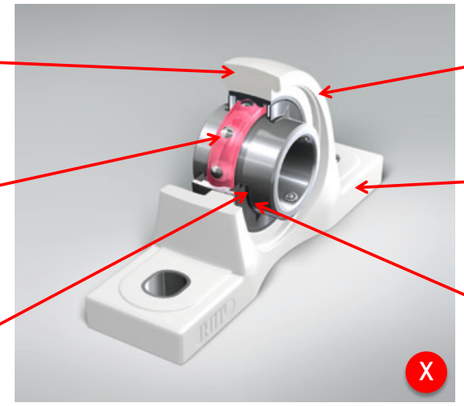
Arduous environments – Dirty / Gritty conditions

3. Life-Lube® Bearing Units

Ideal for operation when contact with water and process fluids is unavoidable

Molded-Oil inserts do not need to be re-lubricated. Large lubricant content gives significant increase in bearing life.

A triple sealing combination; lip seal, flinger combined with Molded-Oil filled cavity provides excellent protection



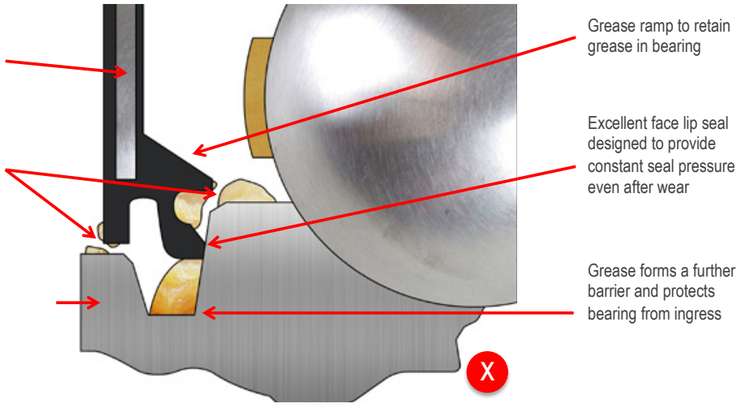
Paint free housings, preventing chipping or flaking to assist with wash down

High corrosion resistance using thermoplastic and stainless steel components

Reinforced stainless steel flinger which traps particles and resits impact damage

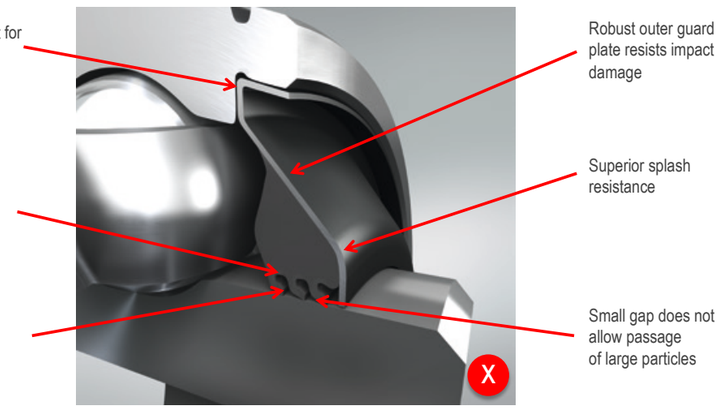
Arduous environments – Dirty / Gritty conditions

4. Seal options for Ball Bearings – DDU



Arduous environments – Dirty / Gritty conditions

5. Triple Lip Seals



Common environments

Hot conditions

Arduous environments – Hot conditions

Hot conditions can present extreme challenges to bearings

Why?

- The temperature can cause bearings to lose their internal clearance due to expansion.
- Bearing lubricants can fail due to separation, oxidation and carburization.
- Seal lips can overheat and become brittle.
- Bearing rings can soften due to high temperatures changing the material microstructure.

Arduous environments – Hot conditions

Generally any application where bearings can be subjected to sustained temperatures above 90°C.

Typical applications:

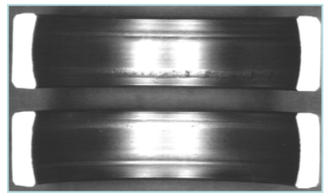
- Fryers
- Baking or Roasting Ovenn
- Steamers
- Cookers

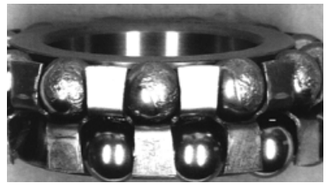
Arduous environments – Hot conditions

Reasons for bearing failure

Radial preload

- This is when the heat acting on the bearing causes the rings to expand removing the bearing internal clearance.
- When the bearing is in radial preload, this results in high forces being applied to the rolling elements and rapid failure.



