

# Keep on rolling

Lubrication system solutions  
for the metals industry





## SKF – Expertise and global presence

Wherever in the world machine parts move,  
SKF is there to provide high-tech solutions for your mill.

### Your partner in friction reduction and tribology

For more than a century, SKF, a leading global provider of bearings and bearing units, has advanced the state of the art in all sectors of industry with its products and solutions. This especially applies to metals production processes. With almost 100 years of experience in this industry, SKF knows the complexities of the metals making process in detail. This includes the entire field of centralized lubrication solutions for these applications.

As of 2010 Lincoln is an SKF Group brand and lubrication is now a core part of the SKF portfolio contributing to and benefiting from our deep knowledge of tribology and friction reduction.

SKF further expanded its expertise in lubrication engineering with the acquisition of Willy Vogel AG, the global leader in centralized lubrication systems, as well as other acquisitions. SKF is thus your prime supplier for steel making with high-quality components and smart system solutions, whether it is continuous casting or rolling mills.

### SKF lubrication knowledge

Aiming for longer service life and less energy use always takes you to the tribology field. That's the reason why SKF established a special research center where lubrication engineering is studied in detail and innovative solutions are developed to improve performance. All SKF lubricants are subjected to extensive analyses and tests before reaching your machines, providing you with the right lubrication technology and support for your applications anywhere in the world.

### Smart systems

SKF developed remote-controlled monitoring systems for applications such as condition-based maintenance so that you always have your installation safely under control anywhere in the world. Both areas – monitoring and maintenance – now rank with bearings and bearing units, sealing and lubrication systems, and mechatronic components as the core competencies that SKF provides its customers around the world. That gives us the capability to develop integrated solutions for you.



Your partner for SKF lubrication solutions  
in the metals industry:

- SKF Center of Excellence for Lubrication Systems  
or Lubrication Application Center
- SKF Solution Factory



## Benefit from our expertise

Specialist SKF application engineers develop individual system solutions

### Worldwide support

A network of sales organizations around the globe, including consultants and service specialists, make SKF a truly global company. This means individual solutions and support wherever you are.

### Centers of Excellence for Lubrication Systems

Local sales units and local application centers rely on the support of the Centers of Excellence, building upon their tribology knowledge and application expertise. Components and solutions for the metals industry are developed and produced in Argentina, Finland and Germany.

### SKF Solution Factories

This unique concept provides direct and local information exchange involving all of our core competencies: bearings and units, seals, mechatronics, services and lubrication systems. At SKF Solution Factories, customers can discuss challenging applications and take advantage of our lubrication specialists' expertise.

For more information about SKF Solution Factories, contact your local SKF representative, or visit [www.skf.com/solutionfactory](http://www.skf.com/solutionfactory).



*Rosario*  
**Argentina**



*Hockenheim*  
**Germany**



*Muurame*  
**Finland**

# The right solution for improved runnability

SKF offers a complete portfolio of lubrication solutions to help prevent unexpected downtime and failures.

*Thanks to more than 100 years of mechanical engineering experience, SKF has an excellent understanding of bearings. As this is always closely related to the science of tribology, SKF, of course, specializes in lubrication.*

## Ways to avoid every second bearing damage

Previous studies have shown that 36 per cent of all premature bearing damage is caused by inadequate lubrication. Add to this number bearing failures caused by contaminated lubricant supply and the percentage of lubrication-related bearing failures can rise to 50%. Supplying the right amount of the right lubricant at the right time with the right lubrication system and to the right lubrication point not only helps prevent these kinds of lubrication-related damages but also provides optimum bearing performance.

SKF offers you a full portfolio of products, ranging from specific lubricants and systems for manual lubrication to state-of-the-art automatic centralized lubrication systems.

## There is no practical alternative to automatic centralized lubrication systems

Only automatic lubrication systems can reliably provide proper lubricant supply to all components. They don't mind heat, water or dirty conditions and get the lubricant to the places where it is needed. Even the smallest quantities of lubricant are reliably fed to the friction points, enabling smooth operation over the long term.



