Split roller bearing applications

Industry matrix

Applications	Building material	Bulk terminales	Cement and aggregate	Food and beverage	Forest products	Grain	Iron and steel	Marine	Mining and processing	Power generation	Pulp and paper	Refining and petrochem	Sugar	Water treatment
Mechanical handling														
Continuous slab casting machines							Page 27							
Conveyors	■	■	Page 6/7	■	■	■	Page 13	Page 33	Page 10/12	■	Page 22	■	■	■
Cooling beds	■						Page 26							
Elevators	Page 29	■	Page 10			Page 17						■	■	
Line shafts	■						■				■			
Log decks and tables					■						■			
Overhead cranes	■						■				■			
Screw conveyor	■		Page 6/7			Page 16				■	■	■	■	
Stacker reclaimers		■					Page 32		■	■				
Winding gear														
Winders									Page 19					
Haulage gear and winches								■	Page 19/28					
Process equipment														
Ball mill trunnions	■		Page 4/5/34						Page 4/5	■				
Ball mill drives	■		Page 4/5						Page 4/5	■				
Cane knives and beet slicers													Page 9	
Carriers and feeders										■	■		Page 9	
Crushers	■		Page 23				■		■	■				
Drum processor			■									■	■	
Dryer rolls											■			
Kiln and mill under rollers			Page 6						■				■	
Kiln and tube mill drives			■									■	■	
Mill drives			■				■			Page 18	■		Page 28	
Mixers and agitators			■	■		Page 16					Page 22	■		
Press rolls	■										■			
Reciprocating screens			Page 23	■	■			Page 23	■				■	
Rotating drums			■									■		
Shredders										■	Page 22		■	
Sugar diffuser drives													■	
Sugar diffuser under rollers													■	
Washers			■	■					■		■		■	
Ancillary equipment														
Crankchaft			■				■		■					
Fans and blowers	■		Page 14/15	■	■	■	■	■	■	Page 24	Page 14	■	■	■
Gearboxes		■	■	■	■	Page 17	■	■	■	■	■	■	■	■
Heat exchangers										■				
Motors and generator sets			■				Page 26/34	■	■	Page 25	■			
Pump and pump drives			■					■	■	■				
Other applications														
Hydro turbines										Page 31				
Marine propulsion shafts								Page 20/21						
Water screens											■			Page 30
Wind turbines										■				

■ Denotes successfull SKF Cooper application. Please refer to page number shown for photograph.

SKF Cooper applications

A world of industry-wide experience

This publication gives an overview into the variety of applications and versatility of SKF Cooper split roller bearings. SKF Cooper bearings has been at the forefront of split roller bearing technology since 1894 and SKF Cooper bearings can been seen around the world in a multitude of industries and applications. The Industry Matrix shown opposite shows typical applications in some of these industries. A brief explanation of SKF Cooper nomenclature is shown inside the back cover.

For more information, please contact your local SKF branch/sales unit.

In some instances, machinery guards have been removed for photographic purposes.

Ball mills

Figure 1

01 BCP 1016 mm EXILOG GR fitted to a 10 feet diameter silica mill.

Figures 2 and 3

A 28" EXILOG and GR bearing fitted to a French aluminates ball mill. Speed is 26 r/min and each bearing is carrying 15 tonnes (*147 kN*).

Figure 4

Cement plant in the UK using SKF Cooper 280 mm bearing on the trunnion shaft.

Figures 5 and 6

South African plant using SKF Cooper 03BCP 320 mm on this ball mill.

In addition to these illustrations and numerous UK applications, SKF Cooper bearings are also used on ball mills in: Egypt, Greece, Ireland, USA and Turkey.

Sizes range from 01 BCP 300 mm EX and GR to 01 BCP 950 mm EXILOG GR.

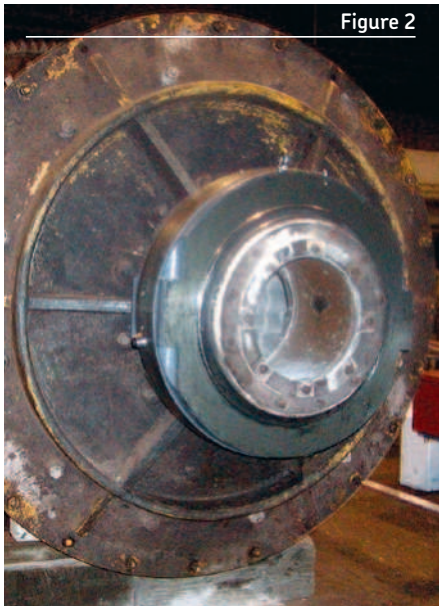


Figure 5

Figure 4

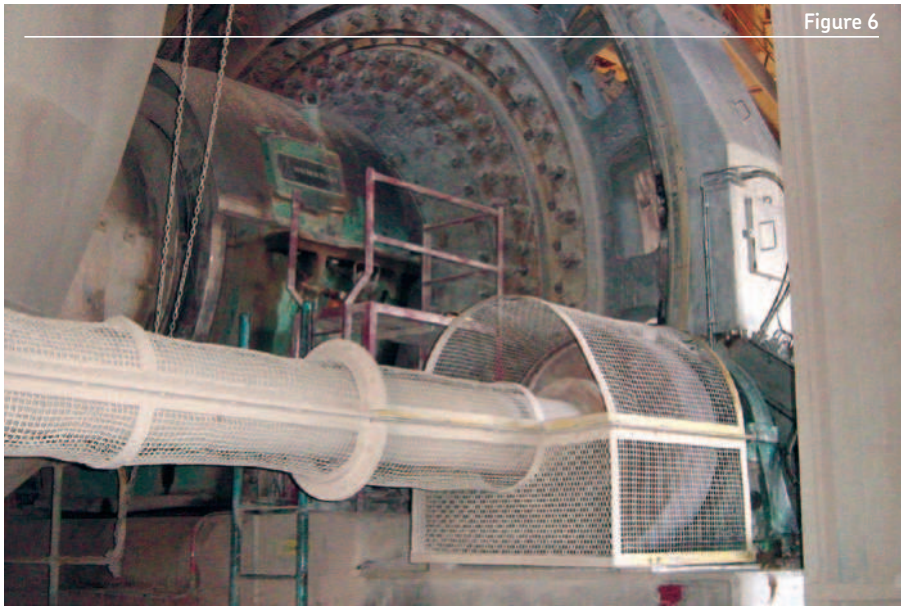
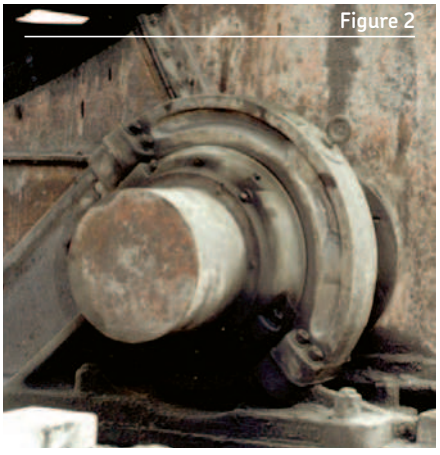


Figure 6

Cement industry



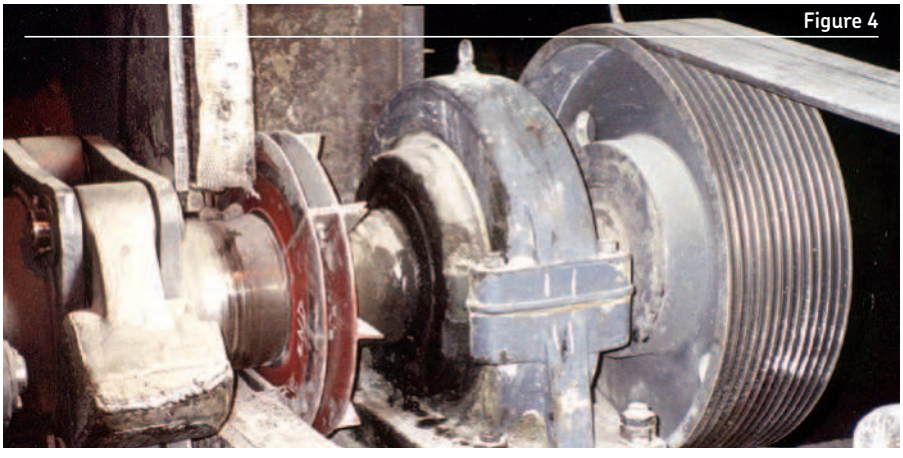


Figure 1

Cement kiln using 10 inch 03 Series with roller thrust bearings in the cartridge end plates which support the under rollers on the kiln. The radial load is 28 tonnes, the axial load 10 tonnes and the speed is 4–5 r/min.

Figure 2

Roller thrust bearings 10 inch 03 Series

Figure 3

SKF Cooper 01BH80mm EX hanger bearing in use on a gypsum products screw conveyor. This application also uses a 90 mm version of the hanger bearing.

Figure 4

Detail of a cement works clinker breaker showing a SKF Cooper 03BCP180 mm GR. This machine also uses 03BCP180 mm EX expansion bearings.