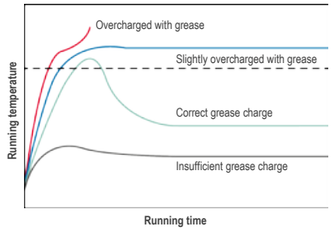


Arduous environments – Hot conditions

Reasons for bearing failure

Lubricant issues

- Not only does lubricant form a cushion between the internal components of a bearing it also allows heat to be dissipated. However when subjected to high temperatures the lubricant can fail and contribute to temperature rise within a bearing due to increased friction and lack of thermal conduction.
- Too much grease can cause churning leading to accelerated heat build up in a bearing, resulting in mechanical issues like preload and dry out of the grease. This is known as thermal run-away.
- At high temperatures base oil can boil out of the grease thickener matrix. This will cause hardening of the grease leading to a solid tar like material in the bearing.

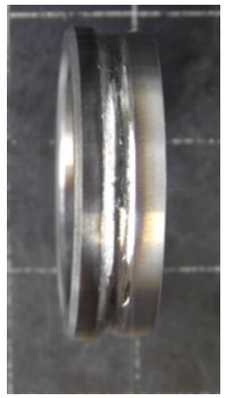


Arduous environments – Hot conditions

Reasons for bearing failure

Material issues

- Bearing steel is designed to achieve a combination of surface hardness for good wear properties and toughness to resist cracking or brittleness.
- This is achieved through a series of heat treatment process finishing with tempering which allows the material matrix to increase toughness.
- However when a bearing is subject to high temperatures in use this destroys the tempered state and further softens the bearing material.
- If the bearing material is softened then it will fail rapidly.



Heat discolouration – micro structure to steel changed due to high temperature

Arduous environments – Hot conditions

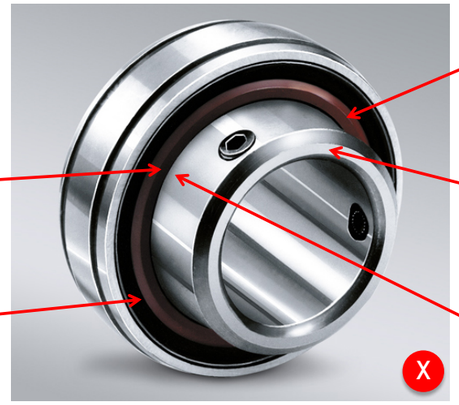
1. Bearing Units with HLT Inserts
Specially designed mounted unit for extremes of temperature up to 180 °C

2. KPM Grease
Alternative grease designed for high temperature environments

3. High Temperature Linear Guides
All metal construction combined with high temperature grease gives elevated temperature performance

Arduous environments – Hot conditions

1. Bearing Units with HLT Inserts



Excellent performance at high temperatures up to 180°C

Special grease maintains good lubrication at extreme temperatures

Special heat treatment to bearing steel in order to maintain hardness at elevated temperatures

Larger internal clearance allows bearing rings to expand without creating preload

Silicon seals are designed to perform without problem at high temperatures

Arduous environments – Hot conditions

2. KPM Grease – High Temperature

Life around 5 time longer than commercially available fluorine greases

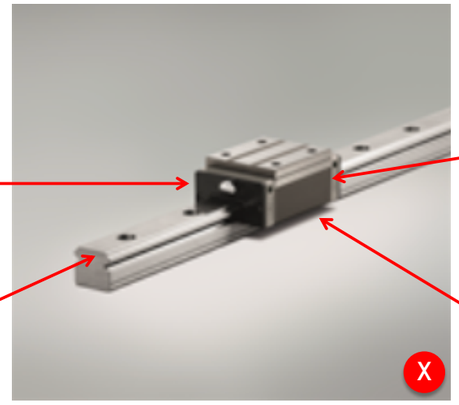
Can be used up to 230°C

Option for NSK sealed and open type bearings

Arduous environments – Hot conditions

2. High Temperature Linear Guides

Maximum temperature up to 200°C without seals (180°C with flourine seal)



Should be used in conjunction with Multitemp ET-150 grease

Standard or stainless steel options

All metal construction when seals not fitted allows high temperature operation

Solutions for the Food and Beverage industries

Common environments

Cold conditions

Arduous environments – Cold conditions

Cold conditions are a changing environment for bearings

Why?

