Optimize performance and improve food safety

SKF capabilities for the food and beverage industry

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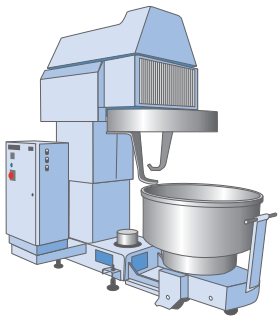
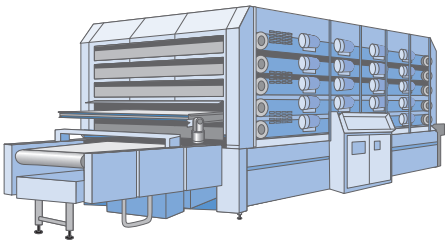
Productivity. Efficiency. Safety. Hygiene. Waste. Energy.

Addressing the industry drivers that impact your plant profitability

Few industrial environments can match the diverse and difficult operating conditions found in the food and beverage processing industries. Extreme temperatures and moist, contamination-prone environments. Frequent wash-downs that degrade equipment and may cause lubricant leakage. Repetitive tasks and hazardous work environments.





Operation and maintenance optimization

Implementing the right maintenance strategies along with supporting tools, technologies and knowledge, can have a positive impact on productivity and reduce your total cost of ownership. SKF can support you with this.

Preparation

Making food and beverage preparation more reliable? It starts by preparing equipment for the high-volume mix of raw materials, moisture and caustic cleaning agents involved. Solutions from SKF can help make it happen.

Processing food by application of heat

High temperatures in baking, frying and roasting require frequent chains and bearing re-lubrication. But frequent lubrication drives lubricant and maintenance costs, and involves the risk of grease leaks and contaminated products. SKF solutions can help.

All of these factors combine to make an impact on machinery and productivity. There is continuous pressure to reduce prices and at the same time comply with strict health, safety and environmental regulations. With rising costs for energy and labour, the need is greater than ever to optimize equipment reliability to maximize uptime and productivity.

SKF can help

Combining SKF expertise in bearings, seals, lubrication, mechatronics and services with decades of application experience in the food and beverage industries, SKF provides solutions for every stage in the process: preparation, heating, cooling and post-production packaging. We offer solutions for wet, contaminated and abrasive environments and we can help you optimize performance and maintenance throughout your plant including your ancillary equipment. These solutions can deliver a number of important benefits:

Higher efficiency

Maximize output from equipment by extending mean time between failures and solving challenging application problems.

Improved hygiene, foreign body prevention

Help eliminate conditions that foster food-borne illnesses and meet the requirements in accordance with ISO 22000 on food safety.

Operator safety

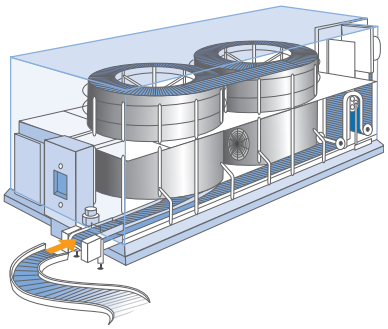
Reduce risk of injuries from repetitive manual tasks, heavy loads, and slippery environments.

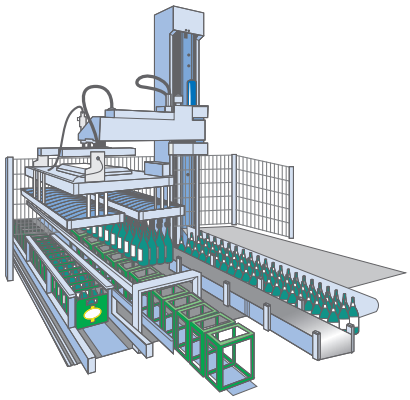
Waste reduction

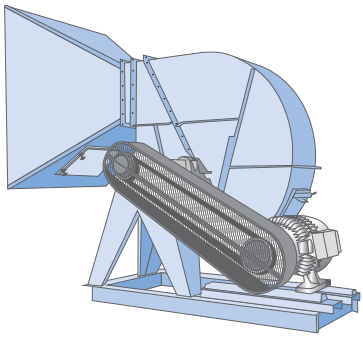
Satisfy tough new environmental regulations by reducing waste, water and lubricant usage, as well as the impact of washdowns on local ecosystems.

Energy savings

Improve efficiency of machinery and auxiliary equipment, from electric motors and pumps to refrigeration systems.







Processing food by removal of heat

The sub-zero temperatures required for freezing, chilling and cooling processes demand frequent maintenance. Rapid temperature changes, frozen water and more can lead to bearing and seal failures and unplanned downtime. SKF low-temperature solutions can help.

Post processing, packaging

Unplanned stops in filling, packaging or palletizing assets can limit efficiencies. Hygienic cleaning can damage seals and cause bearing corrosion. Excessive re-greasing can contaminate products and packaging. SKF solutions can help keep post-processing lines moving reliably.

Maintenance of fluid, air handling and drives

To achieve maximum efficiency, support systems and equipment need a steady flow of cool air, compressed air, steam and electricity. They also require the right lubrication, sealing and condition monitoring approaches. Find out how SKF helped producers apply latest technologies and best suited maintenance activities.

Predictive maintenance approach for reduced unplanned downtime

Early warning of developing problems

Increased confidence in reliable operation of assets in a dairy plant

A dairy product manufacturer had a high incidence of unplanned maintenance, resulting in lost production. The customer invited SKF to support a transition from a reactive to a more controlled, predictive maintenance approach.

By performing vibration analysis on a number of assets, several developing issues were immediately identified, including looseness, bearing and pulley drive problems and misalignments. These could have potentially developed into significant incidents.

SKF aided in the correction of the base looseness, alignment and balancing of fans. Drive and bearing components were changed as necessary.

The results provided increased confidence in reliable operation of the plant's blowers, fans, pumps and gearboxes. Additionally, vibration (and resulting noise) was significantly reduced.

Equipment name	Vibration (mm/s RMS) Before	After	Correction carried out
Dry mix 1 direct conveyor blower	11,8	7,1	Base looseness correction
Dry mix 2 direct conveyor blower	11,0	7,0	Base looseness correction
Exhaust fan 2	16,0	7,5	Base looseness correction
Fan 2	24,0	8,0	Alignment and balancing
Cooling tower pump	14,4	3,9	Motor bearing changed
Exhaust fan 3 (only motor)	16,7	5,7	Bearing motor changed
Air mater fan	32,3	3,3	Motor and pulley changing
Line feed pump	11,1	3,4	Unbalance correction
Vacuum pump	13,0	5,9	Base looseness correction
Labeller machine (gearbox)	29,4	4,4	Base looseness correction

As reactive maintenance is up to 4 times more expensive than planned maintenance, the trend is toward a more planned maintenance approach. Predictive techniques enable manufacturers to reduce the incidence of unplanned stops. SKF does not stop at detecting a problem and alerting the likelihood of failure. SKF uses this information as the basis for diagnosing the source of the problem with the ultimate objective of applying the necessary technology to eliminate reoccurrence, thereby achieving an extension of machine life.

SKF provided training in the use of the necessary tools and in executing basic maintenance techniques (mounting/dismounting, alignment, lubrication).

SKF offers a range of supporting predictive maintenance tools and techniques to:

1 Monitor vibration with SKF Machine Condition Advisor, CMAS 100-SL

2 Detect air leakages with SKF Ultrasonic Leak Detector CMIN 400

3 Perform thermal imaging with SKF Thermal Camera TKTI series

4 Detect electrical discharge with SKF Electrical Discharge Detector pen TKED 1

Development of the maintenance approach from time- to condition-based can increase plant availability and efficiencies.

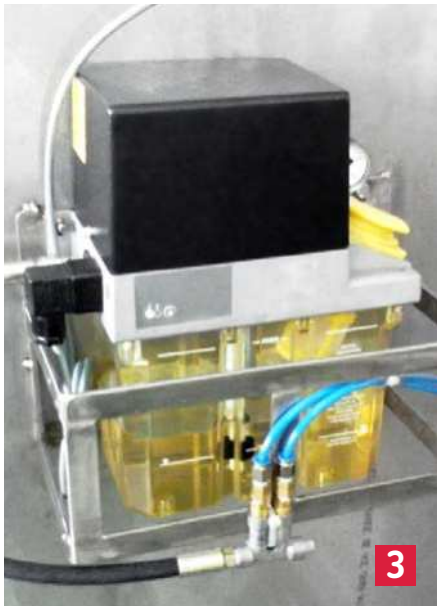
Faced with the challenge of improving overall equipment effectiveness (OEE)?

Transition to condition based maintenance improved the OEE level in a noodle plant

A food manufacturing plant experienced poor availability due to unexpected machine failures. In order to improve the overall efficiency of the plant, the organization decided to pilot a study on one of their noodle lines to better understand the origin of the problems.

The agreed-upon approach involved a detailed survey of a noodle line, including:

- Collection of data regarding bearings, transmission products, power consumption details, and operating environments, including maintenance histories
- Review with engineers, collection of drawings
- Establishing a baseline of existing lubrication practices and lubricants used
- Capturing the current condition of the line through condition monitoring; this enabled detection of misalignment, unbalance, bearing defects, structural looseness and other issues



In order to increase OEE, SKF proposes a thorough review of all maintenance activities to provide a better understanding of what maintenance practices are carried out effectively, and where there is room for improvement.

SKF does not stop at detecting a problem and alerting the likelihood of failure. SKF uses this information as the basis for diagnosing the source of the problem with the ultimate objective of applying the necessary technology to eliminate reoccurrence, thereby achieving an extension of machine life.

The findings of the survey were evaluated in detail, and a set of corrective actions were established.

The survey proved the potential benefits of a condition based maintenance approach as a number of issues were immediately identified such as: oil leakages; chain breakages; seal, bearing, belt and gear failures.

A number of remedial activities were subsequently carried out (pictured at left):

1 Laser alignment of belts and couplings

2 Balancing

3 Changeover from manual to automatic lubrication and lubrication systems upgrades; choice of appropriate lubricants and relubrication intervals

4 Upgrade of power transmission systems

Additional recommendations were suggested to further develop a condition based maintenance program that supports OEE enhancement:

- Establishing further vibration measurement routes
- Monitoring of asset conditions through:
  - thermoghraphy
  - ultrasonic detections
  - stroboscope
  - electric discharge
- Implementing motor current analysis
- Training: practical bearing maintenance, lubrication, vibration monitoring, power transmission, electrical, basic root cause failure analysis training

Challenged to reduce spare parts stock value?

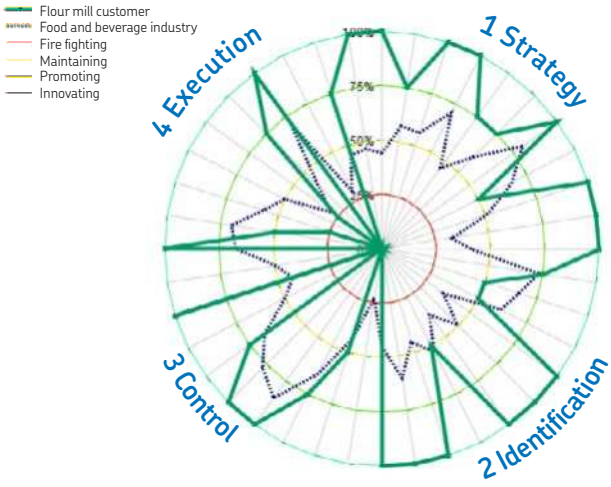
As part of a cost cutting initiative, the maintenance team at an ice cream manufacturing facility was tasked with reducing the spare parts inventory. A site criticality assessment was used to determine what critical spares were needed. As a result, 42% of the total number of line items was removed (8% duplicates).

The SKF global network of authorized distributors can help eliminate the potential for counterfeit products. Using the SKF online ordering system ensures SKF standards.

Development of the maintenance approach from time- to condition-based can increase plant availability and efficiencies

Maintaining a high overall equipment effectiveness (OEE) level, despite an aging plant?

SKF helped a flour mill keep the OEE level high and reduce the cost of maintenance



The mill was operating at approximately 98% overall availability[1] – above industry average. While the existing maintenance strategy was working well, the main concern was not to improve availability, but rather to maintain the current operating level as the plant aged.

Based on an existing long-term relationship, SKF was asked to review future challenges in maintenance. The first step involved performing a detailed evaluation of the plant's work flow processes. The SKF Client Needs Analysis (CNA) was chosen because it provided a means to correlate existing positions against food and beverage industry benchmarks.

The purpose of the SKF Client Needs Analysis (CNA) is to systematically evaluate the current situation, identify opportunities for improvement and select a suitable road map to achieve plant reliability improvements. The CNA asks 40 simple questions (1/2 day to 1 day) based upon work flow processes in four key areas:

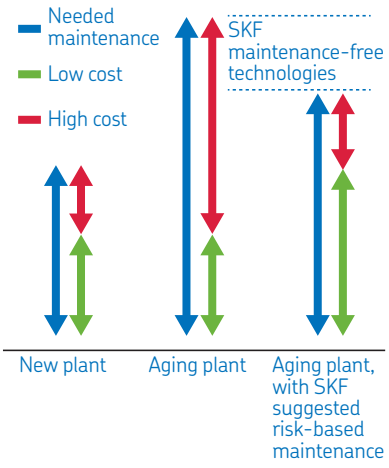
1 The strategy associated with business goals
2 Identification of issues
3 The control of necessary work
4 The optimization of work execution

Comparing the current situation against established benchmarks, the assessment revealed a number of issues:

- Existing maintenance strategy had delivered significant benefits (high OEE); but because the plant was new, it did not require significant maintenance resources
- A high percentage of unplanned maintenance interventions occurred, compared to planned (low predictive maintenance effectiveness)
- Asset criticality assessment left room for improvement
- Limited number of root cause failure analyses performed
- Limited details and depth of asset register
- Only a small number of assets had a spare parts list
- Low operator empowerment
- Technician skills level were in question (not enough training hours)

Acting on these identified areas, the plant was able to maintain the same level of OEE, but incurred less high cost unplanned maintenance. The increased maintenance requirement of the aging plant was offset by increasing levels of planned activities. Identification of asset problems was improved by the effective use of predictive/condition based maintenance tools, techniques and skills.

SKF recommended a risk-based maintenance strategy that considered both the consequence itself and the likelihood of incurring that consequence. Based upon the application and determination of the criticality matrix, high criticality assets were given the necessary predictive maintenance techniques. This enabled the plant to confidently predict when issues were developing with critical assets.



[1] excluding packaging

SKF's unique point-based criticality is a qualitative method to establish and rank equipment criticality, at system and tag level, without considering individual machine failures. The points-based system uses severity and frequency of failures in safety, environment and production, and delivers a relative criticality ranking.

One result of the maintenance strategy review was the development of templates listing asset parts. This allowed the compilation of a more comprehensive spare part list and when set against criticality, the creation of an optimum stock profile.

Lack of root cause failure analysis indicated that the mechanism of failure was not understood. This increased the probability of ineffective and excessive maintenance. Implementation of, and training in, the root cause analysis process enabled full understanding of the failure mode.

As prerequisites for higher operator empowerment, the plant upgraded the computerized maintenance management system. This facilitated the capture and recording of process parameters and general machine performance observations.

The CNA identified that maintenance personnel received relatively few training hours per individual. In response, SKF provided practical training across several maintenance disciplines.

The SKF Reliability Maintenance Institute offers a comprehensive range of classroom and on-line training courses in topics such as condition based maintenance, mechanical training, bearing basics, lubrication, seals and more.

For more information please visit skf.com/services/trainings

Development of the maintenance approach from time- to condition-based can increase plant availability and efficiencies

How to make more time available for continuous improvement?

A beverage plant increased the time available for continuous improvement from 5 to 20%

The plant had a time-based maintenance strategy that resulted in an intrusive strip, inspect and rebuild methodology. The result was an expensive and often unnecessary process that did not address ongoing issues, and prevented plant technicians from focusing on continuous improvement projects.

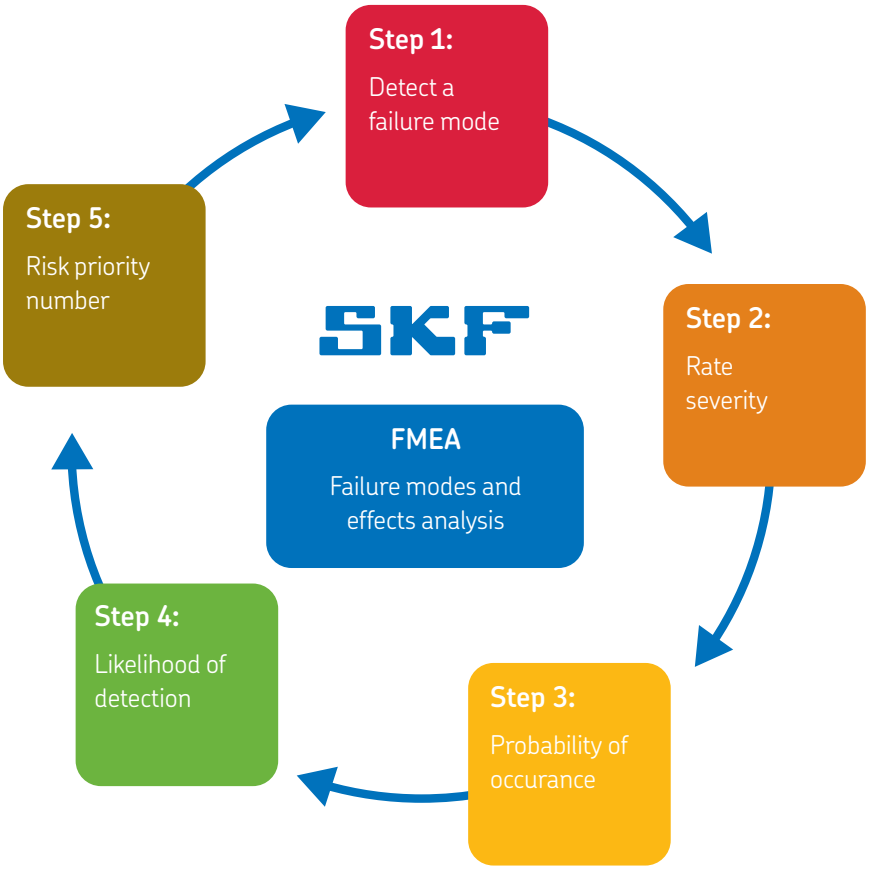
After purchasing SKF Microlog Inspector equipment the customer asked for support in implementing a condition based maintenance program.

SKF conducted a review of the existing plant maintenance activities using failure modes and effects analysis (FMEA) process. Maintenance templates were created, listing potential failure modes and the activities necessary to mitigate them.

Over a period of 18 months, SKF assisted the customer in applying the optimized maintenance activities within a condition based maintenance program. The customer also implemented front line maintenance activities using the SKF Microlog Inspector with associated software. On-site mechanical and basic vibration analysis training further supported this program.

As a result of this implementation, the plant was able to exceed the key target of increasing time available for continuous improvement from 5 to 20% and at the same time plant availability had improved.

The SKF Microlog Inspector is a powerful system developed by SKF for recording inspection data – ideally suited for operational efficiency, process and quality inspections, environmental, safety and regulatory compliance inspections, predictive and preventive/condition based maintenance inspections, as well as basic asset care.



SKF on-site mechanical and basic condition monitoring training

SKF failure modes and effects analysis identifies equipment failures and consequences by examining ways a component or machine can fail; causes for each failure mode; and effects of each failure. Especially useful during the design or operational phases, results are used as input to safety and maintenance engineering, maintainability, logistics service support analysis, and more.

Operator empowerment, within a front line inspection supported maintenance approach

Front line maintenance contributing to increased efficiencies?

Supporting condition based maintenance with a program of operator inspections enabled a threefold increase in the number of points being monitored

A manufacturer produced more than 250 000 tonnes of chocolate at one plant. The plant's preventive maintenance program was time-consuming and involved more than 2 000 inspection points with up to 500 being measured at a time, an equal number of hours were spent recording the data collected. Furthermore, optimization was made difficult due to a lack of documentation on past corrective measures and trends.

In order to maximize the front line maintenance contribution, SKF recommended an operator driven reliability process. SKF Microlog Inspector and @ptitude software were supplied; Monitoring points were established and suitable data collection routes were compiled.

Within a year, the automatic data collection process helped save one man-day per week and achieved greater organizational flexibility because inspections could be performed by a wider number of employees. In addition, production losses were reduced by 1%, while product quality was increased. Due to the success and efficiency of the program, it was decided to increase the number of inspection points to 7 000.

Enhancing equipment efficiency while meeting safety, quality and environmental targets

SKF's operator driven reliability processes and technologies empower front-line operators to monitor the condition of the nominated equipment as part of an ongoing preventive maintenance-based asset management strategy.

SKF condition monitoring, analysis reporting and communication technologies support the operator driven reliability process and can enable immediate detection of problems, and sharing of machine condition data. SKF also offers training in ODR processes.

Operator driven reliability can help increase overall equipment effectiveness (OEE) and complements the autonomous maintenance pillar of total productive maintenance (TPM). ODR also supports compliance with food safety standards and regulations by providing the ability to track and record asset events, inspections, process and maintenance parameters.

Operator observations recorded on paper are being replaced by modern electronic systems

Production operators are a valuable resource, as part of an asset maintenance programme. Because of their close proximity to the machinery, operators are often the first to detect changes in process or mechanical condition. Often their observations regarding an abnormal reading, unusual noises or vibration are either unreported, or if reported, are not effectively acted upon.

The ODR process empowers operators to become an integral part of an overall asset management programme, providing a platform and supporting technology to proactively communicate findings, initiating timely corrective actions.

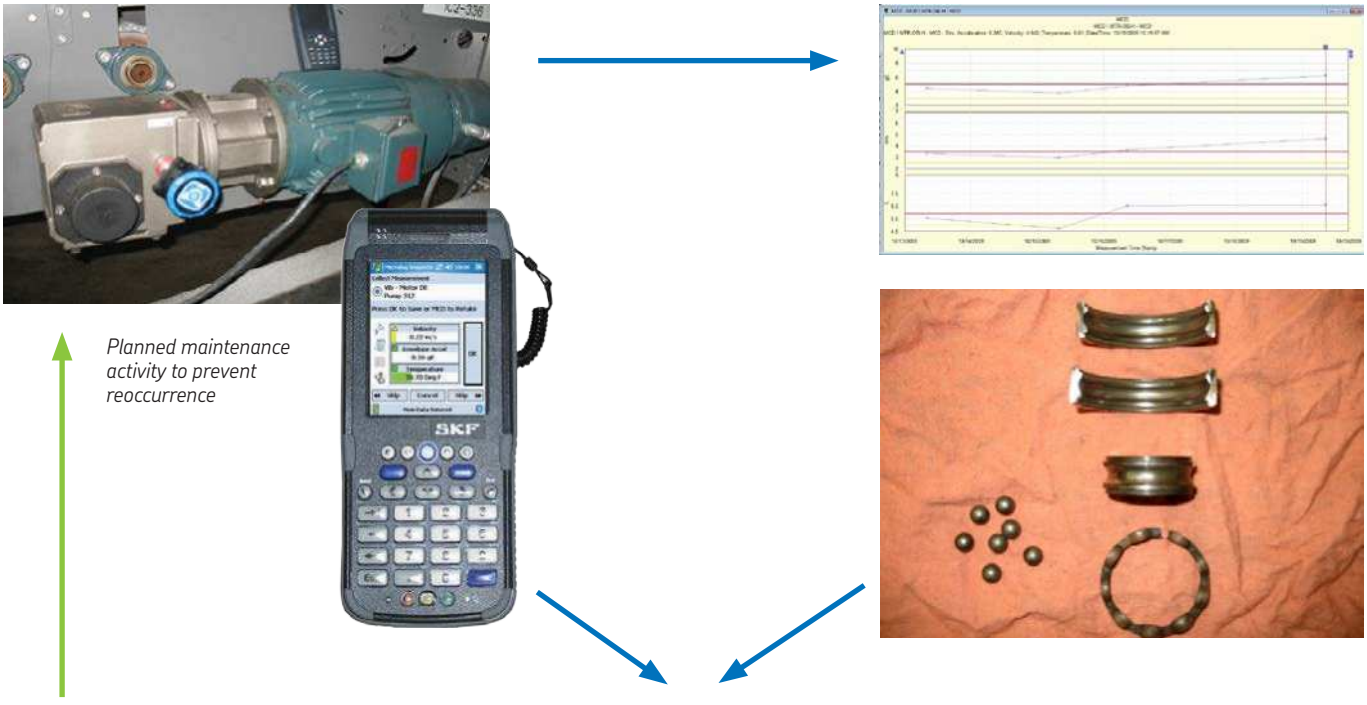
Paper based systems have sometimes been applied but have tendency to fail as they do not provide the necessary consistency and alarm capabilities. Modern electronic systems supported by relevant software enable rapid recording, uploading and sharing of data between operations, maintenance, engineering and plant management.

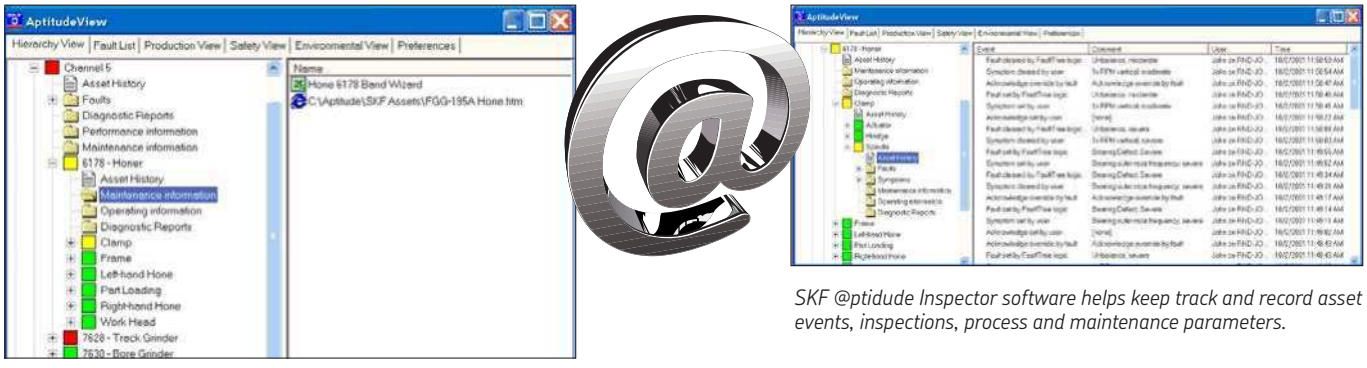
Operator empowerment, within a front line inspection supported maintenance approach

Benefits of the operator driven reliability (ODR) process, using SKF technologies – demonstrated in a beverage production line

In a beverage plant, the condition based maintenance team had been doing vibration monitoring on conveyors. The SKF Microlog Inspector data indicated that one of the conveyors was trending into alarm due to vibration caused by impending bearing failure.

Subsequent relubrication dampened the bearing vibration, but in later checks, the alarm reappeared. As a result, the gearbox was replaced, and a root cause analysis performed, revealing bearing damage caused by a lack of lubrication. To prevent reoccurrence, a planned maintenance activity was implemented for operators to check and replenish the lubricant as required.





SKF @ptidude Inspector software helps keep track and record asset events, inspections, process and maintenance parameters.

The purpose of inspection points on operator routes is to collect data to monitor and track any kind of variation (skids) in the process flow. Subsequent analysis can highlight where this is impacting the process. Thus, if an asset is not functioning to specification, the consequences on performance, efficiency and product quality can be addressed promptly.

For example, in a process area containing multiple pumps, an inspection route could include asset identification with bar codes (or other methods) and execution of the pre-defined instructions such as:

Collection of operational parameters such as pressure gauge readings, leakages, unusual noise, and the derivative point to evaluate pumping flow performance.

Collection of vibration data (also via wireless technology) with a pre-configured alarm that notifies when a level is exceeded.

In addition, data collected by operators can be used as a basis for providing detailed follow-up instructions that can be uploaded to a computerized maintenance management system system allowing the generation of a suitable work order.

Managing lubrication as a preventive approach to food safety

Increased line availability. Reduced maintenance costs.

SKF offers a broad range of technology and service offerings dedicated to helping food and beverage processors manage lubrication. This not only helps achieve food safety, but also contributes to improving efficiency and reducing maintenance costs.

As a starting point, SKF applies a systematic methodology to understand the duty and environment of assets, current lubrication needs and procedures:

- What is being lubricated?
- What lubricants are being used?
- What are the relubrication schedules?

Identification of potential negative impacts on HACCP (hazard analysis and critical control points) can lead to four areas for improvement:

- Relubrication free technologies
- High efficiency seals that keep lubricants in and contaminants out
- Manual lubrication
- Automatic lubrication

Comprehensive range of food grade lubricant solutions

SKF's range of food grade lubricants - all from bearing greases to hydraulic, gear and chain oils, has been specially developed to perform reliably in the typical application conditions of the food and beverage industry and meet the needs of producers to provide safe products.

High efficiency seals

About 14% of bearings fail due to the ingress of contaminants into the bearing enclosure, thus affecting lubricant performance. Because of this, a key element of SKF's approach to managing lubrication is protecting the lubricant through high efficiency seals.

SKF's range of seals includes high performance food grade materials, which provide excellent wear, abrasion and chemical resistance.

Manual lubrication

Reliable operation is achieved through correct lubrication management. It is estimated that about 36% of all bearing failures result from incorrect specification or inadequate application of the lubricant.

Depending on the environmental conditions, use of the correct grease replenished in the correct volume, at the right time, and by right methods, can provide long-term re liable operation.

Relubrication free technologies

During manual relubrication tasks, a common occurrence is grease purge through the seals. This can lead to potential contamination of food lines, slip hazards and increased waste management costs. SKF has several technologies that virtually eliminate the need to relubricate:

- Sealed for life bearings
- Food Line Y-bearing units

Relubrication free technologies are enabled by efficient integral seals offering protection in wet areas, such as process and hygienic cleaning.