16% Poor fitting



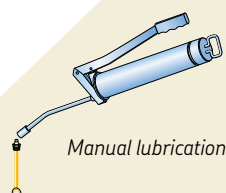
36% Poor lubrication



14% Contamination



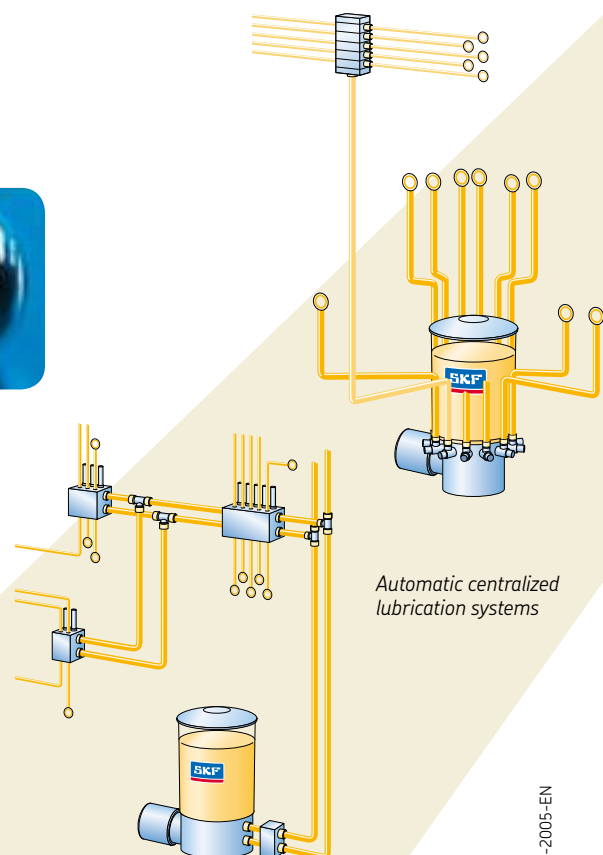
34% Fatigue



Manual lubrication



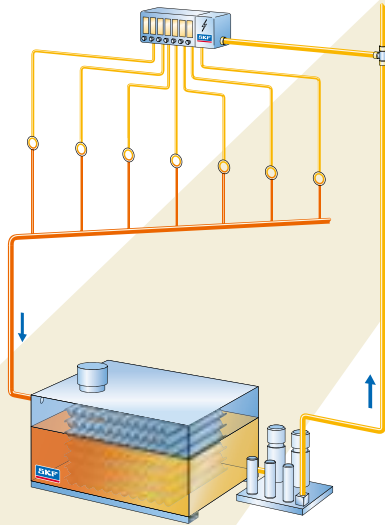
Lubricator



Automatic centralized lubrication systems



*Proactive maintenance*



*Circulating-oil lubrication system*



*Lubricants*

### **Lubricants: The blood in your lubrication system**

Using the right lubricant is just as important as having a reliable lubrication system. The right lubricant creates the conditions for minimal friction and wear. By using a high-performance lubricant, you can extend lubrication intervals and reduce lubricant consumption, increasing the reliability of your system.

With SKF lubricants and SKF lubrication systems, you can rely on SKF's expertise to take care of your system.

Visit [www.mapro.skf.com](http://www.mapro.skf.com) for more information on SKF lubricants.



### **Lubricant analysis**

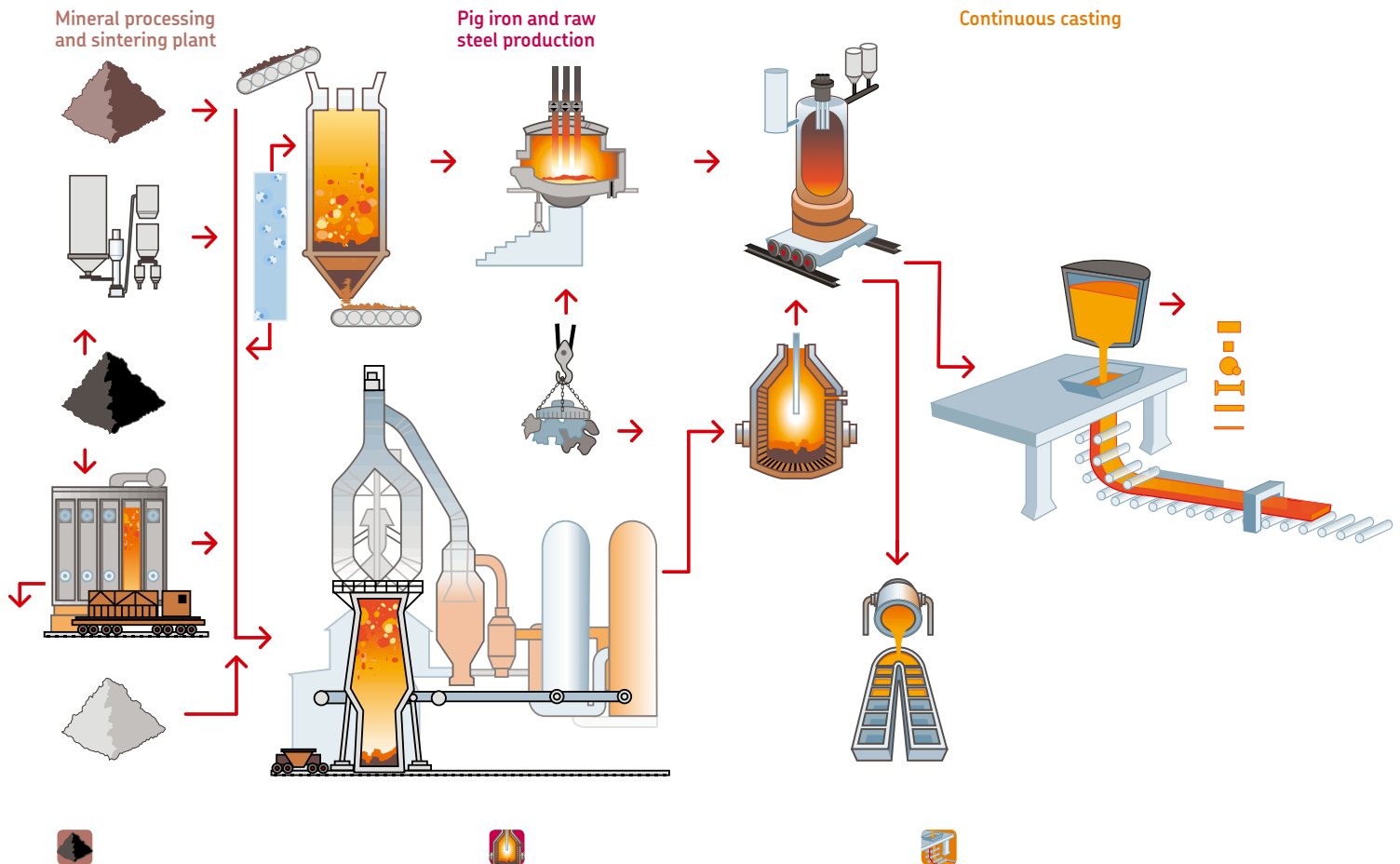
*Our laboratories provide extensive research results. Modern test equipment is used to analyze lubricants (often on behalf of a customer) and check for optimum properties for the application.*