- Operating environment is subjected to sustained sub-zero temperatures.
- This increases grease or lubricant viscosity causing higher torque & lower mobility.
- As temperatures decrease then bearing housings constrict reducing bearing clearance.

Arduous environments – Cold conditions

Generally any application where bearings can be subjected to sustained temperatures below freezing point.

Typical applications:

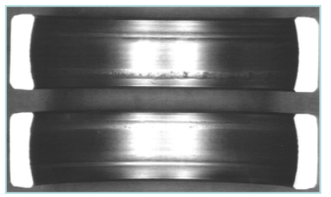
- Cold stores
- GefriFreezers & Chillers
- Flash Coolers
- Blast Freezers

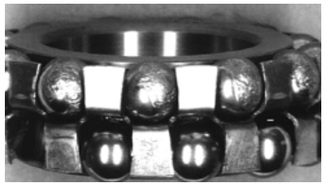
Arduous environments – Cold conditions

Reasons for bearing failure

Radial preload

- Under cold conditions the bearing housing can constrict the bearing and reduce internal clearance.
- The bearing is in radial preload which results in high forces being applied to the rolling elements and rapid failure.



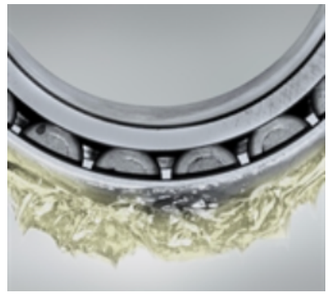


Arduous environments – Cold conditions

Reasons for bearing failure

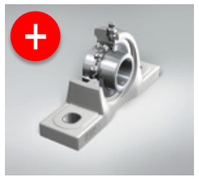
Lubricant issues

- At low temperatures the lubricant becomes thicker and does not flow around the bearing in the normal way.
- This means that the lubricant properties will restrict its ability to separate metallic surfaces inside the bearing.
- This can cause higher torque and more rapid wear of the bearing components.



Arduous environments – Cold conditions

1. Bearing Units with HLT Inserts
Specially designed mounted unit for extremes of temperature down to -40 °C

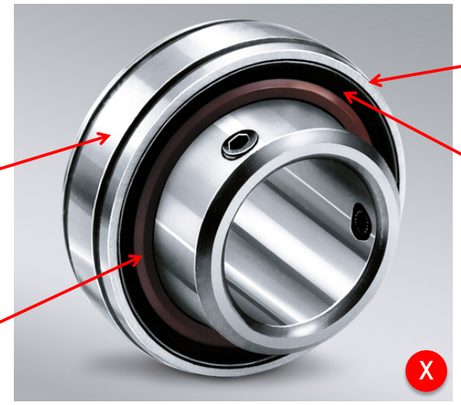


2. Silver-Lube® Bearing Units
The polymer housing is combined with a stainless steel bearing including the self contained Molded-Oil lubrication system

3. Stainless Steel Bearings
Stainless steel construction makes them corrosion proof combined with many efficient sealing options