Relubrication free technologies

In cases where a specific brand of lubricant or grease fill is needed, SKF offers customized, lubricated-for-life bearing solutions.

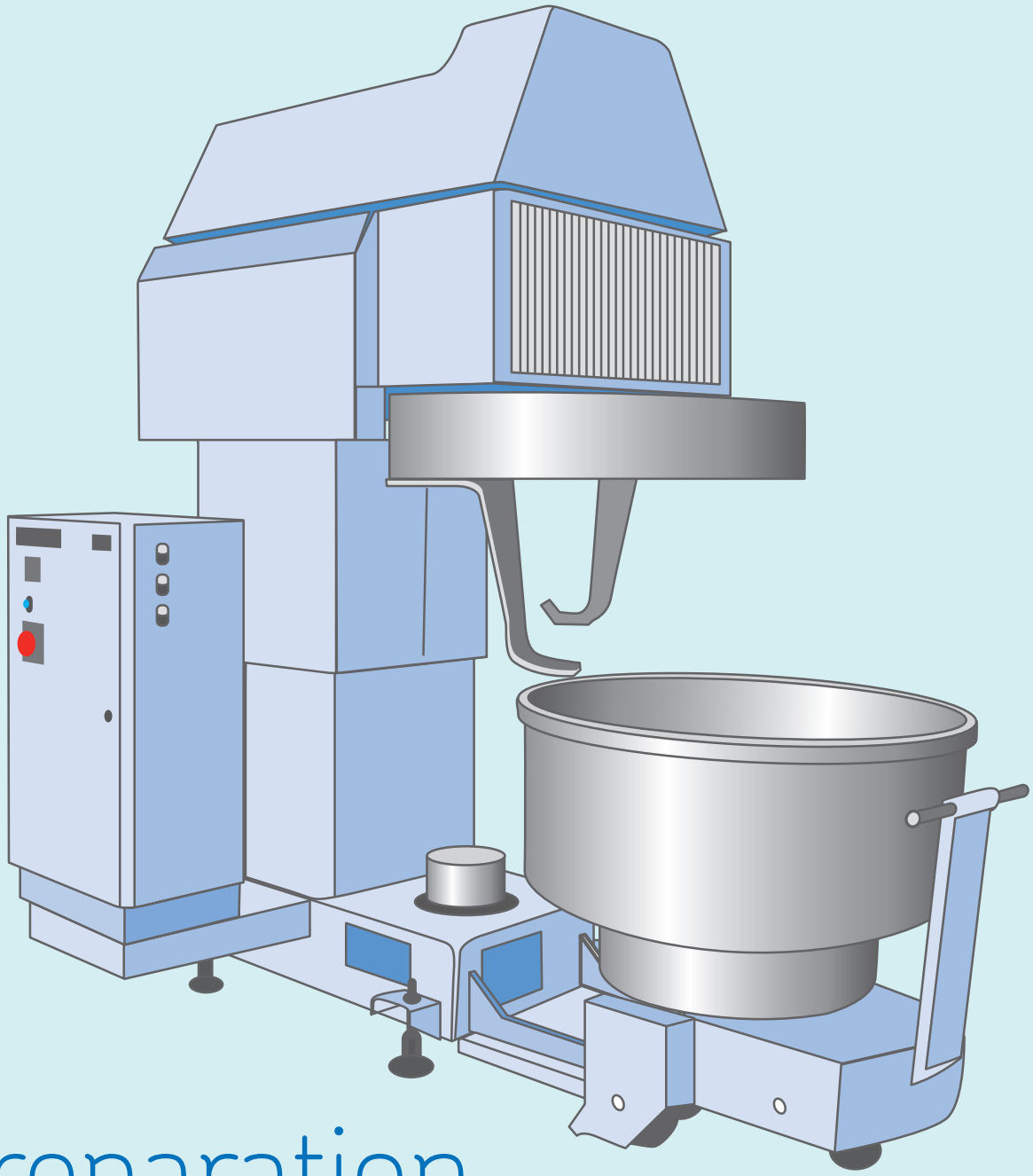
Other technologies, such as dry lube and Solid Oil technologies, can provide relubrication free operation in challenging environments.

Automatic lubrication

In process environments, or where concerns exist over potential missed lubrication points, SKF automated lubrication solutions provide the means for correct control of lubricant application.

Automatic lubrication

Automated SKF lubrication systems provide clean, accurate and reliable lubricant supply while contributing to operator safety.



Preparation

Typical issues for preparation assets and areas

Various applications for washing, sorting, grading, peeling, separating and blending make preparation areas wet and contaminated. Large amounts of water or other liquids are often required, creating high humidity levels that can severely affect rotating equipment. Process materials can also enter the bearings, as can the water and caustic agents used during washdowns.

Ultimately, these operating conditions can lead to additional costs due to lubrication degradation, lubricant loss and increased maintenance. All of these conditions can also increase safety risks for plant workers.

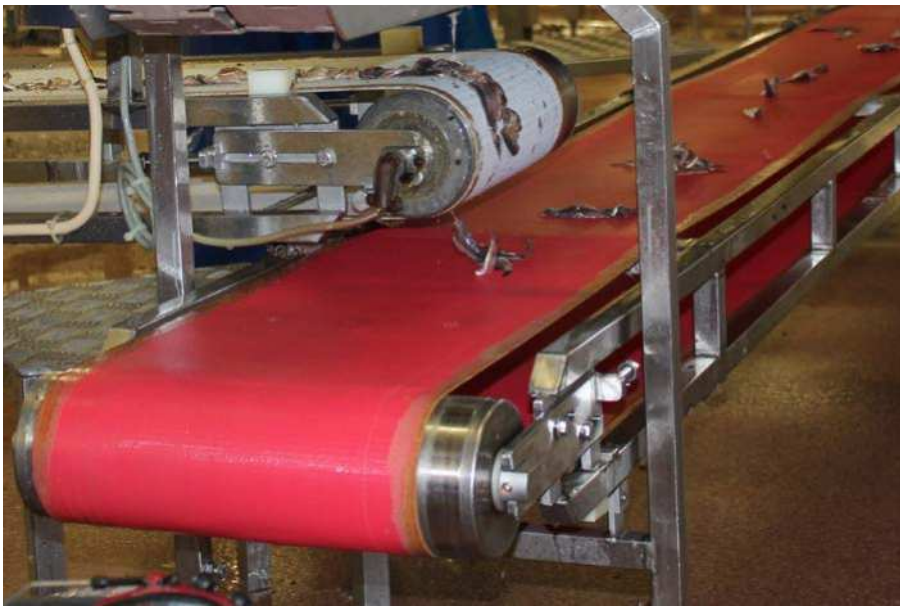
Because the composition of raw materials can be variable, feeding and load rates can be uneven. This may cause heavy shock loads and wear of rotating parts, as well as high energy consumption and costs.

Many raw materials arrive during limited seasonal timeframes and must be moved quickly. Operating parameters of these assets are pushed to the limit, accelerating wear of rotating components and increasing the risk of unplanned stops.

Large amounts of water and process debris resulting from preparation impact energy consumption and waste treatment costs.

SKF can help with a range of technologies designed to reduce the impact of these conditions.

Wet and humid environments



Developing industry requirements, such as Food Safety Modernization Act and ISO 22000, increase emphasis on contamination prevention as opposed to reaction after the fact.

Standard bearings with food safety features?

SKF Food Line stainless steel deep groove ball bearings reduce the risk and consequences of food line contamination.

The metal components of the bearings: balls, rings, cage and seal backing plate are made exclusively from stainless steel, providing increased protection against corrosion.

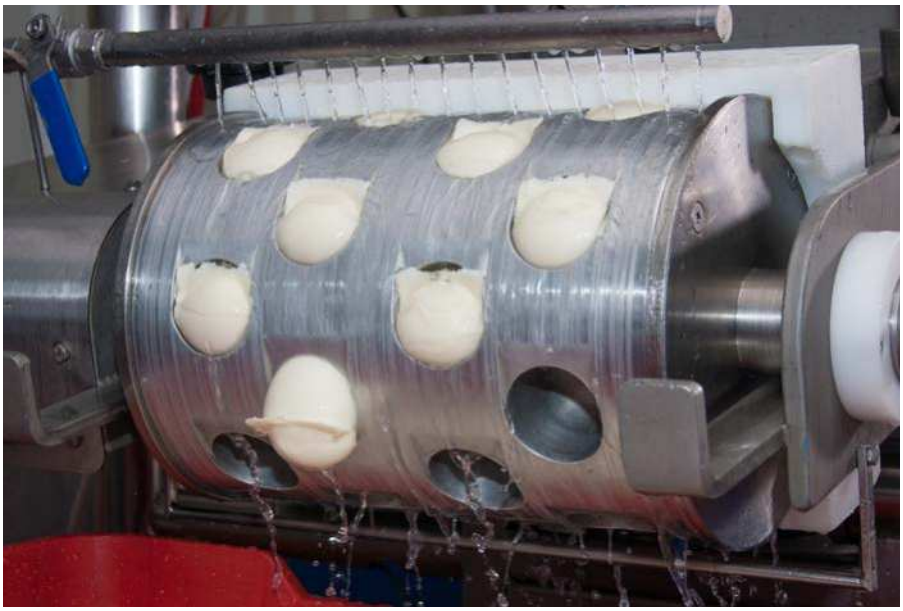
The bearings are prelubricated with a high quality grease registered by NSF as category H1 for food safety compliance.

Nitrile rubber seal material is coloured blue for optical detectability and is compliant with FDA and EC category 3 recommendations. Thus reducing the risk of product recalls.

Product range is available for bore sizes up to 40 mm, further options available for other series and bore sizes up to 50 mm. For more information refer to the designation system in the appendix, ***page 120****.*

The chosen bearing material, the blue rubber seals and selected grease meet relevant industry standards and make these bearings optimal for use in particulary aggressive applications.

Area with higher load, wet and aggressive chemical environments



For more information about SKF offers, please contact your authorized distributor or local SKF representative.

Ultimate protection against corrosion?

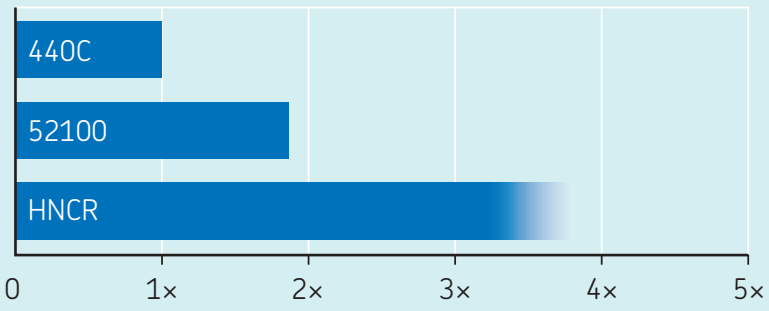
MRC Ultra corrosion-resistant sealed deep groove ball bearings are designed for superior corrosion resistance, increased fatigue life and significantly improved reliability.

Use of high nitrogen corrosion resistant stainless steel technology (HNCR), combined with ceramic balls, stainless steel cage and seal reinforcement, provides outstanding corrosion resistance and fatigue life.

The bearings are prelubricated with a high quality grease optimized for typical food and beverage application conditions and registered by NSF as category H1, for food safety compliance.

Nitrile rubber seal material is coloured blue for optical detectability and is compliant with FDA recommendations, thus reduce the risk of costly product recalls.

For product range please refer to product data table in the appendix, **page 121**



Roling contact fatigue test
MRC ultra corrosion-resistant deep groove ball bearings not only offer for greater corrosion resistance compared to bearings with inner and outer rings made from 440C stainless steel, they also deliver from two to three times the fatigue life.

Areas with high-pressure washdowns and process contaminants

Contamination control and reduced maintenance cost?

SKF Food Line Y-bearing units with composite housings withstand high-pressure washdowns, without the need to relubricate.

Suitable for use in conveyors, elevators, sorters, sizers, presses, brush washers and all washdown areas, SKF Food Line Y-bearing units feature the industry-proven 2RF seal to provide:

- Improved foreign body prevention – no dripping grease or purge contamination
- Reduced relubrication costs and environmental impact
- Reduced risk of premature bearing failure
- No risk of missed lubrication points due to human error
- Corrosion-resistance under virtually all washdown conditions
- Improved bacteria reduction due to solid or filled base design and smooth surface finish

Increased service life

In an apple processing plant, cast iron pillow blocks had to be replaced every 3 months due to rust and lubricant washout. Replacing them with SKF Food Line Y-bearing units with stainless steel bearing inserts increased service life to over 1 year, ensuring full reliability through the season.

To see a demonstration of washdown resistance, scan this code or go to the SKF channel on YouTube.

Available product range[1]):
Metric: 20 to 50 mm bore sizes
Inch: 3/4 in., 1 in., 1 1/8 in., 1 1/16 in., 1 1/4 in., 1 7/16 in., 1 1/2 in., 1 15/16 in. bore sizes

1) Please refer to the designation system in the appendix, **page 120.**

Areas with dust and other process contaminants

Is ingress of process material and high humidity causing downtime?

Bearings with Solid Oil technology make relubrication unnecessary while protecting against contaminant ingress.

Filled with a polymer matrix saturated with oil rather than conventional grease, these specialized bearings:

- Reduce risk of contaminants ingress
- Resist most chemicals used for washdowns
- Eliminate risk of leaking lubricant leading to food contamination
- Available with NSF-approved food grade oil

Solid Oil technology can be used in virtually all SKF bearing types with sufficient internal free space.

Increased reliability in bread prover

In a prover for bread, 60 °C temperatures, high humidity and water droplets were leading to corrosion, while grease emulsification in guide wheel bearings was leading to failure. Stainless steel deep groove ball bearings with Solid Oil technology provided a relubrication and corrosion free solution, eliminating the grease emulsification issues.

Areas with dust and other process contaminants

Is contamination in heavy duty applications a concern?

SKF Explorer sealed spherical roller bearings offer long service life.

SKF sealed spherical roller bearings of Explorer class, are factory-filled with high quality grease and feature an effective integral seal. Benefits are:

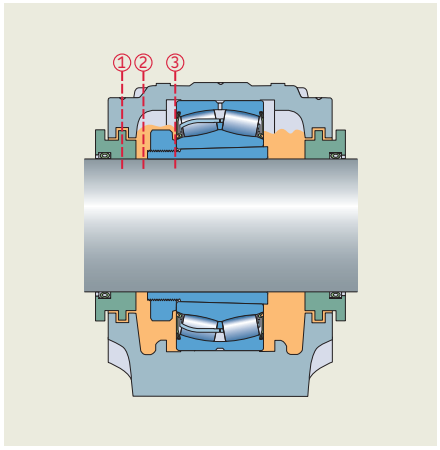
- High reliability for long service life
- Relubrication-free for the life of the bearing in most applications
- Help reduce vibration, noise and operating costs.

When using SKF sealed spherical roller bearings with SKF plummer blocks, the sealing efficiency and flexibility of triple barrier sealing can be considered.

Downtime prevented during season

Due to the ingress of cane juice, plummer block bearings in an intermediate sugar cane carrier had been failing prematurely during every milling season. SKF Explorer sealed spherical roller bearings ended the seasonal failures, increasing replacement interval by 2 years.

Available product range: 25 to 400 mm bore sizes depending on series



The SKF three-barrier solution, which comprises a sealed spherical roller bearing (3), a housing with a 70 to 90% grease fill (2), and external labyrinth seals (1), is a very efficient sealing solution.

Increased bearing life, simplified and safe mounting?

SKF ConCentra provide operational reliability and an innovative concentric locking technology.

SKF ConCentra roller bearing units are robust, ready-to-mount bearing units that are assembled, lubricated and sealed at the factory for maximum service life. The spherical roller bearings inside are SKF Explorer quality.

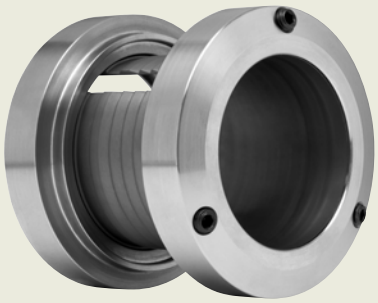
- High operational reliability
- Reduced maintenance, thanks to a robust, high efficiency sealing system
- Simplified mounting through a unique stepped sleeve (→ **fig. 2**)
- High load carrying capacity

Downtime prevented during season

In a sugar cane processing plant where high loads and exposure to raw material ingress were causing bearing failures, installing the SKF ConCentra system improved the mean time between bearing repair from 2,5 months to over 18 months.

SKF ConCentra roller bearing units are available from 35 to 75 mm bore sizes

Fig. 2



The patented SKF ConCentra stepped sleeve

Several factors should be considered when applying lubricant and subsequent relubrication

Selection of right grease

Considering standardized, food compliant greases throughout the plant?

SKF LGFP 2

SKF LGFP 2 is a food compliant bearing grease, certified by the NSF for category H1, and is also Halal and Kosher certified. Added benefits include:

- Full compliance with hygienic regulations
- High resistance to water and corrosion

Grease replenishment points

Concerned about correctly identifying re-lubrication points?

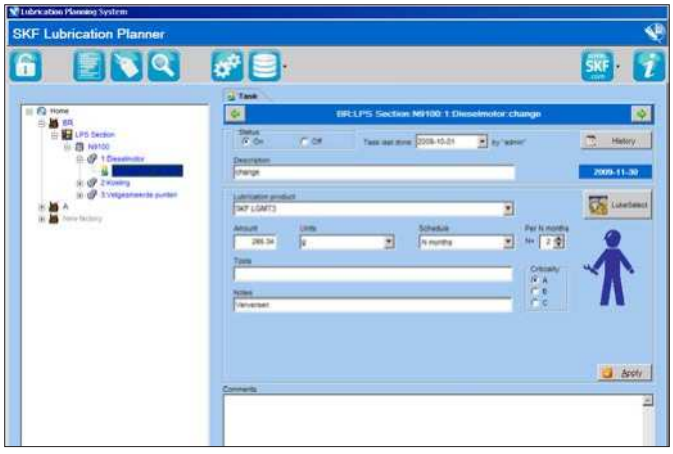
SKF offers simple solutions to identify the correct type and amount of lubricant for your asset.

Grease fitting caps and tags TLAC 50

Help avoid cross-contamination.

SKF Lubrication Planner

Enables simple administration of lubrication routines[1)].



1) Register and download for free at **skf.com/lubrication**

Optimum cleanliness when relubricating?

SKF offers a range of manual and air-operated grease pumps for high volume applications and grease filler pumps that provide optimum cleanliness.

SKF Grease Filler Pumps LAGF series

SKF Grease Pumps LAGG series

How often and in what quantity to relubricate?

SKF DialSet

SKF DialSet software helps calculate the correct grease quantity and lubrication interval. These parameters enable the best fit with scheduled relubrication intervals.

SKF DialSet is a quick and reliable tool for relubrication calculation. Download the App for Android or iPhone by scanning this code.

Ingress protection through high efficiency seals in rotating equipment

Customized seals in 1 to 2 days?

SKF machined sealing solutions

Designed to withstand washdowns that use aggressive chemicals, processed food and beverage ingress, SKF customized machined sealing solutions are manufactured from both FDA compliant standard materials and SKF proprietary approved sealing materials, such as the ECOPUR range.

- Short lead times; customized seals can be produced in as little as 1 to 2 days
- High level of flexibility in design
- Resistant to high humidity, hot steam and chemicals used in hygiene washdown (CIP)
- High wear resistance, including abrasive processing materials
- Less unplanned downtime and scrapped production
- Extended service life
- Reduced friction

Dairy plant increased productivity, reduced maintenance costs

Frequent washdowns with caustic soda and acids in a dairy plant's homogenizer eroded sealing materials, contaminating the milk product. The fast reciprocating movement caused additional stress to the sealing system – as did the homogenizing process itself. All of these conditions contributed to the reduced service life of the sealing system with resulting shaft damage. Additionally, particles from the seals and back up ring entered the milk product.

Using FDA approved materials with high resistance to cleaning chemicals, the sealing solution from SKF has operated problem-free for 12 months. Today, seals are replaced once a year during annual maintenance shutdown. The result: significantly increased productivity and decreased costs related to maintenance and contaminated products.

The SKF SEAL JET system helps enable the production of customized machined seals as prototypes, or small to medium series within 1 to 2 days. The system is a complete production unit consisting of a computer controlled CNC machine, machining tools optimized for polymeric materials and specialized software.

SKF seals made with FDA-compliant H-ECOPUR and ECOPUR 95A-bl-FG with EC 1935/2004 approval feature an improved, low-friction profile, reduced stick-slip effect and excellent sealing capabilities.

For more information refer to the materials data table in the appendix, **page 122**.

Customized asset specific solutions offered as standard

Taking material design to the next level

Based on working experience of previously applied solutions in food and beverage assets, SKF engineers have taken conventional designs one step further and developed alternative solutions following hygienic design principles and utilizing food grade materials for superior performance in food and beverage B applications.

Performance upgrade over conventional designs?

SKF H1R homogenizer chevron packing set

This differentiated solution from conventional elastomer chevron style seal assemblies fits in multiple-piece glands and is typically compressed with a spring.

H1R features a combination of materials to withstand abrasive, potentially non-lubricating products.

Benefits are:

- Extended seals life
- Reduced MTBF
- Reduced frequency and costs of planned sealing system replacement

To adapt solutions to your particular application, please contact SKF

Simplified design, yet effective?

SKF H2R homogenizer composite seal

This high performance composite O-ring loaded rod seal features an elastic energizer element that eliminates the need for springs or packing-style glands. A pressure adaptive back-up ring provides excellent anti-extrusion support for the sealing element.

Geometric design and advanced material selection of the sealing element gives H2R seals:

- Very high pressure resistance
- Outstanding sliding properties in water-based fluids and food products.

Benefits are:

- Extended seals life due to friction and abrasion resistance properties of the sealing material
- High clean ability due to the single dynamic element with multi-point sealing edges

For dimensional tables, please consult publication “Machine seals flexibility and standrard range convenience”.

Standard seals with advanced design options

SKF radial shaft seals offer improved performance.

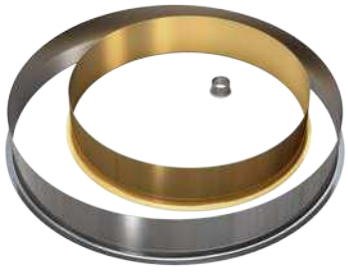
SKF WAVE radial shaft seals – CRW series

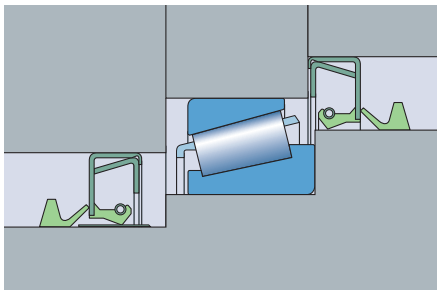
CRW seals feature a metal OD construction that provides positive retention in the housing bore and a suitable running surface for the V-ring. The bore-tite coating on the OD fills in any small imperfections in the housing bore surface.

The SKF WAVE seal design provides superior sealing and up to 20% less friction – resulting in up to 30% lower temperatures compared to conventional straight edge radial lip seals.

SKF Speedi-Sleeve

SKF Speedi-Sleeves are designed to fit securely over worn shaft areas – thus limiting the need for machining and drastically reducing costly downtime. In addition, the special sealing function prevents lubricant leakage to minimize environmental impact. SKF Speedi-Sleeves are made of stainless steel as the base material and can be supplied with a titanium nitride coating – suitable for the food and beverage industry.





Effective sealing system protected soybean flaker

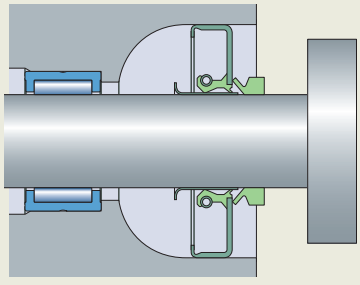
Dust and dirt build-up on the outside of a soybean flaking machine infiltrated the sealing lip, causing wear and contaminating the lubricant. Soybean particles from the flaking operation also got caught under the inner sealing lip, causing damage to the bearing.

The SKF solution used CRWH1 nitrile seals to protect the inside and outside of the bearing, and V-rings to prevent contamination buildup around the seals. Applying SKF Speedi-Sleeve on the shaft under the outside seal eliminated the need to take equipment off-line for a full disassembling to repair the damaged shaft.

Reduced downtime in poultry processing equipment

High pressure jets used to clean processing equipment at poultry packaging plants forced water past the lips of the seals, contaminating the lubricant and damaging the bearings. Existing seals also wore grooves into the shafts.

SKF suggested applying V-rings to prevent water and other contaminants from penetrating the seal. SKF Speedi-Sleeves were used to repair the grooved shafts without removing them from the equipment, thus minimizing downtime.



High efficiency plastic parts for rotating and reciprocating equipment

Improved hygienic design, wear resistance and weight saving

SKF advanced engineered plastics solutions offer an alternative material selection for a wide range of applications.

Temperature extremes, intense pressures, high surface speeds and aggressive chemical cleaning can be better tolerated using SKF FDA-compliant engineered plastic materials.

Filled PTFE-based materials are typically used in higher speed reciprocating and rotary sealing environments. Applications include rotary seals in conveyors; processing equipment, such as mixers; and fluid and air handling equipment. They feature superior self-lubricating properties, as PTFE is a good sliding surface.

High strength materials such as PEEK, PPS, POM, and PETP are frequently used as plain bearings and seals in reciprocating and rotary applications requiring high physical properties to prevent material creep.

- **UHMWPE-based materials (with metals detectable properties)** are utilized as seals and plain bushings for extremely abrasive food products, as well as high pressure applications.

New dye process for meat pies improved production

A dye for meat pies used heavy steel drums, with each pie size needing its own drum. The lack of flexibility meant long changeover periods to modify pie sizes and a difficult cleaning process.

SKF introduced FDA-approved, advanced engineered plastics and specialized machining techniques to create a flexible solution incorporating quick release inserts into the drum design. These improvements helped eliminate complete drum changes and reduced changeover time by 3 hours.

Improved mixing drum design for cereal production

The design of a food processor's cereal mixing drum had seams that did not run in the direction of rotation. Bacteria buildup resulted and led to wear on the underside.

SKF introduced a new, seamless design using wear resistant FDA materials to overcome bacteria buildup. The solution met HACCP requirements, offering improved hygiene control and lengthened life.

Effective lubrication for reliable operations

Concerned about missed relubrication points?

SKF single point automatic lubricator serve as a simple, accurate and reliable re-greasing system used commonly for rolling bearing applications, as well as chains, guides, plain bearings, linear bearings, screws, and even gears.

1 The LAGD series, gas driven
2 The TLSD series, electro-mechanical driven
3 The high pressure TLMR series, electro-mechanical driven

An easy to install centralized lubrication system?

SKF MultiPoint Automatic Lubricators Provide a user-friendly and cost-effective option when longer distances, high flow or enhanced monitoring is required.

SKF lubricator units helped improve reliability in cane elevators

Standard single point lubricators in the pillow blocks of a sugar mill's cane elevators failed to provide the required grease feed rate at various points due to temperature conditions and high vibration levels. SKF electromechanical driven lubricator units virtually eliminated the failures, leading to increased reliability and significant cost savings.

Quick calculation of relubrication intervals?

SKF DialSet assists with the correct set-up of the SKF automatic lubricators.

Additionally, it provides the grease quantity, corrected lubrication interval and required feed rate. These parameters enable the best fit with scheduled re-lubrication intervals.

Reduced residue build-up on the chains?

LFFM 80

High moisture chain oil LFFM 80 exhibits particularly good performance in high moisture environments such as in proofers and pasta driers as well as in applications where condensation might occur. This low viscosity semi-synthetic base oil prevents residue build-up on the chains and offers good wear and corrosion protection.

Benefits are

- Improved chain life
- Maintenance cost savings
- Relubrication intervals are longer
- Reduced oil consumption

Odourless and tasteless, food grade chain oils comply with NSF H1 regulations and provide a high level of safety and ease of handling.

High performance chain oil for general use?

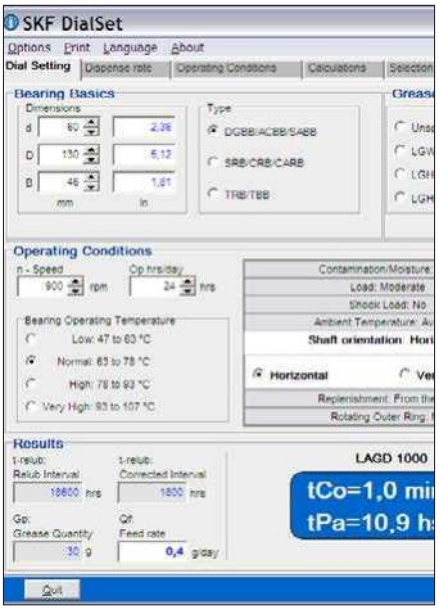
LHFP150

LHFP150 is a general purpose chain oil based on a synthetic oil formulation, with good corrosion and wear protection as well as aging and oxidation stability.

Benefits are

- Improved chain life
- Maintenance cost savings
- Relubrication intervals are longer
- Reduced oil consumption

Odourless and tasteless, food grade chain oils comply with NSF H1 regulations and provide a high level of safety and ease of handling.



SKF Dialset downloads are available for Android or iPhone free of charge on skf.com/lubrication or by scanning this code.

Effective lubrication for reliable operations

Unplanned downtime due to inadequate lubrication?

SKF automatic, centralized lubrication systems simplify lubrication maintenance and improve reliability, productivity and safety.

From its centralized lubrication systems, SKF offers a range of flexible automated solutions for bearings, gears or linear motion and adaptable to various asset conditions. All include a pump unit (with optional control unit), distributors/feeders to automatically deliver the lubricant amounts and intervals. Optionally, this can be linked to the machine's PLC (programmable logic computer) indicating possible lubrication system failure.