## Lubrication is needed for every step

Friction and wear occur across the entire delivery chain. Efficient lubrication is relevant for each individual area with rotating machine components, both upstream and downstream.

### Upstream process



#### Mineral processing and sintering plant

The machines used in ore preparation often have lubrication points that are far apart. The friction points are also exposed to the negative effects of dust and cold. SKF provides optimum solutions for these lubrication points.

The following systems are used:

- Dual-line lubrication systems for bridging large distances
- Automatic chain lubrication systems for oiling chains, particularly scraper chains.

#### Pig iron and raw steel production

Iron is extracted in blast furnaces by reducing the iron oxide content. Most blast furnaces are operated without interruption for approximately 10 years or more. SKF's solutions provide optimum lubrication of blast furnace critical components.

Charge mixing units, revolving chutes, heat valves and air valves are supplied with grease via centralized lubrication systems (multi-line, progressive and dual-line systems).

Pig iron is subsequently transformed into crude steel using steel plant converters. The converter gears are supplied with circulating oil systems, which include oil filtering, cooling and oil-flow control.

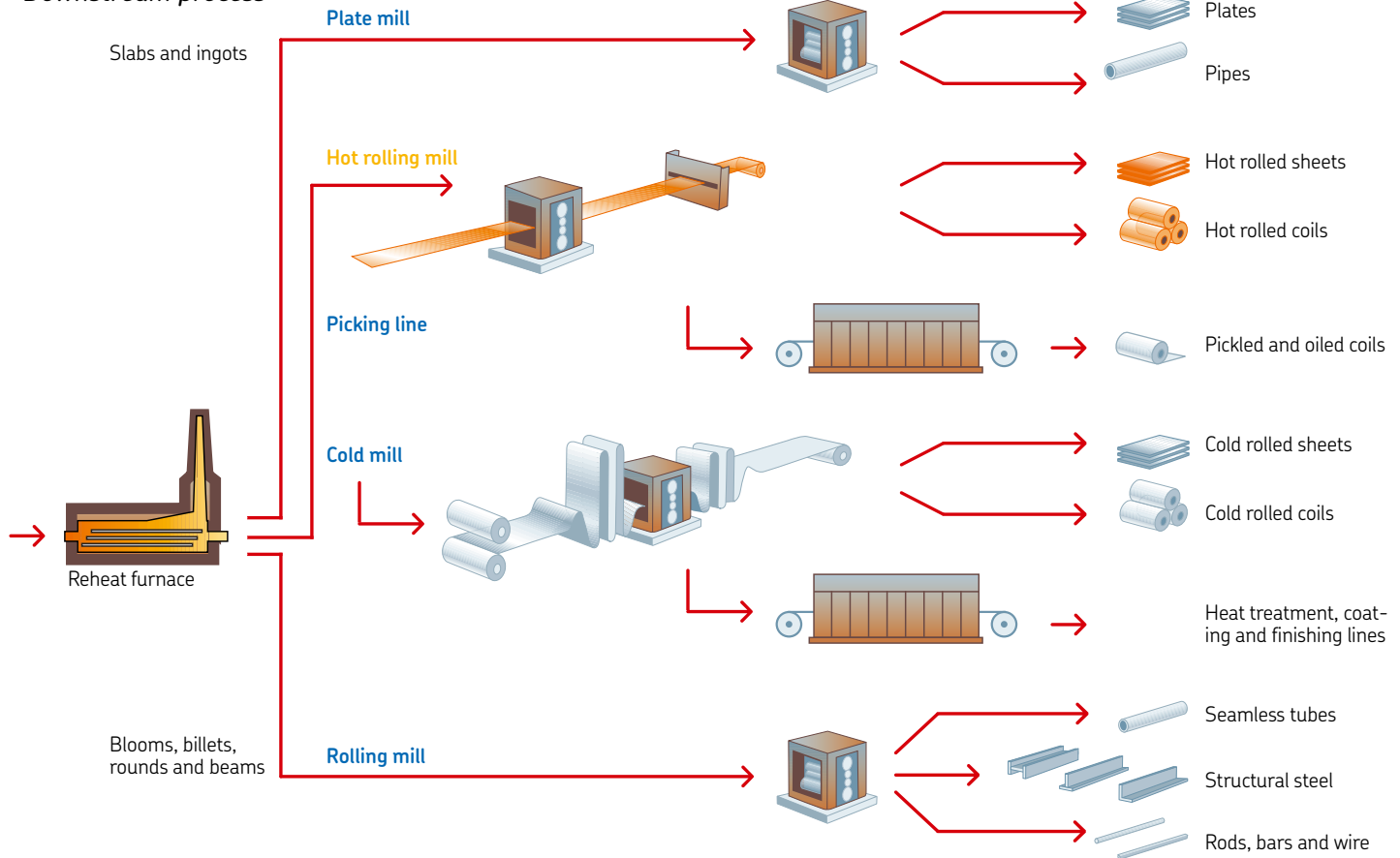
#### Continuous casting

SKF provides suitable lubrication solutions for different segments of the continuous casting system. The slewing bearing in the ladle turret, the oscillating mold and the wheel-bearing assembly within the cooling chamber are supplied with lubricant via dual-line lubrication systems.

Lubrication pinions are used to lubricate the pinion drives in the slewing bearings, which are supplied with grease via small multi-line pumps or directly through existing dual-line lubrication systems via lubricant distributors. The straightener and horizontal section as well as the roll out table and the cut-to-length line are also supplied with high-temperature grease via dual-line systems.



## Downstream process



### Hot rolling mill

The walking beam furnaces, roller tables, roughing stands, shears, coilbox and the finishing stands, cooling roller table and coiler are supplied with grease via dual-line lubrication systems. The coiler mandrel is connected to a dual-line lubrication system which is hydraulically controlled.

Circulating oil systems with filter systems and precise flow metering are used for the rolling stand drive gearboxes and pinions, and back-up roll sleeve bearings.

The moving lubrication points on the coil conveyor belt are supplied with oil or grease by means of special chain lubrication systems (GVP).



### Cold rolling mills

Dual-line lubrication systems for grease are mainly used for coilers, cold rolling stands, skin pass as well as finishing lines.

Circulating oil systems are used with rolling stand gearboxes. The SKF Streamline technology in oil reservoirs provides not only efficient oil treatment, but reduces the reservoir volume at the same time. This results in significant cost savings in terms of lubricant demand and energy use. SKF provides special flow meters for optimum oil supply to the lubrication point and detailed monitoring of the status of each individual point.



### Crane and material handling equipment

Demands on feed and chain conveyors are always very high as they have to continuously operate under harsh conditions such as extreme temperature, heavy load, dust, dirt and water. Regular, accurate lubrication of the chain is the solution to this problem.

The friction points on the transport bogie and cranes are lubricated by means of small multi-line or dual-line pumps.

The moving lubrication points are supplied with oil or grease by means of special chain lubrication systems (GVP).



## The right system for your needs

Nothing runs for very long without the right lubrication system.  
Thus, selecting the appropriate system is of critical importance.



### SKF CircOil circulating oil centralized lubrication systems

Oil-circulating lubrication systems not only lubricate but provide additional benefits such as cooling and flushing. They remove free air and water from the lubricating oil and feed the oil back to the lubrication points at the specified cleanliness, viscosity and flow rate. That way, they provide the maximum possible equipment service life and asset reliability.

#### Advantages:

- Efficient cooling plus lubrication
- Water and air separation
- Integrated condition monitoring
- Adjustable and easy-to-monitor flow rates

