

SKF Cost-Savings through Total Cost of Ownership

Presented to:
Society of Tribologists and Lubrication Engineers
Reducing Tribological Losses and Failures – Part 3
Workshop and Panel Discussion
STLE TORONTO SECTION

Presented by:
Colin Lewis, P.Eng, MBA
Regional Manager, Central & Western Canada

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SKF Overview – a truly global company

- Established 1907 / in Canada since 1917
- Sales 2018 SEK 85,713 million / ~\$12 Bn CAD
- Employees 44,428
- Manufacturing units 94
- SKF presence 130 countries
- Distributors/dealers 17,000 locations
- Global certificates
ISO 9001 – Quality
ISO 14001 – Environment
ISO 50001 – Energy
OHSAS 18001 – Health and safety



SKF vision and mission




A world of reliable rotation

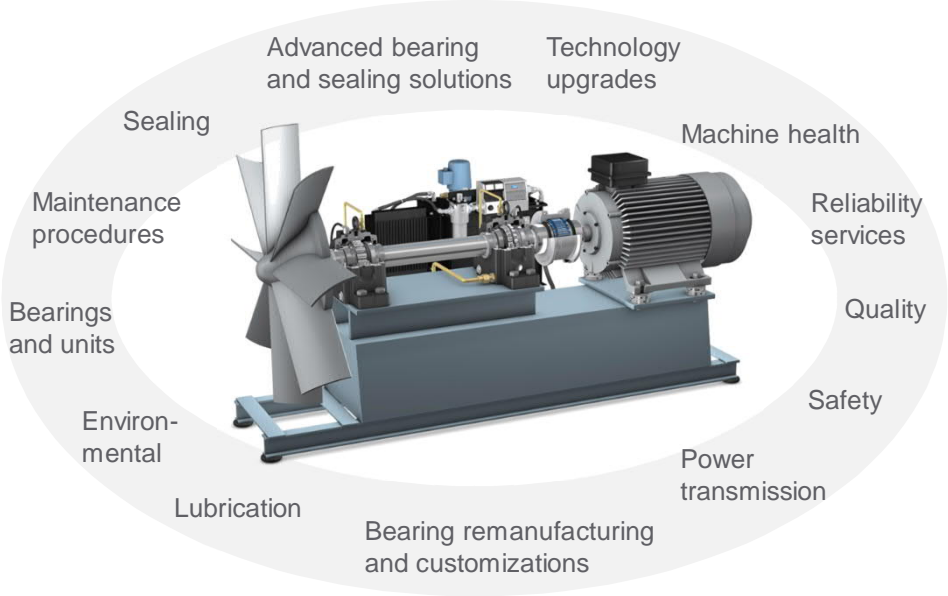
The undisputed leader
in the bearing business

Rotating equipment performance value proposition

Rotating equipment performance



Customer need:
“I want your products and my assets to reach technical end of life with trouble-free operation”