- Enhanced productivity through greater machine availability
- Simplified maintenance given the modular and standardized lubrication system components
- Flexible system – can be adapted to different type of assets, used with a variety of grease and oil types
- Extended bearing and gear service life through reduced wear

Reducing downtime and maintenance costs for a cereal processor

Inadequate bearing lubrication in a cereal drum dryer led to unplanned downtime. The system needed to operate in a very humid environment and was affected by a blocked line that restricted lubricant flow, and the lack of an alert system to indicate lubrication system failure.

The drum dryer was fitted with an SKF ProFlex progressive lubrication system featuring a digital control and monitoring unit with external alarm. By delivering the correct volumes of grease, the new system cut lubricant consumption by 50%, and reduced both unplanned downtime and environmental impacts involving high grease usage and subsequent disposal. The customer realized a return on investment in 8 months.

SKF ProFlex system with additional spraying nozzles can be used for pinion drive lubrication in sugar diffuser, mixers, etc.

SKF DuoFlex system offers numerous advantages for food processing plants, such as sugar mills, for lubrication of plain bearings and gears.

SKF ProFlex, progressive lubrication systems

For small- and medium-sized machines. The progressive system incorporates a feed pump and flow dividers to progressively serve each outlet with a defined amount of lubricant – generally grease – with the additional possibility to detect plugged lubrication points.

SKF ProFlex system can be used for bearing lubrication of dryers, mills, crushers, mixers, filters and more.

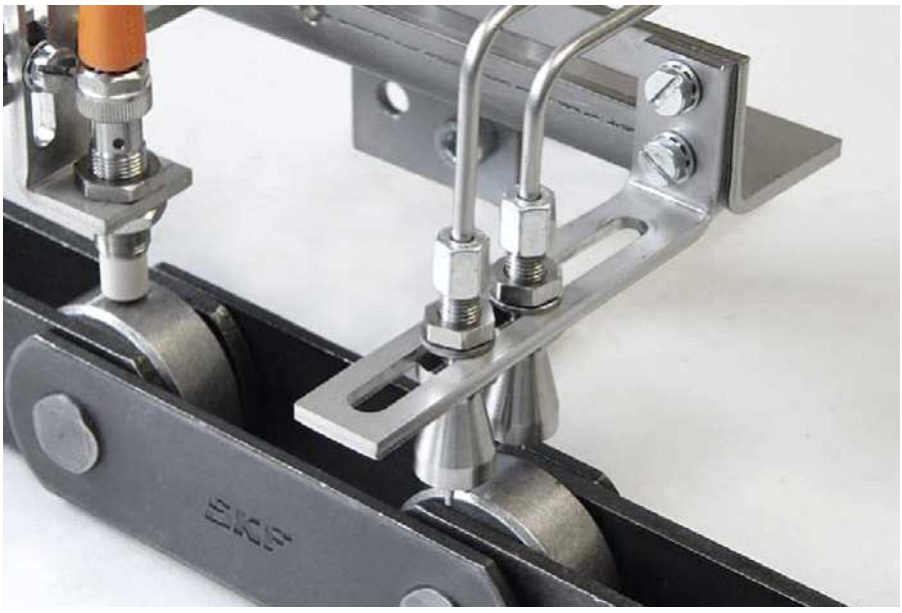
SKF DuoFlex, dual–line lubrication systems

For medium-to-large machines with many lubrication points, long lines and harsh operating conditions. The dual-line system can supply more than 1 000 lubrication points from a single pump unit source.

Reducing excessive lubricant consumption in a sugar cane mill

Bearings in a sugar cane mill were using large amounts of lubricant. SKF recommended the implementation of the SKF DuoFlex dual-time lubrication system to replace the existing oil lubrication system. The changeover led to a reduction in lubricant consumption from 14 tonnes of oil/year to 3,8 tonnes of grease per year, resulting in both improved machine reliability and availability.

Effective lubrication enhances chain reliability



SKF ChainLube, airless oil projection system with integrated automation, pumping systems and reservoir

Longer service life and reduced maintenance for conveying chains?

SKF ChainLube, oil projection systems are reliable solutions for accurate and automatic chain lubrication.

The systems include volumetric piston pumps that precisely deliver a metered volume of lubricant to the points of friction whilst the chain
is in operation. A control unit is preset to the preferred timing for lubricant application. Projection nozzles, having no mechanical contact
with the chains, prevent dirt accumulation and applicator wear.

- Reduced maintenance costs (lubricants and lubrication tasks compared to manual lubrication)
- Eliminated risk of lubrication points being missed through human error
- Improved productivity by eliminating unplanned stoppages
- Longer service life resulting from reduced chain wear
- Reduced energy consumption through decreased friction
- Enhanced operator safety by reducing intervention for maintenance tasks
- Prevents foreign body ingress, thereby helping producers support the HACCP
process in producing safe food
- Better cleanliness by reducing excess lubricant

SKF ChainLube systems can be set up with SKF food grade chain lubricants or other type of lubricant used on site.

SKF can recommend the right oil projection system for specific application needs.

SKF ChainLube, air assisted oil projection system

This system is best suited for lubricating chains where no pitch detection is possible due to fast movement of chain or when pitch is too small (less than 50 mm). Regulated carrier air flow is used to project small amount of lubricant, having viscosity up to 400 cSt with virtually no mist formation around the projection nozzles.

SKF ChainLube, airless oil projection system

This airless oil projection system is suitable for accurate lubrication of chains pitch-by-pitch without the need to connect to a compressed air supply. It is also suitable for lubrication of chains with medium pitch (50 to 300 mm), where speed is below 2 pitches/second.

Reduced operating costs, downtime and energy use in bread proofer

Manual lubrication practices in a critical conveyor chain, where humidity levels were high, led to friction, chain wear and breakage. This resulted in frequent production downtime, reduced product quality, and frequent chain replacement costs. In addition, oil leakage during manual lubrication led to concerns over operator safety.

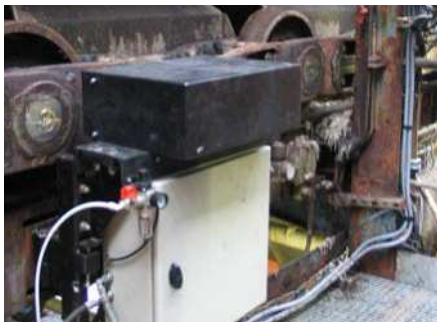
SKF ChainLube automatic oil lubrication system helped cut chain replacements by half. Savings were achieved by reducing product losses and labour costs for manual lubrication. In addition, safety and plant hygiene were improved.

Asset customized solution

Line efficiency affected due to unreliable lubrication?

SKF ChainLube, grease injection system for sugar diffusers reduces unplanned and planned maintenance downtime.

The SKF grease injection system provides an integrated lubrication solution – from greasing units and electronic control unit to pneumatic pump and air treatment plate. In this case, adapted to the tough operating conditions of the diffuser, it ensures optimum grease delivery into the chain pins and roller shafts to avoid chain stoppages.



SKF ChainLube automated lubrication system saved time, money

In a sugar diffuser, a lubrication system was set up to lubricate and protect chain rollers from the effects of corrosion (caused by water and steam ingress to the rollers). However, an inadequate amount of lubricant reaching the chain rollers and shaft led to production stoppages during the seasonal campaign. The maintenance team needed to change the complete chain link, requiring production stoppages of 8 hours. SKF proposed a fully monitored grease injection system that enabled reliable lubrication of the chain rollers. Overall grease consumption was reduced, thanks to precise and adjustable volumetric grease delivery.

SKF solutions optimize chain performance

Asset customized solution

Reduce wear, limit elongation and chain breakage

SKF engineered conveyor chains serve as a reliable solution for demanding applications.

For all the different types of conveyors and chain applications in food and beverage machinery, there is an equally large number of chain configurations and materials available.

The SKF range of conveyor chains includes a variety of chains and chain materials that offer flexibility through customization.

- Materials: from stainless steel in high grade or high strength composition, to long life material in either hardened or cast steel form
- Attachments: designed specifically to suit the process and product

The result is a solution that provides: extended life, easy installation, less downtime and less maintenance.

Upgraded chain helped optimize sugar plant production

A sugar plant's loop link chains failed prematurely resulting in unplanned downtime in the main cane carrier. SKF engineered a custom solution involving a chain made of a special steel and needing a specific forging treatment. The chains have operated successfully for over 2 years without failure, meeting the targeted life expectation and saving significant manpower and preventing lost production.

SKF can offer a wide variety of engineered conveyor chains, custom-made to meet the requirements of each application.

Also available from SKF's standard range of chains:

SKF Xtra Strength Chains – XT series

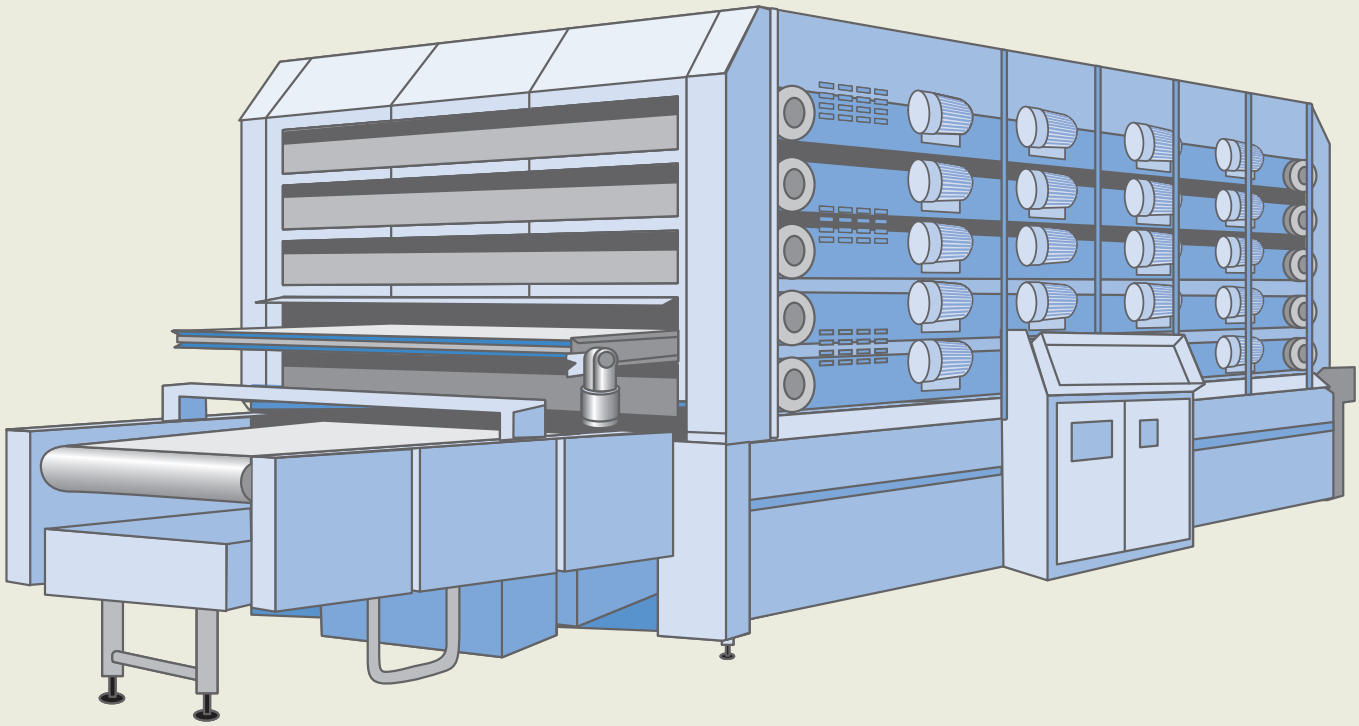
Where applicable, SKF Xtra Strength Chains provide improved productivity for applications with higher shock loads and lower operating speeds. The materials and tolerances of the chain, with an improved heat treatment process, provide superior capabilities over standard chains with the same dimensions. Operating benefits include long life when subjected to shock loads and an enhanced ability to withstand misalignment.

Optimized conveyor drives helped palm oil mill reduce maintenance costs

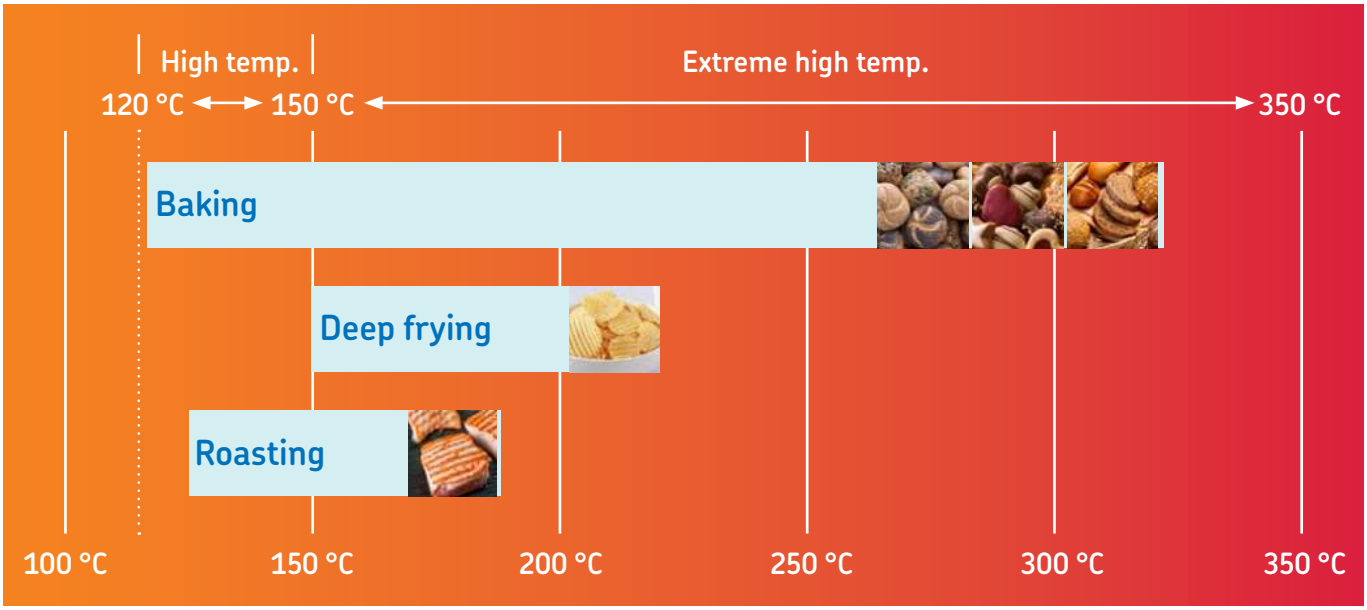
Conveyor drives in a palm oil mill were constantly subjected to extreme conditions. SKF carried out a conveyor chain mapping exercise, resulting in the recommendation of the SKF Xtra Strength solid series with hardened pins to withstand the prevailing conditions. In addition, SKF facilitated training to assist the plant teams to further optimize maintenance operations.

The increased tensile strength helped improve chain life and extend service intervals. In addition, the palm oil plant lowered maintenance costs, and improved machine and conveyor reliability.

Engineered conveyor chains – wide range, custom made for applications



Processing food by application of heat



High temperature applications up to 150 °C

With temperatures ranging from 120 to over 300 °C, processes such as baking, frying, and roasting contribute to high operating costs for rotating machinery.

The need for frequent relubrication is expensive, in terms of labor and high-temperature grease costs. Frequent lubrication can result in unhygienic grease leakage, reduce productivity and drive waste management costs. Extreme temperatures may also lead to corroded bearings, unhygienic flaking corrosion, bearing failure and high standstill, replacement costs.

Increased pressure to reduce baking cycle times, increase process temperature and asset speed to maximize production can contribute to higher operating costs for rotating machinery.

Ultimately, the effects of high and extreme temperature processes limit grease performance and line efficiency, increase safety risks, and drive energy and clean-up costs.

SKF has a range of solutions to help in extreme temperature challenges.

Extreme high temperature applications up to 350 °C

Does use of greased bearings involve costly maintenance, put operator safety at risk and potentially limit the increase of productivity?

SKF dry lubrication bearing technology can provide the right upgrade for your asset!

Based on advanced graphite lubrication, NSF H1 approved high temperature technology features a fully crowned, pure graphite cage for ball bearings and bearing units suitable for continuous operating temperatures up to 350° C (suffix VA228).

The SKF dry lubrication technology can offer:

- Lubrication-free performance
- Reliability and long service life
- Reduced standstills and lost production
- Reduced friction with low start-up and constant low-running torque
- Improved operator safety (no need to relubricate)

Graphite cage
During operation, the pure graphite cage generates minute quantities of graphite – more than enough to lubricate the bearing and enable years of trouble-free operation without maintenance.

Is unhygienic grease leakage a concern?

SKF extreme high temperature ball bearings and Y-bearing units eliminate the need to re-grease

Featuring a manganese phosphate surface treatment that enhances running properties, SKF relubrication-free extreme temperature bearings are available in two types: Y-bearings and deep groove ball bearings.

- Suitable for continuous operating temperatures up to 350 °C
- Enables process temperature increases with no relubrication
- Can provide more flexibility for process temperature to maintain or even improve product quality
- Extends bearing service life

To select the correct bearing type for your specific application conditions, please contact SKF or your SKF authorized distributor.

Deep groove ball bearings in VA228 execution

Y-bearing units in VA228 execution

Reliability and long service life

In a stone baking oven with an operating temperature of 265 °C and 50 r/min, SKF extreme high temperature bearings with fully crowned pure graphite cages provided reliable, relubrication free operation. This dry lubrication solution extended bearing lifecycles from 9 months to 3 years, eliminating the demanding manual relubrication.

Longer service life, shorter baking cycle times

Due to poor lubricant selection and fitting practices, the bearings within a tortilla chip oven required excessive relubrication. Ovens were upgraded with SKF extreme high temperature Y-bearing units. Operators were able to increase oven temperature to 250 °C, reducing baking cycle times from w23 to 17 seconds, and enabling increased production. Bearing life cycles improved to over one year in service.

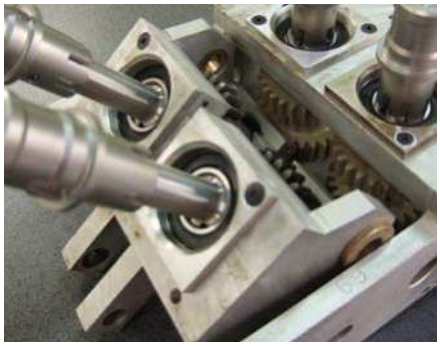
High temperature applications up to 150 °C

Bearings with the correct grease specification for high temperature applications?

SKF double shielded deep groove ball bearings are lubricated for life and custom grease filled for reliable operation

Designed for particularly aggressive application environments, SKF deep groove ball bearings are pre-filled with a multi-purpose grease based on a fluorinated polyether oil/ PTFE mix. While standard lubricant fill occupies between 25 and 35% of the free space in the bearing, other percentages are available on request.

- NSF approved grease
- Custom grease fill on demand
- Extended service life
- Wide operating temperature



SKF can provide custom grease fill (from 10 to 100%)

Reduced downtime and lubrication costs

Problems were being experienced with critical machinery, executing the final sealing function of tea bag production. Due to the proximity of the heating elements, the bearings were exposed to temperatures in excess of 130 °C. The customer was using high temperature greased bearings, but still suffering poor reliability. Analysis of failed bearings revealed a number of issues with the lubricant.

An alternative grease and revised bearing specification were recommended. SKF was able to deliver low quantities of the bearing, greased with the recommended lubricant. This, in combination with shaft and housing redesign recommendations, provided a solution that improved reliability of the application.

Asset customized solutions

Frying oil as bearing lubricant?

SKF fryer bearings allow this and can additionally contribute to food safety

Featuring an innovative lubrication solution that allows cooking oil to enter the bearing and act as a lubricant, SKF fryer bearings help to improve fryer reliability. This unique bearing design includes a special high-temperature plastic material cage design, plus stainless steel shield and flinger in a corrosion-resistant housing.

- Reduction of unplanned stops due to bearing failure and consequent food line contamination
- Extended bearing service life
- Decreased costs through relubrication operation
- Elimination of process oil contamination through grease washout
- Excellent corrosion resistance in hostile environments

Available with cast stainless steel housing, in shaft sizes of 20 to 40 mm and 3/4 to 1 1/2 in.

Improved reliability

A potato crisps fryer was experiencing frequent failures of a housed bearing unit, with each replacement bearing lasting less than 6 000 hours. SKF fryer bearings more than doubled bearing life, achieving more than 16 000 hours of reliable performance with no unplanned stops. Expensive re-lubrication was eliminated.

Reduced planned downtime for wafer baking ovens?

SKF wafer oven units can provide up to 5 years relubrication-free operation, 24/7

The SKF lubrication-free integral wafer oven units consist of a carrier wheel and a top roller unit for baking tongs. A unique graphite cage acting as lubricant provides an environmentally friendly solution that is HACCP compliant.

- Increased production with reduced maintenance
- Environmentally friendly – no dripping grease
- Reduced operating costs – no more relubrication or grease disposal costs
- Ease of replacement – quick retro-fit

Reduced downtime and lubrication costs

In a wafer baking machine that required costly relubrication at 16-week intervals, SKF wafer units provided up to 5 years of relubrication free operation running 24/7, reducing 150 hours of labour and 40 kg of grease costs per year. Productivity was increased through elimination of 26 hours of planned downtime, but also due to increase of process temperature by 10 to 15 °C.

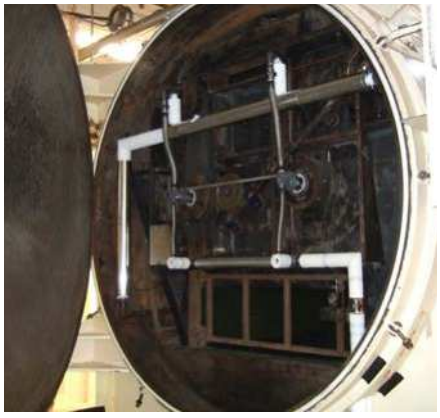
Available as stainless steel and manganese phosphate-coated units with shaft sizes of 25 and 30 mm.

Scan this code to view a short video testimony highlighting the use of SKF wafer over units or visit the SKF channel on YouTube.

Suitable lubricant specification, applied in the correct way

Selection of right grease

Selection of lubricants with the right performance parameters may resolve reliability issues



Improved bearing reliability

In a critical vacuum oven for chocolate crumb – poor lubricant performance was leading to bearing failure. Use of SKF LGET2 [1] high temperature grease allowed replacement of the lubrication system, reducing annual grease consumption from 200 to 4 kg. Improving reliability of the bearings resulted in lower maintenance costs and a significant improvement in productivity.

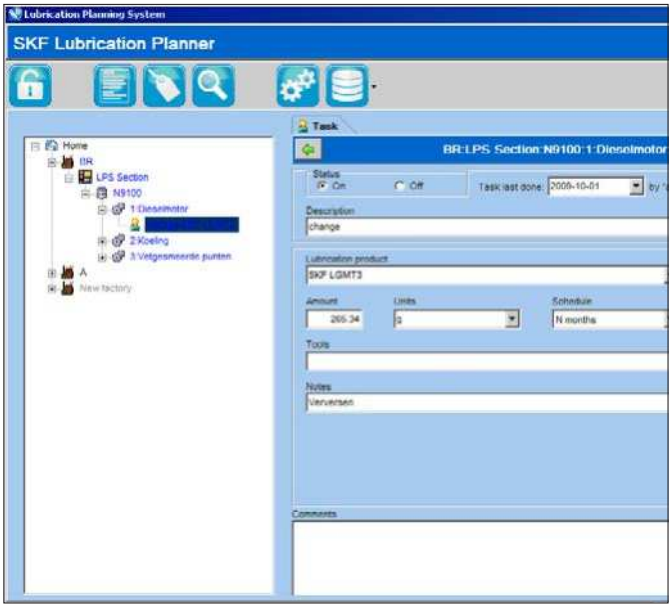
[1] In this case NSF certified, H1 compliant grease was not required.

Grease replenishment points

Concerned about correctly identifying relubrication points?

SKF offers simple solutions to identify the correct type and amount of lubricant for your asset.

Grease fitting caps and tags TLAC 50
Help avoid cross-contamination.



SKF Lubrication Planner
Enables simple administration of lubrication routines [2].

[2] Register and download for free at skf.com/lubrication

Simple and accurate manual relubrication?

SKF offers several relubrication tools and accessories, all designed to make manual grease application easier and more precise.

SKF Battery Driven Grease Gun TLGB 20 series

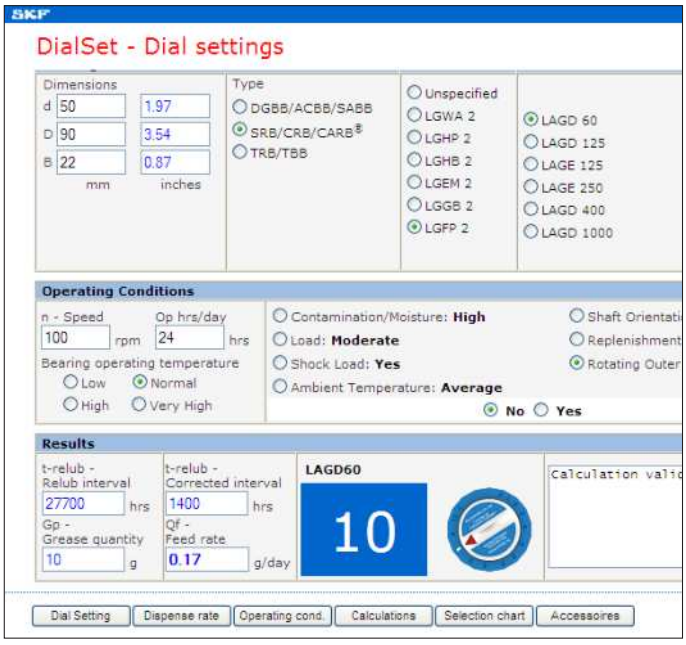
SKF Grease Meter LAGM 1000E

SKF One Hand Operated Grease Gun LAGH 400

How often and in what quantity to relubricate?

SKF DialSet

SKF DialSet software helps calculate the correct grease quantity and lubrication interval. These parameters enable the best fit with scheduled re-lubrication intervals.



SKF DialSet downloads are available for Android or iPhone free of charge on skf.com/lubrication or by scanning this code.

SKF sealing systems offer efficient lubricant protection

Sealing materials that are FDA-compliant and suitable for high temperature applications?

SKF seals for high temperatures help to ensure optimal functionality and long service life.

To manage the combination of heat resistance and thermal expansion, SKF offers a range of seal materials – from fluorocarbon and PTFE to advanced elastomers made of food grade materials. SKF Ecosil, SKF Ecorubber and SKF Ecoflon ranges are some of the SKF proprietary materials resistant to hot water, steam and typical cleaning agents. Benefits include:

- Increased sealing efficiency and asset life – due to high abrasion resistance
- Energy efficiency – reduced friction

Range of SKF sealing materials complying with FDA regulations. Please refer to the chemical resistance table in the appendix, ***page 122.***

Extreme temperature applications (> 180 to 350 °C)

Increased chain reliability, enhanced operator and food safety?

SKF ChainLube, airless oil projection system is a user-friendly, food-safe and reliable solution for accurate and automatic chain lubrication

The system provides accurate lubrication of chains pitch-by-pitch, without the need to connect to compressed air supply. It is best suited for lubrication of chains with medium pitch (50 to 300 mm), speed below 2 pitches/second, temperature (nozzles area) up to 220 °C. Projection nozzles, having no mechanical contact with the chains prevent dirt accumulation and applicator wear.

- Reduced maintenance costs (lubricants & lubrication tasks compared to manual lubrication)
- Eliminated risk of lubrication points being missed through human error
- Improved productivity by eliminating unplanned stoppages
- Longer service life resulting from reduced chain wear
- Reduced energy consumption through decreased friction
- Operator safety by reduced intervention for maintenance tasks
- Helps producers support the HACCP process in producing safe food
- Better cleanliness by reducing excess lubricant

Improved productivity of pizza baking oven

In a pizza baking oven, manually applied oil lubrication delivered insufficient lubricant to friction areas such as chain links and pin bores; this resulted in excessive wear and subsequent chain slippage. In addition, energy consumption and unplanned downtime were high. An average of 40 to 50 minutes was needed to re-start production, reducing oven availability. The SKF ChainLube oil projection system increased reliability once installed, providing accurate automatic pitch-by-pitch lubrication.

To see a demonstration of the SKF chain lubrication system in action, scan this code or go to the SKF channel on YouTube.

A compact unit with integrated automation, pumping systems and reservoir makes installation simple and user friendly.

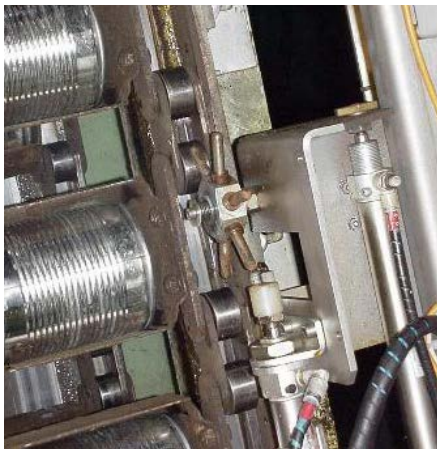
SKF ChainLube system can be set up with SKF food grade chain lubricant LFFT 220 for high temperature or other type of lubricant used on site.

Enhanced service life, no unplanned stops?

SKF grease injection systems for continuous sterilizers reduce unplanned stops, while enhancing chain service life.