Proven sealing capability

SKF Cooper bearings are proven to operate effectively in hostile and abrasive conditions.

These illustrations show SKF Cooper bearings covered in cement dust. Non-SKF Cooper bearings would likely fail prematurely in these operating conditions

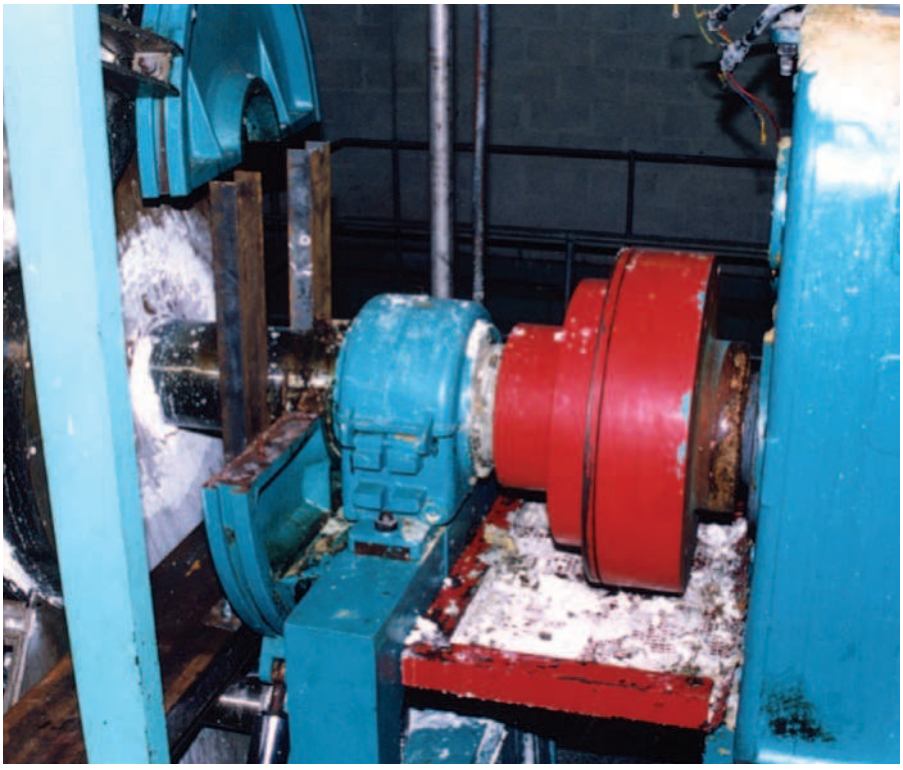
External alignment ensures 360° concentricity at all times, eliminating contamination and increasing bearing life.

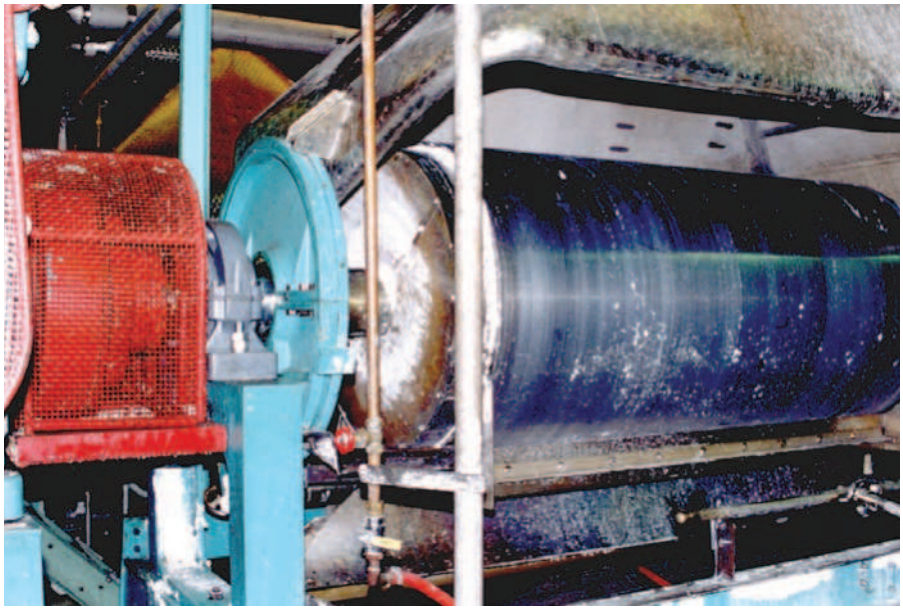
SKF offers a choice of seals to suit various applications and requirements. Full details are shown in our product catalogue.

Environmental comment

SKF Cooper has no control over customer product usage or operating conditions. These images show the extreme working conditions in which SKF Cooper bearings are able to operate effectively and return optimum performance.

Chemical industry





Drying cylinders

A customer had major concerns with high maintenance costs of their installed sleeve bearings. Grease-lubricated 01 BCP 180 mm EX (brass cage and C5 clearance) and GR bearings (C3 clearance) with high-temperature packing seals (HTP) were seen as the ideal solution to redeem this.

The SKF Cooper bearings were made to special dimensions to match the footprint of the sleeve bearings.

By changing from sleeve bearings to SKF Cooper split roller bearings fitted to the drying cylinder support rollers, the customer's maintenance time and maintenance overhead costs have been reduced. The customer has also benefited from power savings.

The SKF Cooper bearings are completely accessible in place. The split feature of the bearings permits access for inspection or maintenance without having to move any adjacent motors or gearboxes.

The figure top left shows the drying cylinder with the sleeve bearing in place prior to conversion.

The conversion to SKF Cooper bearings and SKF seals is shown bottom left.

Sugar industry

Figures 1 and 2

This South African sugar mill is fitted with SKF Cooper bearings of many types and sizes.

Figure 3

The cane knives are fitted with 03 BCP 200 mm EX (expansion) and GR (fixed) bearings.

Figure 1

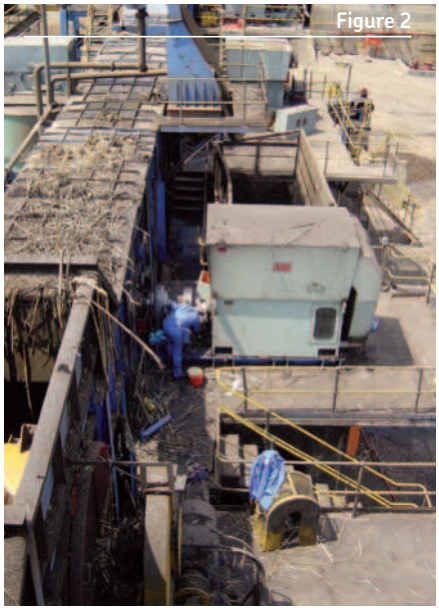


Figure 2


Figure 3

Conveyor bearings

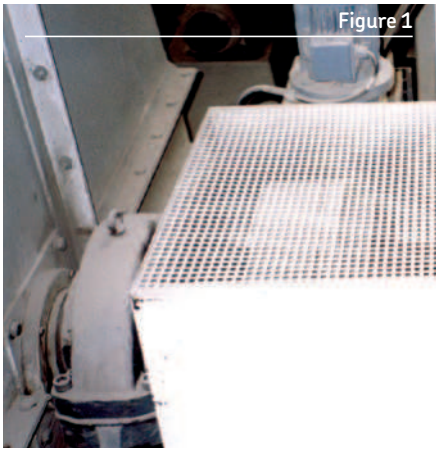


Figure 1

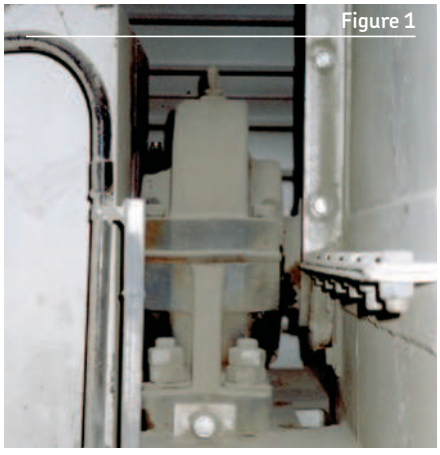


Figure 1


Figure 3

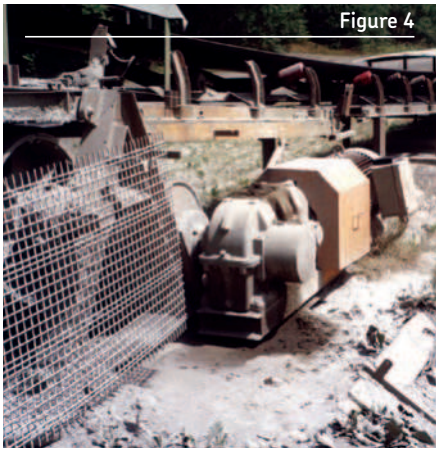


Figure 4


Figure 5

Figures 1 and 2

This German bucket elevator uses SKF Cooper 01 BCP 160 mm GR in trapped positions. The advantages of SKF Cooper split shaft bearings is easily seen in these figures.