RIGHT SOLUTION

RIGHT PERFORMANCE

RIGHT TOTAL COST OF OWNERSHIP

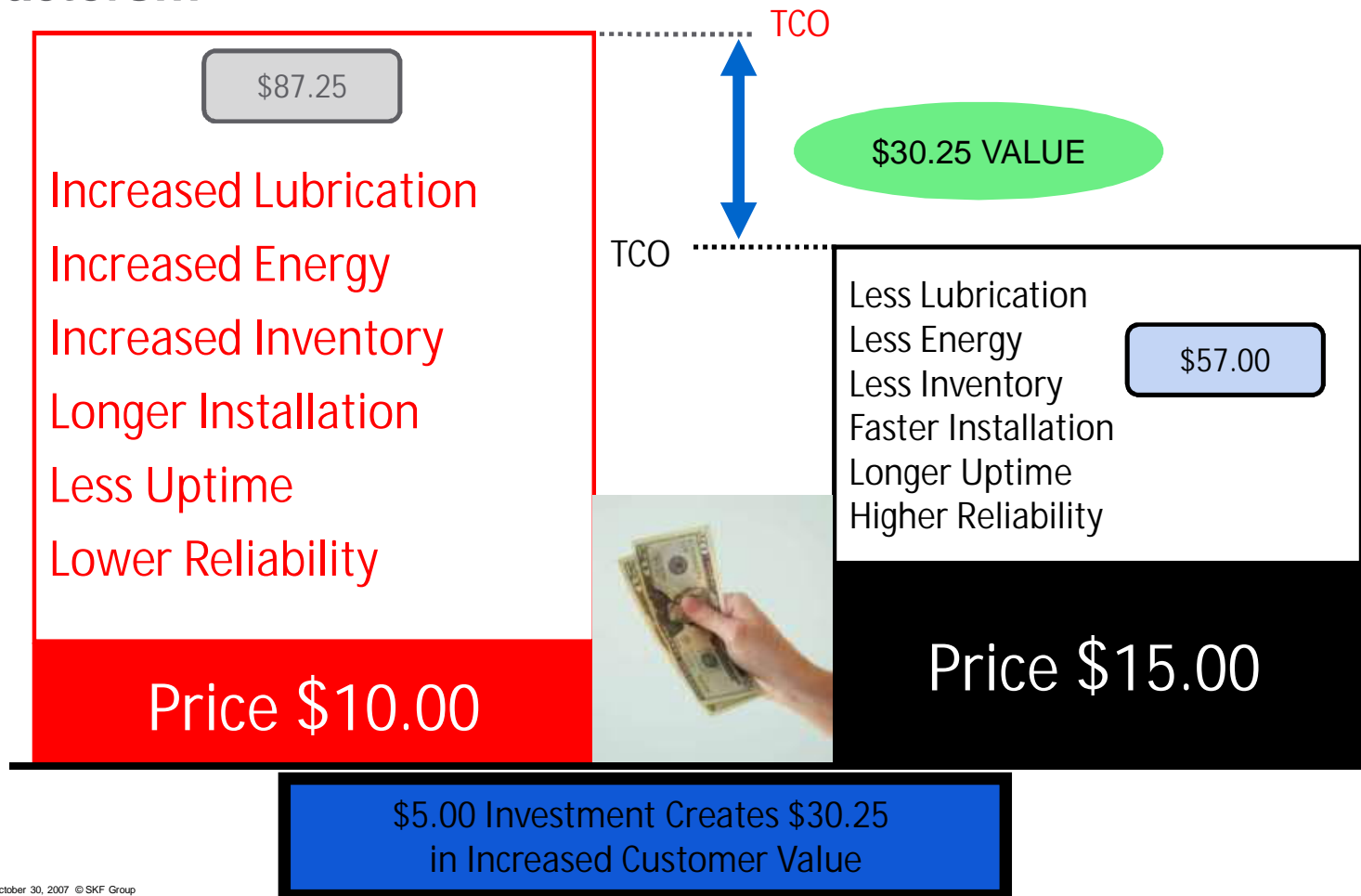
The Priceberg

Total cost of
ownership

An iceberg floating in the ocean. The tip of the iceberg is above the water surface, and a large, much larger portion is submerged below the surface. A white circle highlights the submerged portion. A small blue box with the word 'PRICE' is placed on the visible tip of the iceberg. The background is a blue sky and ocean.

PRICE

Price vs. Total Cost – It's about measuring all the factors...

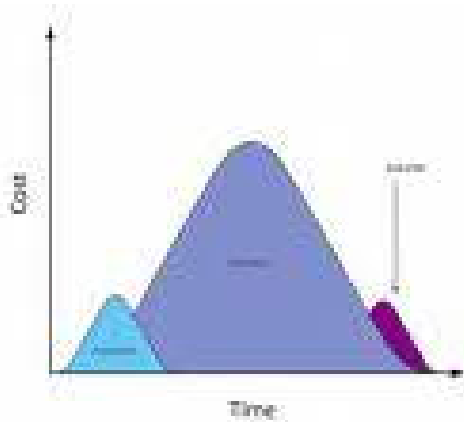


Total Cost of Ownership... The Real TCO

Design

Robustness
Ease of Manufacture
Tolerances
Design Costs
Sales Costs

Customer TCO



Acquisition

Inventory Amounts
Payment Terms
Contract Management
Supplier Consolidation
Finance Charges
Obsolescence
Receiving

Unit Price

Operation

Energy and Lubrication
Product Life
Auxiliary Repair Costs
Production Amounts
Production Quality
Machine Reliability
Cost to install

Warranty costs

Disposal

Dismantle
Shipping
Disposal Costs
Recycling Costs
Treatment Costs
Government Fees
Sustainability Issues