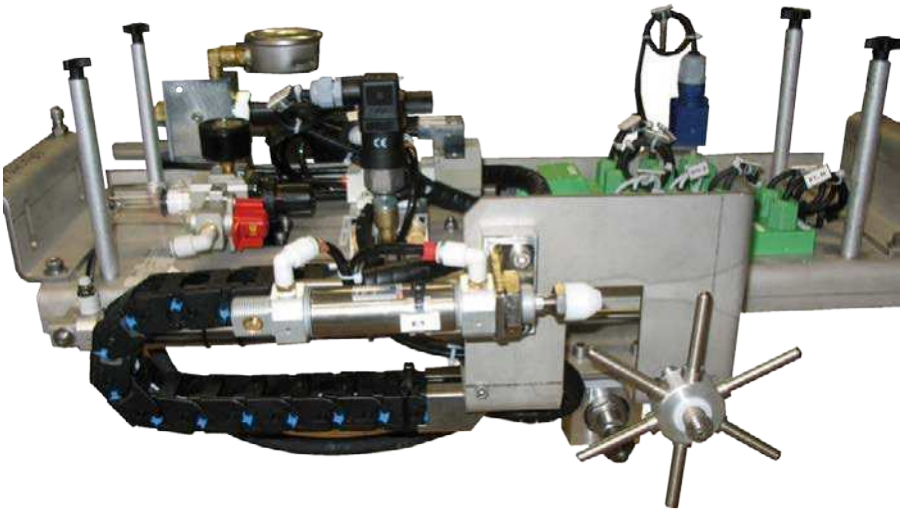
Developed for continuous sterilizers for cans and glass containers, this SKF solution automatically injects pressurized lubricant into the chain pin while the chain is moving. Along with the ability to monitor and control lubrication cycles, the system offers:

- Elimination of unplanned downtime caused by improper lubrication
- Increased chain service life through precision lubrication
- Improved sterilizer efficiency
- Reduced grease consumption
- Reduced environmental impact

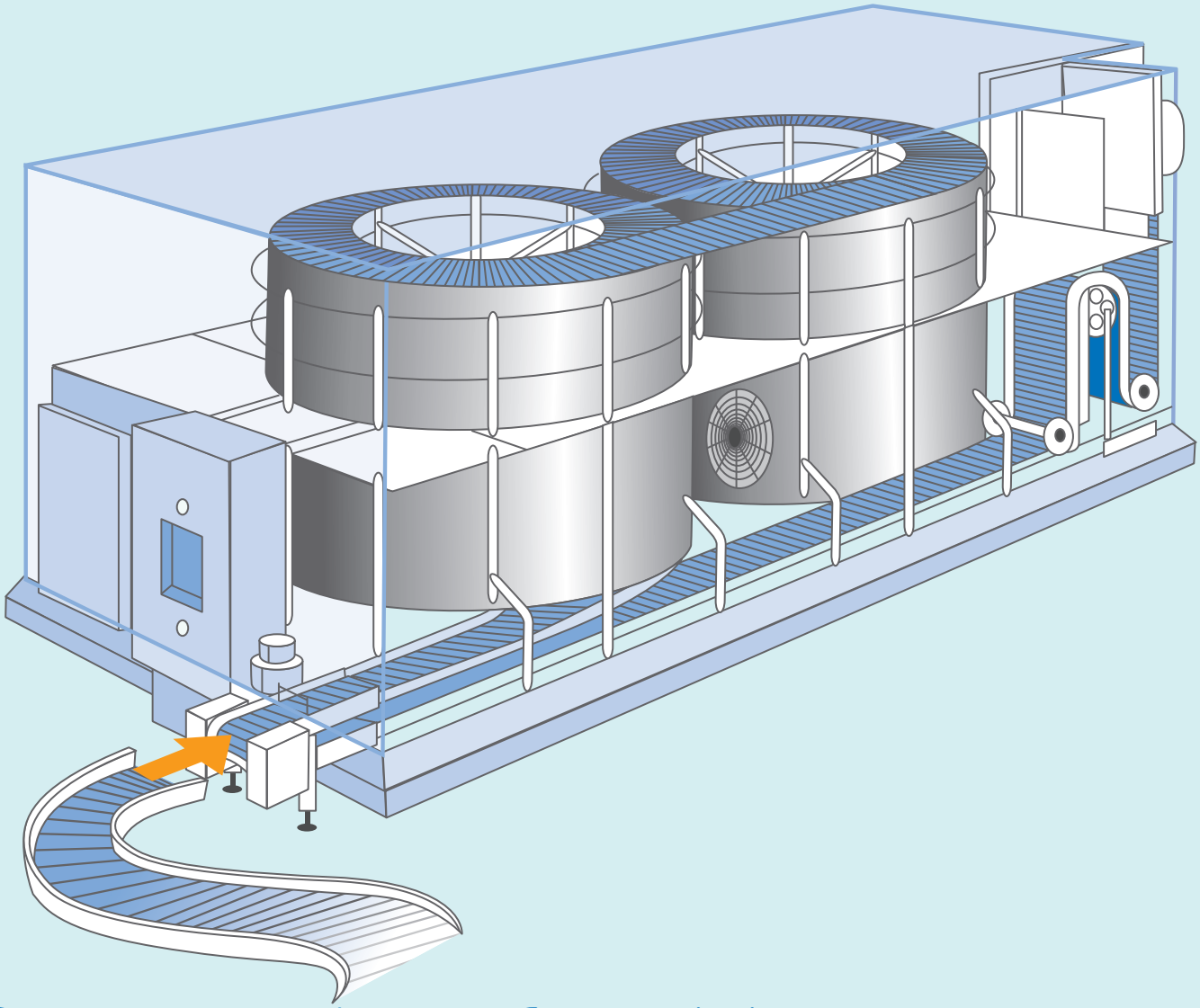


Enhanced service life, no unplanned stops

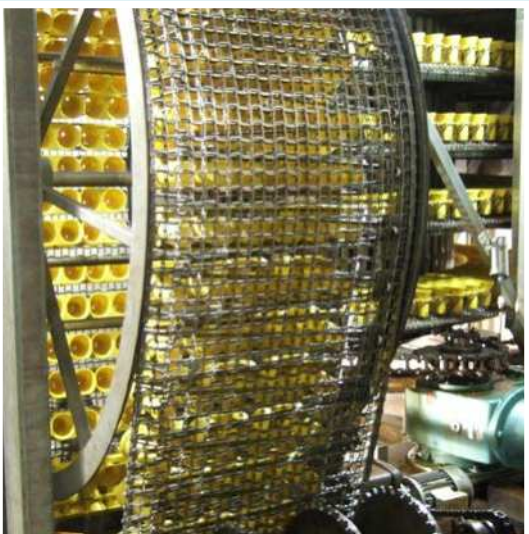
Using the SKF grease injection system on just one vegetable canning machine, a processor was able to cut labor and repair costs, reduce unplanned downtime, and extend chain service life significantly. Chains in the canning machine are now expected to last 12 to 15 years (compared to 6 to 7 years with conventional systems).

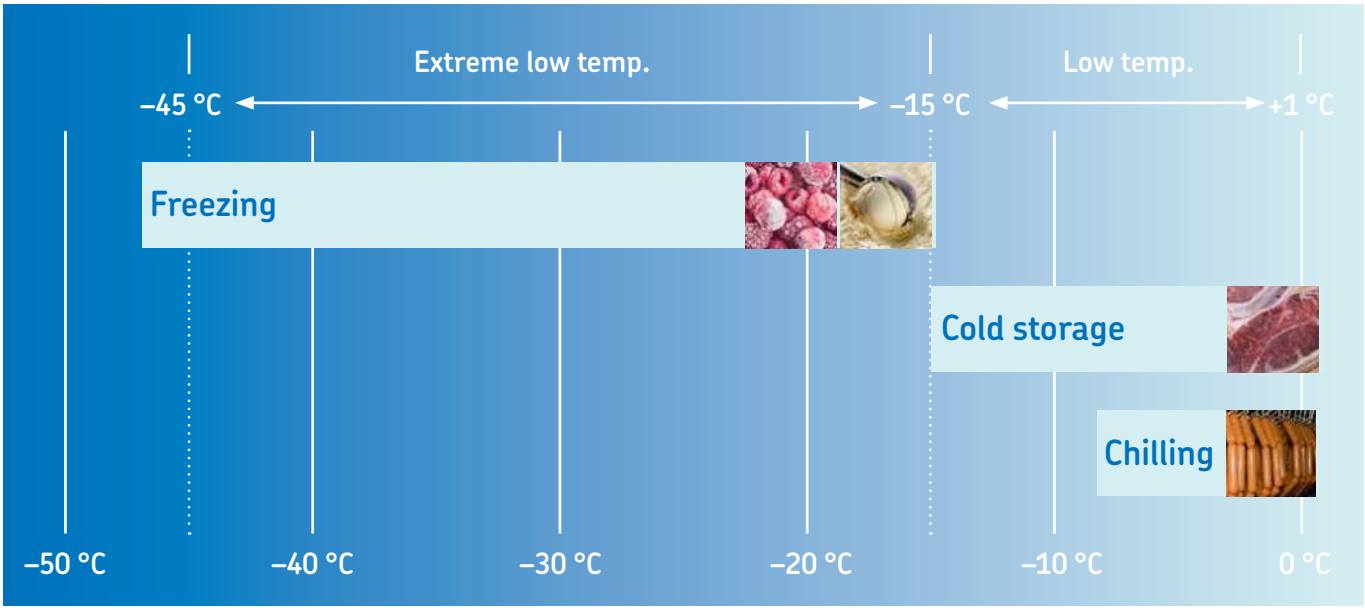


The unit includes one injection head, one chain pick-up system with start wheel and a unit to control and monitor lubrication cycles.



Processing food by removal of heat





Typical issues in cold environments

Machinery subjected to sub-zero temperatures for freezing, chilling, and cooling processes require frequent maintenance.

During hygienic cleanings, temperatures can change quickly from sub-zero to 35 °C, causing air to expand inside the bearings. This causes “breathing” problems and can result in water or moisture entering the bearings, often resulting in corrosion and grease emulsification.

Poor performance of the degraded grease may cause metal to metal contact, raceway distress and high friction, impacting reliability and energy consumption. Relubrication to purge the bearings of moisture can lead to contamination of the product. In extreme cases, ring fractures can result from blocking caused by frozen water or lubricant.

As a consequence, unplanned stoppages, excessive replacement parts with related labor costs may occur. Purging can result in extended use of expensive food grade grease. All this leads to an increase in overall maintenance costs and loss of productivity.

SKF low-temperature solutions can help.

Extreme temperature applications (–15 to –45 °C)

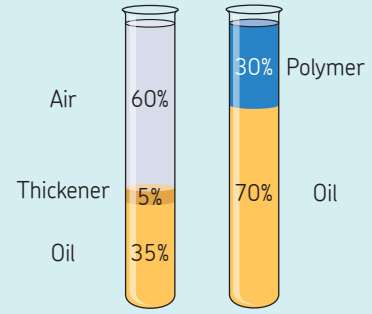
Lubrication technology that can minimize risk of contamination and reduce maintenance costs?

Solid Oil bearing technology is a reliable solution for cold environments

Solid Oil is a polymer matrix saturated with a lubrication oil that completely fills the internal space in a bearing and encapsulates the cage and rolling elements.

The Solid Oil matrix contains two- to four- times more lubricating oil than a corresponding sealed, grease-filled bearing.

- Relubrication free
- Reliable: eliminates breathing in bearing induced by rapid temperature changes and reduces the risk of corrosion
- Keeps contaminants out and resists most chemicals used in washdowns without emulsifying
- Food safe
  - No leaking and no contamination of the food: Solid Oil can withstand high centrifugal forces
  - Food grade Solid Oil is available down to –45 °C (designation W64FL)
- Reduced standstill and lost production
- Can be used in hard to reach areas – where manual relubrication is difficult



The Solid Oil matrix contains 2 to 4 times more oil than in conventional greased bearings, this makes relubrication unnecessary.

The polymer matrix completely fills the internal space in the bearing, encapsulating the cage and rolling elements. Solid Oil technology can be used in virtually all bearing types with sufficient internal free space.

To select the correct bearing type and Solid Oil lubricant for your specific application conditions, please contact SKF or your SKF authorized distributor.

Hygienic washdowns with sudden temperature shifts leading to bearing failure?

Stainless steel bearings with Solid Oil tecnology extend service life in challenging environments.

Solid Oil technology significantly reduces breathing in the bearing that can occur due to rapid temperature changes, limiting the corrosion effects resulting from hygienic cleaning. The result:

- Extended bearing life
- Reduced downtime and maintenance costs: spare parts, lubricant and labour

Increased life, despite washdown regime

In a spiral freezer for fish, chain sprocket bearings had a short service life due to high ingress of water in the bearings and breathing during cleaning cycles (–45 to +35 °C). The SKF stainless steel deep groove ball bearing with Solid Oil technology (low temperature variant) and a 2RS1 seal provided:

- Reliable operation by preventing breathing in bearings
- Increased bearing life cycles from 1 to 2 years
- Maintenance cost savings

To watch a demonstration of SKF freezer solution benefits, scan this code or go to the SKF channel on YouTube.

Applications with higher load, frequent washdowns (–15 to –45 °C)

Breakthrough in bearing life with ultimate protection against corrosion?

MRC ultra corrosion-resistant sealed deep groove ball bearings with Solid Oil technology are designed for superior corrosion resistance, increased fatigue life and significantly improved reliability

The Solid Oil lubrication technology for very low temperatures (–45 °C) reduces the risk of breathing in the bearing induced by frequent washdowns and sudden temperature shifts. Use of high-nitrogen corrosion-resistant stainless steel technology (HNCR) combined with ceramic balls, stainless steel cage and seal reinforcement provides:

- Outstanding corrosion resistance and fatigue life
- Significantly extended bearing reliability

For additional protection, bearings can be equipped with a nitrile rubber seal material in blue colour for optical detectability, compliant with FDA recommendations, thus reducing the risk of costly product recalls.

More ice cream with less maintenance

An ice cream manufacturer experienced short service-life of standard steel bearings in the hubs of their ice cream hardening tunnel. This was due to breathing in the bearings and hub during cleaning cycles and the risk of water ingress (temperature shift from –45 to 25 °C), causing corrosion.

SKF equipped the tunnels with MRC Ultra corrosion hyphen resistant ball bearings with Solid Oil technology and FDA approved machined seal, optically detectable.

After just a year in operation, the SKF bearings performance indicated an increase in their predicted operational life in the application up to six years. And as they are relubrication-free, the bearings have helped the manufacturer cut maintenance time and costs, improved food safety by eliminating potential grease contamination of the product but also the environmental impact, by reducing lubricant waste, grease clean-up and disposal.

Low temperature applications (down to –15 °C)

Reliability issues due to corrosion and grease wash out?

SKF Food Line Y-bearing units offer a relubrication free solution.

Suitable for use in low temperature environments to –15 °C, SKF Food Line Y-bearing units with stainless steel bearing inserts offer:

- Relubrication free – no dripping grease or purge contamination
- Reduced maintenance costs and environmental impact
- Reduced risk of premature bearing failure
- Corrosion-resistance
- Improved bacteria reduction due to solid or filled base design and smooth surface finish

Doubled bearing life and reliability

In an ice cream batch tunnel, chain drive support bearing failures were occurring due to corrosion and emulsified grease. The use of SKF Food Line Y-bearing units extended bearing life from 6 months to more than 1 year with full reliability during the high season.

Available product range[1]:

- *Metric: 20 to 50 mm bore sizes*
- *Inch: 3/4 in., 1 in., 1 1/8 in., 1 1/16 in., 1 1/4 in., 1 7/16 in., 1 1/2 in., 1 15/16 in. bore sizes*

1) Please refer to the designation system in the appendix, **page 120**.

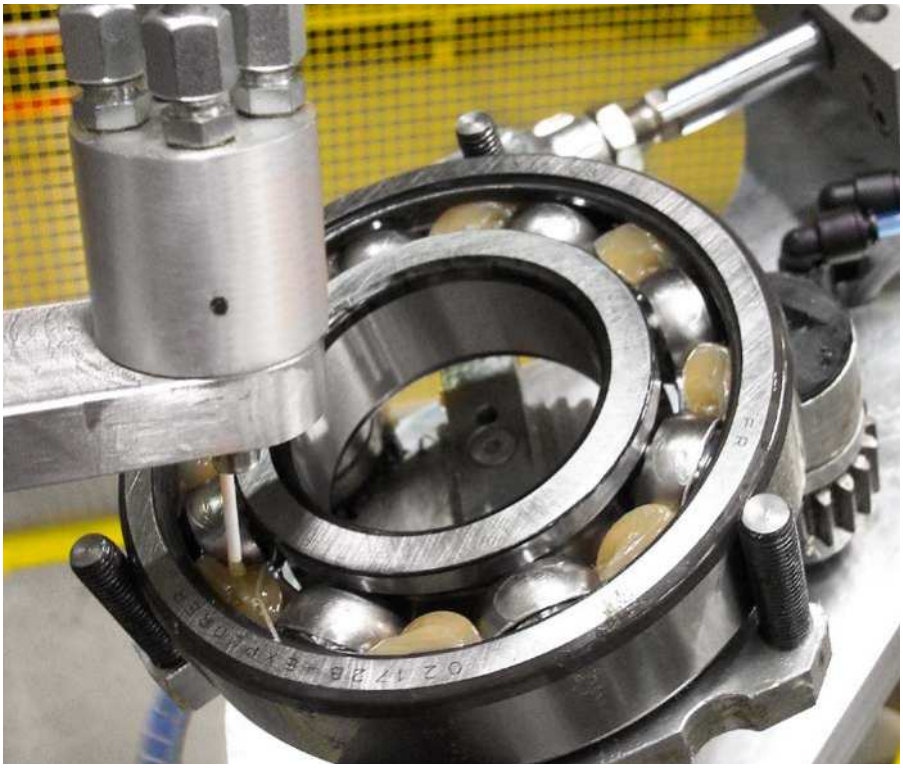
Low temperature applications (down to –15 °C)

Unable to source bearings with the required grease specification?

SKF lubricated for life, custom grease filled bearings

In cases where a specific brand of lubricant, a specific grease fill or non-standard packaging or markings are needed, SKF offers a customized solution:

- Wide variety of bearing types available
- Seals or shields as required (size dependent)
- All grease fills possible (from 10 to 100%)
- Any customer specified grease can be used (e.g. if facility is restricted to the use of one grease manufacturer)
- Traceability code and new designation laser marking can be added
- Vacuum packaging possible on request



Reliable supply of sealed bearings with non-standard grease types and fills

In a hardening tunnel, the customer wished to use stainless steel bearings filled with a specific low-temperature lubricant that had been proved to perform well in such applications. Suitable bearings were unavailable on short lead times and small quantities. This resulted in delays of overhauls.

SKF was able to supply stainless steel bearings filled with the customer specified lubricant in a small volume and satisfied the lead time requirement.

Grease protection through high efficiency seals and sealing systems

Sealing materials that are FDA compliant and suitable for sub zero temperatures?

SKF seals for low temperatures help to ensure optimal functionality and long service life

SKF seal materials range from Fluorocarbon rubber and PTFE to advanced elastomers made of food grade materials. SKF Ecosil, SKF Ecoflon, ECOPUR 95A-bl-FG and SKF Ecorubber range are just some of the SKF proprietary materials resistant to cleaning fluids and low temperature applications that help achieve:

- Increased sealing efficiency and asset life, due to high abrasion and wear resistance
- Energy efficiency
- Reduced friction

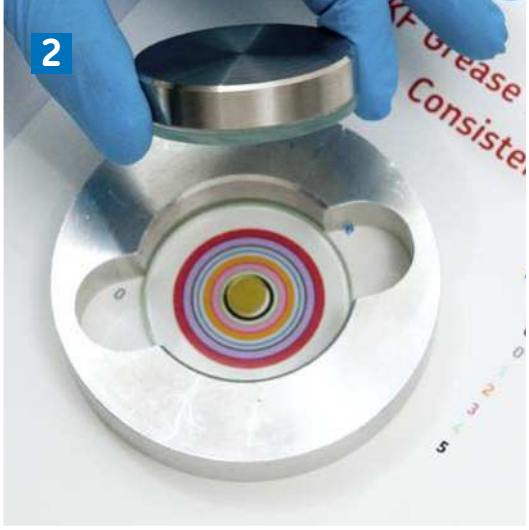
Doubled mean time between repairs in hardening tunnel gearbox

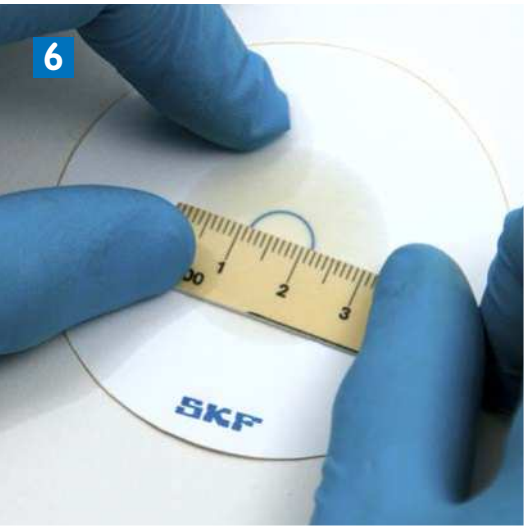
In a hardening tunnel, annual maintenance was scheduled to avoid catastrophic failure of the main gearbox and chain drive. Gearbox removal carried health and safety risks.

An SKF root cause failure analysis identified corrosion (due to cleaning fluid ingress) and seals "breathing" coupled with incorrect mounting of seals as key problems. SKF suggested the installation of a cartridge with two Ecoflon 4 seals, offering superior chemical, wear and abrasion resistance. On the vertical output shaft, SKF stainless steel deep groove ball bearings filled with Solid Oil helped prevent corrosion and fluid leaking into the bearing. A simpler flinger sealed the output shaft and kept excess water away when rotating. As a result, mean time between repairs has been extended to 18 months.

Examples of SKF sealing materials complying with FDA regulations

For more information refer to the materials data table in the appendix, **page 122**.





SKF test kit enables fast, reliable lubricant analysis

A food processing plant relied on an outside lab to analyze lubricant samples taken from the facility's operating equipment. But response time was often delayed, thereby slowing plant managers' decision-making. The SKF TKGT 1 test kit enabled plant maintenance personnel to perform basic tests to assess grease performance in-house, thereby helping empower on-line operators and speeding up the decision-making process. In addition, analysis costs have dropped by 25%.

Applying lubrication and subsequent relubrication in the right way

Correct methods and tools for routine manual relubrication

Can contribute to reducing bearing failures as much as 36%

SKF One Hand Operated Grease Gun LAGH 400

SKF Grease Meter LAGM 1000E

Understanding grease condition will enable the optimization of relubrication schedules

Testing grease condition?

SKF Grease Test Kit TKGT 1

This SKF condition monitoring equipment helps evaluate and monitor grease condition, helping users achieve:

- Grease savings – relubrication intervals can be adjusted according to real conditions
- Reduced risk of undetected grease degradation and contamination
- Prevention of failures due to underperforming lubricants
- Optimized relubrication routes
- Enhanced asset optimization – information can be used for root cause analyses

To see how the SKF Grease Test Kit analyzes grease condition, scan this code or visit the "SKF Maintenance Products Channel" on YouTube.

Automatic chains lubrication for challenging environments

Extending mean time between failure for conveying chains?

SKF ChainLube, oil projection systems are reliable solutions for accurate and automatic chain lubrication.

The systems include volumetric piston pumps which precisely deliver a metered volume of lubricant to the points of friction while the chain is in operation. A control unit is preset to the preferred timing for lubricant application. Projection nozzles, having no mechanical contact with the chains, prevent dirt accumulation and applicator wear.

- Reduced maintenance costs (lubricants and lubrication tasks compared to manual lubrication)
- Eliminated risk of lubrication points being missed through human error
- Improved productivity by reducing unplanned stoppages
- Longer service life resulting from reduced chain wear
- Reduced energy consumption through decreased friction
- Operator safety by reduced intervention for maintenance tasks
- Helps producers support the HACCP process in producing safe food (prevent foreign body ingress)
- Better cleanliness by reducing excess lubricant

SKF can recommend the right oil projection system for specific application needs.

SKF ChainLube, air assisted oil projection system

Is best suited to lubricate chains where no pitch detection is possible due to fast movement of chain or when pitch is too small (less than 50 mm). Regulated carrier air flow is used to project small amount of lubricant, having viscosity up to 400 cSt with virtually no mist formation around the projection nozzles.

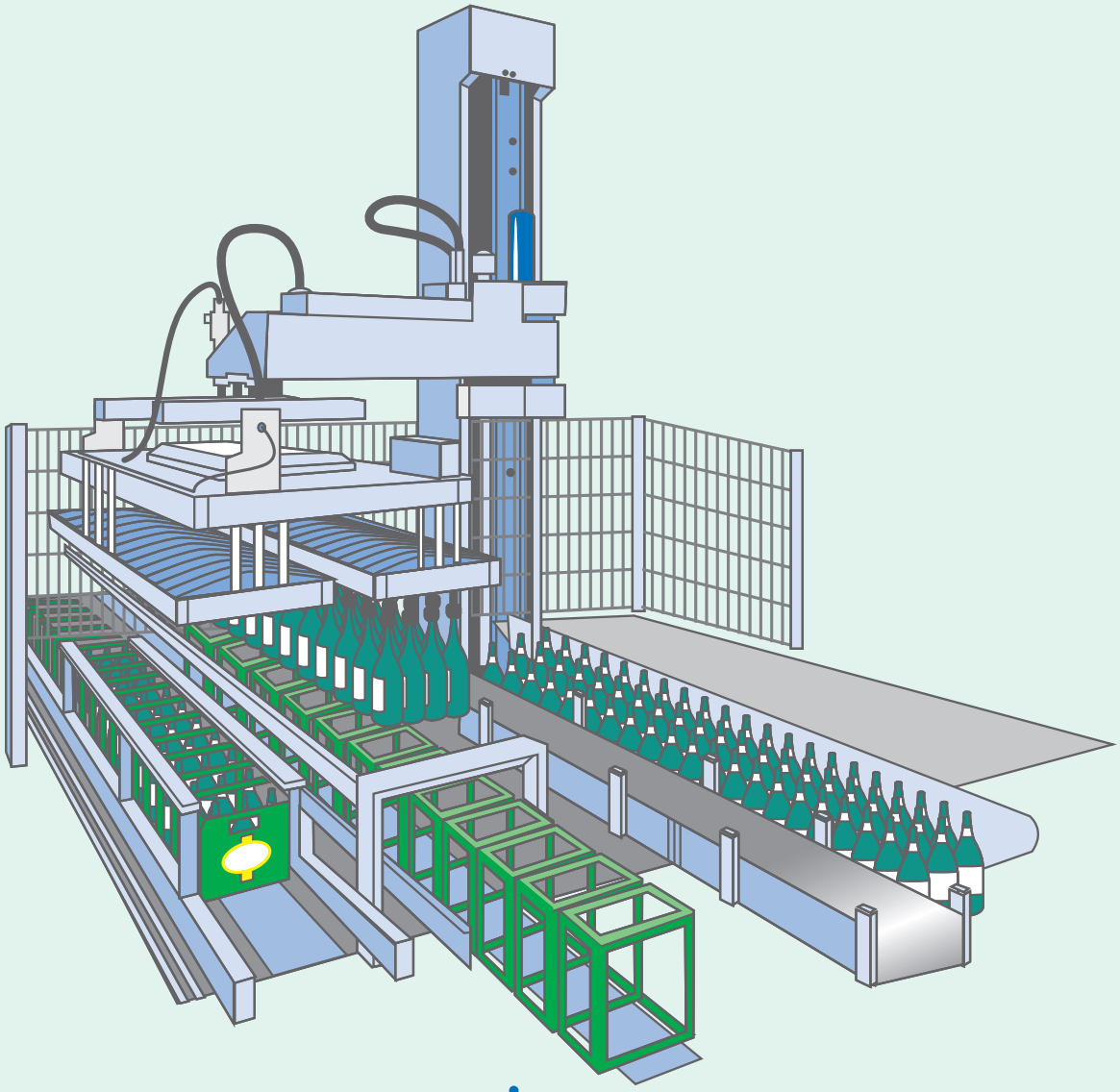
SKF ChainLube, airless oil projection system

Suitable for accurate lubrication of chains pitch-by-pitch without the need to connect to a compressed air supply. Suitable for lubrication of chains with medium pitch (50 to 300 mm), where speed is below 2 pitches/second.

Modular and flexible system to project wide range of viscosity lubricants to several lubrication points (commonly up to 12).

A compact unit with integrated automation, pumping systems and reservoir makes installation simple and user friendly. It serves up to 8 lubrication points.

SKF ChainLube oil projection systems can be set up with SKF LFFM 80 – a food grade chain lubricant for low temperature and humid environment or other type of lubricant used on site.



Post processing and packaging

Typical issues with post processing and packaging assets

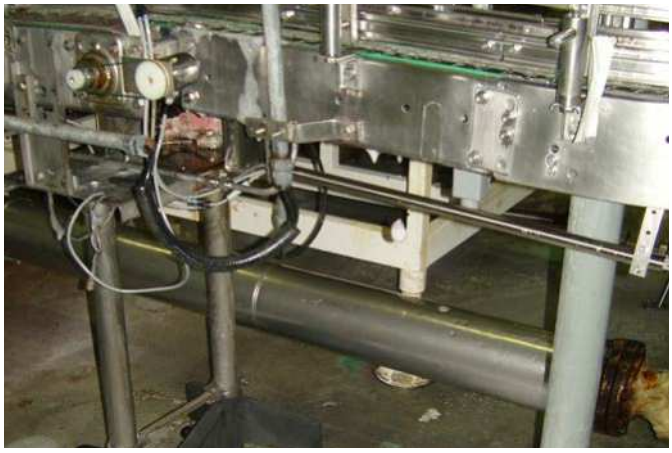
From filling, packaging lines to palletizing areas, post-processing applications present many challenges that impact line efficiencies.

SKF can support through managing lubrication, from a range of relubrication free technologies and effective sealings to automatic lubrication systems.

Where high pressure washdowns are applied, water and detergents can cause contaminant ingress, corrosion, and grease washout in bearings.

The abrasive nature of processing materials and caustic liquids used during the cleaning process can reduce the effectiveness of seals and cause bearings corrosion.

Excessive regreasing, often used to purge the bearing, can lead to possible product/packaging contamination and impact waste treatment costs.