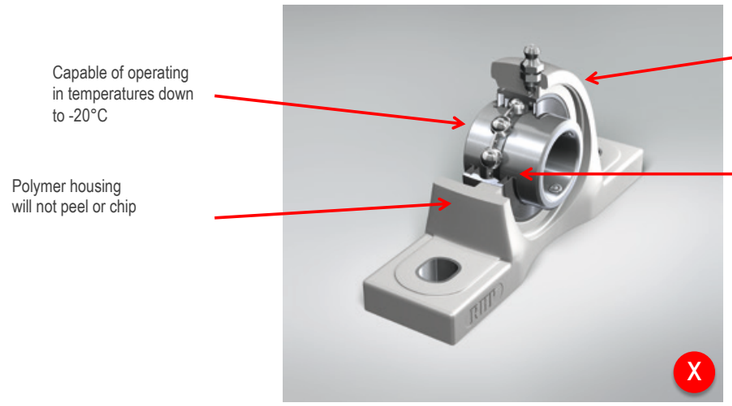
Arduous environments – Cold conditions

1. Bearing Units with HLT Inserts



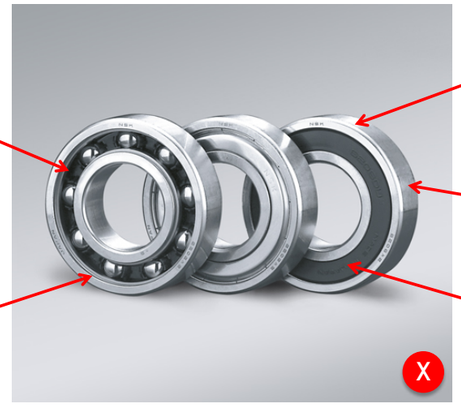
Arduous environments – Cold conditions

2. Silver-Lube® Bearing Units



Arduous environments – Cold conditions

3. NSK ES1 Stainless Steel Ball Bearings



High performance lithium based grease

5 times longer corrosion resistance than standard stainless steel

High corrosion resistant stainless steel ES1 resists condensation which occurs at low temperatures

Good chemical resistance

Efficient range of standard sealing options such as DDU

General environment

The Food & Beverage industry can present many challenging environments for bearings. However there are also some important applications where performance and reliability are needed. These may not be close to the food line but are equally important to keep the plant going.

Typical applications:

- Gearboxes
- Electric motors
- Ingredient mixers
- Conveyors
- Pumps
- Packaging machines

NSK's range of high performance bearings are designed to provide superior service and minimise down time.

Summary of operating conditions for Food & Beverage industry

Bearing and Seal solutions

Silver-Lube® Bearing Units

Molded-Oil Bearings

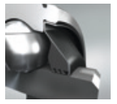
Bearing Units with HLT Inserts

DDU Seals

Stainless Steel Bearings

Life-Lube® Bearing Units

KPM Grease



Triple Lip Seals

click on icons + for more information

Summary of operating conditions for Food & Beverage industry

Linear solutions

Stainless Steel Linear Guides + K1 Lubrication

Stainless Steel Ball Screws + K1 Lubrication

Miniature Linear Guides PU Series

High Temperature Linear Guides

click on icons + for more information

Innovative Products

- Self-Lube® Units
- Self-Lube® Inserts with Flinger Seals
- Silver-Lube® Mounted Units
- Life-Lube®
- Triple-Lip Sealed Inserts
- Molded-Oil Bearings

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. * For all options see Self-Lube® catalogue

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)

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

Self-Lube® Inserts with Flinger Seals

NSK's Inserts equipped with Flinger Seals have been especially designed to provide the insert with additional protection from external contaminants, like stone projection or high pressure washdowns.

Product Features

- Efficient sealing "S" type
- Nitrile rubber lip bonded to steel flinger
- No contact between the lip and the outer ring
- Same speed limit as standard inserts
- Available for both setscrew and eccentric collar
- Locking device
- Large size range offered, including imperial options
- Inserts interchangeable with standard items

Benefits

- Longer bearing life due to additional protection
- Maintenance costs reduction
- High speed (Same speed limit as standard sealed inserts)
- Easy mounting
- Option delivered as standard

Condition Description

- Arduous Environments
- High Speed

Industries

- Agriculture
- Material Handling
- Textile and Leather
- Food and Beverage

1030	-	30	DEC	G	FS

	Description
1030	Insert with spherical O.D, long inner ring
-	
30	Bore Diameter
DEC	Eccentric collar lock with extended inner ring
G	Insert equipped with flinger seals
FS	Re-greasing facility

Innovative Products

Silver-Lube® Mounted Units

NSK's Silver-Lube® series is a range of corrosion resistant bearing units specifically for use in industries where frequent thorough washdowns are necessary, optimum hygiene standards are required and good chemical resistance is important over a wide temperature range.

Product Features

- High grade stainless steel bearing-rings, cage & balls, seal core & grub screws, grease nipple & holt hole liners
- Nitrile rubber seals and stainless steel flingers
- Thermoplastic polyester resin housing; plastic end covers available
- Factory filled with a wide temperature USDA H1 food grade grease
- Silver-Lube® is available in four different geometries

Benefits

- Resistant to cleaning agents and chemicals thus resistant to corrosion & peeling paint
- Long life / low cost of ownership
- Superior resistance to regular washdowns & chemical attack due to effective & efficient sealing arrangement
- Relubrication is possible for long trouble-free life, minimising maintenance, maximising productivity
- Approved to NSF, temperature scale from -20°C to +90°C

Condition Description

- Arduous Environments
- Contamination

Industries

- Chemical and Pharmaceutical
- Food and Beverage
- Material Handling
- Packaging
- Utilities

J	10	25	25	G	CR

	Description
J	Reverse outer
10	OD profile
25	Basic group
25	Bore size
G	Greaseable
CR	Corrosion Resistant

Life-Lube®

The Life-Lube® series combine the corrosion resistant properties of Silver-Lube® housings with the excellent sealing and lubricating properties of Molded Oil inserts. Life-Lube® units are specifically for use in industries where contact with water and process fluids is unavoidable, excellent chemical resistance is required and a longer lubrication life is necessary.