Accenture's Asset Lifecycle Total Cost of Ownership

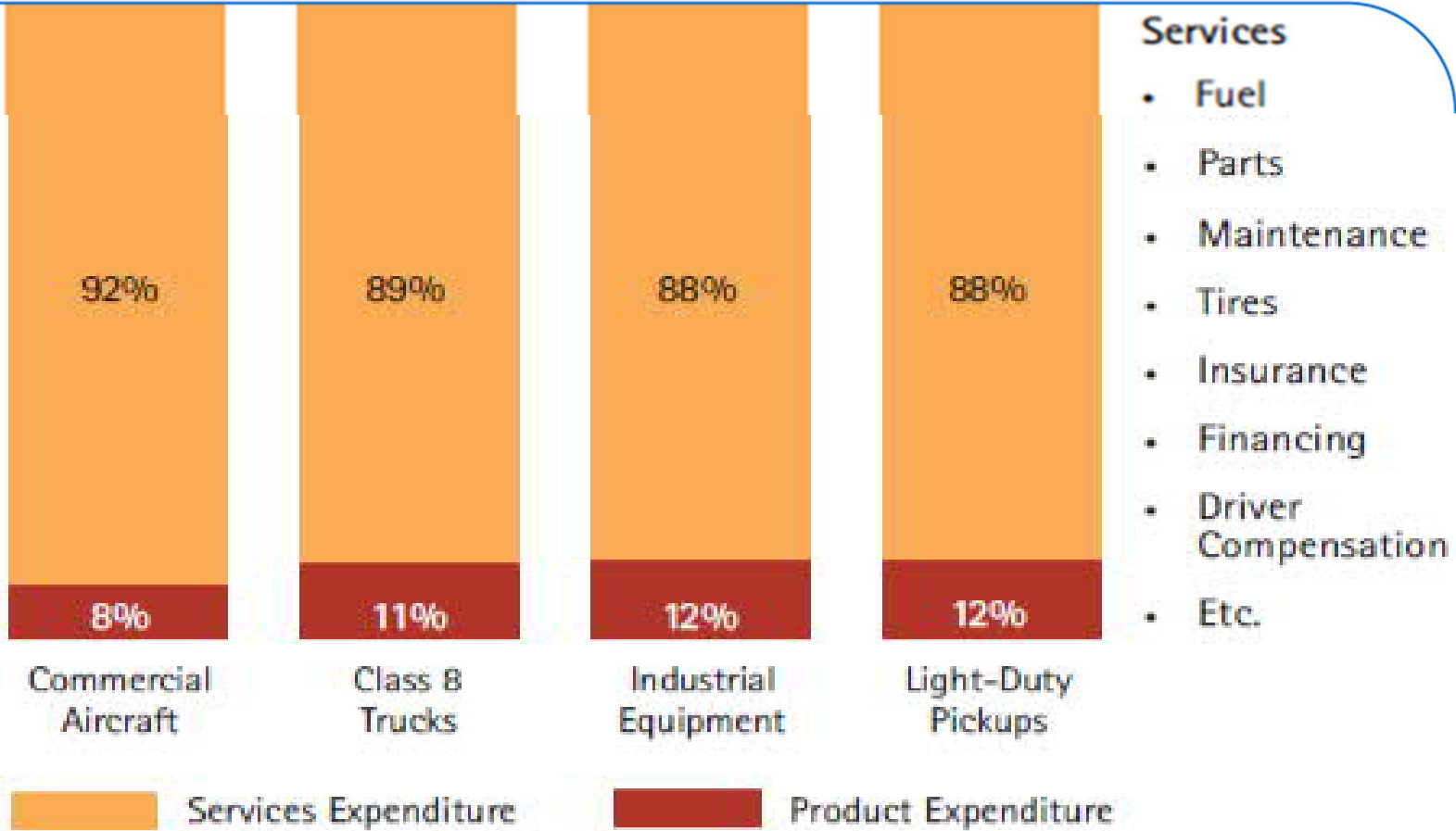
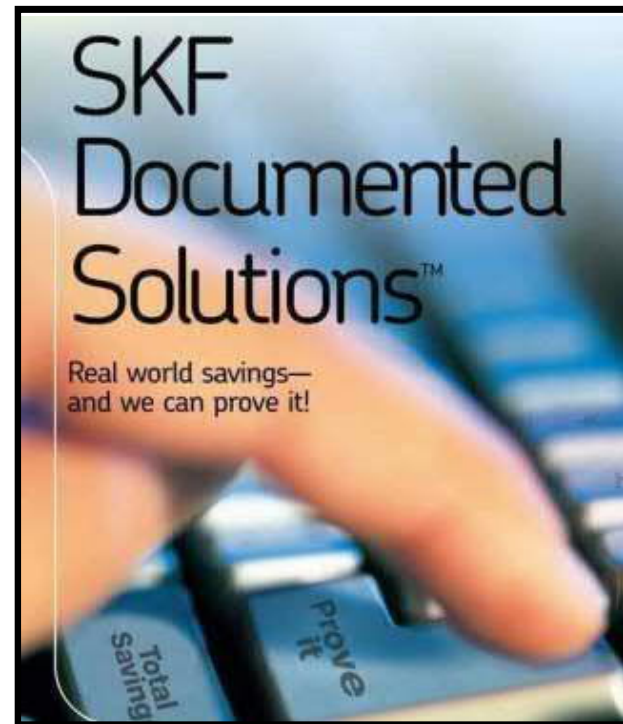


