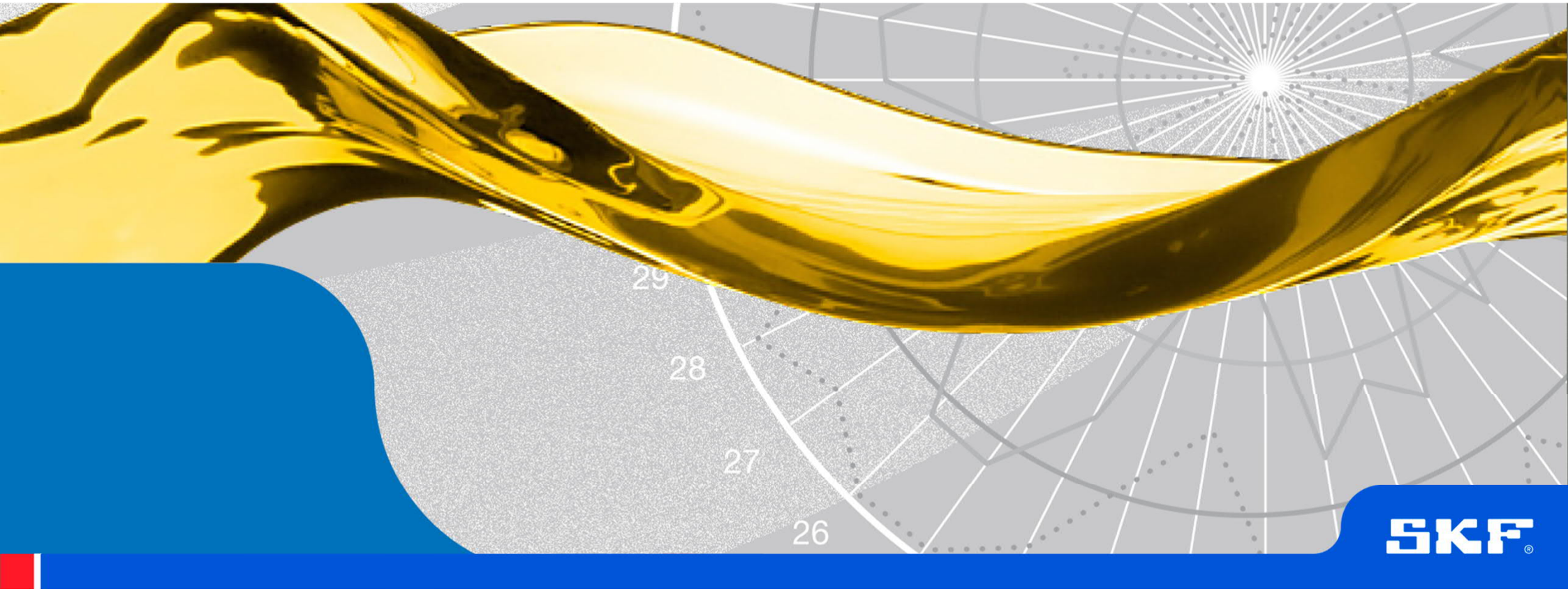
Boosting reliability

How SKF can help you improve your bottom line

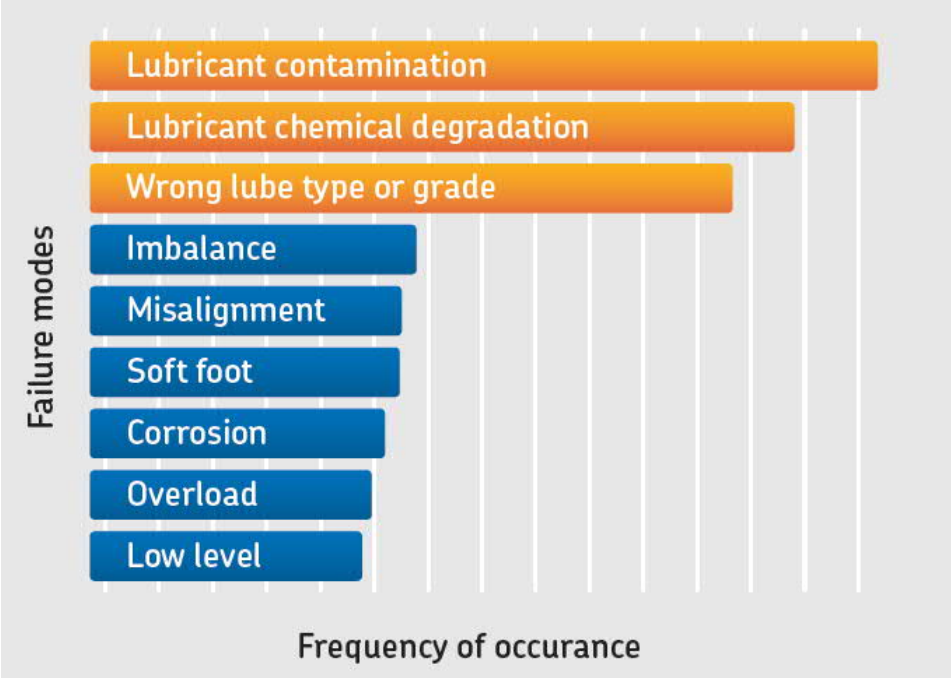


The importance of Lubrication Management

What are the most frequent failure modes?