Figure 3

This kaolin screw conveyor is fitted with 01 BH 60 mm EX bearing and uses automatic lubrication. The hanger bearing has a double heavy duty lip seal to retain the lubrication and keep out the kaolin.

Figures 4 and 5

A German chalk extraction conveyor operates in dusty, dirty and moist conditions which caused the motor and gearbox to be firmly stuck to the shaft. The main conveyor bearing failed requiring immediate replacement.

The exisiting 150 mm bearing was replaced with a SKF Cooper 01 BCP 150 mm GR SRS. The split rubber seal was specified to combat the moist environmental conditions.

Figure 1

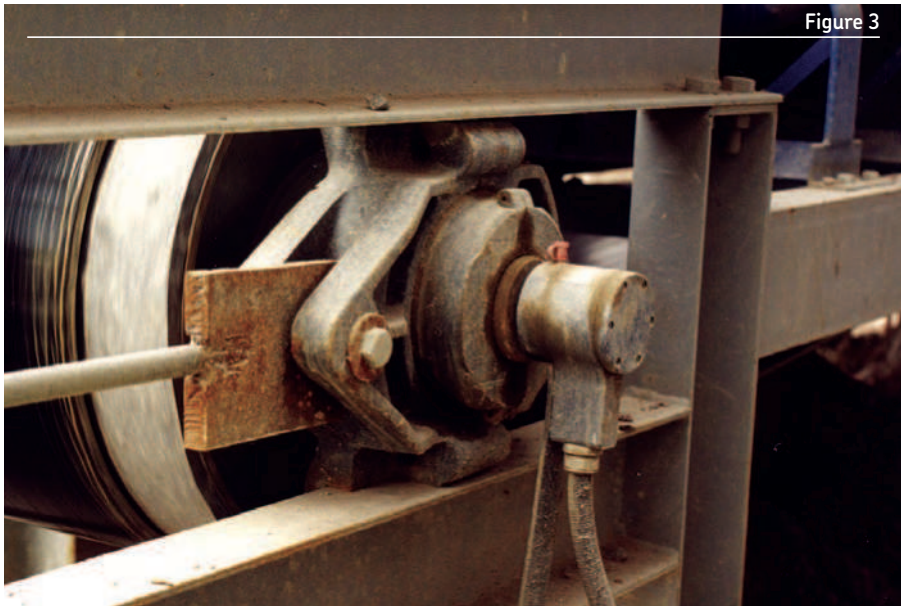
SKF Cooper 01 BH 80 mm EX hanger bearing in use on a gypsum products screw conveyor. This application also uses a 90 mm version of the hanger bearing.

Figure 2

Over 480 SKF Cooper bearings up to 13 inch shaft size are fitted to this raw material conveyor.

Figure 3

Take up housing (tension type) fitted to a raw materials conveyor at an aggregate depot uses a SKF Cooper 01E 80 mm EX (expansion) and GR (fixed) bearings.



Conveyor bearings

Water collected in the tail drum pit and entered the tail drum bearings. As a result, the standard housing bearing fitted to the 100 mm shaft failed every 2-3 months.

To rectify the problem, SKF recommended a BCP 100 mm GR (fixed) and EX (expansion) bearings.

The water penetration problem was solved by using an SKF Cooper SRS seal which is suitable for wet but not submerged applications. The SRS seal is available in high and low temperature versions (–20 to 100 °C).

The bearings are lubricated to SKF specifications and have provided continuous operation for over a year (at time of printing) with no problems.

Figure 1

01 BCTT 150 mm (take-up tension type) housings used on a sugar mill.

Figure 2

A conveyor pulley for an iron ore producer, equipped with sealed 231 Series 380 mm shaft spherical roller bearings. Supporting the customer with quick and easy in situ replacement with little disturbance to the shaft alignment or driveline. SKF Cooper split spherical roller bearings offer a solution – reducing mean time to repair (MTTR) by 70%.

Figure 3

A conveyor headshaft at a steel mill is equipped with SKF Cooper. 8 inch 02 Series bearings are used in the trapped and open positions, as well as 3 inch 01 Series bearings installed on the second rollers.


Figure 1


Figure 2

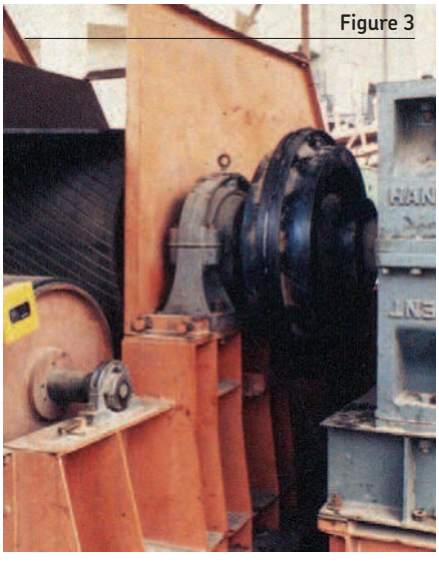
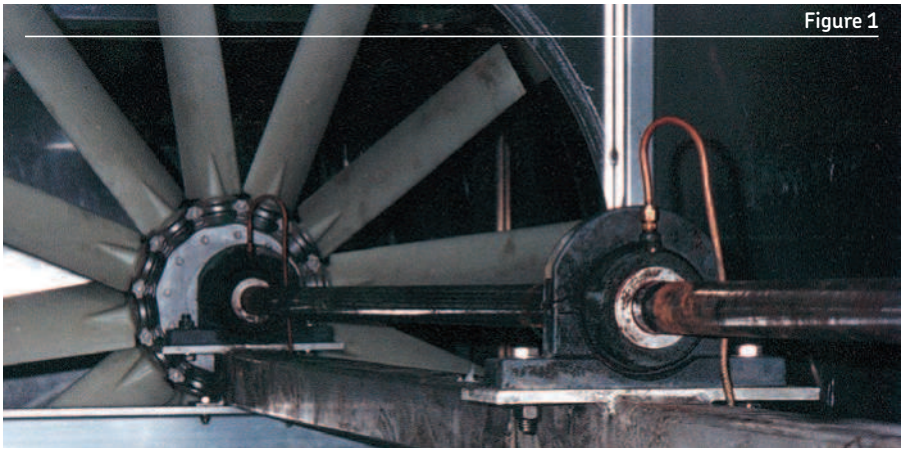
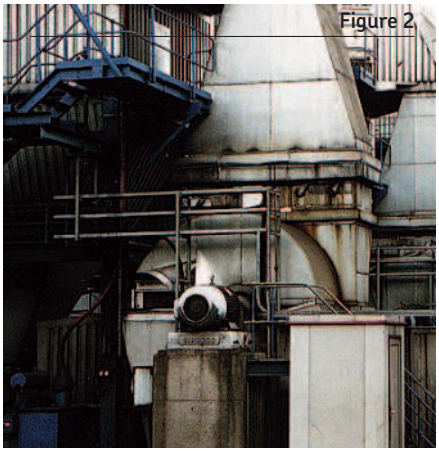
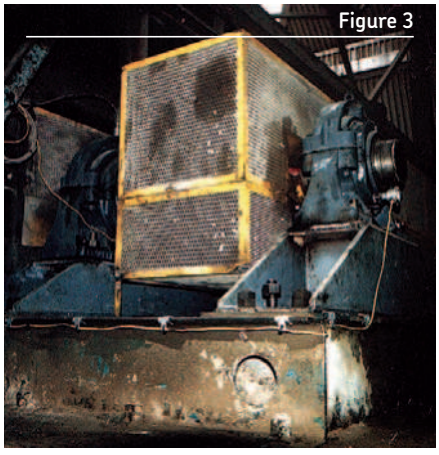


Figure 3

Fans and blowers







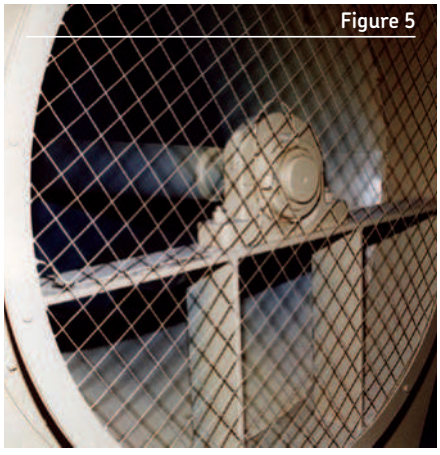


Figure 1

SKF Cooper 01 Series BCP on a Canadian lumber drying kiln.

Figure 2

A typical power station fan application, in this instance an 02 BCP 100 mm EX/GR TL S1

Figure 3

This cement works ventilation fan uses SKF Cooper 02 BCP 900 EX TL S1 and 02 BCP 900 GR TL S1.

Figures 4 and 5

The UK General Motors Paint Shop uses SKF Cooper 01 BCP 75 mm EX and GR bearings for fume extraction bearings.

Figures 6 and 7

This boiler fan uses an 02 BCP 200 mm TL and an 02 BCP 160 mm TL on the same shaft.

Figure 8

The lubricator-equipped cement industry fan is an 02 BCP 8 in EX TL.