Figure 1. Initial product purchase relative to total cost of ownership

SKF Documented Solutions Program

SKF has developed a tool that allows the customer, sitting down with his SKF Account Manager to FIND, Measure Expected, Prioritize, Implement, Measure Actual, and Replicate to realize savings

- Help customers justify a solution want.
- Help sales force of our OEMs explain customer value.
- Defend SKF price premium.
- Help distributors with their cost saving commitments in exchange for share.
- Speed up sales cycle.
- Reduce discounting of SKF products and services with supporting business case.



SKF DSP Tool - Calculations

The screenshot displays the SKF DSP Tool web interface. At the top, there are browser tabs and a navigation menu with 'BASIC', 'BENEFIT', and 'INVESTMENT' options. The main content area is titled 'Benefit calculations' and contains a list of 15 items, each with an input field, a unit, and an 'Actions' button. The first item, 'Increased production availability - less unplanned downtime', has a value of 204000 CAD. The second item, 'Reduced unplanned maintenance work', has a value of 107400 CAD. The remaining items have empty input fields. The bottom of the browser window shows a Windows taskbar with the date and time '9:38 PM 11/20/2019'.

Benefit Category	Value	Unit	Action
Increased production availability - less unplanned downtime	204000	CAD	Actions
Increased production capacity		CAD	Actions
Increased production quality		CAD	Actions
Reduced scrap production		CAD	Actions
Increased production availability - less planned downtime		CAD	Actions
Reduced unplanned maintenance work	107400	CAD	Actions
Reduced work related to repairs		CAD	Actions
Reduced maintenance work in general		CAD	Actions
Reduced training cost		CAD	Actions
Reduced associated repair expenses		CAD	Actions
Reduced consumption of spares		CAD	Actions
Reduced cost of tools and maintenance facilities		CAD	Actions
Reduced energy consumption by electric machines		CAD	Actions
Reduced energy consumption by electric machines		kg CO ₂	Actions
HSE compliance and insurance		CAD	Actions
HSE incidents cost savings		CAD	Actions

Supporting tools to quantify value

SKF		3 Barrier DSP	
Quantity	10	BEARING DATA	
Shaft Size (ex, 2.1/2) [inches]	4.15/16	Bearing Designation	22228-2CSSK/VT143
Rotational Speed [RPM]	100	Bore (d)	140 mm
Requested Service Life (hours)	100000	Outer Diameter (D)	250 mm
Relag Interval (hours)	50000	Width (B)	68 mm
Parts Cost per Unit: Regular	\$5 000	Dynamic Load Rating (C)	710 kN
Parts Cost per Unit: Taconite	\$6 500	Fatigue Load Limit (Pu)	86.5 kN
Parts Cost per Unit: 3BS	\$5 500	Equivalent Load (P)	89 kN
Install Cost (Per Housing, No Material)	\$2 000	Limiting Speed	670 RPM
Replacement Cost - (Per Housing)	\$50 000	Bearing life calculation factor (e)	0.24
Lube System	\$0	Bearing life calculation factor (Y1)	2.80
Service Cost (Per Housing, per visit)	\$60	Bearing life calculation factor (Y2)	4.20
Tac Purges per year	12	Bearing life calculation factor (Y0)	2.80
Open Brg Lube (per year)	6	dm	195 mm
Sealed Bearing Lube (per year)	1	ndm	19500 mm/min
Practical Factor	0.50	Bearing Factors	2 mm/min
Taconite Quality Factor	0.50	(GC 6000, pg. 239)	
		Relubrication Interval	12599
		(GC 6000, pg. 239)	