Product Features

- PBT thermoplastic resin housing
- Molded-Oil inserts (with solid lubricant)
- Martensitic stainless steel
- Nitrile rubber seals
- Available in Pillow Blocks (NP), 2 and 4 Bolt Flanges (SF, SFT) and Take-up unit housings (ST)
- Bore size 20mm - 40mm

Benefits

- Corrosion resistance
- Paint free housings, preventing chipping & flaking
- Resistant to contamination increasing operating life
- Ideal for operations where fluid process is unavoidable
- No need for re-lubrication

Condition Description

- Arduous Environments
- Contamination

Industries

- Food and Beverage

P	NP	25	LP99

	Description
P	Plastic Housing
NP	Housing Type
25	Bearing Bore
LP99	Molded-Oil Lubrication Sytem

Innovative Products

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

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

NSK Europe - https://www.nskeurope.com

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)

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

NSK Europe - https://www.nskeurope.com

Product Catalog

Self-Lube®

MOTION & CONTROL™
NSK

+ SELF-LUBE®

www.nsk-literature.com/en/self-lube-bearings

Product Catalog

Guide to RHP Self-Lube®

MOTION & CONTROL™
NSK

GUIDE TO RHP SELF-LUBE®

www.nsk-literature.com/en/rhp-self-lube-guide

NSK SALES OFFICES EUROPE, MIDDLE EAST AND AFRICA

UK
NSK UK Ltd.
Northern Road, Newark
Nottinghamshire NG24 2JF
Tel. +44 (0) 1636 605123
Fax +44 (0) 1636 643276
info-uk@nsk.com

France
NSK France S.A.S.
Quartier de l'Europe
2, rue Georges Guynemer
78283 Guyancourt Cedex
Tel. +33 (0) 1 30573939
Fax +33 (0) 1 30570001
info-fr@nsk.com

Germany, Austria, Benelux
Switzerland, Nordic
NSK Deutschland GmbH
Harkortstraße 15
40880 Ratingen
Tel. +49 (0) 2102 4810
Fax +49 (0) 2102 4812290
info-de@nsk.com

Italy
NSK Italia S.p.A.
Via Garibaldi, 215
20024 Garbagnate
Milanese (MI)
Tel. +39 02 995 191
Fax +39 02 990 25 778
info-it@nsk.com

Middle East
NSK Bearings Gulf Trading Co.
JAFZA View 19, Floor 24 Office 2/3
Jebel Ali Downtown,
PO Box 262163
Dubai, UAE
Tel. +971 (0) 4 804 8205
Fax +971 (0) 4 884 7227
info-me@nsk.com

Poland & CEE
NSK Polska Sp. z o.o.
Warsaw Branch
Ul. Migdałowa 4/73
02-796 Warszawa
Tel. +48 22 645 15 25
Fax +48 22 645 15 29
info-pl@nsk.com

Russia
NSK Polska Sp. z o.o.
Russian Branch
Office I 703, Bldg 29,
18th Line of Vasilievskiy Ostrov,
Saint-Petersburg, 199178
Tel. +7 812 3325071
Fax +7 812 3325072
info-ru@nsk.com

South Africa
NSK South Africa (Pty) Ltd.
25 Galaxy Avenue
Linbro Business Park
Sandton 2146
Tel. +27 (011) 458 3600
Fax +27 (011) 458 3608
nsk-sa@nsk.com

Spain
NSK Spain, S.A.
C/ Tarragona, 161 Cuerpo Bajo
2a Planta, 08014 Barcelona
Tel. +34 93 2892763
Fax +34 93 4335776
info-es@nsk.com

Turkey
NSK Rulmanları Orta Doğu Tic. Ltd. Şti.
Cevizli Mah. D-100 Güney Yan Yol
Kuriş Kule İş Merkezi No:2 Kat:4
Kartal - Istanbul
Tel. +90 216 5000 675
Fax +90 216 5000 676
turkey@nsk.com

Please also visit our website: www.nskeurope.com
Global NSK: www.nsk.com