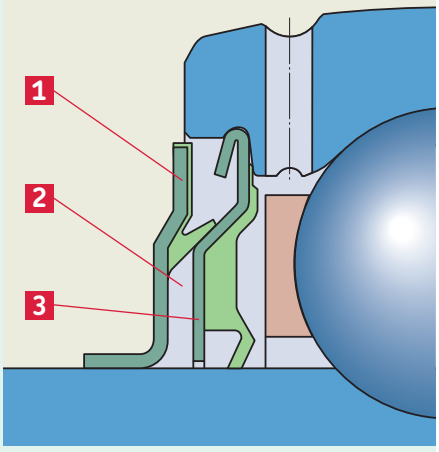


High volumes of a water and soluble lubricant mixture used to lubricate flat top conveyor chains can cause operator accidents due to slippery floors, or package quality issues resulting from organic development and moisture formation.

High-pressure washdowns

Fig. 1

SKF Food Line Y-bearing unit sealing system



Need effective high pressure water exclusion?

SKF 2RF bearing seal technology Help prevent contamination, retain lubrication

The innovative and effective sealing system consists of a multiple barrier protection which enables longer bearing service life (→ **fig. 1**).

- The SKF seal arrangement is proven to be highly effective during high pressure washdowns
- The 2RF seal provides excellent protection against detergent penetrating into seal contact areas
- Food compatible materials
  - The flinger and the seal's contacting lips are made of an FDA approved rubber compound
  - The space between the insert seal and the flinger is filled with SKF food grade NSF approved grease

1 The flinger adds mechanical and centrifugal protection against contaminants entering the bearing cavity, and provides a first contacting seal with its rubberized lip acting axially against the gasket seal.

2 The space between the flinger rubberized lip and the gasket seal is filled with SKF food grade grease in order to provide additional protection.

3 Additional sealing efficiency is achieved through the labyrinths created by the flinger's external diameter and the outer ring, plus the metallic seal insert and the inner ring shoulder.

See the SKF 2RF seal in action during a high pressure washdown test. Scan this code or visit the SKF Channel on YouTube.

Significantly increased bearing service life

High pressure washdowns were causing bearing failure and corrosion issues in a dairy packaging conveyor line. The results were costly, bearings had to be routinely replaced every 60 to 90 days. With stainless steel SKF Food Line Y-bearing units, bearing service life increased from 2 000 to 22 000 hours.

For more information about the SKF offer, please contact your authorized distributor or local SKF representative.

Relubrication free bearing life even with frequent washdowns?

SKF Food Line Y-bearing units reduce the washdown related problems of corrosion, premature failure and environmental impact

Featuring the 2RF multiple seal design, SKF Food Line Y-bearing units keep detergent, water and other contaminants out of the bearing cavity, while keeping lubricant inside.

- Improved foreign body ingress prevention – no dripping grease or purge contamination
- Reduced relubrication costs and environmental impact
- Reduced risk of premature bearing failure
- No risk of missed lubrication points due to human error
- Corrosion-resistant under washdown conditions
- Improved bacteria reduction due to solid or filled base design and smooth surface finish

How much grease can you save from relubrication of 100 bearing positions?

Average 15 g *(0,53 oz.)* of lubricant per bearing purge, which is equal to:

- **1,5 kg** *(3.3 lb.)* per weekly maintenance cycle
- **78 kg** *(172 lb.)* of lubricant per year

With the SKF Documented Solution Program, your SKF representative can show you how much you can reduce cost with SKF Food Line Y-bearing units, based on running data from your own plant.

Extensive housing range

Composite

Cast stainless steel

All SKF Y-bearings units are available in the following bore sizes[1]:

Metric: 20 to 50 mm

Inch: 3/4 in., 1 in., 1 1/8 in., 1 1/16 in., 1 1/4 in., 1 7/16 in., 1 1/2 in., 1 15/16 in.

1) Please refer to the designation system in the appendix, **page 120**

Corrosion-resistant insert bearings

Stainless steel execution

Effective end covers

Tested to withstand 100 bar pressure wash without dislocating. Available for the full range.

Wet and corrosive environments

Standard bearings with food-safe features?

SKF Food Line stainless steel deep groove ball bearings reduce the risk and consequences of food line contamination

Featuring stainless steel metal components – including rings, balls, cages, shields, and seal backing plates – SKF Food Line stainless steel deep groove ball bearings deliver reliable performance in humid, corrosive environments. Prelubricated with a high quality NSF category H1 grease, the bearings also feature a blue-coloured nitrile rubber seal material for optical detectability that complies with FDA and EC category 3 recommendations.

- Increased protection against corrosion
- Compliance with food safety regulations
- Optically detectable seals limit the effects of potential food line contamination
- Available for shaft sizes up to 40 mm

Doubled bearing service life

On a packing line for ready-to-drink dairy products, hydrogen peroxide and other cleaning agents were causing bearings to corrode and fail prematurely. SKF stainless steel deep groove ball bearings more than doubled original bearing service life.

Ingress of process material and corrosion?

SKF stainless steel deep groove ball bearing with Solid Oil technology have a solid oil matrix filling the free space within the bearing. This significantly reduces the ingress of foreign bodies.

Containing 2 to 4 times more oil than conventional greased bearings, SKF stainless steel deep groove ball bearings with Solid Oil technology offer relubrication free operation for the life of the bearing. The solid oil matrix is chemically inert, offering resistance to caustic agents typically used in hygienic cleanings.

- Significantly reduces ingress of contaminants
- Minimizes risk of corrosion
- Available with NSF-approved food grade oil for temperatures between –20 and +85 °C (white colour)
- Available for shaft sizes up to 40 mm

Reduced grease contamination of packaging

Exposure to chemical cleaning agents and constant humidity were causing standard deep groove ball bearings in a bottle-filling machine to corrode. Excessive relubrication of the original bearings caused contamination to the packaging. A switch to SKF stainless steel deep groove ball bearings filled with solid oil increased bearing service life from 3 to 11 months, whilst eliminating lubricant contamination.

Areas with high humidity

Applications exposed to harsh chemical environments?

SKF polymer bearings[1] have excellent chemical resistance in challenging environments

Featuring an advanced, self-lubricating polymer material, SKF polymer bearings are capable of running dry, with no relubrication. These bearings have a low coefficient of friction and excellent resistance to wear and fatigue.

- Self-lubricating, no need for lubricant
- Corrosion and chemical-resistant
- 80% lighter than steel
- Quiet running

SKF polymer bearings are available in various dimension series for bore diameters ranging from 3 to 60 mm.

Increased asset availability

Corrosive agents (ozone water) and lubricant washouts in a bottle washing machine were causing repeated bearing failures. Installing SKF polymer bearings reduced downtime, improved production and significantly increased bearing life.

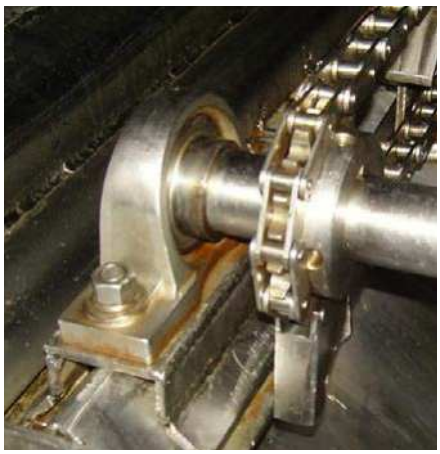
Areas with high shock loads

Housing fracture, poor reliability?

SKF Food Line Y-bearing units in stainless steel housings are most appropriate for applications requiring superior durability.

With the ability to accommodate heavy or shock loads, risk of housing failure is significantly reduced. Additionally, an advanced sealing system keeps water and other contaminants out of the bearing and retains the lubricant.

- Reduced re-lubrication costs and environmental impact
- Reduced risk of premature bearing failure
- Corrosion-resistant under virtually all washdown conditions



1) To select the correct bearing type for your specific application conditions, please contact SKF or your SKF authorized distributor.

Customized asset specific solutions offered as standard

Taking material design to the next level
Based on working experience of previously applied solutions in F&B assets, SKF engineers have taken conventional designs one step further and developed alternative solutions following hygienic design principles and utilizing food grade materials for superior performance in F&B applications.

Rotary unions for dosing machines

Flexible retrofit solution when you need it most

SKF rotary unions seals R1U for filling machines

This springless rotary lip seal features a flexible, low-friction lip design that delivers good lip tracking ability despite any eccentricities. To compensate for potential wear, the seal lip is thicker at the tip. This thicker outer lip and an oversized outer diameter helps prevent the seal from rotating in the gland.

- Good sealing ability, performs reliably in contact with different processed foods and beverages
- Straightforward retrofit, can be adapted to any kind of housing
- food safety compliance (use of grade material)

Technology upgrade[1)] that can reduce maintenance cost and frequency?

SKF rotary unions seals R2U for filling machines

This low-friction rotary lip seal has superior performance in applications with speeds and temperatures that prove to be challenging and require costly and frequent replacements due to wear caused by seals on the metal counter faces. The seal design features an elastomer O-ring and OD interference that helps prevent the seal from rotating in the gland.

- Reduced replacement needs of mechanical components, leading to reduced maintenance costs and considerable resource savings in dismounting and mounting
- Reliable operation even with increased speed, temperature and under poor lubrication conditions

R1U seals are suitable for speeds of 0,5 meters per second and pressures up to 10 Bar.

When produced from PTFE materials, R2U seals are suitable for speeds up to 2,5 meters per second and pressures up to 10 Bar

1) To be used in existing arrangements, mechanical modifications are needed. Please contact your SKF sales partner or distributor.

Simple retrofit solution, quick problem solver

SKF D1P seals for dosing pistons are highly cleanable and offer precision sealing performance, stable fit in the piston housing.

Featuring an elastomer sealing lip and a geometric design, D1P seals are capable of speeds of 0,5 meters per second and can handle pressures to 10 bar. The seals can be installed back-to-back, or in standalone setups with low vacuum values during the recharge stroke.

- Good sealing ability, reliable performance in contact with different processed foods and beverages
- Straightforward retrofit, can be adapted to any kind of housing

Frequent downtimes necessitating costly replacement?

SKF D2P seals for dosing pistons are a reliable solution when seals are exposed to highly abrasive products, cleaning chemicals, high pressures and speed.

This meander spring-energized thermoplastic lip seal is filled with silicone to keep contaminants out of the spring cavity. The seals are very easy to clean and fit in a two-piece gland so that the static lip can be axially compressed. When PTFE materials are used, D2P seals will resist high temperatures.

- Increased performance given technology upgrade*
- High chemical and thermal resistance
- Reduced wear despite abrasive food products
- Less costly replacement

Increased performance with simple maintenance?

SKF D3P sealing system for dosing pistons is a complete thermoplastic piston for filling cylinders, installed directly on the driving rod.

Made of SKF Ecowear and a variety of SKF Ecoflon compounds, the sealing system simultaneously provides a sealing and guiding effect for reduced maintenance. O-rings act as elastic energizing elements to keep contaminants from getting trapped, and can be manufactured in different elastomeric materials according to the application requirements.

- Increased performance given technology upgrade[2)]
- Significantly simplified maintenance
- Improved clean ability

[2)] The sealing system design enables simple screwing instead of snap-into for simplified maintenance

Ingress protection through high efficiency seals and sealing systems in rotating and reciprocating equipment

The SKF SEAL JET system helps enable production of customized machined seals as prototypes, or small to medium series within 1 to 2 days.

Sealing solutions that are FDA compliant and effective in hostile environments?

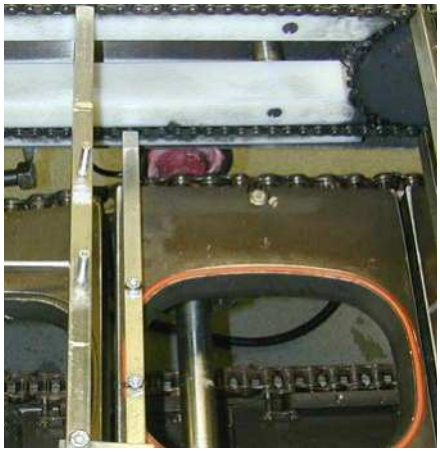
SKF machined sealing solutions are designed to withstand processed food and beverage ingress as well as washdowns that employ aggressive chemicals.

SKF sealing solutions use both standard and SKF proprietary, FDA-approved sealing materials. Custom designs can be produced in as little as 1 to 2 days, offering:

- Resistance to high humidity, hot steam and chemicals used in hygiene washdown (CIP)
- Superior wear resistance, including abrasive processing materials
- Reduced unplanned downtime and scrapped production
- Improved service life
- Reduced friction

H-ECOPUR is a thermoplastic polyurethane elastomer that combines the engineering properties of ECOPUR with a high resistance to hydrolysis (degradation of water) and outstanding stability in mineral oil. H-ECOPUR is KTW approved and meets the FDA standards.

SKF can provide integrated solutions, incorporating engineered plastics parts, optimized seals and more.



Increased bearing life in labeling machines

Issues with water penetrating seals, along with high humidity and caustic chemical washdowns led to shortened bearing life in labeling machines. SKF supplied a custom-designed lip seal made of SKF Ecorubber with SKF Ecopaek cassette that increased seals life by 4 times. Additionally, machine availability and productivity were improved due to a reduction in unplanned stops.

Reduced waste with shrink wrap seal

On a food production line, a standard silicone seal under the tray lip did not seal correctly. This caused misalignment of the tray when the label was heat shrunk to the face of the tray. Incorrect positioning of the labels resulted in scrapped product, high waste costs as well as high maintenance and repair costs.

SKF engineers applied a machined silicone oblong-shaped O-ring to seal correctly under the tray lip, thereby eliminating any movement when pressure was applied to heat shrink the label. Production increased due to consistently aligned labels at 130 units per minute and scrap meals were reduced from 25 to 3%.

Reduced costs, increased reliability for carousel filling station

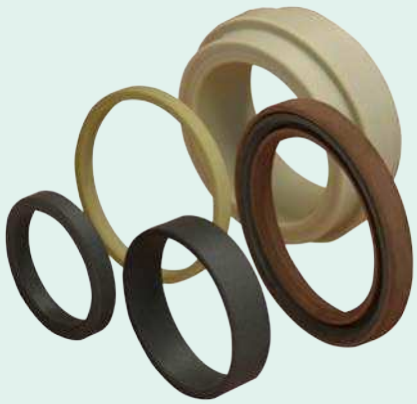
In a carousel filling station, the original POM (Polyoxy-methyelene) parts reacted to chemicals used in an aggressive cleaning process. This resulted in changes in the colour and more importantly the properties of the sealing material. These changes caused an associated bayonet connection to become loose, affecting the integrity of the system.

SKF designed a replacement part with a combination of an engineered plastic part and a machined sealing element made from SKF Ecoflon 1. The life of the sealing system was increased 3 times with a corresponding increase in production and a reduction in associated maintenance costs.

Improved sealing system reduced downtime in carousel filling stations

In carousel filling machines, seals wear out quickly due to the effect of hot steam sterilization and aggressive CIP solutions, causing unexpected downtime. SKF provided a sealing kit, manufactured from SKF proprietary FDA approved materials.

- Optimized seal design
- Increased reliability, due to good chemical and steam resistance
- Local manufacture, delivery within 1 day
- Reduced machine downtime, resulting in reduced costs
- Easier replacement, retro-fitting in existing housing

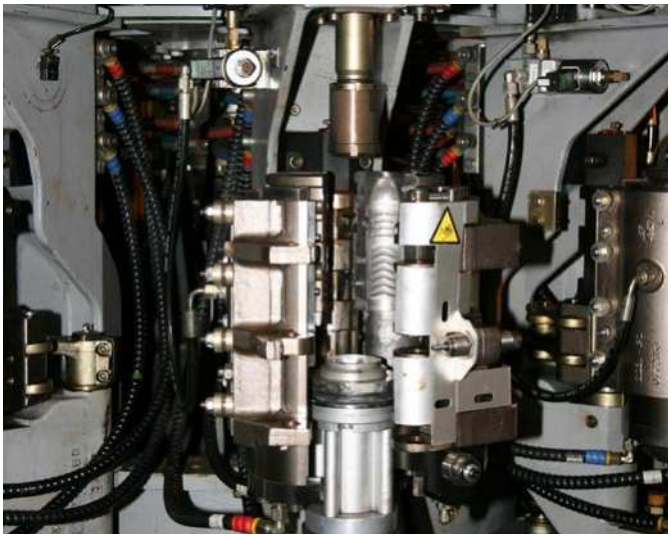


Please refer to the chemical resistance table in the appendix, page 122

Improved sealing system durability in bottling machine distributor

In a facility's bottling machines, seals used in rotary distributors used to wear out quickly, causing unexpected downtime. SKF provided an integrated sealing solution, with an optimized seal design using FDA approved material H-ECOPUR FG. Benefits were:

- Improved chemical resistance against process fluids and CO_2
- Increased seal life by 80%, resulting in reduced costs
- Machine availability improvement
- Easy replacement, retro-fitting in existing housing



Cost-saving solution for rotation blow molding machine

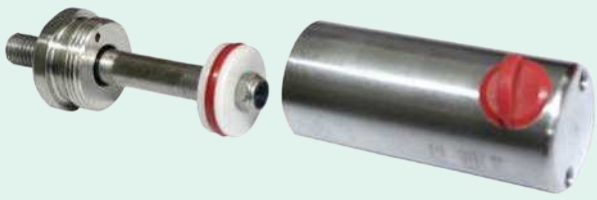
In a rotational blow molding machine, hot polyethylene-terephthalate (PET) caused major seal wear, leading to unplanned machine downtime. The SKF solution consisted of integrated, sealing and engineered plastic parts, including a bell valve, bell seal and spring retainer. Benefits were:

- Increased lifetime from 2 to 12 months
- Reduction of over 50% in seal spare parts stock
- Related maintenance costs reduced by 30%

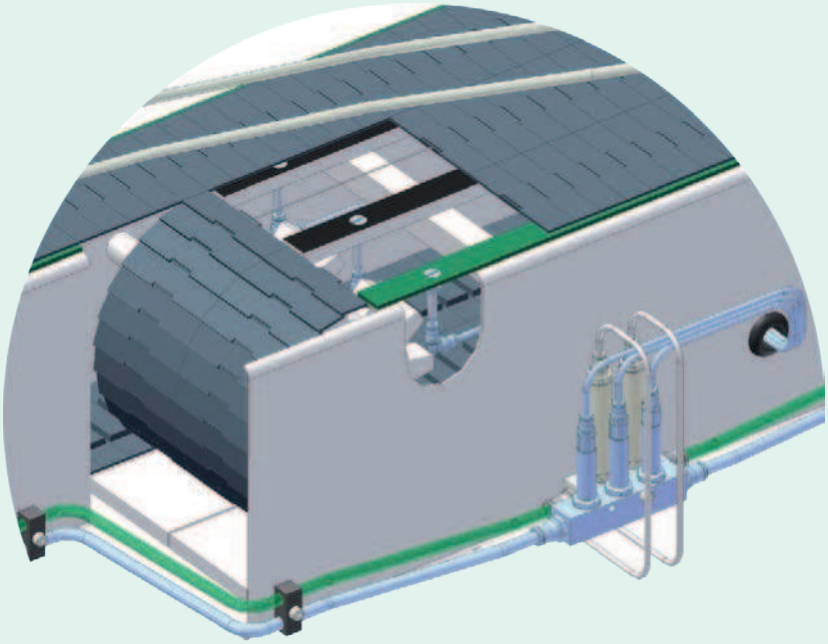
Reduced maintenance costs, increased productivity in can filling station

A poorly performing sealing system in a can filling station led to production standstills every 3 to 4 weeks. SKF determined that an inadequate seal design led to a loss of pressure in the cylinder and significant wear of the sealing materials.

The SKF solution involved an improved design that incorporated a guiding function, and a piston seal customized to the technical requirements of the application. Once installed, the solution operated trouble free for 1 full year. The seals are now replaced once a year during a planned system shutdown when all moving parts are replaced.



Lubrication solution for flat top conveyors



An alternative lubrication to water and soluble lubricant?

SKF Dry Lubrication system for conveyors reduces waste, brings operator safety benefits and more.

Dry lubrication for plastic flat top chain conveyors using PET, carton or can packages – is a flexible and completely automated system which applies a small amount of SKF Dry Film Lubricant (NSF H1 certified) on the conveyor chains and guides. Benefits include:

- Cost savings by eliminating high volume of water and soluble lubricant
- Improved operator safety by reducing slip hazards
- Quality of packaging is maintained by elimination of moisture
- Enhanced line efficiency by avoiding replacement costs and associated unplanned production stops
- Reduced cleaning costs

Scan this code to see a video of the SKF dry lubrication system in action or visit the SKF Channel on YouTube

Improved safety, line efficiency, reduced waste in bottling lines

In a water bottling plant using PET packaging, conveyors were lubricated by spraying large volumes of water mixed with soluble lubricant. This created a highly humid environment and caused related problems including slippery floors, foam formation, plant inefficiencies, energy waste, and the need for frequent cleaning.

The SKF Dry Lubrication system was set up to lubricate 90 flat top chains, with 200 lubrication points. In one lubrication line alone, the system resulted in savings of 320 liters soluble lubricant and 93 m3 of water per month. Additional benefits were realized in reduced cleaning expenses, enhanced packaging quality and in operator and product safety.

SKF Dry Film Lubricant LDTS 1 is specially developed for automatic lubrication of plastic flat top chain conveyors. LDTS 1 is NSF H1 certified for use where incidental contact with food can not be excluded.

Automatic systems for simplified lubrication maintenance

Unplanned downtime due to inadequate lubrication?

SKF automatic, centralized lubrication systems simplify lubrication maintenance and improve reliability, productivity and safety.

From its centralized lubrication systems, SKF offers a range of flexible automated solutions for bearings, gears or linear motion, adaptable to various asset conditions. All include a pump unit (with optional control unit), distributors/feeders to automatically deliver the lubricant amounts and intervals. Optionally, this can be linked to the machine's PLC (programmable logic computer) indicating possible lubrication system failure.

- Enhanced productivity through greater machine availability
- Simplified maintenance given the modular and standardized lubrication system components
- Flexible system – can be adapted to different type of assets, used with a variety of grease and oil types
- Extended bearing and gear service life through reduced wear

SKF MonoFlex, single-line lubrication systems

Versatile system for small- to medium-sized machines, which dispenses lubricant to individual lubrication points in precise amounts, regardless of changes in viscosity or back pressure.

Can be used advantageously for both bearing and chain lubrication in packaging machines, shrink wrappers, palletizers, etc.

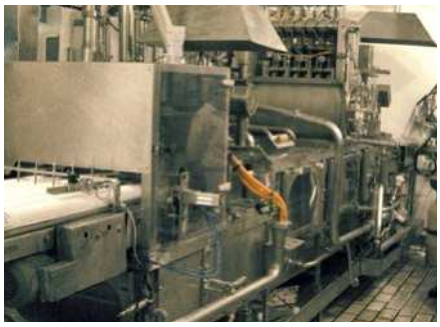
Reduced costs, increased reliability for packing machine

In a sterile milk packaging machine with an unreliable oil lubrication system, the installation of an SKF MonoFlex system resulted in savings by streamlining manual lubrication tasks. In addition, the system increased asset reliability as a result of the automatic lubrication of all points.

SKF ProFlex, progressive lubrication systems

For small- and medium-sized machines. The progressive system incorporates a feed pump or flow limiter to progressively serve each outlet with a defined amount of lubricant – generally grease – with the additional option of detecting plugged lubrication points.

Can be used for bearing lubrication in packaging machines, palletizers, etc.

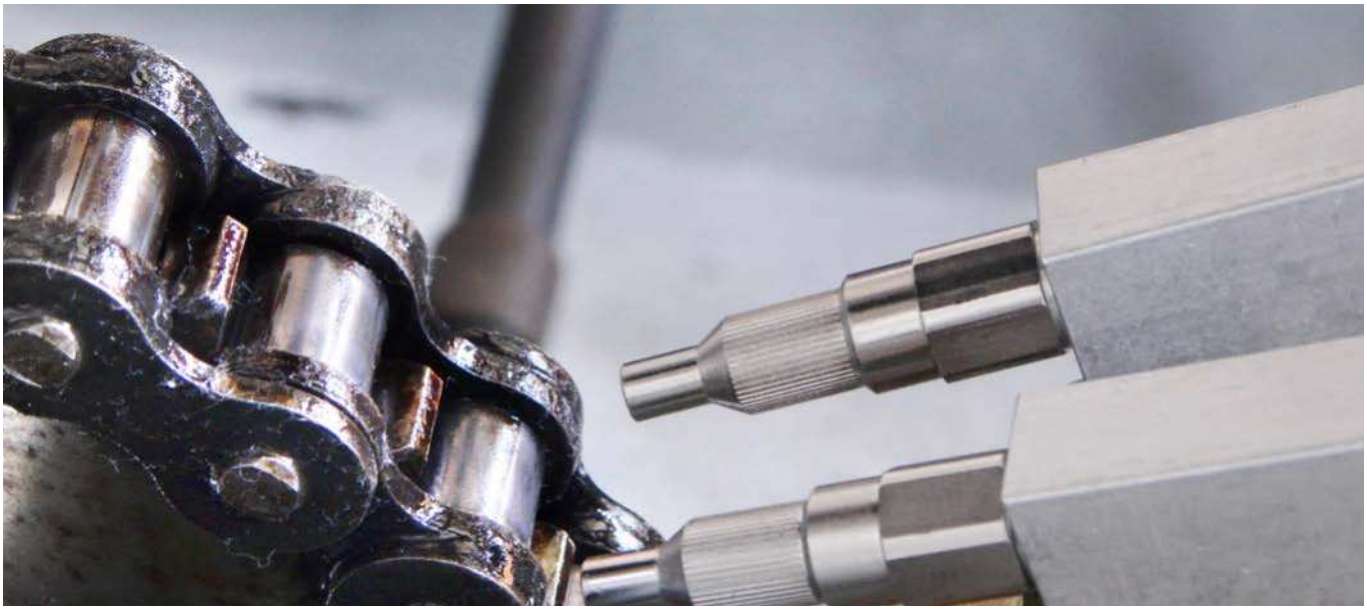


Reduced planned downtime of packaging operation

A milk cream packaging machine with 133 manual lubrication points required a lengthy time interval for relubrication; there was also a high risk of failure due to the possible omission of some hard to reach lubrication points.

The SKF ProFlex system increased reliability by helping to ensure the lubrication of all points. Benefits were significant, including the reduction of scheduled maintenance for relubrication tasks.

Increased chain reliability by automatic lubrication and the use of high quality chains and lubricants



For lubrication of chains in packaging machines, palletizers, shrink wrapper, etc.

Longer service life for conveying chains with reduced maintenance?

SKF ChainLube, air assisted oil projection system are reliable solutions for accurate and automatic chain lubrication.

SKF ChainLube is best suited for lubricating chains where no pitch detection is possible due to fast movement of chain or when the pitch is too small (less than 50 mm). Regulated carrier air flow is used to project small amount of lubricant, with virtually no mist formation around the projection nozzles. Because there is no mechanical contact with the chains, the projection nozzles prevent dirt accumulation and applicator wear.

- Reduced maintenance costs (lubricants and lubrication tasks compared to manual lubrication)
- Eliminated risk of human errors in manual relubrication
- Improved productivity by reducing unplanned stoppages
- Longer service life resulting from reduced chain wear
- Reduced energy consumption through decreased friction
- Operator safety by reduced intervention for maintenance tasks
- Better cleanliness by reducing excess lubricant

Is corrosion an issue for your chains?

SKF Xtra Corrosion Resistant Chain series

When superior corrosion resistance is required, SKF stainless steel and nickel-plated chains, H2-approved can be the appropriate solution.

For non-food contact areas, zinc-plated roller chains can be used, combining the strength of standard roller chains with the corrosion resistant properties that come from the zinc-plating, thus providing enhanced service life.

Improved conveyor chains helped fruit packing plant increase productivity

Chains in a fruit packaging distribution system often failed in less than 6 months, due to continued exposure to acidic lemon juice and other corrosive materials. The SKF solution involved a special chain with a zinc coating that could resist corrosive environments. The result was longer periods between change-outs, less downtime for chain replacement, and improved productivity.

Curved conveyors can face frequent chain failure

SKF Side Bow Chains

SKF Side Bow Chains feature increased flexibility that enable them to bend and twist due to extra clearance between the inner and outer side plates. Their ability to convey product in multiple directions – through radius turns as well as vertically – gives them an added advantage over standard conveyor chains, providing longer service life.

SKF Side Bow Chains provided longer service life

A canning plant experienced frequent chain failures (twice a month) which led to unscheduled shutdowns and production losses.

SKF analyzed the problem and recommended the SKF Side Bow Chain as a more suitable replacement. The result was an increase in production uptime and significant savings due to the elimination of production stoppages. In addition, the plant realized a return on its investment in 2 weeks.

High quality, food grade chain lubricants by SKF

SKF's range of food grade chain lubricants includes variants for:

High moisture (LFFM 80)
General purpose (LHFP 150)
High temperature (LFFT 220)

SKF linear motion systems

A cost effective and simple shaft guiding system

SKF linear ball bearings provide low friction movement with virtually unlimited stroke

With a wide range of linear ball bearings and accessories, SKF can assist in designing and building simple, economical linear guiding systems to suit many different applications.

The bearings are available in two size ranges – compact to ISO 1 standard and heavy duty to ISO 3 standard. In each of these ranges, there are a number of type and design variants that help achieve a variety of operating benefits.

- Corrosion resistant material for most variants
- Improved reliability – self-aligning features accommodate machine inaccuracies
- Long life and reduced ingress of contaminants as a result of high sealing performance
- Better running accuracy, given adjustable pre-load

SKF linear ball bearings are available from 3 to 80 mm as open or sealed variants.

Driving system with high quality performance and long-term reliability

SKF ball and roller screws are optimum solutions for a wide range of applications that require precision driving systems.

Screws, guidance systems and many other components can be made from stainless steel and designed to withstand corrosive environments, while providing high quality performance and long-term reliability.

- Optimized performance through both standard and customized components (e.g., special machining of shaft screw, splines, pre-load adjustments, when necessary as customer request)
- Flexibility: different combination of components, screw size and nut flange design

SKF ball and roller screws are available in a wide range of materials and designs.