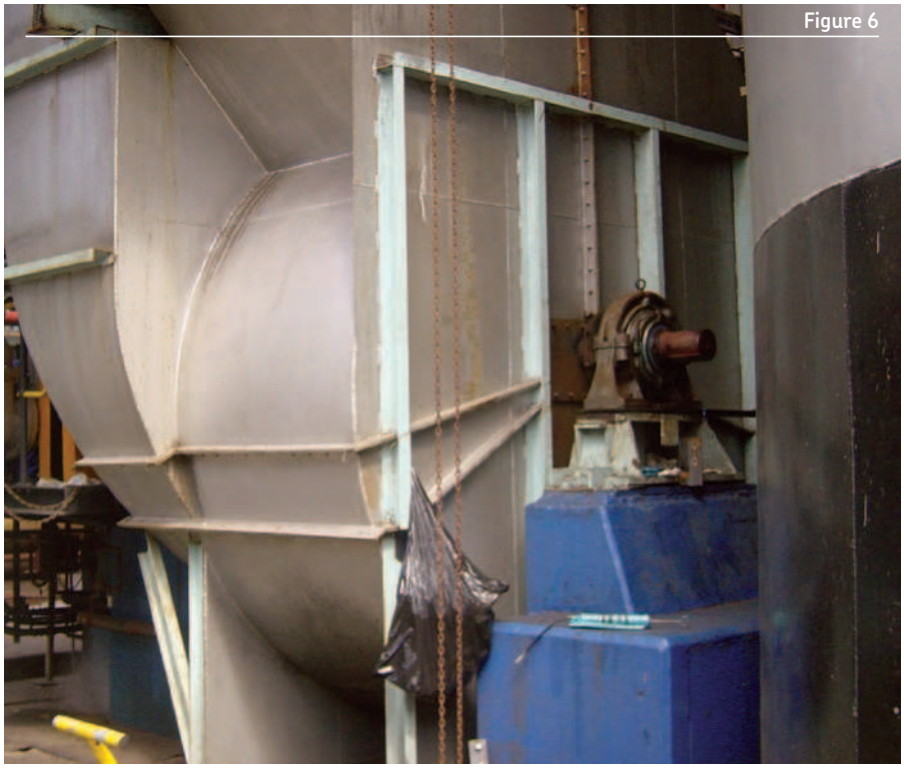


Figure 6

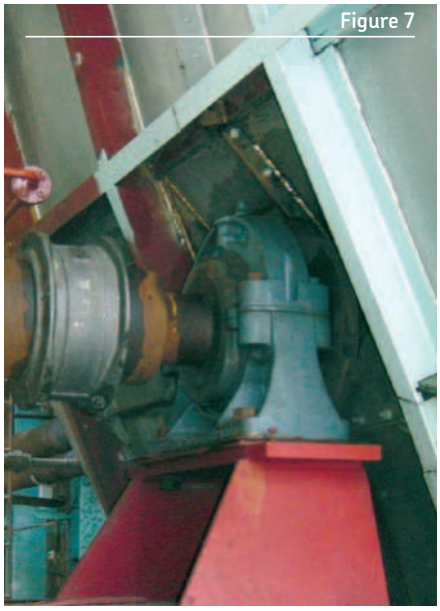


Figure 7


Figure 8

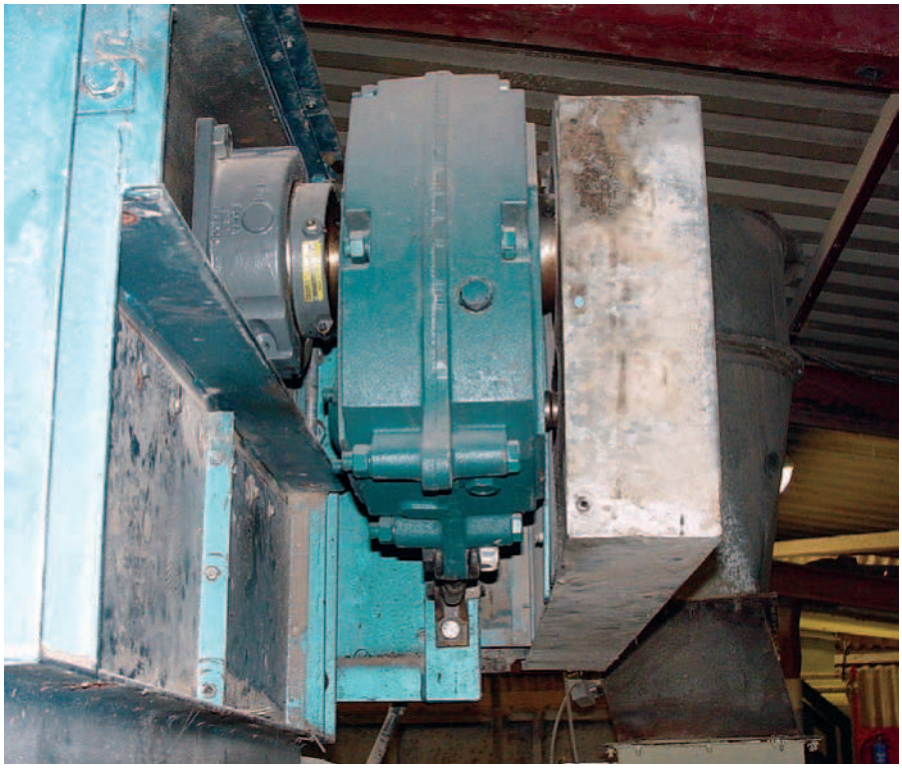
Grain handling

The original solid bearings were replaced with standard SKF Cooper split shaft bearings in flange housings (BCF) and pedestals (BCP) with slight modifications to the housing seating area to meet the customer's specification. This reduced the bearing change time from 1-2 days to 2-3 hours.

The germination tank high humidity lubrication problems were addressed by the combination of the SKF external misalignment feature combined with the SRS seals which remain in complete concentricity with the shaft at all times. This keeps out foreign matter and lubrication retention is greatly improved which increases bearing life.

The previously fitted SF75/1075/75 bearings used on this 600 staggered bucket elevator had the 75 mm, 106 r/min drive shaft bearings fitted in trapped applications behind a 13-1 gear reduction box, which caused immense maintenance access problems.

In order to reduce the customer's maintenance expense, SKF recommended 01 EBCDFN 75 mm EX (expansion) and GR (fixed) bearings.



Link spindles and pilger mills


Figure 1

Pilger mills

SKF has global experience in pilger mill bearings, the smallest is an 01 B 125 mm GR fitted to a German pilger mill, the largest application uses SKF Cooper 03 500 mm bearings, these examples are in Germany, India and Japan.

Figures 1 and 2

A SKF Cooper 01 B 560 mm link spindle drive to a high speed reversing (78 r/min in 2 seconds) rolling mill. The use of 01 Series bearings, double mounted in one specially manufactured housing provided the required load capacity while meeting the high speed reversal speed requirements.

Figure 3

Assembling 01 B 600 mm EX in Finland. SKF Cooper has a proven history of link spindle applications throughout the world with spindle support bearings from 280 mm up to 775 mm bearings


Figure 3

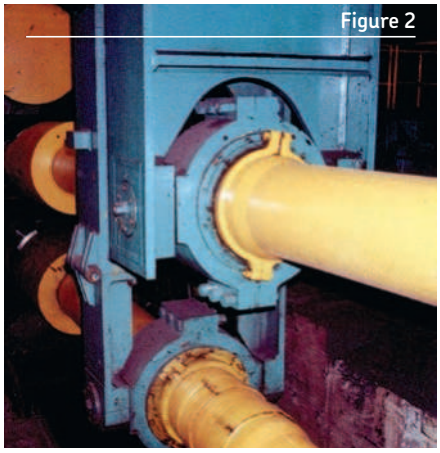


Figure 2

Mine winders and haulages

Figures 1, 2 and 3

Coal industry mine winders include 03 Series 600 mm for an operating load of 80 tonnes per bearing at 48 r/min and 02 Series 400 mm for an operating load of 32 tonnes per bearing at 31 r/min.

Figure 4

A 700 mm diameter special double bearing supplied for a tower mounted winder in a copper mine. Normal operating load is 185 tonnes and the speed is 54 r/min.