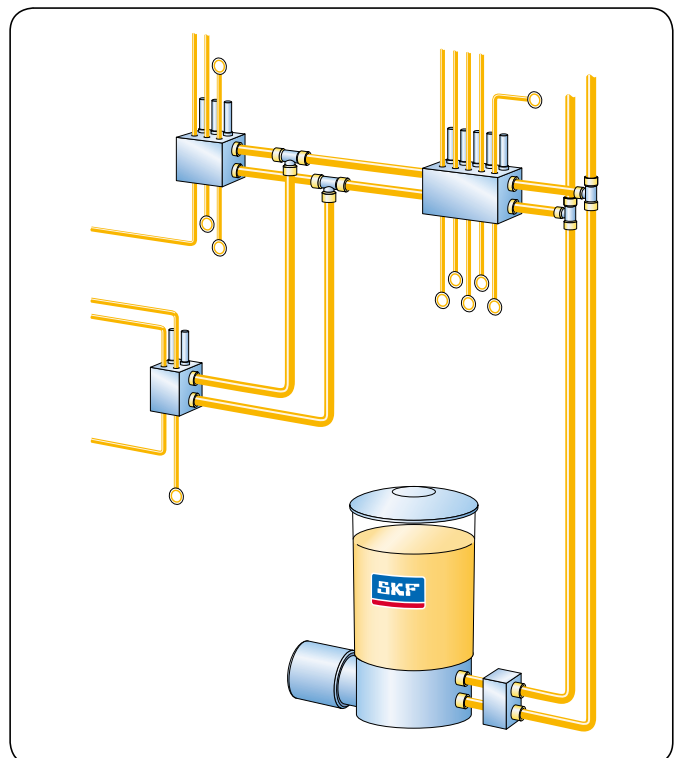
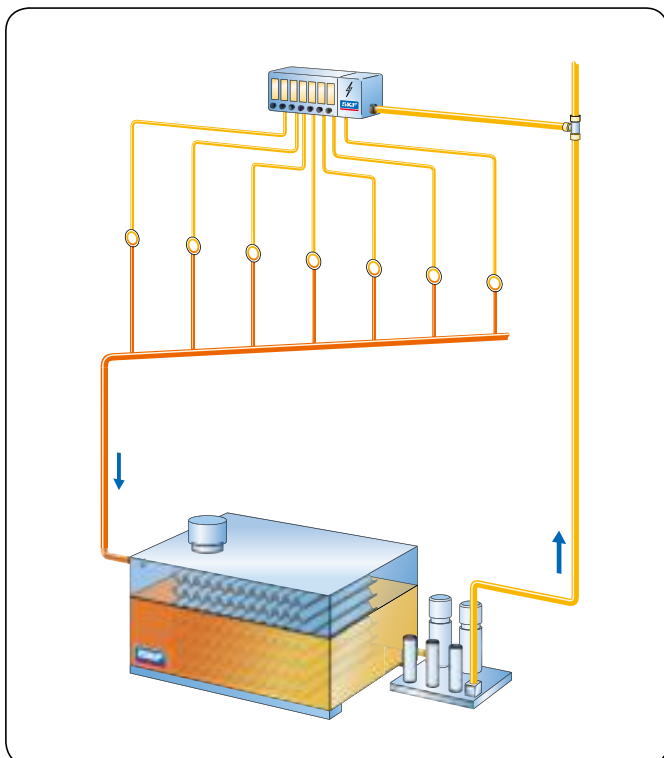


### SKF DuoFlex dual-line centralized lubrication systems

The perfect total loss lubrication system when it comes to long distances and extension capabilities. Exactly metered quantities of grease or oil are fed to individual lubrication points using dual-line distributors. Their function is based on two main lines which are alternately pressurized.

#### Advantages:

- Easy layout, modification of the metered quantity, and extension of the number of lubrication points
- Suitable for all systems with a major number of lubrication points