	Operational and Cost Information				
	Regular Housing	Taconite Seals	3BS	Saving 3BS v Reg	Saving 3BS v TAC
aSKF	0.19	3.0	6.0		
L10mh (hours)	32427	512000	1024000		
Practical Life (hours)	16213	128000	512000		
Practical Life (Years)	1.9	15.1	60.2		
Adjusted Relube Interval	6000	8000	18000		
Lube For Life Hours (hours)	16200	21600	48600		
Initial Parts and Installation Cost (\$)	\$70 000	\$85 000	\$75 000		
On Going Cost - Grease/Tac Purge. \$/yr	\$3 600	\$7 200	\$600		
TCO Year 1	\$73 600	\$92 200	\$75 600	-\$2 000	\$16 600
TCO Year 2	\$127 200	\$99 400	\$76 200	\$51 000	\$23 200
TCO Year 3	\$130 800	\$106 600	\$76 800	\$54 000	\$29 800
TCO Year 4	\$184 400	\$113 800	\$77 400	\$107 000	\$36 400
TCO Year 5	\$188 000	\$121 000	\$78 000	\$110 000	\$43 000

Rev. 2014-06-13

SKF DSP Tool - Results

The screenshot displays the SKF Documented Solutions Program interface. The browser address bar shows the URL `apptools2.skf.com/DSP_WEB/#/analyse/@X_100216`. The application header includes the SKF logo and navigation tabs: Start, Find, Analyse, Calculate, English, and Help. Below the header, there are tabs for General, Solutions, Calculations, Result, and Report. The main content area is titled "RESULT OVERVIEW BENEFIT AND INVESTMENTS" and contains a "Summary" section with the following metrics:

Metric	Value
Return on investment (ROI)	334 %
Payback time	2.77
Internal rate of return (IRR)	334 %
Value added	239620 CAD

Below the summary is a "Cash flow graph" titled "Cashflow analysis". The graph shows a bar chart with two bars: a negative bar at year 0 and a positive bar at year 1. A blue line connects the two bars, showing a sharp increase from a negative value to a positive value.

Year	Cash Flow (CAD)
0	-50,000
1	239,620

Interesting Value Measured using DSP – 2019

76,000 Number of Accepted / Verified cases since inception

676 Million CAD of verified cost savings

25 Industry End User and OEM Segments

100's of Sub Segments to learn best practices from

107 Number of Solutions in DSP

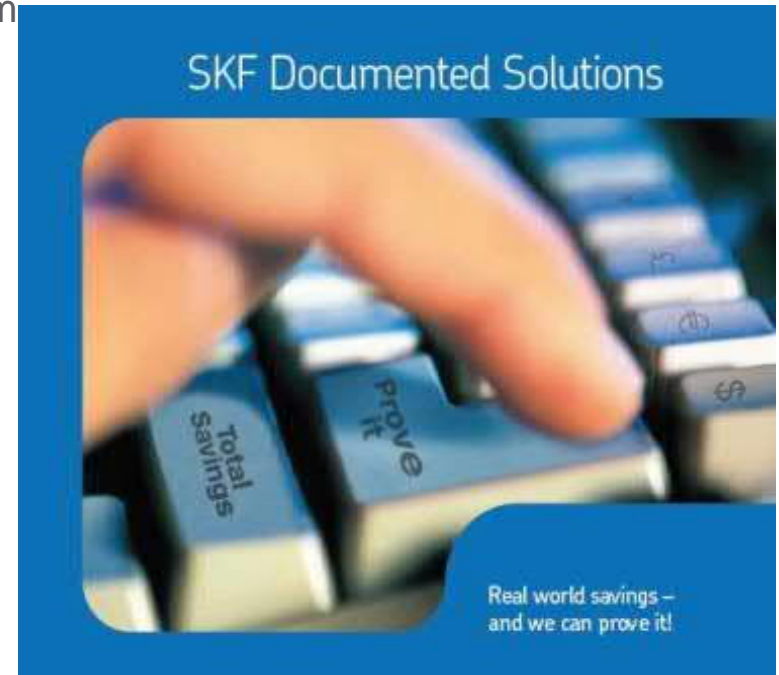
- 24 Bearing
- 48 Services
- 7 Lube
- 7 Mechatronic
- 4 Seals
- 9 Application Improvements
- 8 Process Improvements