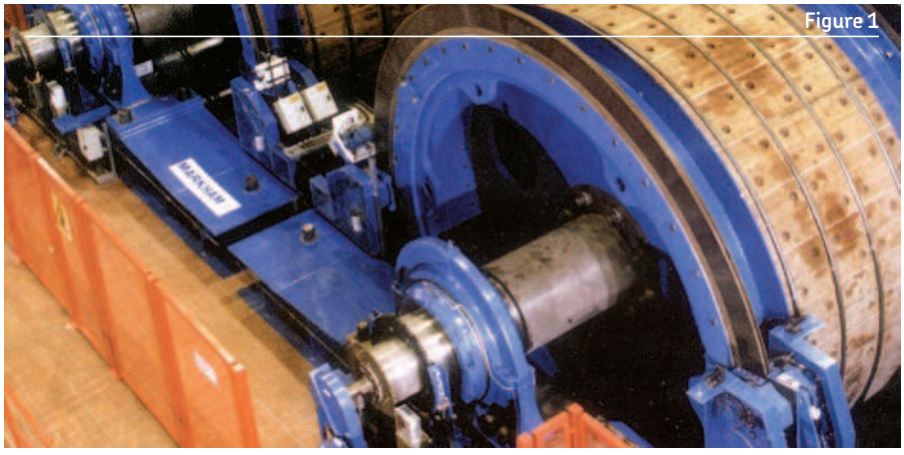


Figure 1

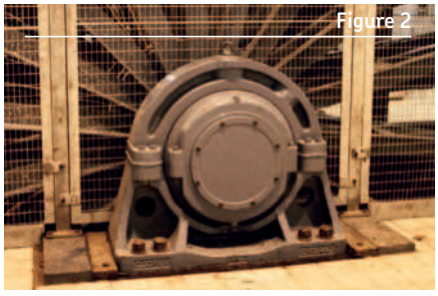


Figure 2

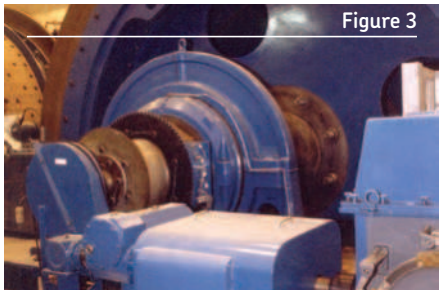


Figure 3


Figure 4

Marine propulsion bearings

Figure 1

This offshore supply vessel is fitted out with SKF Cooper 01 BCP 500 EX and 02 BCP 500 GR on the propulsion shaft.

Figure 2

'Dae A Express' high speed ferry uses 01 BCP 120 mm EX and 01 BCF 120 mm EX on waterjet drives.

Figure 3

A typical installation of a SKF Cooper BCP in a propulsion shafting application.

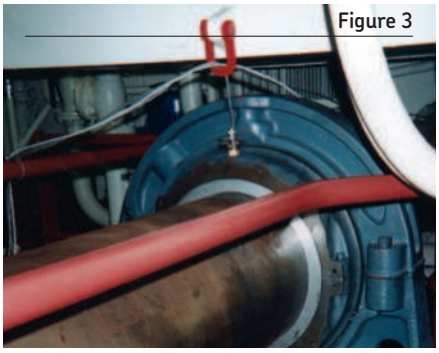


Figure 1

Hoverspeed Super SeaCat is fitted with weight saving aluminium 01 BCAPLA 210 mm EX cartridges and pedestals.

Figure 2

01 BCPAPA 440 mm EXILOG bearings specified for the Japanese SuperTechno Liner twin 27 MW gas-turbine driven waterjet systems.

Figure 3

A typical waterjet drive trapped position utilising a 240 mm BCP EX with felt seals.

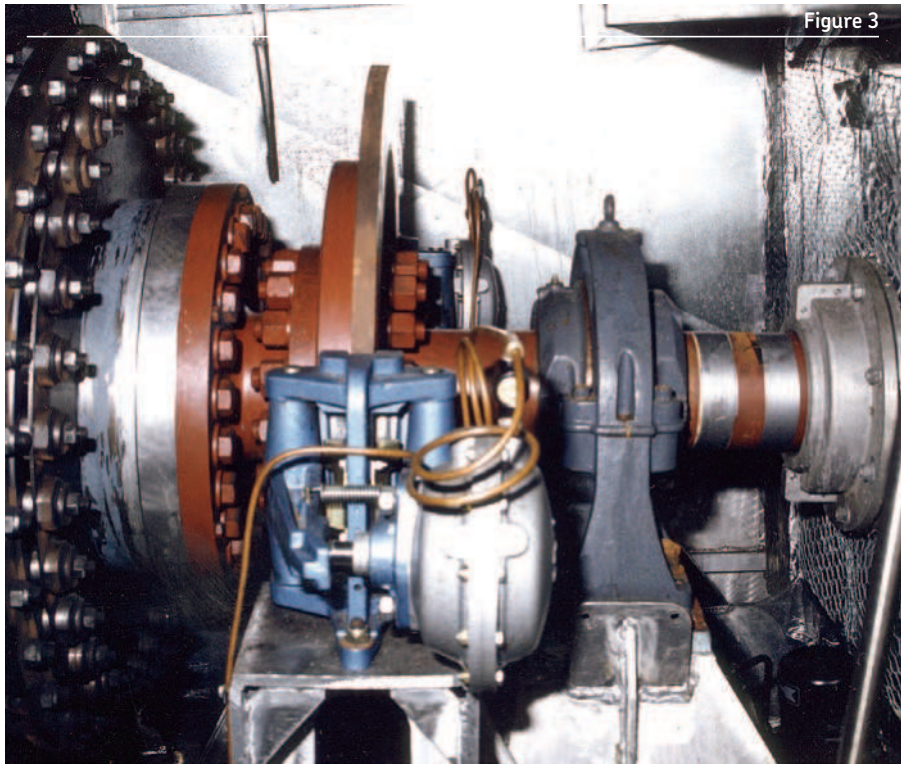
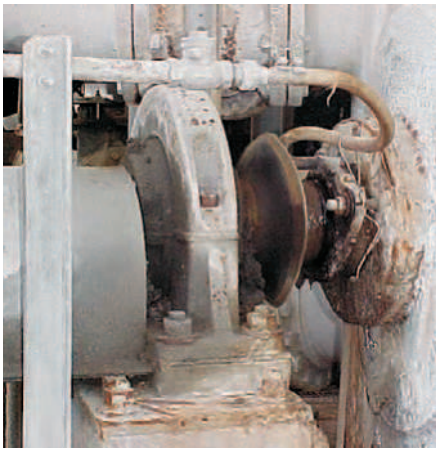
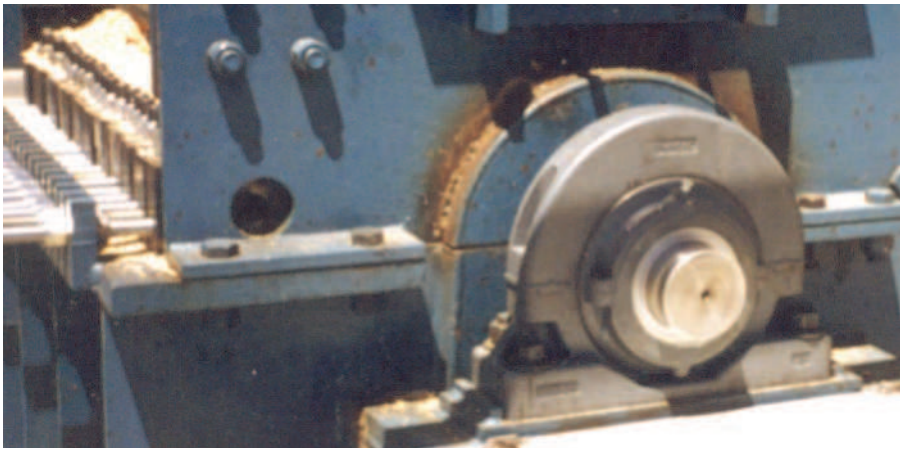


Figure 2

Paper and timber





Agitators, mixers, conveyors, chippers, debarkers and saws

Trapped 01 BC 315 EX ATL and 01 BC 415 EX ATL bearings are shown in use on agitators in the paper industry.

The aluminium triple labyrinth seal used in this application, combined with the recommended full pack grease, prevent water intrusion in the event of stuffing box failure. If there is a stuffing box failure, downtime is kept to a minimum as the split to the shaft feature permits easy replacement and inspection in the shortest possible time.

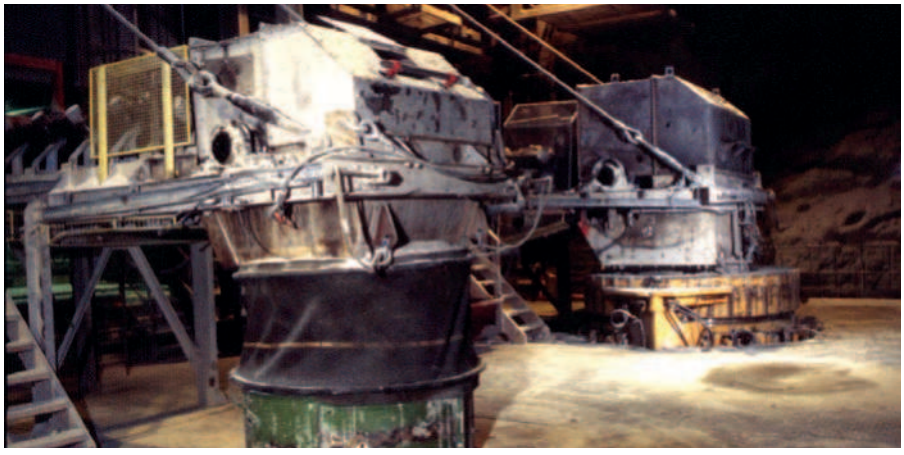
Prior to the installation of SKF Cooper bearings, the plant was frequently shut down to replace flooded bearings.