- Electric or pneumatic drive





### SKF MultiFlex multi-line centralized lubrication systems

The lubrication system for compact applications with up to 100 lubrication points. A maximum of 24 outlets can be directly connected or extended by means of progressive feeder technology.

#### Advantages:

- Continuous operation with small lubricant quantities
- Suitable for small machine groups with lubrication points not too far apart
- Electric drive; other drives on request

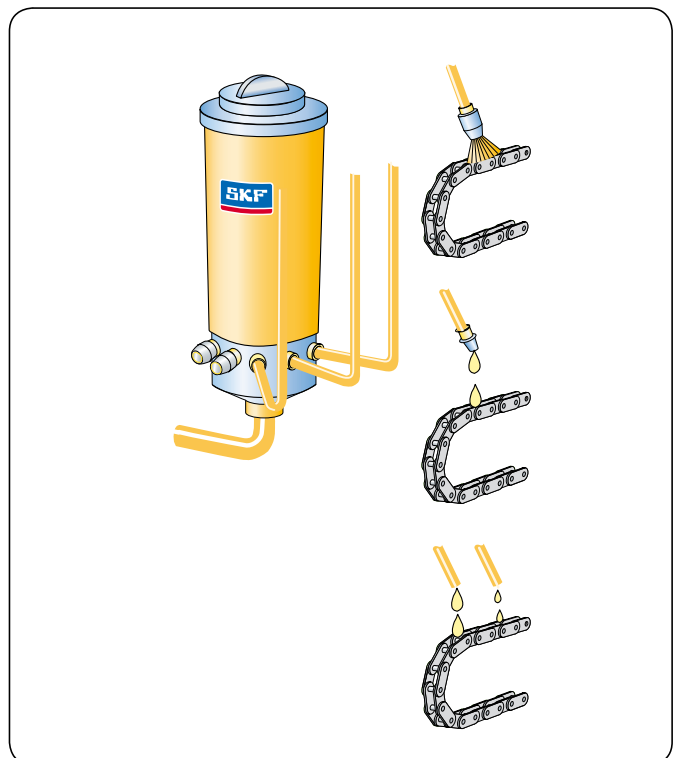
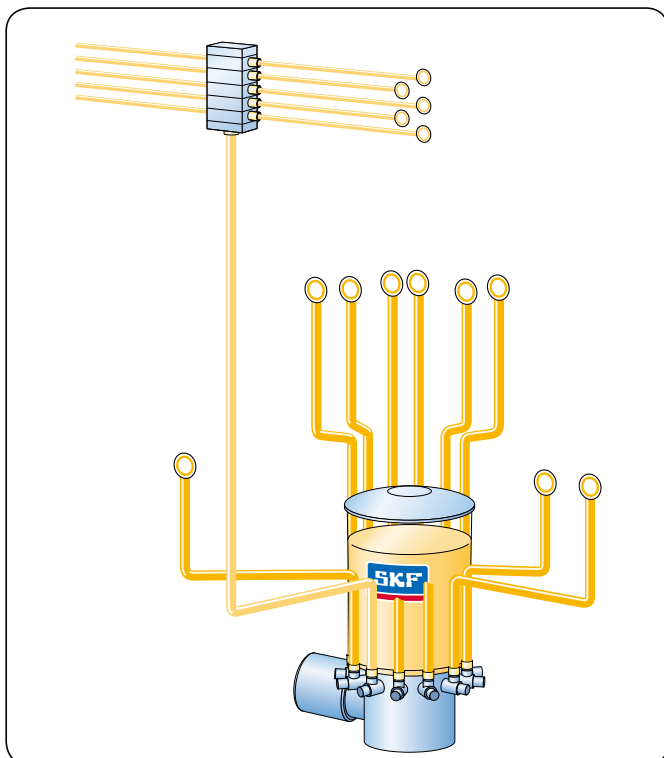