Improved reliability of screws on chocolate batching line

A chocolate manufacturer had reliability issues on the batching machine, needing to replace the machine's screws every 6 months. The SKF solution involved a replacement screw with modifications to diameter, improving load performance. This extended the operating life to 24 months.

SKF offers the profile rail guides LLT series in six sizes (15, 20, 25, 30, 35 and 45 mm) and 6 carriages.

Miniature profile rail guides are available in four sizes (7, 9, 12 and 15 mm) and 14 carriages.

Increased service life for date printing machine

In a dairy plant, a non-standard linear system of a date printing machine experienced short life cycles due to high vibration and poor quality components. The problems also resulted in poor printing quality and an excessive scrap rate. The SKF profile rail guide system provided a standard, non-custom solution that extended asset availability from 4 to 12 months, reduced scrap costs and optimized spare parts needs.

Need to improve packaging quality and reduce line downtime?

SKF profile rail guides provide accurate and repeatable cycling

The assortment of SKF profile rail guides includes a range of sizes, carriages and accessories, available in various preload and accuracy classes. In addition, they can operate at virtually unlimited stroke. As a result, there is an SKF profile rail guide available to meet the needs of virtually any application. The operating features and benefits are many, including:

- Increased performance through optimized carriage design
- Extended life thanks to a high performance sealing system
- Improved reliability – given the self-aligning capability of the raceways' X arrangement, can accommodate a certain level of misalignment between the rails
- Low friction, smooth and stick-slip-free operation

SKF miniature profile rail guides offer accurate and repeatable cycling with minimal mounting space

The assortment of SKF profile rail guides includes a range of sizes, carriages and accessories, available in various preload and accuracy classes. In addition, they can operate at virtually unlimited stroke. As a result, there is an SKF profile rail guide available to meet the needs of virtually any application. The operating features and benefits are many, including:

- Superior performance: high acceleration, preload, stiffness and self-aligning capability result in better service life
- Corrosion resistance: all parts of the system are made of stainless steel or plastic material
- Ease of maintenance: oil holes in the end caps of the carriage make it easy to relubricate the system
- Low friction, smooth and stick-slip-free operation

SKF actuation systems

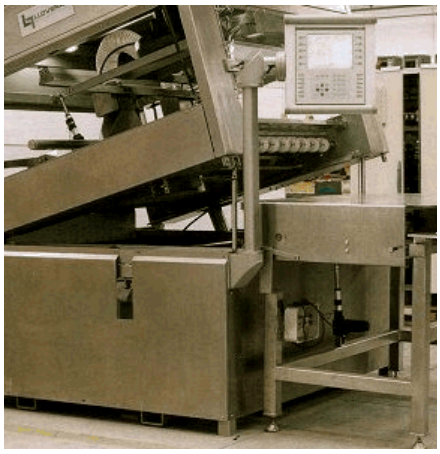
Improve accuracy with reduced operating costs

SKF linear actuators enable precise, controlled, and repeatable push/pull movement in linear drive applications.

The modular design and open architecture provide opportunities to integrate components and achieve customized solutions within existing operational parameters.

SKF offers a wide range of standard actuators as a basis for customized system solutions, including accessories such as hall sensors, limit switches, potentiometers, friction clutches and back-up nuts. Additionally, SKF actuators are available with housings made of different materials (e.g., aluminium, zinc, polymer). SKF linear actuators offer several operating benefits, including:

- Ready-to mount for easy plug-in operation
- Virtually maintenance free
- Environmentally friendly alternatives to hydraulic types



SKF linear actuators help increase productivity, improve operator safety

SKF worked with a manufacturer to fit its specially designed chocolate cooling tunnel with SKF linear actuators. The SKF solution contributed in a variety of applications, including header lift, upper covering, conveyor belt centering, an air cooler positioning gantry and adjustable table height.

Results included an improvement in product quality by allowing automatic adjustments of conveyor alignments and cooling mechanism heights; faster resets by allowing a simple repositioning of coolers between batches; and increased operator safety by reducing manual intervention and providing easy access for cleaning.

Standard versions of SKF linear actuators can handle loads up to 12 kN, as well as deliver speeds up to 180 mm/s and a maximum stroke of 700 mm.

Maintaining the same performance while using less energy

SKF Electromechanical cylinders combine the power of hydraulics and the velocity of pneumatics to create a solution that meets the needs for high loads and long strokes.

The electromechanical system features just one energy conversion versus two in a hydraulic system. Set up is much simpler, as the motion controller can be connected to all industrial electrical power supplies and customer interfaces, resulting in reduced installation time. Advantages include:

- Improved reliability – less wearing parts and virtually maintenance free
- Energy savings – due to reduced number of energy conversions
- Allows faster operation and long strokes under high load
- High acceleration capability, optimizing cycle times
- Ease of use and set-up

SKF electromechanical cylinders can accept nominal loads up to 250 kN; maximum linear speeds up to 150 mm/s; and maximum stroke of 700 mm. Customization is available upon request.

Reducing compressed air demand

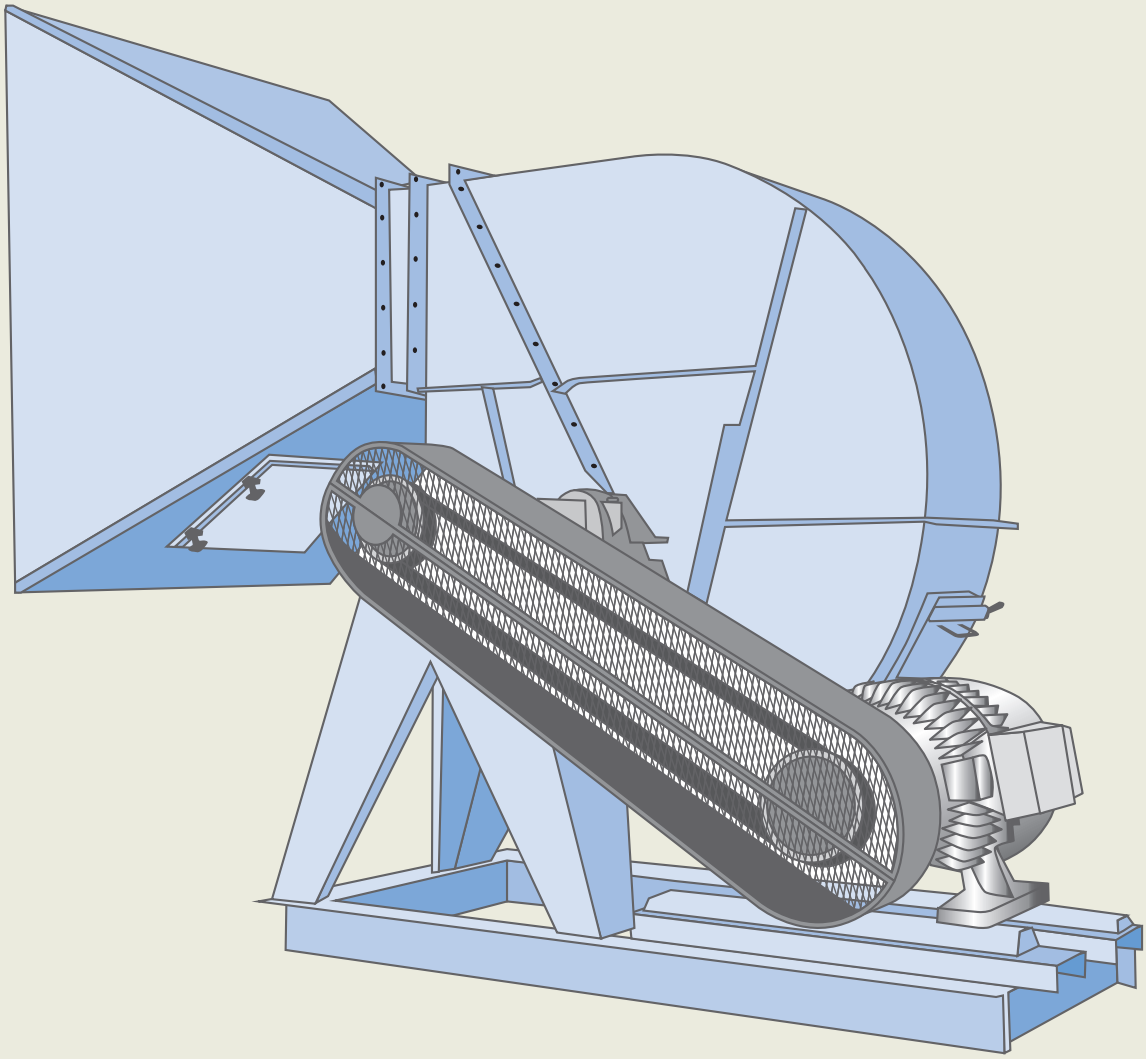
SKF CASM electric cylinders improve energy efficiency while providing simple integration into existing systems.

CASM electric cylinders are ideally suited for performing fast and powerful linear movements. The CASM modular concept enables easy connection to motors and control systems. IP54S level protection is provided as a result of an efficient sealing system, high-grade materials and precision assembly. Due to a reduced number of components, the system is more cost-effective than hydraulic and pneumatic systems. Benefits include:

- Energy savings up to 90%, if replacing a pneumatic system to a fully electric driven one
- Fewer contamination risks due to high IP rating
- Compact design offers ease of maintenance
- Fewer components can lead to reduced inventory and less maintenance complexity
- High process stability: CASM actuators are software-controlled, providing accurate synchronization and positioning
- Fully interchangeable with pneumatics system due to ISO standard dimensions

SKF CASM electric cylinders are available in standard ISO sizes: 32, 40 and 63.

Scan this code to see a short video of the CASM electric cylinder or visit the SKF Channel on YouTube



Maintenance of fluid, air handling and drives

Typical issues with fans and blowers, drives, pumps and compressors

Harsh operating conditions and usage regimes can lead to lubrication issues and bearing failures. The root cause needs to be investigated and fully understood.

Critical drive systems not always accessible or in positions where access means risk to operators safety. Condition is often unknown, with resulting concerns over reliability.

Poor sealing efficiency in gearboxes or pumps can affect drive systems performance, reliability and overall hygienic conditions. SKF technologies and best suited maintenance activities can help.

Misalignments can result in poor reliability, high energy and spare part consumption.

Fans and blowers life optimization

Fan out-of-balance causing reliability and performance issues?

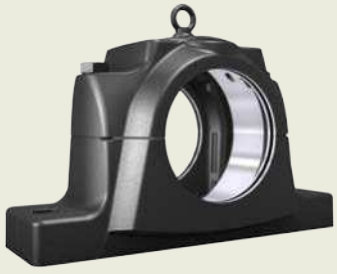
SKF total fan shaft solution can significantly improve fan availability, service life and performance.

The basis of the solution is a self-aligning bearing system that combines a CARB toroidal roller bearing manufactured to SKF Explorer performance standard in the non-locating bearing position, with an SKF Explorer spherical roller bearing in the locating bearing position.

The result:

- Improved reliability, reduced downtime
- Extended service life, less maintenance demand
- Reduced friction and vibration levels
- Lower energy consumption
- Reduced lubricant use and lower operating temperatures
- Increased operator safety, by controlling noise and temperature

After 10 years of operation in a sugar mill exhaust fan, this CARB toroidal roller bearing continues to provide superior performance.



The upgraded SE K7 housings help to maximize bearing service life by combining stiffness with highly accurate machined surfaces and a specially designed split seal that reduces friction and heat to accommodate higher speeds.

The CARB toroidal roller bearing (non-locating position) enables the inner ring to move independently of the outer ring and accommodates axial shaft displacement within the bearing, virtually without friction. This significantly reduces the problem of induced axial loads otherwise created by thermal expansion of the shaft. The SKF spherical roller bearing (locating position) accommodates both radial and axial forces.

Automatic systems deliver the correct type and precise amount of lubricant at set intervals.

Questioning your fans' reliability?

SKF condition monitoring and assessment, upgrade recommendations and installation of upgraded components can maximize reliability in critical fan applications.

1 Fans with a history of unplanned stops can be monitored with equipment such as SKF CMAS 100 machine condition advisor. This can simultaneously check temperature, vibration and enveloped acceleration indicating the overall fan health.

2 If high values (compared to built in ISO levels) are recorded on either vibration or enveloped acceleration, the CMAS 100 condition advisor will indicate a danger (D) warning or alarm. A decision can be made whether to conduct further analysis.

3 A root cause analysis of the failed bearing could indicate, for example, high axial loads have led to a failure mode illustrated by the raceway damage (top photo) and outer ring fretting corrosion (bottom photo).

4 The CARB toroidal and spherical roller bearing combination can be selected to resolve the root cause of the indicated damages; in this instance this is likely to be fan imbalance.

5 Use of the SKF Drive-Up method and utilizing specific tools for mounting of the CARB toroidal and spherical roller bearing will help to prevent potential failures due to incorrect mounting. The use of the SKF bearing lock nut spanner TMHN 7 provides an accurate method of mounting, self aligning ball bearings – common in smaller fans.

To see a short instructional film on CARB toroidal roller bearings scan this code or visit the SKF Channel on YouTube.

For a video demonstration of the proper mounting and dismounting of spherical roller bearings with tapered bore, scan this code or visit the SKF Maintenance Products Channel on YouTube.

Fan life optimization through bearing technology upgrade and correct fitting

Dealing with high vibration, imbalance and premature bearing failures?

SKF fans solution based on the self-aligning system proved to be an ideal solution for maximizing bearing life.

SKF solution increased reliability of boiler's gas exhaust fan

A food processor experienced unexpected bearing failures in its exhaust gas fan during the production season. These failures reduced the ability of the boiler to provide steam for the process, as well as to generate energy.

The recommendation was to implement the SKF fan solution featuring spherical roller and CARB toroidal roller bearings, SNL housings and SKF SYSTEM 24 automatic lubricators. In addition, routine vibration analysis was introduced.

As a result, mean time between repair increased to 4 years, resulting in decreased maintenance costs and reliability during the season. The solution helped reduce vibration and temperature levels and eliminated the need for manual relubrication.

Upgrading to the SKF fan solution, based on the self-aligning system, increased mean time between repair for critical fan in coffee plant

A critical exhaust fan in a coffee plant required several repairs over a short period of time, leading to unplanned downtime and related maintenance costs. SKF engineers performed a complete machine reliability assessment. As a result of this, proven SKF fan upgrade solutions were applied. Unnecessary maintenance costs and approximately 66 hours of lost production were saved during the course of a year.

SKF Explorer bearings helped sugar plant eliminate fan breakdowns

A sugar mill's critical fans had frequent unplanned breakdowns due to premature bearing failures; this made it necessary to re-babbit twice a year. The plant maintenance team replaced the babbit bearings in two fans with SKF Explorer spherical roller bearings. Since then, the fans have operated without breakdown through 4 milling seasons, resulting in substantial cost savings.

16% of premature bearing failures are caused by poor fitting. Work to prevent them.

The SKF Reliability Maintenance Institute offers a comprehensive range of classroom and on-line training courses regarding mechanical training, and also other topics such as condition based maintenance, bearing basics, lubrication, seals and more.

For more information please visit ***skf.com/services/trainings***

Fan life optimization through correct lubrication

Do your fans have hard to reach points that need frequent relubrication?

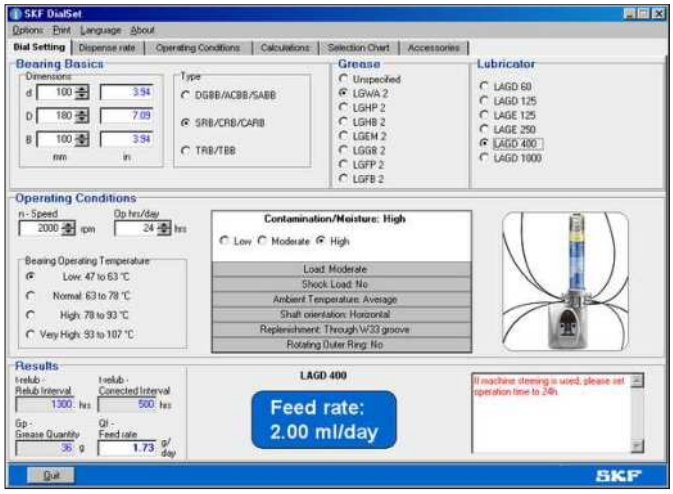
To avoid bearing failures due to inappropriate lubrication, the use of simple automatic systems from SKF can provide accurate and reliable lubrication of fans.

SKF automatic single point lubrication systems

SKF MultiPoint automatic lubrication systems LAGD 400 and LAGD 1000

Getting more control over regreasing quantities and intervals

SKF DialSet can calculate the correct grease dispense rate based on an application's operating conditions[1].



[1] Desktop, online and smart phone versions are available free of charge. Visit skf.com/lubrication for more information.

Operating parameters of your critical fan reaching the limits for grease lubrication?

Grease lubrication is the preferred option on many fan applications, due primarily to the simplicity of the housing design, sealing and lubricant retention. Oil lubrication however, is the optimum lubricant and can be essential for applications involving higher speeds and/or temperatures.

SKF oil lubricated housings provide the necessary design features to enable the correct application of oil as a lubricant, providing optimal reliability in more extreme fan applications.

SKF engineering services recommended a change to oil lubrication to increase reliability of critical fans

In an industrial blower for steam boiler, grease lubricated bearing failures were experienced every milling season due to high ambient temperatures. These conditions posed high demands on both bearings and lubricants.

SKF recommended a change to oil circulation lubricated SNL plummer blocks. The industrial blowers have run for 1 milling season without any breakdowns since installation. This has increased productivity and reduced maintenance costs (labour, lubricant wastage, downtime).

Fan and blower life optimization through power transmission upgrades

Unreliable fan drives causing unplanned downtime, high energy consumption?

Correcting alignment and upgrading belt drives reduced unplanned downtime and extended drive system life

A baking oven's circulatory fan drive went though an unusually large number of V-belts (25 in a month). Each belt replacement took 30 to 45 minutes, resulting in costly unplanned downtime.

SKF was asked to evaluate the drive and proposed a redesign that reduced the number of belts from 3 to 2, and allowed the use of lighter, 2-groove, taper-bushed pulleys that had less overhang, reducing the load on the bearings. The results included an extension of belt life (to an average of 7 months) as well as significant reductions in belt replacement time (15 minutes). Cost savings were generated from reduced unplanned downtime, spare parts and electricity consumption.

SKF solutions helped to optimize performance of sugar blowers

A manufacturer of sweetened dairy products experienced poor reliability (mean time between failure (MTBF) of 4 to 6 months) on its sugar blowers, with associated high spare parts consumption. An SKF technical assessment led to a new solution that upgraded the existing arrangement to an improved SKF Cogged Raw Edge (CRE) belt type, including belt alignment and belt tension checks.

The SKF solution helped reduce energy consumption on 7 blowers by an average of 7%, increasing reliability and MTBF.

SKF Cogged Raw Edge belts

Are highly flexible belts that can bend around a smaller pulley without causing undue amounts of stress. They are reliable for use in environments from –30 to +75 °C, including tropical climates. Their high energy efficiency construction includes a "raw edge" combined with a "cogged" design that offers:

- Higher friction, resulting in 25 to 30% more power transmitted
- Improved efficiency, leading to less energy consumed
- Lower maintenance requirements than for conventional wrapped belts
- Less internal heat build up to enhance long term rubber life

SKF pulleys with taper bushings

Offer convenient and easy mounting and dismounting, providing a fast and efficient method to secure the drive system.

Benefits include reduced installation time, and less risk of shaft damage and injuries.

Taper bushing

Wedge belt pulleys

Unplanned blower drive failure in elevated ambient temperature?

Corrections to design, alignment and tensioning of belt drive, helped increase efficiency at dairy plant

A dairy company experienced problems with belt drives on the blowers of their dryer. The drive belts operated in a very high ambient temperature (60 °C), leading to short life (4 to 5 weeks), frequent replacements and lost production due to unplanned shutdowns.

A comprehensive evaluation of the belt drive confirmed that failure was due to very high running temperatures that were causing the rubber to cure and harden, resulting in the belts cracking and breaking. Other issues included:

- The design of the drives made it difficult to maintain tension correctly, adding to the problem of high temperatures
- An analysis with the SKF Belt Frequency Meter found the tension to be higher than recommended for this belt type
- Misalignment of the motor caused elevated belt temperatures.

The recommended solution, the SKF Xtra Power belts were able to accommodate higher temperatures and belt stress while maintaining correct tension. The SKF Belt Frequency Meter was used to fit the belts at the correct tension, and SKF belt alignment tools to correctly align the fan and motor pulleys.

A subsequent inspection of the drives found no sign of abnormal wear or heat deterioration, and the tension was within specification. In addition, an infrared image showed that the running temperature of the belts had been reduced by up to 10 °C.

Additional benefits included a reduction of unplanned downtime, maintenance costs and increased energy savings from the belt drives running efficiently.

The SKF Belt Frequency Meter

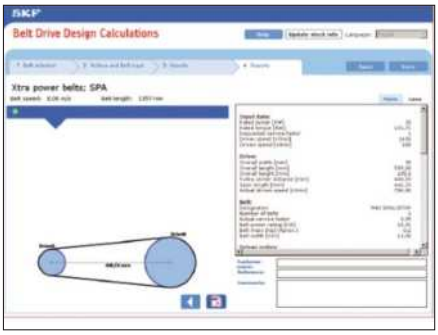
Helps achieve quick and accurate tensioning of belt drives by means of belt frequency measurements.

Using proven infrared measuring, this tool allows any operator to set the correct belt drive tension.

SKF XtraPower belts provide improved efficiency and durability.

SKF XtraPower belts are characterized by high operating efficiency (up to 97%) even in slightly higher temperatures (up to 70 °C); minimal elongation; and an ability to retain optimal tension without constant maintenance. The specially formulated compounds used in the rubber and the tension cords makes the belt more resistant to heat and shock loads.

Determining if existing belts are optimal for applications



SKF belt calculation software[1)]

Using plant application data, the program will select the most efficient and economical belt solution for the application.

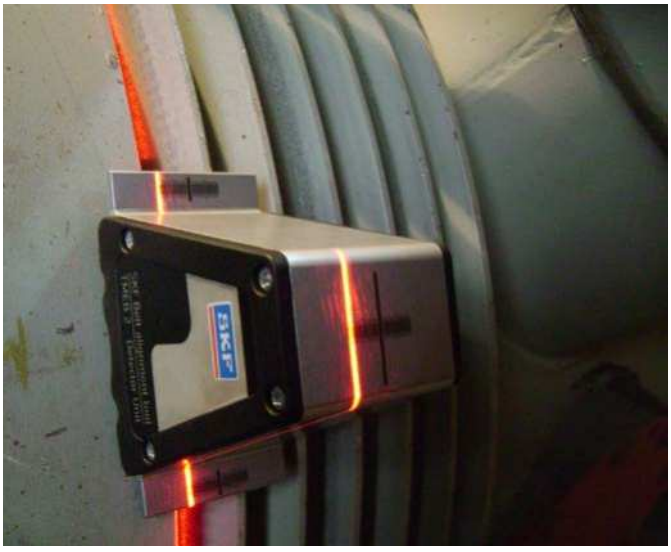
Download the App by scanning this code.

1) Available free-of charge as an App for smart devices and on skf.com

Fan and blower performance optimization and energy savings

1 Operator routine inspections can detect high overall machine vibration using the SKF Machine Condition Advisor, CMAS 100-SL. Energy consumption can also be checked at this stage.

2 Elevated level of the above parameters (vibration and energy) are common indicators of power transmission alignment issues.



3 SKF Belt Alignment Tool can be used to confirm and correct the identified misalignment; this will support improved fan reliability.

4 Re-checking energy consumption can provide proof of the energy savings.

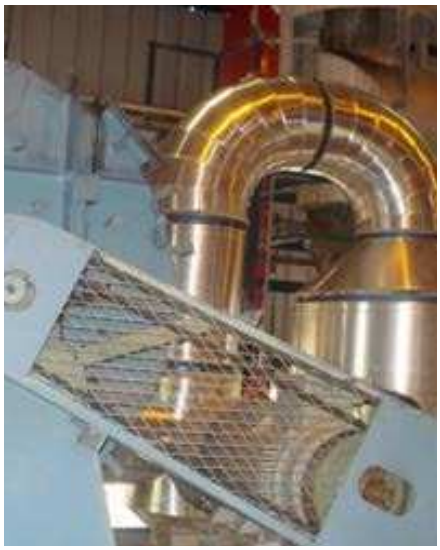
Improved reliability and productivity of dairy fans

Two high-pressure fans in a dairy plant experienced elevated vibration levels, detected with the SKF Machine Condition Advisor CMAS. Belt alignment was suspected as being an issue, but a closer inspection also revealed issues with the fan foundations. Faults were corrected and SKF belt alignment equipment ensured a correct drive set-up. Fan reliability was improved, with resulting energy savings.

SKF belt alignment helps reduce energy consumption, enhance reliability

Increasing energy consumption was noted on a noodle line roots blower. An operator inspection using the SKF Machine Condition Advisor, model CMAS, detected excessive vibration. Further analysis identified misalignment between the motor and blower pulleys. The misalignment was corrected using the SKF Belt Alignment Tool TMEB 2; subsequent energy consumption measurements confirmed a reduction of almost 30%.

Motor current measurement		Phase A	Phase B	Phase C
Blower	Before maintenance	38,7 A	38,1 A	38,5 A
	After maintenance	**28,0 A**	**28,5 A**	**27,0 A**



SKF Stroboscope and Belt Alignment Tool helps cut energy consumption in utility/ incinerator fans

Visual operator inspection using SKF stroboscope identified unusual belt wear in two incinerator fans, also causing increasing energy consumption. Belt misalignment was suspected, then confirmed and corrected using the SKF TKBA 40 laser alignment tool. Early correction of the misalignment between pulleys eliminated wear on the belts and contributed to an energy reduction of approximately 20% for each fan.

Motor current measurement		Phase A	Phase B	Phase C
Fan 1	Before maintenance	12,2 A	13,2 A	12,8 A
Fan 1	After maintenance	**10,6 A**	**10,5 A**	**10,7 A**
Fan 2	Before maintenance	12,2 A	12,8 A	12,7 A
Fan 2	After maintenance	**10,5 A**	**10,5 A**	**10,6 A**

Performance optimization through advanced monitoring, analysis and balancing

When simple measures are insufficient to solve problems such as identifying the source of high vibration levels, SKF can offer expertise and advanced techniques for in-depth analysis

1 Periodic fan condition monitoring program using SKF Microlog Analyzer can collect and perform advanced analysis, share machine condition data.

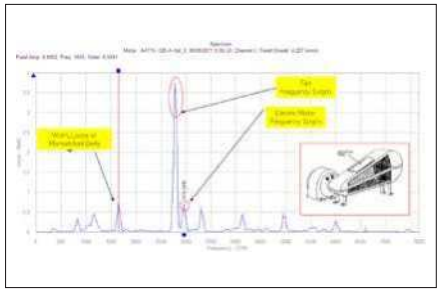
Periodic data collection with SKF Microlog Analyzer

2 SKF on-line machine condition monitoring system is a viable solution for critical fans where access is difficult or user safety is at risk. It allows early fault detection and prevention, automatic recognition to be able to correct existing or impending conditions, and advanced condition-based maintenance to improve machine reliability, availability, and performance.

Range of SKF sensors monitoring defined points and SKF IMx online surveillance system

Spectrum analysis with SKF @ptitude software can isolate the different sources of vibration.

3 SKF @ptitude software provides fast, efficient and reliable storage, analysis, and retrieval of complex asset information. This is scalable to specific needs, whether it is on-line or periodic condition monitoring data collection, in-depth vibration analysis and expert advice.

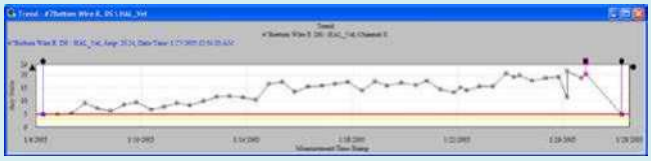


4 SKF engineering can support trouble shooting the identified fan issues, assisted by instruments such as SKF Dynamic Motor Analyzer.

Checking electric motor performance with the SKF Dynamic Motor Analyzer.

Advanced analysis revealed unexpected causes of fan vibration

High vibrations in a fan motor were detected during periodic condition monitoring using SKF Microlog Analyzer. Plant technicians knew that such vibrations were often due to unbalance and poor ground fitting. However, an SKF spectrum analysis identified a vibration peak inconsistent with the machines frequencies. Further analysis linked the high vibration to a conveyor connected to the fan. Adjustments made as a result of SKF findings reduced the vibration level from an average of 11 to 2 mm/s, thereby enhancing equipment reliability.



SKF @ptitude

SKF condition monitoring helps improve reliability in milk powder plant

A milk powder plant needed to optimize reliability of its critical fans. Machines were located in a critical hygiene area, making it preferable to minimize human intervention. High temperatures and process air pressure increased the risk of manual checks.

SKF recommended a system providing 24/7 online monitoring of the plant's critical processing line assets. The implemented system helped enhance food and operator safety, immediately improving reliability by identifying problems, such as loose covers and bearing defects. This helped to prevent unscheduled stops and loss of production.

Increased fan life in a chocolate plant reduced energy consumption and production losses

High vibration levels were registered in a layering air handling unit responsible for maintaining the temperature and humidity of processing lines.

SKF condition monitoring specialists performed a vibration analysis and identified fan unbalance as the problem. Using the SKF Microlog balancing module the fan impeller unit was dynamically balanced. This helped reduce vibration levels by 78%, resulting in less energy consumption, reduced equipment breakdowns and less risk of production losses.

SKF helped achieve 20% energy savings in exhaust fan

High vibration levels in an exhaust fan were a reliability concern, with the risk of a 6-hour unplanned shutdown should a sudden failure occur. To address this, it was decided that SKF specialists perform periodic vibration analysis and field balancing services.

High vibration was also impacting the electrical performance of the motor, this was investigated with the SKF dynamic motor analyzer. An uneven and damaging load ratio across the three phases was detected. After re-balancing, new measurements demonstrated an improved load balance between the 3 motor phases, resulting in motor life optimization and 20% reduction in energy consumption.