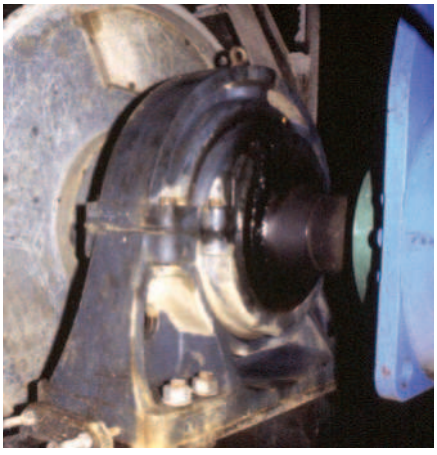
Also shown are SKF applications on chippers, conveyors and saws.

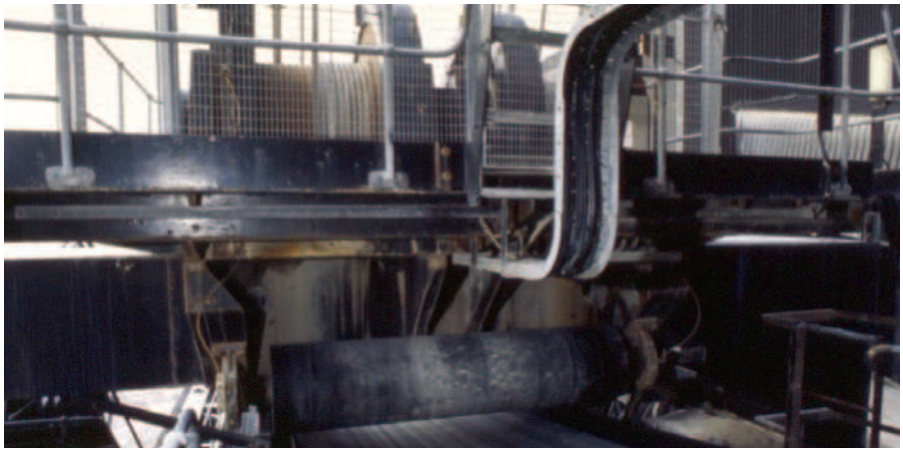
Quarry industry bearings

Quarrying applications

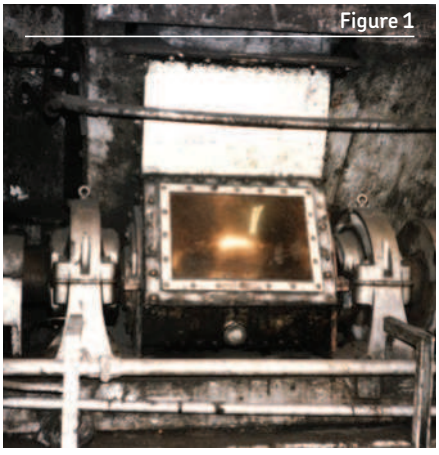
SKF Cooper bearings are fitted to numerous applications in the quarry industry ranging from ball mills to conveyors, crushers, under rollers and reciprocating screens.

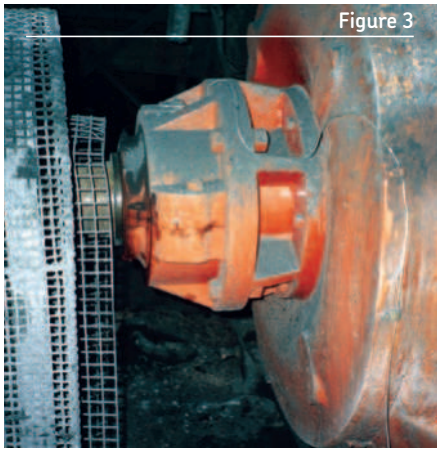






Power generation





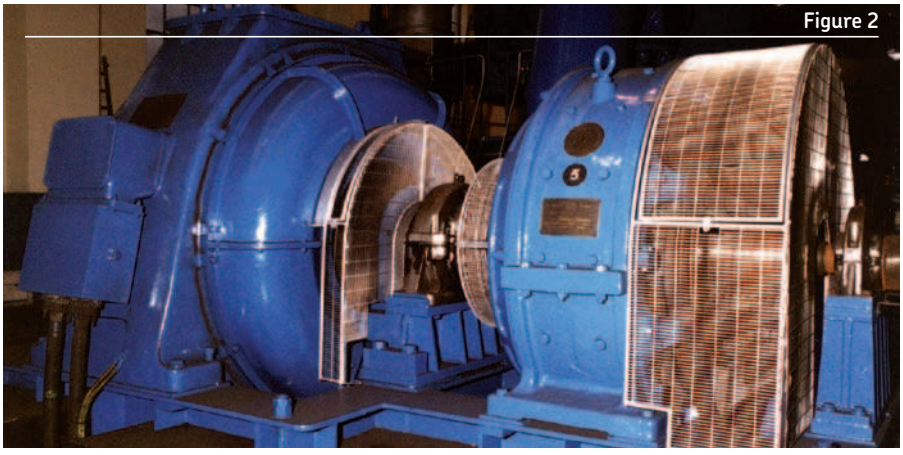


Figure 1

Power station briquette making plant.

Figure 2

Motor generator sets.

Figure 3

Coal mill bearing conversion from a whitemetal bearing.

Figure 4

Power generation trapped application.

Figure 5

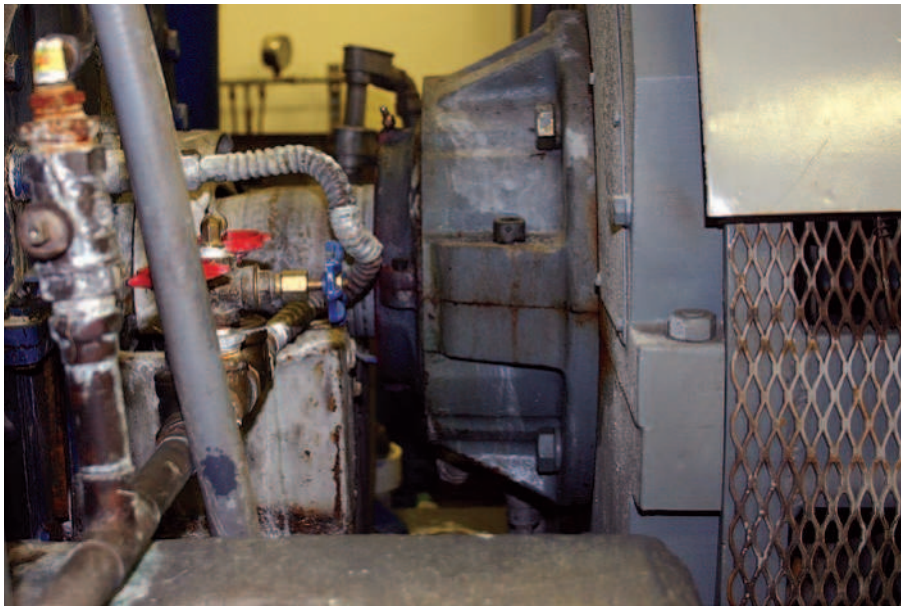
Ventilation fans. More fan types are shown in the fan and blower section.

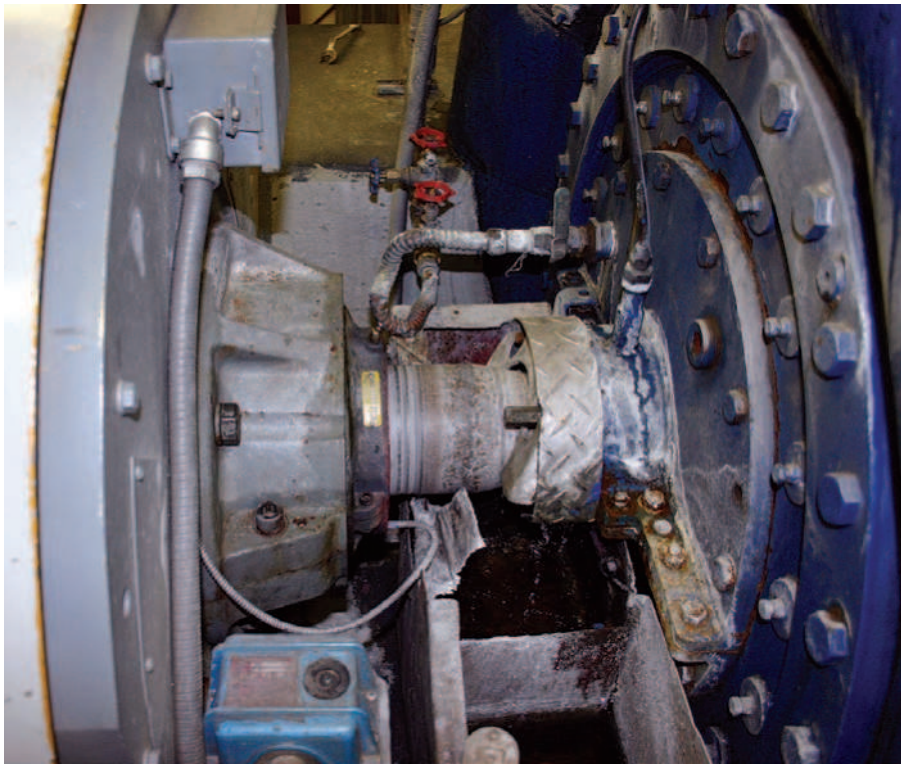
Irrigation generator sets

Runnning at 1,200 r/min, these 01 BCF 508 EX TL flange bearings have saved the customer days of maintenance downtime installing new bearings on these water powered generator sets.