5 languages

51 currencies can be converted

14 energy and sustainability calculations

and can convert KW saved to CO2 reduction



Justifying working with SKF and our Partnered Authorized Distributors

This calculation allows a customer to review the real impact a change on a bearing supplier and the associated price has on their business. For example, sometimes purchasing people will look at the price difference between two choices and assume that the resulting product life needs to at least be this amount to justify the price premium. For example a bearing that is twice the price needs to last at least twice as long.

However, when you start to look at the whole situation, where bearings are just at the heart of your machines, and we are looking at how long does a machine last the analysis is quite different. In reality it is machines that produce something or do something, the bearing is just at the heart of that machine. Working with SKF, our over 100 years of knowledge, and 5 Platforms of Technology, run the numbers to see the real impact you need to switch to an SKF Partnership, or the minimal possible gain with high risks to move based on unit price.



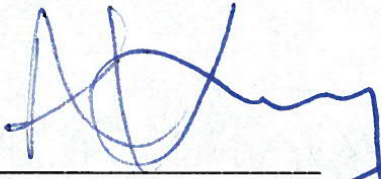
① Currency	United States Dollars (\$)	
① Annual maintenance repair and operation expenses	6000000	\$
① Annual downtime value	2000000	\$
① Total annual maintenance expenses	8000000	\$
① Annual cost of buying SKF	400000	\$
① Discount offered by lower price competitor	35	%
① Annual possible reduced price for option B	140000	\$
① Possible price for option B	260000	\$
① Average MTBR for all assets	36	Months
① Cash flow generated each month	666667	\$
① Cash flow break even	36.21	Months
① Increase of MTBF required	0.21	Months
① Minimum change needed between SKF and option B	6.30	Days
① Lifecycle change of assets required	0.58	%

“We are not selling parts or bearings – We are helping customers make their assets last longer”.



Real Example - Rio Tinto IOC signs off on \$44 MCAD DSP!!

Total: \$ 44,250,070

Approval IOC:  _____

Date: 28/04/2016

Achille Njike, PhD, MBA, P.Eng.
Director of Asset Management
& Business Performance

Signed by Achille Njike, PhD, MBA, P.Eng.
Director of Asset management and Business Performance
Rio Tinto Iron Ore company of Canada

What comprised the \$44 MCAD saving

Action	\$ Saving	Downtime Hours saved
Replaced conveyor bearings with 3-barrier solution	15 MCAD	150
Improve reliability of feed conveyors to mill. PM & PdM procedure improved + machine upgrades	7.5 MCAD	332
Reduce conveyor belt slippage, improve take-up performance & lagging	1.4 MCAD	32
Substantial reduction of Ore freezing in feeders	7.9 MCAD	250
Refined adjustment of Safe sets on Gyrotors	4 MCAD	40
Low oil level trip on gearboxes	3 MCAD	30
Reduce water ingress in Lube system	1.3 MCAD	20
12 Other improvement actions	3.9 MCAD	N/A

Rio Tinto IOC \$44 MCAD DSP SKF Canada – how it began

2013 SKF approaches Rio Tinto Corporate

- Customer objectives - reduce operating and maintenance costs.

Rio Tinto IOC Labrador city

- Remote location and high cost of unreliability.
- SKF historical business ~\$250-300k/ year in bearings & seals

SKF Canada Services & Solutions team high-level site survey Dec 2013

- *The 3-barrier solution was presented but no reaction from customer*

First Asset Management Services contract won



- Iron Ore Company of Canada (Rio Tinto)
- Plant Production :18 million tons / year
- # of employees : 1100

Rio Tinto IOC \$44 MCAD DSP SKF Canada – how it began

SKF deploys a skilled team that quickly delivers on promises

- significantly improved Mean Time Between Failure for Mill

The SKF team was on average 8 people onsite during the first 2 years of project. This was key to building relationships and realize additional improvement projects, leading to service and product sales

Rio Tinto quickly recognized SKF as Category 1 (Highest class) Service Provider, Advisor and Supplier