### SKF Chain lubrication systems

These lubrication systems are designed for any possible kind of conveyor or chain. As the chain links are lubricated on the move, there is no need for extensive piping. Electrically driven pumps apply lubricant using nozzles or brushes or inject lubricant directly into the pin.

#### Advantages:

- Continuous operation without maintenance stops
- Extended service life
- No excess lubricant consumption thanks to precise metering



# Lubricating, cooling and cleaning with one system

SKF CircOil circulating oil lubrication systems are used in applications where bearings and gearboxes must be both lubricated and cooled.

*The lubrication system must be able to deliver the right amount of perfectly conditioned oil to each lubrication point. The system must cope with high temperatures and eliminate contaminants such as abrasive particles, and thermally degraded additives, water and air bubbles.*



Circulating oil lubrication systems lubricate and cool heavily loaded bearings and are suitable for all sizes of machines. They effectively separate dirt particles, air bubbles, and water from the oil. Special flow meters feed lubricant to the individual points. The actual delivery rates can be monitored visually or electronically.

Monitoring systems with flow rate indication and multiple alarm levels are available for condition-based maintenance. SKF CircOil systems are available in a wide range of tailored and ready-to-use solutions for flow rates from 1 to 3,000 l/min.

## Pump unit

The number and type of units are selected depending on the lubricant used, its viscosity and the required flow and pressure.

## Filter

Single filters or double filter units are used according to the requirements for filter rating and serviceability. Monitoring options range from simple visual clogging indication to real-time monitoring of the differential pressure.

## Cooling/heating

In addition to lubricating, the oil's main purpose is to cool bearings and gearboxes. To allow for optimum heat dissipation, cooling is provided to achieve a constant oil temperature.

Heaters are installed in the reservoir for start-up after shutdowns or oil changes.

## Monitoring

Sensors provide data on temperatures, pressure, oil level and individual flows. This information is used for control and can be visualized in the data control system.

## Material

The materials are determined by the operating conditions of your system. You choose between carbon steel, high-quality stainless steel, or special coatings.

## SKF special tank design

SKF uses a special tank design to allow for optimum oil treatment and conditioning. The unique SKF Streamline and Flowline technologies provide efficient separation of air, oil, and particles.

At the same time, they cut down on tank sizes significantly. This meets the requirements for modern solutions that reduce both, the total amount of oil and the energy use, thereby reduce environmental impact.

Plate separator for efficient separation of air, water and particles.



## Flow limiters provide nearly constant oil flow

*SKF flow limiters are specifically designed for demanding oil circulating applications. Their robust design withstands extremely harsh ambient conditions and provides nearly constant oil flow to each lubrication point.*



### Flow limiter technology

SKF flow limiters that are used in circulating oil lubrication systems divide up the oil flow into parallel individual volumetric flows specifically adjusted to each lubrication point. Sensors with a digital output signal or gear-type flow meters with a measuring capability can be used to monitor the volumetric flow.

#### Technical features:

- Displacement: 0,09 to 132 l/min
- Max. pressure: 5 to 200 bar
- Material: anodized aluminum

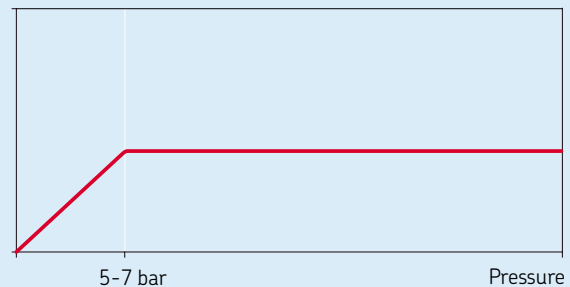
#### Advantages:

- Nearly constant flow rate due to pressure-compensated technology
- Almost independent of oil viscosity and pressure changes
- Easy commissioning
- High dependability
- Robust design