The continually damp and sometimes very wet environment required the specification of ATL seals to prevent water penetrating the bearing.

The use of ATL seals provides optimum bearing life and excellent lubrication retention for this application.





Steel industry

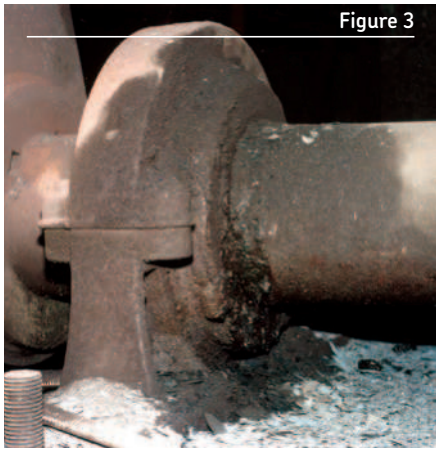


Figure 1

Steel industry rolling mill drives use high rise pedestals (PH) for the 02 BCPH 750 mm and 760 mm for the electrical specification SKF Cooper bearings which are manufactured to comply with the electricity supply industry specifications.

Figures 2 and 3

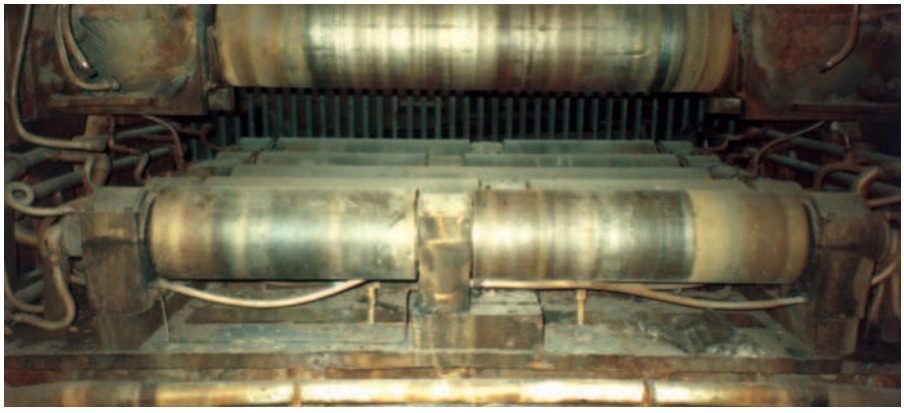
Cooling bed drive mechanism utilising 200 mm 01 Series BCP's.

Figure 4

The turnover mechanism for a cooling bed features 01 Series 170 mm BCP SKF Cooper bearings.

SKF Cooper bearings offer optimum performance, simple and speedy bearing inspection for preventative maintenance and immense downtime savings during inspection or replacement.

SKF Cooper has long standing cooperation with steel producing OEM's and end-users around the world.

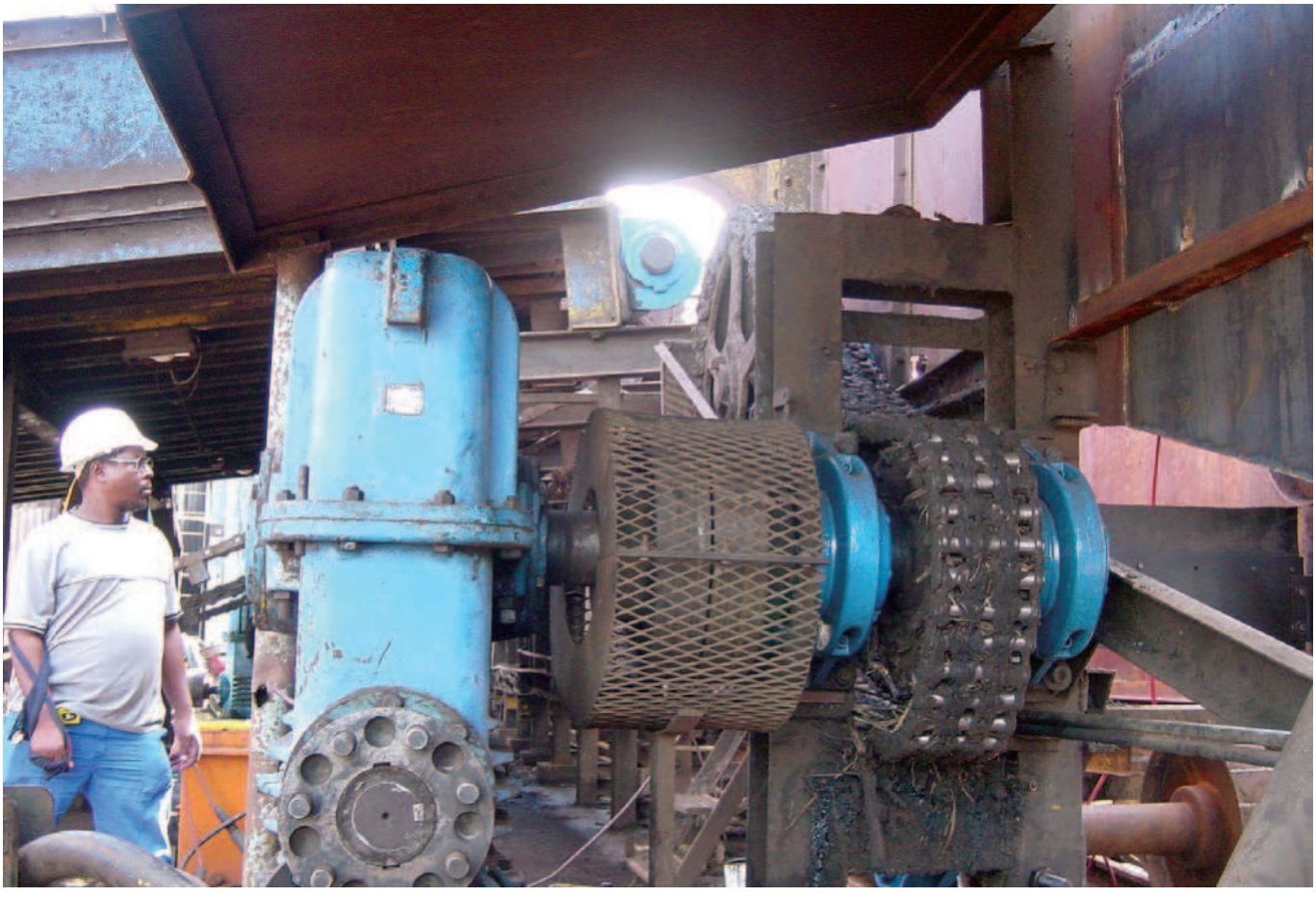


Trapped positions

Trapped positions

Many photographs throughout this publication illustrate trapped bearing positions.

SKF Cooper bearing users save a great number of maintenance and downtime hours in addition to vastly increasing production hours and uptime.



Miscellaneous applications

Asphalt plants

This application is a conversion from a Solid 'Self Lube' (shown lower right) to a split-to-the-shaft 01E 65 mm GR SKF Cooper SN-compatible pedestal.

The customer required a maximum operating temperature of 100 °C on this inclined 62 bucket elevator. The load capacity of the elevator is 1,500 kg. This is a typical trapped application that is well suited for SKF Cooper split bearings.

Water treatment


Figure 1

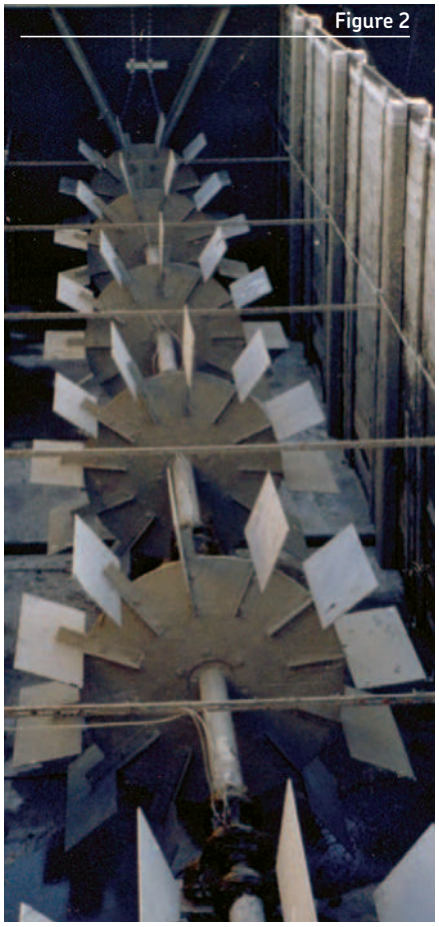


Figure 2

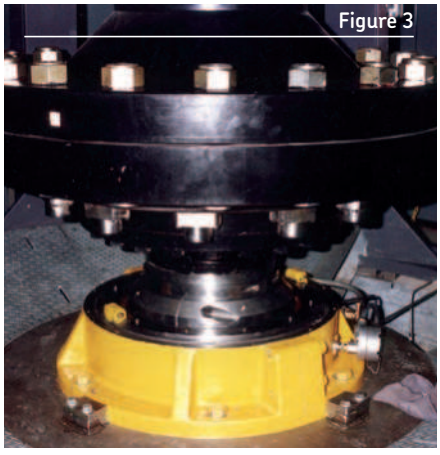


Figure 3


Figure 4

Figure 1 and 2

The use of SKF Cooper bearings in flocculator basins is widespread, due to the excellent sealing qualities of ATL seal when operated in submerged conditions. This is one of the many sealing options available with an SKF Cooper bearing.