Rio Tinto Labrador City



Rio Tinto 3-barrier solution, SKF Canada

SKF Canada Services & Solutions team uncovers customer problem

- frequent pre-mature bearing failures in critical conveyors.
- SKF Bad actor management process identifies contamination as the culprit

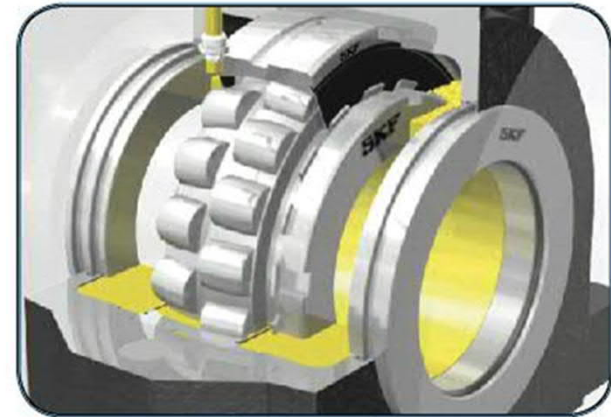


Due to newly established relationships and having gained trusted advisor status, SKF Canada has the opportunity to consult Rio Tinto about corrective action – revisits 3-barrier solution. SKF Canada establishes a cross-functional team connecting with several departments at Rio Tinto.

Customer reference – SKF Three Barrier Solution

Rio Tinto (IOC Labrador City), 2014:

- \$1M order to upgrade conveyor bearings to SKF Three Barrier Solution
- \$15M in downtime avoidance savings
 - 150 downtime hours avoided
 - \$100,000 per hour production value



Another DSP example – Automatic Lubrication at Agricultural Processing Plant

Customer challenges:

- Over-greasing (lack of grease amount control)
- Lack of manpower to respect necessary relub schedules
- CFIA inspections and compliance



Recommended Solution: SKF System 24 Automatic Lubricators, custom filled with food grade grease

Value added (annual benefits):

- Reduced grease consumption, \$73K
- Reduced parts consumption and related maintenance work, \$20K
- Reduced work related to manual lubrication, \$17K



Conveyor in ore mining, Australia

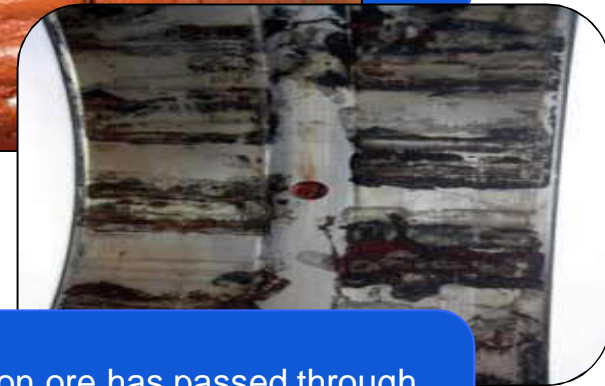
Test result after 18 months in operation

Detection of damage after 4 months

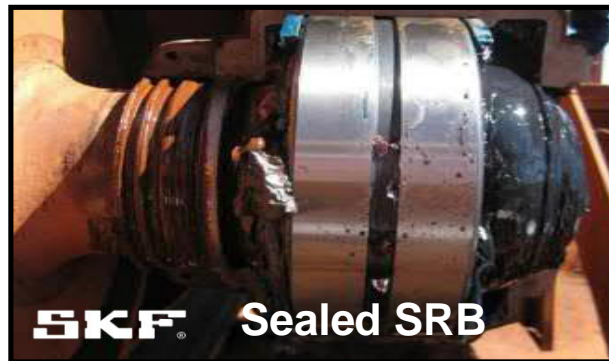


Iron ore enters the housing from this side

Iron ore moves through the housing...



Test result after 18 months in operation: **still running after 24 months!**



SKF

Three Barrier Solution in a transporter in the mining industry

Temp: 35° C

Speed: 80 rpm

Conditions: contaminated, humid, dusty

Issue

- Previous solution: open SRB with contact labyrinth seals that only lasted for **4 months**
- The customer wanted to increase the service life

Solution

- SKF sealed bearing 22228-2CS5K/VT143
- SKF grease LGGB 2/5
- SKF System 24 LAGE 125/HB2

x 6

Customer value

- MTBF increased from 4 months to **2 years**, as of today
- Increased work safety since less maintenance is required
- Reduced grease consumption



SKF®