### Constant oil flow with SKF flow limiters

independent of temperature or viscosity changes within a wide range (< 600 mm<sup>2</sup>/s)

Oil flow



SP/SMB 8 flow limiter  
digital output signal



SP/SMB 9 flow limiter  
flow measuring capability for up to 8 l/min



SP/SMB 13 flow limiter  
flow measuring capability for up to 30 l/min

# The right components for grease lubrication systems

## Pumps designed to fit the application

*Criteria such as ambient conditions, required delivery rates, lubricants employed, and service intervals determine which pump to select. The pumps come with different control and monitoring options.*



### FK pump unit

Piston pump unit with metal reservoir and up to 6 internal pump elements

#### Technical features:

- Reservoir capacity: 15; 50; 100; 200 kg
- Number of outlets: 1 or 2
- Displacement: 12,4 to 370 cm<sup>3</sup>/min (0,67 to 20 kg/h)
- Max. pressure: 400 bar

#### Advantages:

- Multi-purpose properties, easy to retrofit to existing system (SKF MonoFlex, DuoFlex, or ProFlex)
- Suitable for grease up to NLGI Grade 3
- High functional reliability due to positive displacement working principle
- Wide range of reservoir sizes



**SKF dual-line pump units**  
FK pump unit



### ECB-DC pump unit

Pump unit with metal reservoir, a double piston and cylinder set

#### Technical features:

- Reservoir capacity: 18, 60, 100 kg
- Number of outlets: 1
- Displacement: 11 to 462 cm<sup>3</sup>/min (0,59 to 27 kg/h)
- Max. pressure: 250 bar

#### Advantages:

- Robust and reliable dual-line pump for extreme conditions
- Suitable for greases up to NLGI Grade 3
- Assembled on a sturdy baseplate and completed by a reversing valve and a relief valve



ECB-DC-42 pump unit



### FB pump unit

Piston pump unit with metal reservoir and up to 24 pump elements

#### Technical features:

- Reservoir capacity: 6; 15; 30 kg
- Number of outlets: 1 – 24
- Displacement: 0,04 to 7,0 cm<sup>3</sup>/min per outlet
- Max. pressure: 350 bar

#### Advantages:

- Very sturdy and vibration-resistant multi-line pump
- Suitable for greases up to NLGI Grade 3
- Suitable for harsh operating conditions
- Suitable for continuous operation



FB pump unit

## Exact metering for each lubrication point

SKF lubricant distributors are high-precision components. They are available in special material designs for various ambient conditions.

*All distributors offered by SKF are distinguished by high manufacturing precision so lubricant can be fed to the contact area with pinpoint accuracy.*



### DDC and DCM dual-line distributors

Dual-line distributors inject exactly metered quantities of lubricant to the lubrication points. The main lines are alternately pressurized.

#### Technical features:

- Number of outlets: 1 – 8
- Displacement per outlet and cycle: 0,09 to 10 cm<sup>3</sup>
- Max. pressure: 400 bar
- Material: galvanized steel as standard, stainless steel on request

#### Advantages:

- Modular and block versions
- Low pressure losses
- Various sizes, continuously adjustable
- Sturdy, durable technology
- Suitable for use in difficult ambient conditions



**SKF dual-line distributors**  
DDC-246; DDC-234

DCM-254

# Special solutions for material handling equipment

## Lubrication systems for chains, conveyors, and overhead cranes

*Demands on feed and chain conveyors are always very high as they have to withstand heavy loads, continuous operation and harsh operating conditions. Cranes have to be continuously available even during shutdowns. Special care should be taken to keep them operational at all times. SKF has the equipment to make maintenance easier.*



### Grease injecting lubrication system

Chains and conveyors of a certain size need special treatment. SKF is specializing in this kind of application using GVP type chain lubrication systems. These inject the grease directly into the chain pins while the chain is moving.

- Lubrication system for roller chains and rivetless chains
- Lubricant is injected under pressure directly into the lubrication point
- For greases up to NLGI grade 2
- Analysis and monitoring with the SKF Visiolub software



SKF Grease injection system for chain conveyors



### Oil lubrication for chains

Depending on the application, SKF can offer three types of oil lubrication systems for chains:

- Airless oil projection
- Brush application
- Oil+air spray



SKF Oil projection system for chain conveyors



### Grease lubrication for overhead cranes

Crane lubrication points are not easy to access. Depending on the size and the extension, SKF can offer multi-line or dual-line solutions to make maintenance personnel's lives easier.

- SKF ProFlex progressive lubrication systems
- Cost-effective
- Easy to monitor



Multilub pump unit, progressive feeder and KFG pump unit for SKF ProFlex progressive lubrication systems

## Find out more about SKF solutions

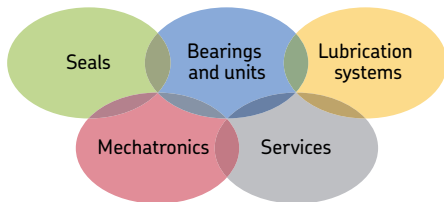
The SKF media library online at [skf.com](http://skf.com) is the one-stop shop for SKF publications.