Gearbox performance and life optimization

Increasing service life under poor lubrication and contaminated conditions

Upgraded SKF Explorer bearings with extended service life last up to twice as long as the original market-leading SKF Explorer performance class bearing.

Upgraded SKF Explorer performance class spherical roller bearings provide a number of key performance benefits. The unique engineering, manufacturing and material improvements of the upgraded SKF Explorer bearings have been shown to:

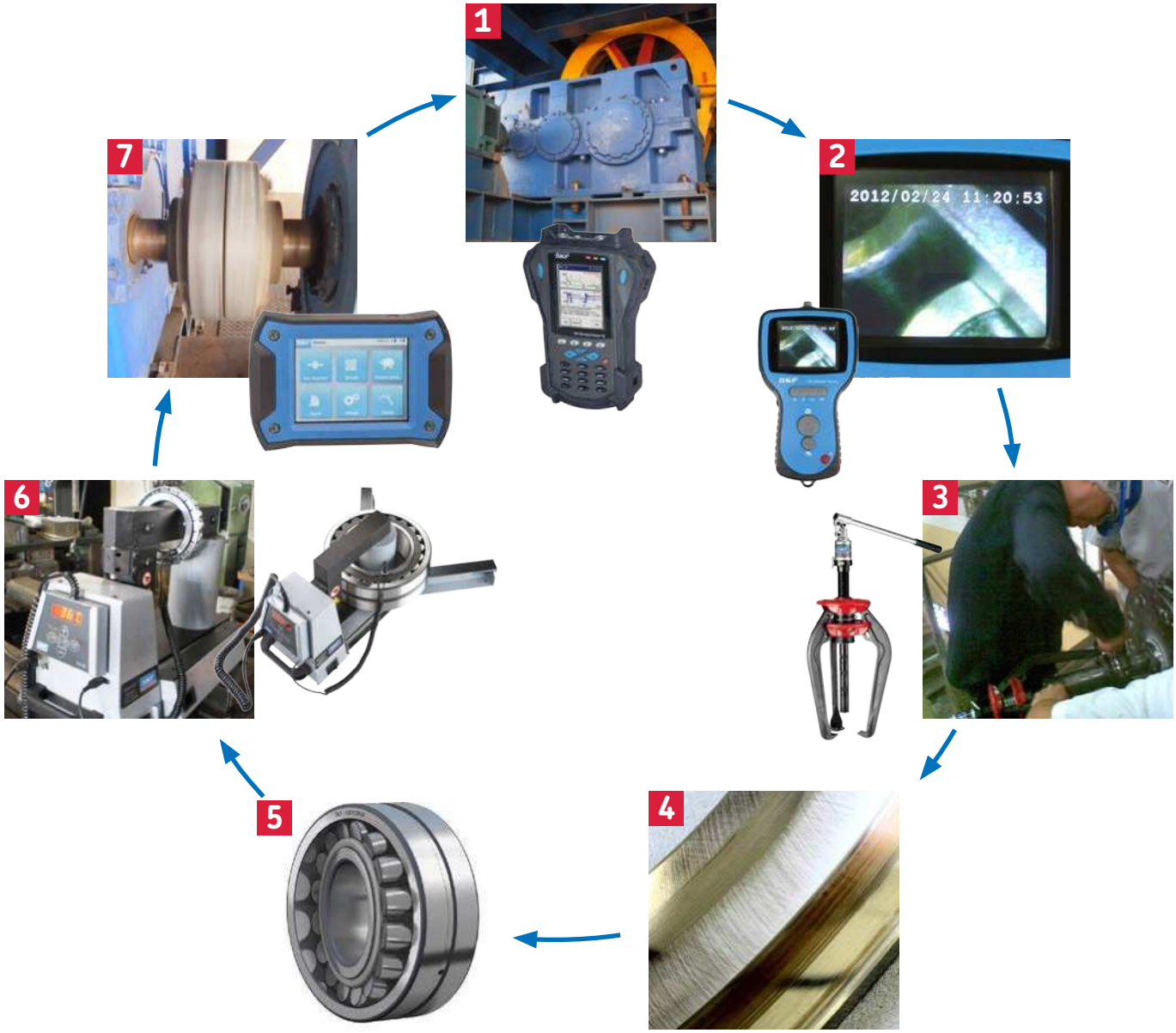
- Increase uptime
- Improve reliability
- Increase productivity
- Reduce noise and vibration levels

The upgraded spherical roller bearing provides up to twice the service life of the original SKF Explorer class bearings when operating under marginal lubrication or contaminated conditions. Additionally, once early signs of bearing damage have been detected, the bearing will continue to operate longer, providing more time to plan, order parts and prepare for shutdown, thereby reducing downtime and its related costs.

Increased reliability of critical gearbox

In a sugar beet processing plant, the maintenance team wanted to know the condition of the critical gearbox driving the twin beet pressing shafts. SKF engineering provided an expert analysis service, which revealed that contamination and poor lubrication were contributing towards bearing damages which would have ultimately caused failure.

Replacement of the existing spherical roller bearing with an upgraded SKF Explorer bearing facilitated a like for like replacement that provided improved operation under such conditions, potentially doubling service life.



1 Vibration detection using SKF Microlog can indicate alarm condition of the bearing. Downloading bearing frequency data into SKF @ptitude Analyst, can indicate for example, failure on the inner ring.

2 The use of an SKF Endoscope allows an internal visual inspection of the gearbox, providing evidence of damage to justify removal of the gearbox.

3 SKF EasyPull TMMA series allows dismounting of the bearings without damaging shafts and abutments, while at the same time helping to maintain operator safety.

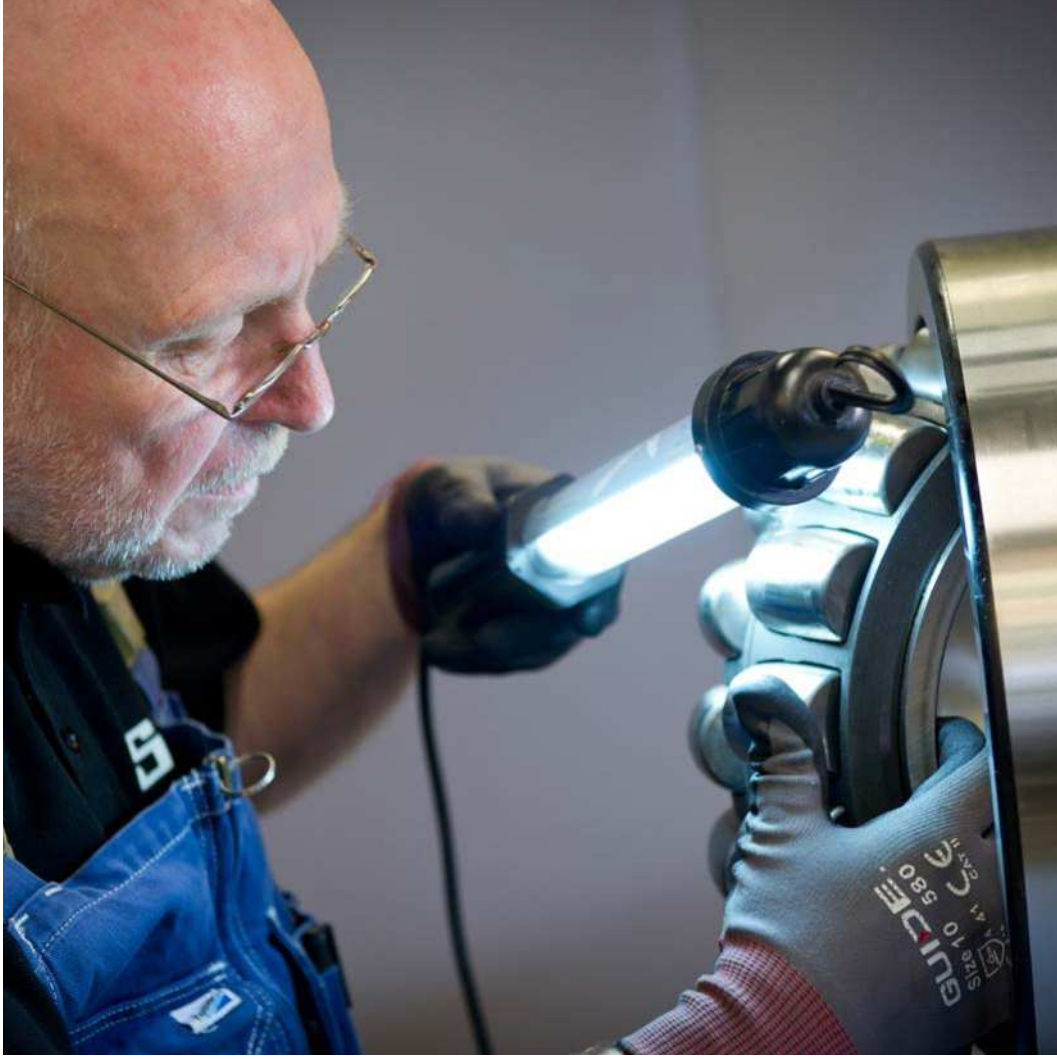
4 Through root cause analysis, SKF can identify if, for example, an issue is related to lubrication. Improving the lubrication system or changing the lubricant could lead to a solution.

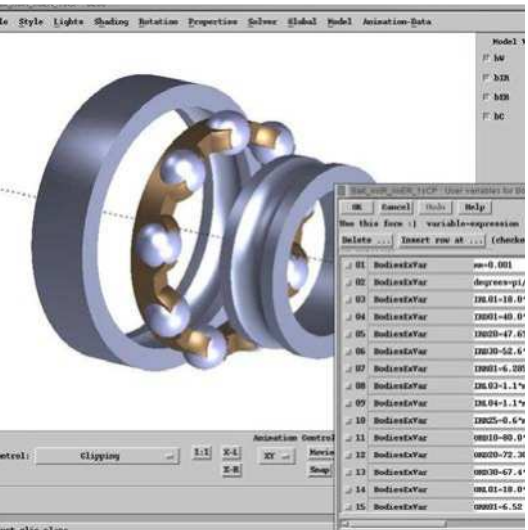
5 Alternatively, replacement with upgraded SKF Explorer spherical roller bearings can provide up to twice the life compared to original SKF Explorer class bearings under poorly lubricated conditions.

6 Mounting bearings with SKF TIH series induction heaters is a safe method of mounting bearings without potential shaft damage.

7 Shaft alignment with SKF TKSA series equipment helps facilitate optimum reliability.

SKF offers a unique combination of competencies from various fields of engineering, including virtual testing using dynamic simulations, lubrication management and determining root cause to rotating machinery problems.





Gearbox performance and life optimization

Extended mean time between repairs with SKF bearings, seals and engineering

Root cause failure analysis leads to specialized SKF solution, increased MTBR

In a hardening tunnel, yearly time-based maintenance was scheduled to avoid catastrophic failure of the main gearbox and chain drive. However, removing the gearbox was a difficult operation, involving health and safety risks. Given the need to increase the mean time between repairs to beyond one year, SKF conducted a root cause failure analysis. The results concluded that corrosion (due to ingress of cleaning fluid) and seals "breathing" – coupled with incorrect seal mounting – were the key issues to address.

The solution SKF offered included a cartridge with 2 seals (avoiding incorrect mounting) made of Ecoflon 4 material, that had superior chemical, wear and abrasion resistance. SKF stainless steel deep groove ball bearings filled with Solid Oil technology were installed to avoid corrosion and help offset issues due to ingress of fluid into the bearing. Additionally, a less complex flinger on the output shaft was proposed to seal the shaft and fling excess water away when rotating. As a result, the customer increased mean time between repairs to 18 months.

Transmission system life optimization

SKF Xtra Strength Chains contributed to improved machine uptime

A bakery plant was using a high number of chains in its rotary dough moulder drive. The chains failed, on average, within 10 days, causing excessive downtime, lost production and high spare parts consumption.

SKF redesigned the complete drive using SKF Xtrapower duplex chains and sprockets as a complete package. Significant improvements in machine uptime were realized, with subsequent increased productivity and reduced consumption of spare parts. The SKF chains have now been running without failures for over 1 year.

SKF chains helped sugar mill reduce downtime

A sugar mill faced chain failure problems in the drive system of a crushing unit. Chain failure occurred within 30 to 45 days; The requirements of the drive exceeded the capabilities of standard chains. SKF applied a special heavy duty chain to fulfill the drive requirements, extending service life to over 3 months, fulfilling customer need. Additionally, all chains were manufactured to ISO standards.

SKF FRAS Flex reduces downtime

A food producer experienced problems with a natural rubber coupling that broke soon after being exposed to high temperatures from a nearby oven. SKF replaced the original coupling with a new flex coupling containing chloroprene elements that resist high temperatures. The result was significantly increased coupling life, reducing unplanned downtime and improving line efficiency.

SKF Xtra Strength Chains

SKF Xtra Power chains are ideally suited for applications subjected to high shock loads and low operating speeds. The materials, tolerances and improved heat treatment processes of this chain provide superior capabilities over standard chains with the same dimensions.

SKF ANSI Sprockets

Made from high quality steel and machined to exacting standards (e.g., ISO), increase drive life when used with SKF Xtra Power chains.

SKF Flex Couplings

SKF Flex Couplings are designed to accommodate misalignment, shock loads and to reduce vibration levels. These easy-to-install, maintenance-free couplings are available with either a machined-to-size or tapered bore.

FRAS tyre couplings accommodate higher operating temperatures than standard natural rubber, and are ideal for low maintenance environments. The couplings' fire resistant and anti-static properties offer a solution for applications where standard products are not suitable.

Looking for means to reduce energy consumption, increase reliability?

Sugar producer produced energy consumption and improved centrifuge reliability during season

A sugar processor experienced poor machine reliability in its raw sugar centrifuges caused by sudden accelerations and decelerations, and leakages of syrup and oil. This situation was further aggravated by incorrect maintenance practices.

SKF made an assessment and redesign of the power transmission system, including optimal mounting and precision alignment of SKF pulleys and belts. The SKF solution resulted in a 6,5% reduction of energy consumption in the centrifuge motor (24 MWh saved per year). Unplanned stops of the centrifuge during the production season were eliminated.

SKF engineering services contributed to increased reliability on wet mixer motor

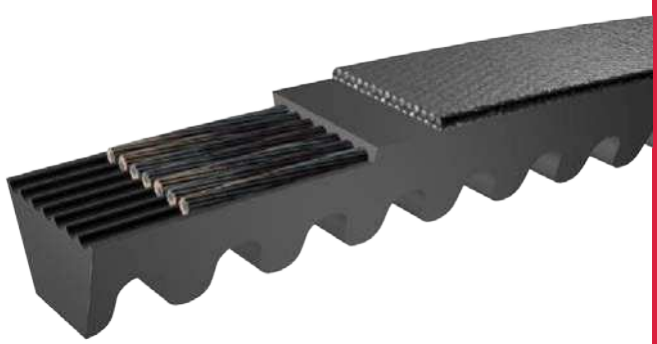
V-belts in a wet mixer motor required frequent replacement (every 2 months or less), a condition that was further aggravated by incorrect maintenance practices. The SKF solution included a redesign of the power transmission system, including the installation of SKF Cogged Raw Edge belts and pulleys with taper bushings, along with precision laser alignment and correct belt tensioning during mounting.

The solution provided over 6 months of continuous operation, along with reduced energy consumption.

SKF Cogged Raw Edge belts

SKF Cogged Raw Edge belts are highly flexible belts that can bend around a smaller pulley without causing undue amounts of stress. They are reliable for use in environments from –30 to +75 °C, including tropical climates. Their high energy efficiency construction includes a “raw edge” combined with a “cogged” design that offers:

- Higher friction, resulting in 25 to 30% more transmitted power capacity
- Improved efficiency, leading to less energy consumed
- Lower maintenance requirements than for conventional wrapped belts
- Less internal heat build up to enhance long term rubber life



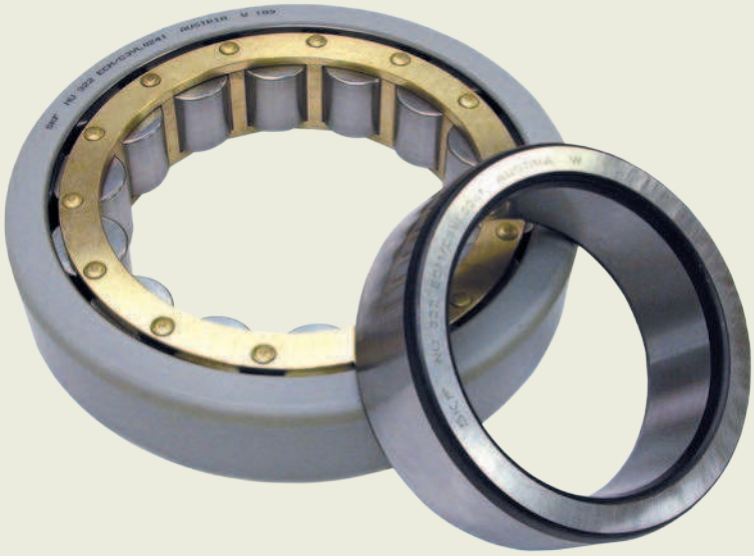
Motor life and performance optimization

Protecting against stray electric currents from variable speed drives that can damage bearings

INSOCOAT bearings protect against the passage of electric current.

INSOCOAT bearings feature a plasma sprayed ceramic coating on the inner or outer ring that insulates the bearing from damaging effects of stray electric currents. Because they have the same boundary dimensions as standard bearings, INSOCOAT bearings do not require special installation procedures or expensive modifications.

- Extend service life by insulating the bearings
- Reduce maintenance and repair costs
- Cost-effective solution compared to other insulating methods



Extended bearing life, reduced maintenance in fan motors

A milk powder plant's fan motor experienced high levels of vibration. The problem was traced to an electric current passing through the fan motor bearings that caused erosion and limited operation to only 2 000 hours. The problem was addressed with INSOCOAT bearings featuring an aluminium oxide film on the surface of the outer ring to provide electrical insulation to the stator. As a result, service life increased from 2 000 to 20 000 hours with considerable cost savings resulting from the reduced maintenance interventions – washing, drying, varnishing, bearing changes, insulation control, etc.

Understand failure modes to prevent re-occurence

Variable speed drives are frequently used for motors, these can increase the risk of stray high frequency electrical currents passing through the bearings. To ensure reliability it is important to monitor such applications, understanding the root cause to prevent premature failures and their reoccurrence.

1 Identifying the presence of stray electric current is made possible with the SKF Electrical Discharge Detector Pen TKED 1.

2 The SKF Machine Condition Advisor CMAS 100 can indicate whether or not the damage has already occurred and its severity.

3 Using the correct bearing dismounting methods and tools (e.g., SKF deep grove ball bearing puller kit TMMD 100) helps prevent damage of corresponding parts.

4 If damage is detected, it is essential to determine the cause. SKF root cause failure analysis can highlight fluting, electrical erosion.

5 If the bearings show any sign of damages, then replacement with INSOCOAT bearings help provide protection against the passage of electrical current.

6 Applying the manual drive-up mounting techniques through the SKF Bearing Fitting Tool TMFT 36 will help prevent premature bearing failure.

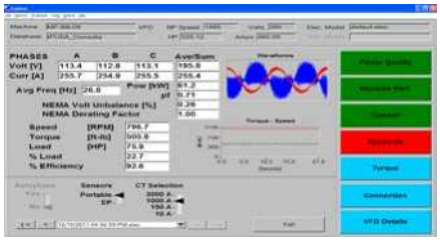
Transmission system life optimization

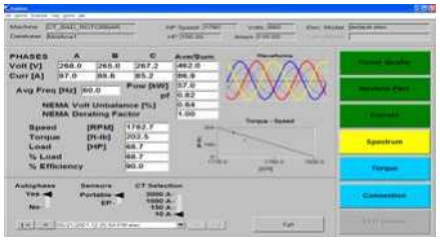
Electric motor reliability concerns, when:

It is part of critical equipment

SKF Dynamic Motor Analyser EXP 4000

Designed for in-service monitoring of power circuit issues, motor health, load, and performance, this SKF equipment provides a comprehensive look at overall motor integrity.





Managing asset availability by understanding machine condition

A plant was experiencing reliability issues in its critical electric motors. The problem was made worse by the lack of electrical status controls for the equipment. SKF recommended condition based monitoring for the plant's 30 critical electric motors, using the SKF dynamic motor analyzer to monitor power circuits, rotor status and load ratings. Among the benefits were 2 instances where unscheduled stops were avoided. In the first, current unbalance and a severe voltage drop were detected preventing production losses of 72 hours; in the second, the use of an SKF thermo-graphic camera revealed a broken bar in the motor, avoiding a 120 hours stoppage.

Improved critical motor reliability in a chocolate plant

Using the SKF Microlog Analyzer, high vibrations in the motor of a chocolate plant's two-roll refiner were detected. From studying the data using SKF @ptitude Analyst, bearing defects were identified as causing the problem. Bearings were replaced during a planned shut-down avoiding any production losses. As a result, vibrations were reduced from 9,7 to 0,8 mm/s.

Access is difficult for monitoring and maintenance, and is a safety issue

SKF Thermal Cameras can detect from distance overheated motors that can be difficult to access safely.

Maintenance efforts and unplanned downtime can therefore be minimized.

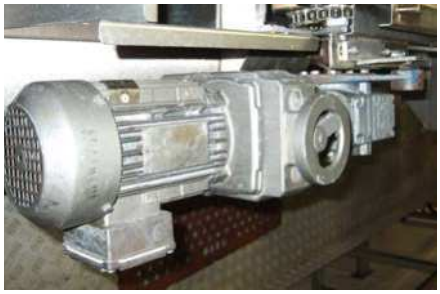
With the use of the **CMSS sensors** range, SKF offers 3 different methods to collect vibration data where operator access is difficult, and a potential safety issue.

SKF Microlog series of portable data collectors and analyzers connected to SKF junction boxes, they will provide convenient and safe manual access to sensors during periodic collection routes. Together with SKF @ptitude Analyst software, it is possible to perform advanced vibration spectrum analysis.

SKF Machine Condition Transmitters provide single channel machine protection, with the option of being controlled remotely by decision control systems.

SKF Multilog IMx multi-channel monitoring system provides 24/7 multiple-machine monitoring and advanced vibration analysis through SKF @ptitude Analyst software.

Ingress of cleaning fluids and process material



SKF customized sealing solutions

On a conveyor drive, the seal on the electric motor's output shaft must tolerate high pressure cleaning with washdown fluids. SKF supplied a seal assembly consisting of a radial elastomer lip seal, an L-shaped metal wear sleeve with integral elastomer seal for sealing against the shaft, as well as an elastomer face seal to prevent the ingress of the washdown spray.

Geared motors performance and life optimization

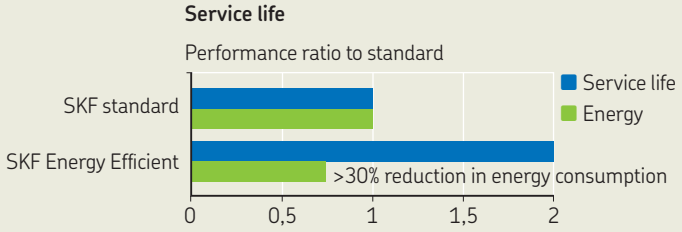
Savings from energy efficient bearings can be significant when many motors are involved

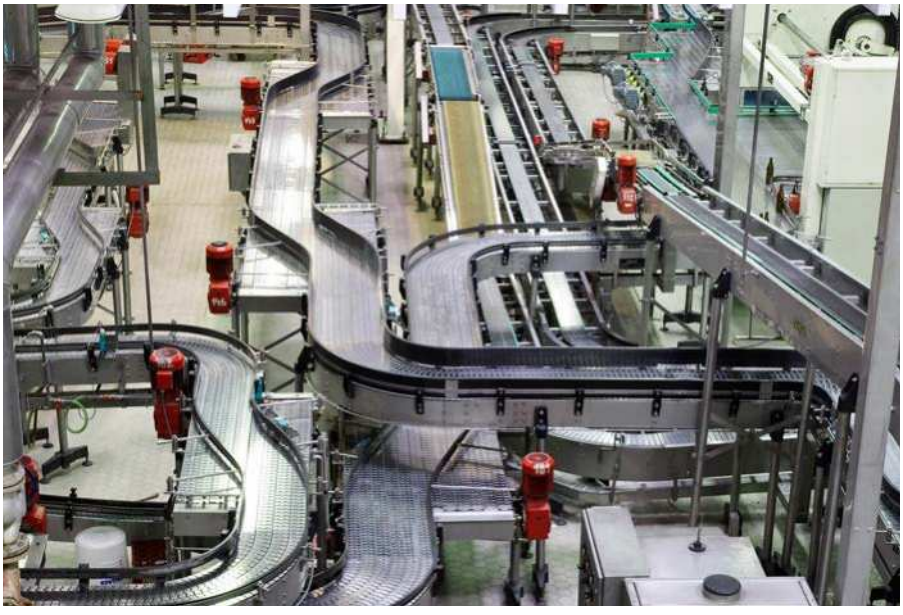
SKF E2 deep groove ball bearings reduce friction for reduced energy use

SKF Energy Efficient (E2) bearings feature an optimized design balance between the internal geometry, grease and cage. The bearing is designed to lower friction by 30 to 50% compared with SKF standard bearings, and to offer substantial reductions in cost and energy usage. Bearings conform to standard ISO boundary dimensions.

Advantages include:

- Lower energy consumption through reduced friction
- Longer service life, reducing cost of ownership





How much energy could you save in a plant with 90 geared motors, averaging 3 kW in size, working 24/5?

Replacing SKF standard deep groove ball bearings with SKF Energy Efficient ones can increase bearing life while reducing friction. Under the prevailing operating conditions, minimum bearing life can be more than doubled and bearing friction reduced by about 25%. In the plant illustrated above,

- 2 W/h in power can be saved for each motor, adding up to 12 kWh/year per motor, or 1 MWh/year for each line with 90 geared motors.[1)]

[1)] With the SKF Documented Solutions Program, your SKF representative can show you how much can be saved with SKF E2 deep groove ball bearings based on running data from your plant.

Increased reliability of critical geared motors

Protecting against ingress of cleaning fluids and process material

SKF Speedi-Sleeve is a well-proven solution to repair worn shafts within minutes.

They provide an excellent sealing surface without having to disassemble the shaft or change the seal dimensions. The sleeve, combined with an SKF radial shaft seal, provides an enhanced sealing system.

SKF WAVE radial shaft seals – CRW series can offer the right protection.

SKF proposed sealing solution for worn nitrile seals in a food processing line

Equipment in a food processing plant was subjected to periodic washdown with a chemical solution of water and chlorine compounds. Over time, the sealing material became swollen and eventually failed. Shaft surfaces grooved, requiring extensive rework to be brought back to a serviceable condition. The application called for a sealing solution that minimized the effects of the chlorine washdown, complemented by a cost-effective shaft repair solution.

The SKF solution employed FKM V-rings as a barrier to isolate the existing nitrile seals from the washdown solution. These V-rings offer resistance to chemicals that commonly damage nitrile, polyacrylates or silicones. Additionally, SKF Speedi-Sleeve was employed to repair the damaged shafts with minimum cost and downtime.

SKF Speedi-Sleeve helped protect shafts against contaminant ingress

In a manufacturer's distribution center, very fine dust from corrugated cartons was creating a problem: the dust covered much of the equipment, working its way past the sealing lips both on the input and output shafts of the conveyor drive. Although the seals were replaced during a rebuild, oil leaks continued. The contamination had caused the shaft to wear under the seal lip, leading to premature seal failure and leaking oil. This could result in a safety hazard and contamination of merchandise.

The solution consisted of SKF Speedi-Sleeves to repair the damaged shaft without rework, along with an SKF WAVE CRWA1 seal. The solution also provided effective lubricant retention, minimizing downtime and associated costs.

The metal OD construction of the CRW type seal provides positive retention in the housing bore as well as a suitable running surface for the V-ring. The Bore-Tite coating on the OD helps to fill in any small imperfections in the housing bore surface.

The SKF WAVE seal design provides superior sealing and up to 20% less friction, resulting in up to 30% lower temperatures compared to conventional straight edge radial lip seals.

Increased reliability of critical geared motors

Simple tools and methodologies to more advanced condition monitoring and engineering

Routine front line inspection can provide early indication of impending problems.

The SKF CMAS Machine Condition Advisor can simultaneously check temperature, vibration and enveloped acceleration, indicating overall machine health.

SKF Machine Condition Indicator provides asset condition information to front-line, giving an early indication of components deterioration.

An SKF Stroboscope can support in the inspection of external seals. It can highlight impending issues, such as leakages, without stopping the machine.

Advanced data collection and analysis can further identify specific issues.

An SKF Microlog can be used for effective vibration measurement, allowing the isolation of specific conditions of individual gears and bearings.

An SKF Endoscope enables internal visual inspection – assessing the level of damage of gears and bearings, without dismantling the gearbox.

SKF advanced oil analysis service

Repetitive failures should be investigated to prevent reoccurrence.

SKF application engineering can provide detailed analysis to identify the root cause of rotating machinery problems.

Overcoming time-consuming and costly repairs

Using the right tools, knowledge and quality components from SKF for motor repair

SKF Energy Efficient and SKF Explorer deep groove ball bearings

Provide increased performance and life.

SKF training program[1)]

on subjects such as shaft and housing tolerance, mounting and dismounting and lubrication provide the highest potential for the bearings to achieve their maximum theoretical life.

SKF Dynamic Motor Analyzer EXP 4000[2)]

Designed for in-service monitoring of power circuit issues, motor health, load and performance, the SKF EXP 4000 provides a comprehensive look at overall motor integrity.

1) For more information on SKF online and class room training, please visit **skf.com/services/trainings**

2) Service provided by SKF certified electric motor rebuilder. For more information and to locate a certified rebuilder please visit **skf.com/services**

SKF
Certified Rebuilder
Electric Motors

Pumps life and performance optimization

Optimized bearing configuration to maximize reliability?