Many water companies use up to 140 Cooper BCP's in sizes from 27/16 in to 4 7/16 in.

Temperatures vary from freezing 0°C in winter to 25°C in summer. A food grade grease is usually specified for this application.

Figures 3 and 4

A water company in Australia uses oil lubricated SKF Cooper CT13832 special 12 1/2 in thrust bearings for their vertical pump in the top position.

For the lower position radial bearings are used - SKF Cooper 02 BCFS 300 mm EX and 02 BCPS 300 mm EX.

Turbine power

Hydro turbine

01 Series complete bearing unit fitted to a water turbine in France. The customer required a special made-to-order shaft size solution, a custom four-part flange housing to support installation due to space and advanced bulk head sealing. Providing a significant improvement in bearing life and reduction in bearing operating temperature compared to the previous solution.

Further turbine applications

SKF Cooper has considerable water turbine experience with applications in Canada, Italy, France and USA. Bearing specifications are from 01 BCP180 mm EX and GR on a horizontal turbine to four 01 BCF 380 mm EX in special flange housings on four turbines.

Miscellaneous applications

Stacker reclaimer

This bucket wheel stacker reclaimer can handle 3 500 tonnes per hour and the boom can operate on a pile up to 50 feet high. The slewing ring pinnion gear is supported by a 6 1/2 inch and 7 inch 01 Series SKF Cooper bearings in flange housings.

SKF Cooper bearings up to 380 mm in diameter are used on the shaft of the bucket wheel as shown below.

Mobile shiploader

For operation in Saudi Arabia, this mobile shiploader is designed to receive cement clinker from 50 tonne dump trucks and discharge into vessels at a continuous handling rate of 1 200 tonnes per hour.

The SKF Cooper BCF (flange) bearing can be seen at the head of the retractible cascade chute.

Unique solution products

Made-to-order bearings

Typically 01 and 02 Series bearings over 300 mm (*12 inches*) and all 03 and 04 Series are made to order. SKF has the capability to manufacture split or solid thrust and radial roller bearings of any size up to 1.5 m (*60 inches*) shaft diameter.

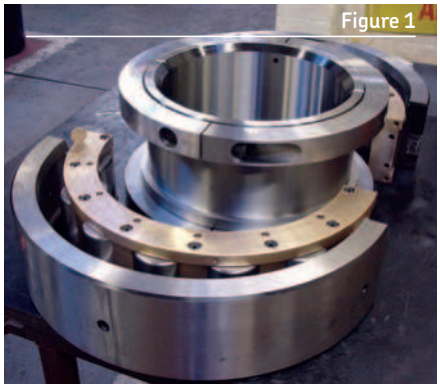
Figure 1 03 Series 300 mm GR Pilger mill bearing.

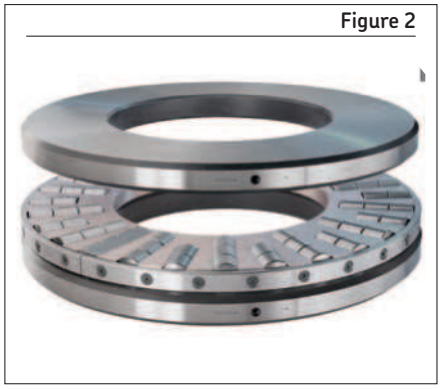
Figure 2 Flat thrust roller bearing

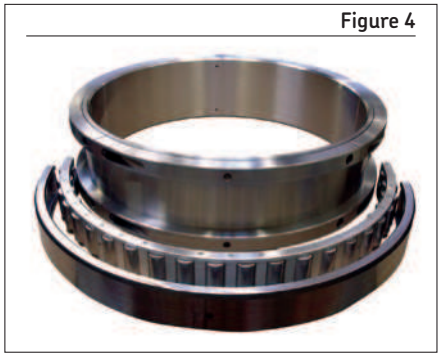
Figure 3 750 mm double row split cylindrical roller bearing for link spindles in the metals industry.

Figure 4 01 Series 850 mm EXILOG Split roller bearing for use on ball mill trunnions.

Figure 5 02 BCP 460 mm bearings for marine propulsion shafts.







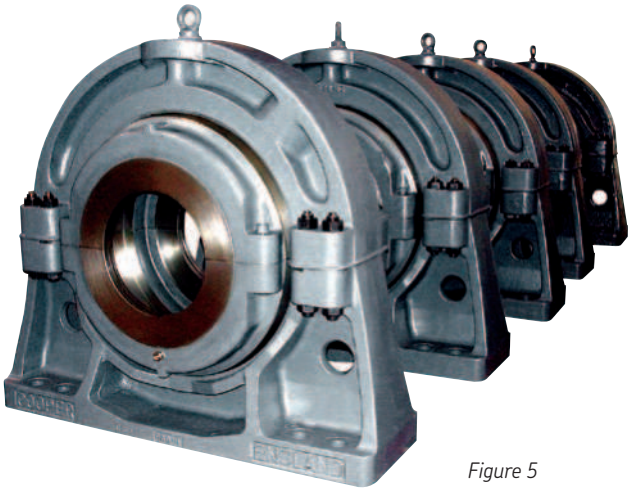


Figure 5

SKF Cooper nomenclature

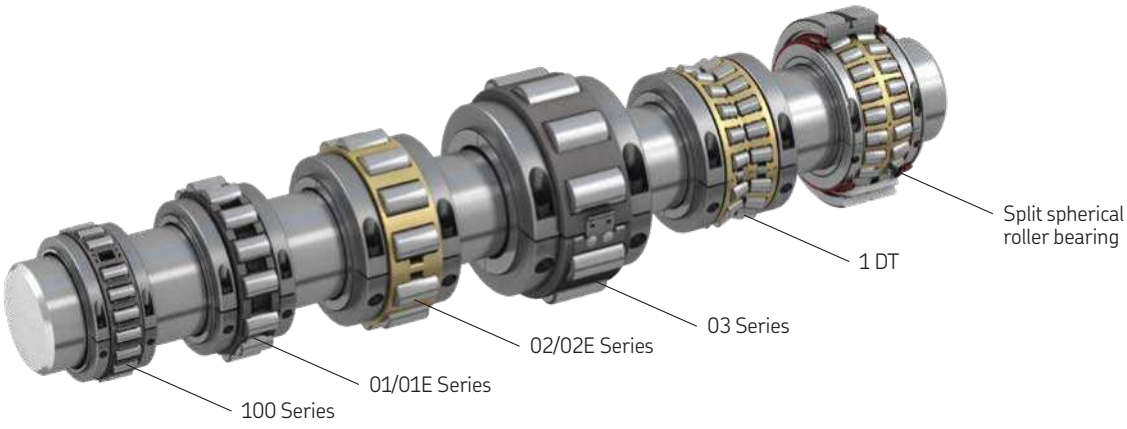
Comparison of series

For most shaft sizes SKF offers a range of three standard series:

01 Series for medium duties, 02 Series for heavy duties and 03 Series for extra heavy duties. The use of more rollers, larger rollers or a combination of both, increases the load capacity of a roller bearing.

For a given shaft size, 02 Series offers more radial and axial capacity than the 01 Series. The 03 Series in turn offers more capacity than the 02. The choice of three Series enables SKF Cooper users to select bearings suitable for a wide variety of load and speed conditions.

For more information please see the SKF Cooper split roller bearings product catalogue or visit our website at skf.com or cooperbearing.com.



01	BCP	120M	EX	F

Series designation

01 Series	Medium duty
01E Series	Enhanced duty
02 Series	Heavy duty
03 Series	Extra heavy duty

Seal type [1)]

AT	Aluminum triple Labyrinth seal
F	Felt seal
SRS RP	SRS seal with retaining plate. Can operate in submerged conditions.

Configuration identifier [1)]

BCP	Bearing, cartridge and pedestal
BCF	Bearing, cartridge and flange

Bore sizes

Metric: 120M shown in box represents 120 mm, 130M would represent 130 mm.

Imperial: Last two digits represent 16ths of an inch
For example: 415 =4 15/16". 500 = 5". Standard size range from 35 mm (13/16") up to 300 mm (24"). Over 300 mm (24") are made to order.

Bearing type

EX	Expansion type
GR	Fixed type

[1)] The full range of SKF Cooper mounting and sealing options are shown in our product catalogue and on our website: cooperbearings.com

skf.com | cooperbearings.com

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