*The table below provides an overview of the products and solutions from SKF for the metals industry as well as publications containing additional information. You can find publications at [skf.com](http://skf.com); all publications can be downloaded in PDF format.*



| Product                                              | Lubricant |        | <br>Mineral processing<br>and sintering plant | <br>Pig iron and raw steel<br>production | <br>Continuous casting | <br>Hot rolling mill | <br>Cold rolling mills | <br>Crane and material<br>handling equipment | Publication No. |
|------------------------------------------------------|-----------|--------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------|
|                                                      | Oil       | Grease |                                                                                                                                |                                                                                                                           |                                                                                                         |                                                                                                       |                                                                                                         |                                                                                                                                 |                 |
| Pump units                                           |           |        |                                                                                                                                |                                                                                                                           |                                                                                                         |                                                                                                       |                                                                                                         |                                                                                                                                 |                 |
| FB                                                   |           | •      | •                                                                                                                              |                                                                                                                           | •                                                                                                       | •                                                                                                     |                                                                                                         |                                                                                                                                 | 1-3026          |
| FF                                                   |           | •      | •                                                                                                                              |                                                                                                                           | •                                                                                                       | •                                                                                                     |                                                                                                         |                                                                                                                                 | 1-3025          |
| FK                                                   |           | •      | •                                                                                                                              |                                                                                                                           | •                                                                                                       | •                                                                                                     |                                                                                                         |                                                                                                                                 | 1-3033          |
| KFG(S)                                               | •         | •      |                                                                                                                                |                                                                                                                           |                                                                                                         |                                                                                                       |                                                                                                         | •                                                                                                                               | 1-3030          |
| SKF Grease injection system                          |           | •      | •                                                                                                                              |                                                                                                                           | •                                                                                                       |                                                                                                       |                                                                                                         | •                                                                                                                               | 1-4101          |
| SKF Oil projection system                            | •         |        | •                                                                                                                              |                                                                                                                           | •                                                                                                       |                                                                                                       |                                                                                                         | •                                                                                                                               | LS/P2 10275     |
| SKF Multilube                                        | •         | •      |                                                                                                                                |                                                                                                                           |                                                                                                         |                                                                                                       |                                                                                                         | •                                                                                                                               | 6407            |
| Flow limiters with gear wheel-type flow indicator    |           |        |                                                                                                                                |                                                                                                                           |                                                                                                         |                                                                                                       |                                                                                                         |                                                                                                                                 |                 |
| SP/SMB9                                              | •         |        |                                                                                                                                |                                                                                                                           | •                                                                                                       | •                                                                                                     |                                                                                                         |                                                                                                                                 | 1-3002          |
| SP/SMB10                                             | •         |        |                                                                                                                                |                                                                                                                           | •                                                                                                       | •                                                                                                     |                                                                                                         |                                                                                                                                 | 1-3003          |
| SP/SMB13                                             | •         |        |                                                                                                                                |                                                                                                                           | •                                                                                                       | •                                                                                                     |                                                                                                         |                                                                                                                                 | 1-3004          |
| SP/SMB14                                             | •         |        |                                                                                                                                |                                                                                                                           | •                                                                                                       | •                                                                                                     |                                                                                                         |                                                                                                                                 | 1-3005          |
| Flow limiters without gear wheel-type flow indicator |           |        |                                                                                                                                |                                                                                                                           |                                                                                                         |                                                                                                       |                                                                                                         |                                                                                                                                 |                 |
| SP/SMB3, SP/SMB6                                     | •         |        |                                                                                                                                |                                                                                                                           | •                                                                                                       | •                                                                                                     |                                                                                                         |                                                                                                                                 | 1-3001          |
| SP/SMB8                                              | •         |        |                                                                                                                                |                                                                                                                           | •                                                                                                       | •                                                                                                     |                                                                                                         |                                                                                                                                 | 1-3028          |
| Control and monitoring units                         |           |        |                                                                                                                                |                                                                                                                           |                                                                                                         |                                                                                                       |                                                                                                         |                                                                                                                                 |                 |
| SKF DuoFlex controls                                 | •         | •      | •                                                                                                                              |                                                                                                                           | •                                                                                                       |                                                                                                       | •                                                                                                       |                                                                                                                                 | On request      |
| SKF CircOil controls                                 |           | •      | •                                                                                                                              |                                                                                                                           | •                                                                                                       | •                                                                                                     | •                                                                                                       | •                                                                                                                               | On request      |
| Additional system components                         |           |        |                                                                                                                                |                                                                                                                           |                                                                                                         |                                                                                                       |                                                                                                         |                                                                                                                                 |                 |
| Electrical filling pump                              |           | •      | •                                                                                                                              |                                                                                                                           |                                                                                                         | •                                                                                                     |                                                                                                         | •                                                                                                                               | On request      |

[skf.com](http://skf.com)  
[skf.com/lubrication](http://skf.com/lubrication)



### The Power of Knowledge Engineering

Drawing on five areas of competence and application-specific expertise amassed over more than 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry worldwide. These five competence areas include bearings and units, seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management systems. A global presence provides SKF customers uniform quality standards and worldwide product availability.

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