MRC PumPac[6] and SKF "matched", universally ground angular contact ball bearings

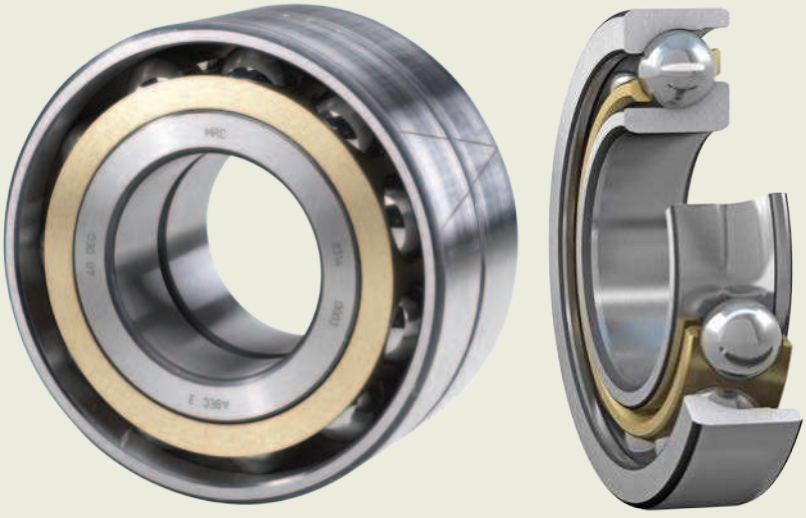
SKF angular contact ball bearings are an effective solution to maximize the bearing performance in centrifugal pump applications subject to thrust load and high speed. Universally ground bearings with suffixes BECBM provide reliable operation, and feature:

- High precision execution, providing high running accuracy
- Controlled ball guidance, due to machined brass cages
- Reduced failure potential, given optimized axial clearance

The MRC PumPac series is an upgraded solution from universally ground angular contact ball bearings. When used in similar pumps, the PumPac series provides even greater benefits to those outlined above, including:

- Simplified mounting – a "V" etched on the outside diameter facilitates correct mounting
- Prevention of process material leakages thanks to improved mechanical sealing integrity - this due to high radial stiffness of the bearing system
- Increased life from the use of bearings with different contact angles (40, 15 degrees), which provide additional control of axial clearance in the unloaded bearing

Available in bore sizes of 10 to 240 mm, dependent on bearing series



Optimized equipment performance with universally ground bearings

A customer was experiencing poor reliability resulting from the failure of thrust bearings. Root cause analysis determined that unequal load sharing was the primary reason of failure. Under further investigation, it became clear that unmatched bearings were being used. The application of SKF universally ground angular contact ball bearings with suffix BECBM resolved the issue, and have since provided long-term, reliable operation.

6) MRC is a brand of SKF.

SKF radial shaft sealing solutions can offer the right protection.

SKF machined sealing solutions

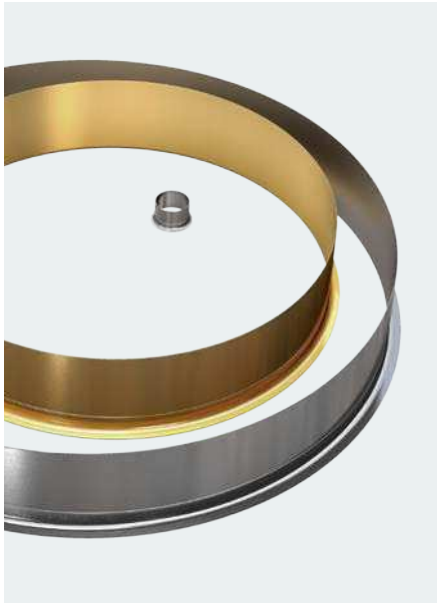
Provide an optimized seal design and can be made of standard and SKF proprietary FDA approved sealing materials.

H-ECOPUR and SKF Ecowear 1000, featuring improved wear and chemical resistance.

Standard solutions

Such as the metric SKF rubber outside diameter radial shaft seals, HMS5 and HMSA10, are designed to provide optimized performance under aggressive and contaminating operating conditions.

Additionally they are able to accommodate considerable thermal expansion, high dynamic run out and shaft-to-bore misalignment.



SKF Speedi-Sleeve

Is designed to fit securely over worn shaft areas – thus limiting the need for machining and resulting downtime.

In addition, the special sealing function can prevent lubricant leakage, minimizing potential environmental impact. SKF Speedi-Sleeve is a well-proven solution to repair worn shafts within minutes. It can provide an excellent sealing surface witho ut having to disassemble the shaft or change the seal dimensions. The sleeve, combined with an SKF radial shaft seal, provides an enhanced sealing system.

Improved energy efficiency of pumps

How much energy can be saved with correct alignment?

A beverage plant documented 180 MWh/ year energy savings, while increasing pump reliability

A customer experienced high vibration levels on 12 pumps, resulting in excessive consumption of both spare parts and energy. An SKF condition monitoring program utilizing an SKF Microlog Analyzer showed that the high vibration levels were clearly due to misalignment. Using the SKF TKSA 40 system, technicians were able to accurately realign the pumps. Measuring energy consumption before and after, demonstrated an average of 8% energy savings (as high as 20% in some cases). Reductions in total energy consumption for the 12 pumps was estimated to be 180 MWh/ year; vibration levels also decreased, positively impacting pump reliability.

To watch an instructional video for the use of the TKSA series Shaft Alignment System scan this code or visit the SKF Maintenance Products Channel on YouTube.

Enhancing pump performance

Condition inspections and assessments, SKF upgrade recommendations, correct installation of components and final alignment can maximize the reliability of critical pump applications.

1 Operator inspection reveals high noise and leaking fluid from the pump. This is recorded on an SKF Microlog Inspector and downloaded into the CMMS system, resulting in a work order to inspect the pump.

2 The pump is stripped down to determine the cause of the problems. Dismounting tools from SKF can be used to safely and securely remove components to help ensure operator safety and prevent shaft damage.

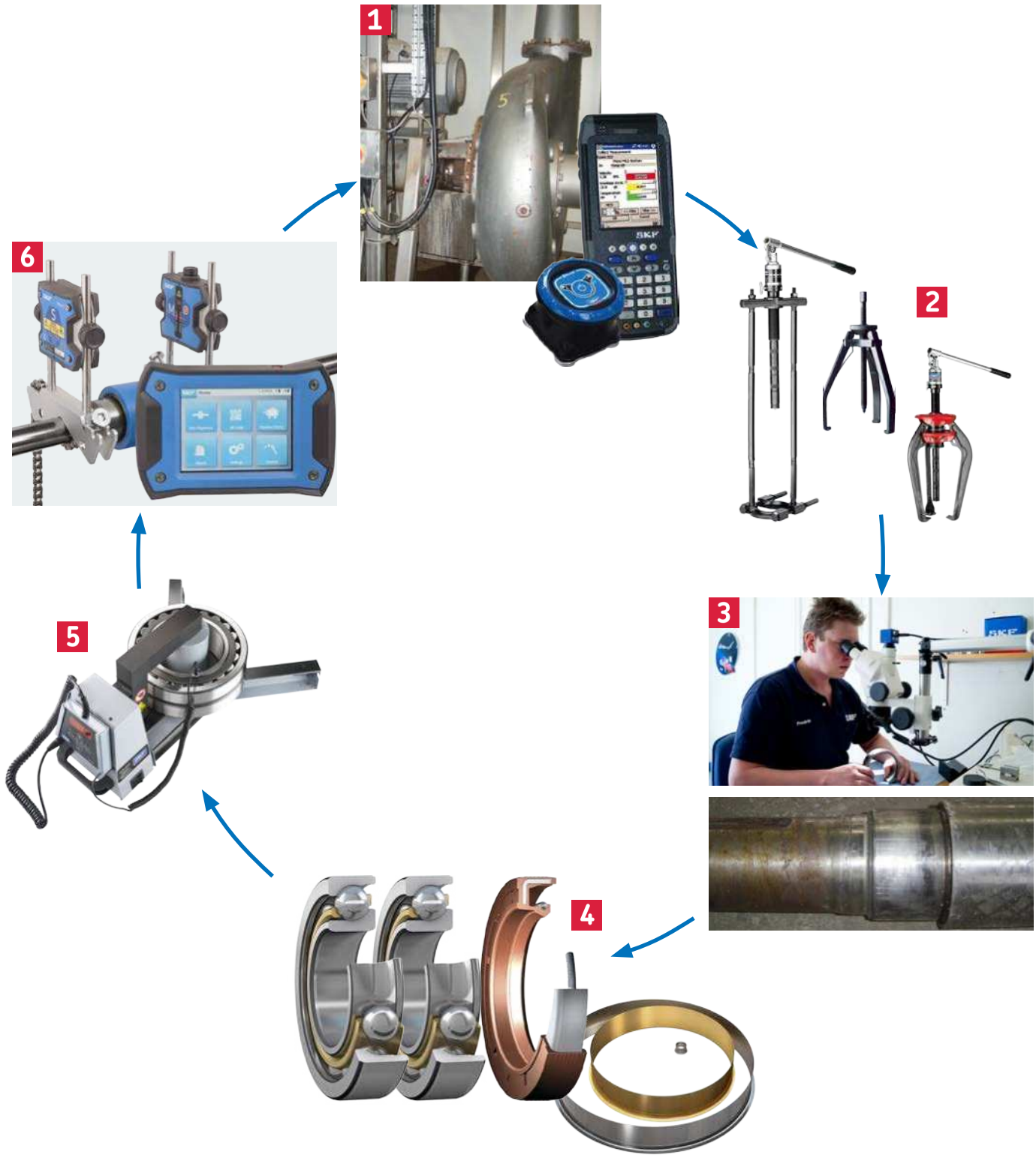
3 Root cause analysis of components identifies issues such as:
- Seal wear that has reduced sealing efficiency and damaged the shaft
- Incorrect bearing selection – use of unmatched bearings resulting in problems with load sharing
- Bearing seating damage indicating incorrect tolerance class and surface finish

4 SKF solutions to address these root causes include:
- High efficiency standard seals or alternatively machined seals with improved lip profiles, manufactured from high wear resistant FDA approved materials (see previous page)
- SKF Speedi-Sleeve – avoids the need for shaft rework, providing a hard polished seal running surface
- Engineering services recommending correct tolerance classes and optimum surface finish for bearing seating
- Universally matched SKF angular contact ball bearings to improve load sharing and provide optimum performance

5 Safe and secure mounting of the bearings using an SKF TIH 30 Induction Heater prevents potential damage to the shaft.

6 Correct alignment using an SKF TKSA 40 series Shaft Alignment System provides reliable operation and helps minimize energy consumption.

Enhancing pump performance



Compressor life cycle costs reduction

Reduced compressor life cycle costs through transition to condition based maintenance?

Refurbishing compressors using a time based strategy without consideration of asset maintenance history can have a major impact on costs. Intervals between maintenance can be significantly extended by utilizing a condition based maintenance strategy. This approach is based on invasive maintenance only being needed when one or more indicators show that equipment performance is deteriorating. Benefits include:

- Reduced maintenance costs
- Improved system reliability – decreasing the number of maintenance interventions will reduce the risk of human error
- Confidence in machine behavior by gaining knowledge and understanding of compressor operating characteristics
- Early detection of problems that can result from overhauls

Extended mean time between maintenance by 30% utilizing SKF condition based maintenance

A frozen food plant's ammonia compressor had a Mean Time Between Maintenance of 20 000 hours using a time based program. Moving to a condition based approach, the plant achieved a 30% increase in the time between maintenance on one of its compressors. When applied across the plants 15 compressors, significant cost savings were realized. As a result, the plant reduced maintenance costs and increased compressor availability.

Notes

Appendix

Designation system for SKF Food Line stainless steel deep groove ball bearings

The designations for SKF stainless steel deep groove ball bearings follow the basic SKF designation system except for inch types. However, the prefix "W" has been implemented to indicate that the material is stainless steel.

Supplementary designations

In addition to the designation suffixes that are listed in the SKF rolling bearings catalogue, the following designation suffixes are relevant for SKF stainlees steel deep groove ball bearings:

W Stainless steel deep groove ball bearing metric series

D/W Stainless steel deep groove ball bearing inch series

X One boundary dimension deviates from ISO standard

BB1 Two or more boundary dimensions deviate from ISO standard

2TS PTFE seal for stainless steel deep groove ball bearing

2ZS Shield of pressed sheet steel on both sides of the bearing with retaining ring

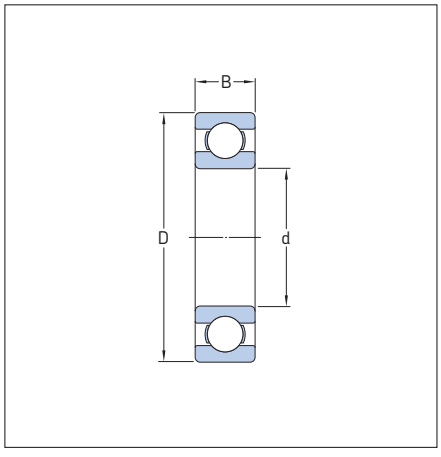
R Flanged outer ring

R-2Z Shield of pressed sheet steel on both sides of the bearing and flanged outer ring

VT378 Food grade grease with aluminium thickener of consistency 2 to the NLGI Scale for a temperature range –25 to +120 °C (normal fill grade)

VP311 VP311 Blue colored seal made of FDA and EC approved rubber (NBR) on both sides of the bearing and lubricant registered by NSF as category H1. FDA approval according to CFR 21 section 177.2600 'Rubber articles intended for repeated use' for use in contact with aqueous and fatty foods. EC approval according to the overall migration requirements of the German BfR recommendation XXI for category 3 materials.

For additional information, refer to the *SKF rolling bearings catalogue* or the *SKF Interactive Engineering Catalogue* available online at www.skf.com.



SKF Food line stainless steel deep groove ball bearings

SKF Food line stainless steel deep groove ball bearings, metric

Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d	D	B	C	C_0	P_u				
mm			N		N	r/min		kg	–
8	22	7	1 990	780	34	–	22 000	0,0117	**W 608-2RS1/VP311**
10	26	8	3 970	1 960	83	–	19 000	0,0185	**W 6000-2RS1/VP311**
	30	9	4 360	2 320	100	–	16 000	0,0304	**W 6200-2RS1/VP311**
12	28	8	4 420	2 360	102	–	16 000	0,0198	**W 6001-2RS1/VP311**
	32	10	5 720	3 000	127	–	15 000	0,0362	**W 6201-2RS1/VP311**
15	32	9	4 880	2 800	120	–	14 000	0,0288	**W 6002-2RS1/VP311**
	35	11	6 370	3 600	156	–	13 000	0,0442	**W 6202-2RS1/VP311**
17	35	10	4 940	3 150	137	–	13 000	0,0385	**W 6003-2RS1/VP311**
	40	12	8 060	4 750	200	–	12 000	0,0647	**W 6203-2RS1/VP311**
20	42	12	8 060	5 000	212	–	11 000	0,0657	**W 6004-2RS1/VP311**
	47	14	10 800	6 550	280	–	10 000	0,1047	**W 6204-2RS1/VP311**
25	47	12	8 710	5 850	250	–	9 500	0,077	**W 6005-2RS1/VP311**
	52	15	11 700	7 650	335	–	8 500	0,1291	**W 6205-2RS1/VP311**
30	55	13	11 400	8 150	355	–	8 000	0,113	**W 6006-2RS1/VP311**
	62	16	16 500	11 200	480	–	7 000	0,1958	**W 6206-2RS1/VP311**
35	62	14	13 800	10 200	440	–	6 700	0,1475	**W 6007-2RS1/VP311**
	72	17	22 100	15 300	655	–	6 000	0,2792	**W 6207-2RS1/VP311**
40	68	15	14 600	11 400	490	–	6 300	0,1856	**W 6008-2RS1/VP311**
	80	18	25 100	17 600	750	–	5 600	0,3578	**W 6208-2RS1/VP311**

MRC metric range of ultra corrosion-resistant sealed deep groove ball bearings

Principal dimensions						Basic load ratings dynamic	static	Fatigue load limit	Speed ratings Reference speed	Limiting speed	Mass	Designation
d		D		B		C	C_0	P_u				
mm	*in.*	mm	*in.*	mm	*in.*	N		N	r/min		kg	–
10	*0.3937*	30	*1.1811*	9	*0.3543*	5 100	2 370	–	–	17 000	–	200SZZ-HNCR-HYB
12	*0.4724*	32	*1.2598*	10	*0.3937*	6 800	3 050			15 000		201SZZ-HNCR-HYB
15	*0.5906*	35	*1.3780*	11	*0.4331*	7 600	3 700	–	–	13 000	–	202SZZ-HNCR-HYB
17	*0.6693*	40	*1.5748*	12	*0.4724*	9 550	4 760	–	–	12 000	–	203SZZ-HNCR-HYB
20	*0.7874*	47	*1.8504*	14	*0.5512*	12 800	6 580			10 000		204SZZ-HNCR-HYB
25	*0.9843*	52	*2.0472*	15	*0.5906*	14 000	7 830	–	–	8 500	–	205SZZ-HNCR-HYB
30	*1.1811*	62	*2.4409*	16	*0.6299*	19 500	11 300	–	–	7 500	–	206SZZ-HNCR-HYB
35	*1.3780*	72	*2.8346*	17	*0.6693*	25 500	15 300			6 300		207SZZ-HNCR-HYB
40	*1.5748*	80	*3.1496*	18	*0.7087*	30 700	19 000	–	–	5 600	–	208SZZ-HNCR-HYB
45	*1.7717*	85	*3.3465*	19	*0.7480*	33 200	21 600	–	–	5 000	–	209SZZ-HNCR-HYB
50	*1.9685*	90	*3.5433*	20	*0.7874*	35 100	23 200			4 800		210SZZ-HNCR-HYB
								–	–		–	
10	*0.3937*	26	*1.0236*	8	*0.3150*	4 620	1 960	–	–	19 000	–	100KSZZ-HNCR-HYB
12	*0.4724*	28	*1.1024*	8	*0.3150*	5 070	2 360			17 000		101KSZZ-HNCR-HYB
15	*0.5906*	32	*1.2598*	89	*3.5039*	5 590	2 850	–	–	14 000	–	102KSZZ-HNCR-HYB
17	*0.6693*	35	*1.3780*	10	*0.3937*	6 050	3 250	–	–	13 000	–	103KSZZ-HNCR-HYB
20	*0.7874*	42	*1.6535*	12	*0.4724*	9 360	5 000			11 000		104KSZZ-HNCR-HYB
25	*0.9843*	47	*1.8504*	12	*0.4724*	11 200	6 550	–	–	9 500	–	105KSZZ-HNCR-HYB
30	*1.1811*	55	*2.1654*	13	*0.5118*	13 200	8 270	–	–	8 000	–	106KSZZ-HNCR-HYB
8	*0.3150*	22	*0.8661*	7	*0.2756*	3 250	1 360	–	–	23 000	–	38ZZ-HNCR-HYB
								–	–		–	
10	*0.3937*	22	*0.8661*	6	*0.2362*	2 510	1 120			19 000		1900SZZ-HNCR-HYB
12	*0.4724*	24	*0.9449*	6	*0.2362*	2 890	1 460	–	–	18 000	–	1901SZZ-HNCR-HYB
15	*0.5906*	28	*1.1024*	7	*0.2756*	4 030	2 040	–	–	16 000	–	1902SZZ-HNCR-HYB
17	*0.6693*	30	*1.1811*	7	*0.2756*	4 360	2 320			14 000		1903SZZ-HNCR-HYB
20	*0.7874*	37	*1.4567*	9	*0.3543*	6 380	3 680	–	–	12 000	–	1904SZZ-HNCR-HYB
25	*0.9843*	42	*1.6535*	9	*0.3543*	7 030	4 530	–	–	10 000	–	1905SZZ-HNCR-HYB

Appendix

A range of food-grade sealing materials

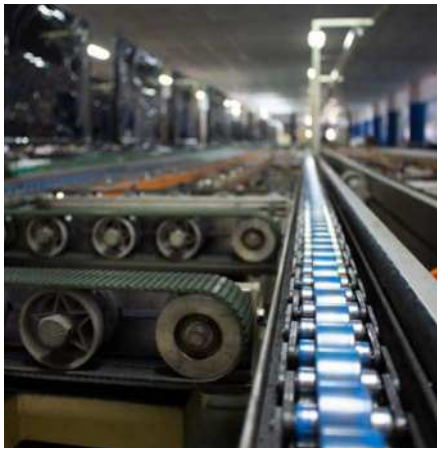
Material	DIN / ISO / ASTM	Colour	Main properties				F&B standards compliance			
			Temperature, min	Temperature, max	Hardness[1]		FDA	3A	EU	ADI free
			°C (°F)	°C (°F)	Shore A	Shore D				
Thermoplastic elastomers										
H-ECOPUR	TPU	red	–20 (–5)	+110 (+230)	95 ± 2	48 ± 3	YES	YES	NO	YES
H-ECOPUR 95A-NC	TPU	opaque	–20 (–5)	+110 (+230)	95 ± 2	48 ± 3	YES	YES	NO	YES
H-ECOPUR 95A-blue	TPU	blue	–20 (–5)	+110 (+230)	95 ± 2	48 ± 3	YES	YES	NO	YES
ECOPUR 95A-bl-FG	TPU	blue	–50 (–60)	+110 (+230)	95 ± 2	47 ± 3	YES	n.d.a.	YES	YES
H-ECOPUR 85A	TPU	red	–20 (–5)	+100 (+210)	85 ± 2	35 ± 3	NO	n.d.a.	NO	YES
Elastomers										
SKF Ecorubber-H 85A-b-FG	HNBR	black	–25 (–15)	+150 (+300)	85 ± 5	n.a.	YES	NO	NO	YES
SKF Ecorubber-2 85A-w-FG	FPM / FKM	white	–20 (–5)	+200 (+390)	85 ± 5	n.a.	YES	YES	NO	YES
SKF Ecorubber-2 80A-b-FG	FPM / FKM	black	–20 (–5)	+200 (+390)	80 ± 5	n.a.	YES	NO	NO	YES
SKF Ecorubber-3 85A-w-FG	EPDM	white	–50 (–60)	+150 (+300)	85 ± 5	n.a.	YES	YES	YES	YES
SKF Ecorubber-3 85A-b-FG	EPDM	black	–50 (–60)	+150 (+300)	85 ± 5	n.a.	YES	NO	YES	YES
SKF Ecosil	MVQ / VMQ	reddish brown	–60 (–75)	+200 (+390)	85 ± 5	n.a.	YES	NO	NO	YES
Thermoplastics										
SKF Ecotal	POM-C (Acetal)	black	–50 (–60)	+100 (+210)	n.a.	82	YES	YES	YES	YES
728	POM-C (Acetal)	white	–50 (–60)	+100 (+210)	n.a.	85	YES	YES	YES	YES
SKF Ecopaek	PEEK	cream	–100 (–150)	+260 (+500)	n.a.	87	YES	YES	YES	YES
SKF Ecoflon 1, 700	Virgin, unfilled PTFE	white	–200 (–330)	+260 (+500)	n.a.	57[3]	YES	n.d.a.	YES	YES
SKF Ecoflon 5, 777	Modified PTFE	white	–200 (–330)	+260 (+500)	n.a.	59[3]	YES	YES	YES	YES
SKF Ecoflon 14, 755	PTFE (+ 10% Ekonol)	tan	–200 (–330)	+260 (+500)	n.a.	59[3]	NO	NO	NO	YES
SKF Ecoflon 16	PTFE (+ 25% PEEK)	cream	–200 (–330)	+260 (+500)	n.a.	66[3]	YES	NO	YES	YES
721	PTFE (+ minerals)	white	–200 (–330)	+260 (+500)	n.a.	62[3]	YES	n.d.a.	NO	YES
729	PET	white	–20 (–5)	+115 (+240)	n.a.	87	YES	YES	YES	YES
SKF Ecowear 1000, 776	UHMWPE	white	–200 (–330)	+85 (+185)[5]	n.a.	64[3]	YES	YES	YES	YES
795	UHMWPE	white	–200 (–330)	+100 (+210)[6]	n.a.	64[3]	YES	YES	YES	YES

1) Hardness value is recorded after a period of 3 seconds
2) CIP cleaning is a short-term treatment, afterwards the system is completely flushed with fresh water
3) Shore D hardness values for PTFE and UHMWPE grades are reference values
4) Short-term treatment possible
5) Up to +110 °C (+230 °F) in short-term cleaning treatment
6) Up to +125 °C (+255 °F) in short-term cleaning treatment

Resistance to cleaning processes						Resistance to food							COP
Nitric acid (acidic CIP)[2]	Caustic soda (alkaline CIP)[2]	Phosphoric acid (acidic CIP)[2]	Sodium hypochlorite	Distilled water	Steam	Dairy	Olive oil	Cocoa butter	Fruit and sugar mass	Sausage, meat	Alcoholic beverages < 15%	Alcoholic beverages > 15%	Steam, short-term treatment
Tested at 80 °C *(175 °F)*, 2%	Tested at 80 °C *(175 °F)*, 3%	Tested at 80 °C *(175 °F)*, 1%	Tested at 70 °C *(158 °F)*, 3%	Tested at 100 °C *(210 °F)*	Tested at 121 °C *(250 °F)*								
+	+	+	+	+	0[4]	+	+	+	+	+	+	n.d.a.	0
+	+	+	+	+	0[4]	+	+	+	+	+	+	n.d.a.	0
+	+	+	+	+	0[4]	+	+	+	+	+	+	n.d.a.	0
–	+	n.d.a.	+	0	–	+	+	+	+	+	+	n.d.a.	–
n.d.a.	n.d.a.	n.d.a.	n.d.a.	+	0[4]	n.d.a.	+	n.d.a.	+	+	+	n.d.a.	n.d.a.
0	+	+	0	+	0[4]	+	+	+	+	+	+	n.d.a.	+
+	0	+	+	0	–	+	+	+	+	+	n.d.a.	n.d.a.	0
+	0	+	+	0	–	+	+	+	+	+	+	n.d.a.	0
+	+	+	+	+	+	+	–	–	+	+	+	+	+
+	+	+	+	+	+	+	–	–	+	+	+	+	+
+	+	+	+	+	–	+	–	+	+	+	+	0	0
–	0	0	0	+	–	+	+	+	+	+	+	+	–
–	0	0	0	+	–	+	+	+	+	+	+	+	–
+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+	+	+	+	+	+
n.d.a.	n.d.a.	n.d.a.	n.d.a.	+	0[4]	+	+	+	+	+	+	+	0
+	+	+	+	+	+	+	+	+	+	+	+	+	+
n.d.a.	n.d.a.	n.d.a.	n.d.a.	+	+	+	+	+	+	+	+	+	+
0	–	+	+	+	–	+	+	+	+	+	+	+	–
+	+	+	–	0	–	+	+	+	+	+	+	+	0
+	+	+	–	+	–	+	+	+	+	+	+	+	0

Key

+	Resistant
0	Limited resistance
–	Not recommended
YES	Compliant
NO	Not compliant
n.d.a.	No data available
n.a.	Not applicable



Appendix

Designation system for SKF Food Line Y-housings and Y-bearing units

Examples								
SYWK 30 YTH	SY	W	K	30	Y	TH
FYTWK 25 NYTH/VZ1A2	FYT	W	K	25	NY	TH /VZ1A2
FYAWK 1.1/4 LTA	FYA	W	K	1.1/4	L	TA
SYFWR 40 YTHR	SYF	W	R	40	Y	THR
TUWK 505 L	TU	W	K	505	L	

Identification of housing shape

SY	Plummer block housing
SYF	Short base
FY	Square flange (4-bolt)
FYT	Oval flanged (2-bolt)
FYA	Three bolt flanged
TU	Take up

Identification of SKF Food Line

W	SKF Food Line Y-housing and Y-bearing unit

Identification of housing material

K	Composite
R	Stainless steel

Identification of size

	Bearing units for metric shafts: in millimeters uncoded
20	20 mm bore diameter
	to
50	50 mm bore diameter
	Bearing units for inch shafts: in inches uncoded
3/4	3/4 in. = 19,050 mm bore diameter
	to
1 15/16	1 15/16 in. = 49,213 mm bore diameter
	Housings for both imetric and inch shafts
504	For Y-bearing sizes 204
	to
510	for Y-bearing sizes 210

Additional housing features

A	Units of the next smaller size than normal (inch units only)
L	Suitable for ECL cover
N	(in combination with suffix VZ1A2 at the end of designation) SKF Food Line Y-bearing unit with composite housing with relubrication feature
Y	Suitable for ECW cover
Z	SYF short base units with inch thread

Identification of inserted SKF Food Line Y-bearing

TA	SKF Food Line Y-bearing YAR series with grub screw locking, zinc coated carbon steel rings, seals and flingers with stainless steel insert and FDA approved synthetic rubber and food-grade grease, two lubrication holes in the outside diameter of the outer ring, one on each side, positioned 120° apart
TAG	SKF Food Line Y-bearing, YAR series with grub screw locking, zinc coated carbon steel rings, seals and flingers with stainless steel insert and FDA approved synthetic rubber and food-grade grease, lubrication groove and one hole in the outside diameter of the outer ring, located on the side opposite the locking device and one lubrication hole located on the same side as the locking device
TH	SKF Food Line Y-bearing, YAR series with grub screw locking, stainless steel rings and balls, seals and flingers with stainless steel insert and FDA approved synthetic rubber and food-grade grease, lubrication groove and one hole in the outside diameter of the outer ring, located on the side opposite the locking device
THR	SKF Food Line Y-bearing, YAR series with grub screw locking, stainless steel rings and balls, seals and flingers with stainless steel insert and FDA approved synthetic rubber and food-grade grease, lubrication groove and one hole in the outside diameter of the outer ring, located on the same side as the locking device

Notes


SKF
YAR 204-2RF/HV
SKF
SYWK 25 YTH
SKF
YAR 210-2RF/HV
7 316574 813650
SKF
FYTWK 30 YTH
SKF
SYWK 25 YTH
SKF
FYTWK 35 YTH

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