• A root cause analysis of machine degradation will find many repeated causes. To improve the effectiveness, we should focus on those critical few failure modes that occur most frequently.

•The most frequent failure modes occurring in an industrial plant are often related to lubricant contamination, chemical degradation or cross contamination.



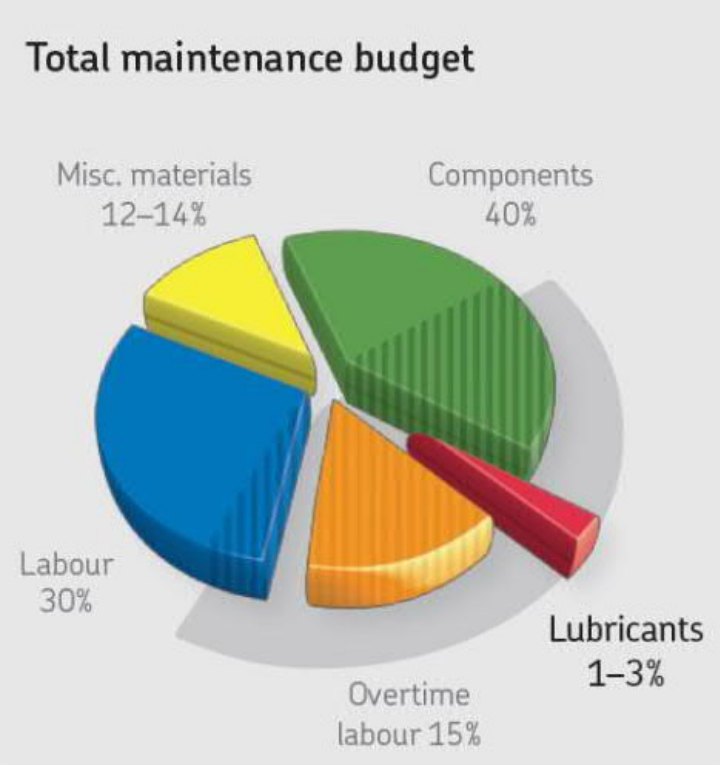
The importance of lubrication

50% of all premature bearing failures are due to lubrication or contamination issues!

For example:

- too much lubricant
- too little lubricant
- wrong type of lubricant
- contamination of the lubricant with water, air, particles, etc.
- cross-contamination (i.e. mixing of incompatible lubricants)

The influence of lubrication in maintenance costs



Lubricants **3%**
Purchase price of lubricants is normally
not a big component of maintenance budget

Components **20%**
Typically half of components' costs are associated
with lubricated component failure and collateral damage

Overtime Labor **15%**
Overtime is mostly influenced by machine failures.
A large part of these failures are lubrication related

Labor Cost **1.5%**
Approximately 5% of maintenance labor
can be attributed to lubrication work

TOTAL LUBRICATION RELATED COSTS **~40%**

What Lubrication Best Practices can do for you

INCREASE

- Productivity
- Reliability
- Availability and durability
- Machine uptime
- Service intervals
- Safety
- Health conditions
- Sustainability

REDUCE

- Energy consumption due to friction
- Heat generation due to friction
- Wear due to friction
- Noise due to friction
- Downtime
- Operating expenses
- Product contamination
- Maintenance and repair costs
- Lubricant consumption
- Corrosion

What is Lubrication Management?

A solid lubrication management program should cover aspects as varied as:

- ✓ Logistics and supply chain
- ✓ Lubricant selection
- ✓ Lubricant storage and handling
- ✓ Lubrication tasks planning and scheduling
- ✓ Lubricant application procedures
- ✓ Lubricants analysis and condition monitoring
- ✓ Lubricant waste handling
- ✓ Training
- ✓ Automatic Lubrication Systems

Lubricant storage & Handling

- Do your tools help to minimize ingress of contaminants?
- Are your lubricants and tools properly identified to avoid cross-contamination?
- Does your room grant a safe and controlled atmosphere?
- Is it equipped with spillage and fire control devices?
- Do you comply with health and safety regulations
- Do you have all required documentation available and accessible?
- Is your personnel trained to constantly improve ?

Lubricants selection & application methods

- Are your lubrication technicians trained to properly select and apply lubricants?
- Do they have the right tools and safety equipment for the job?
- How do you define when to use automatic lubrication or manual lubrication?
- What do your lubrication technicians know about lubrication systems?
- Did they help to design/improve lubrication routines?
- Are there written procedures?
- Are they encouraged by management to develop a continuous improvement plan in their role?
- Is there a formal development plan for their careers?

Lubrication Analysis

- Is your test slate defined for each critical asset?
- Does it include primary and secondary tests?
- Do you perform tests in the field?
- How do you keep track of results? Do you track the trends?
- Have you identified, labeled and prepared your sampling ports?
- Are samples taken in a reliable and consistent manner?
- Do you have written procedures for such tasks?

Contamination and condition control

- Do you only provide dry and clean oil to your machines?
- How do you avoid that new contaminants ingress to new oil?
- Do you have ISO cleanliness code and water level content defined for critical assets?
- How often do you control those levels?
- How do you identify / control the sources of contamination ingress?
- Do you have a defined plan for leakage control?
- Do you have the necessary training and equipment for oil reconditioning?

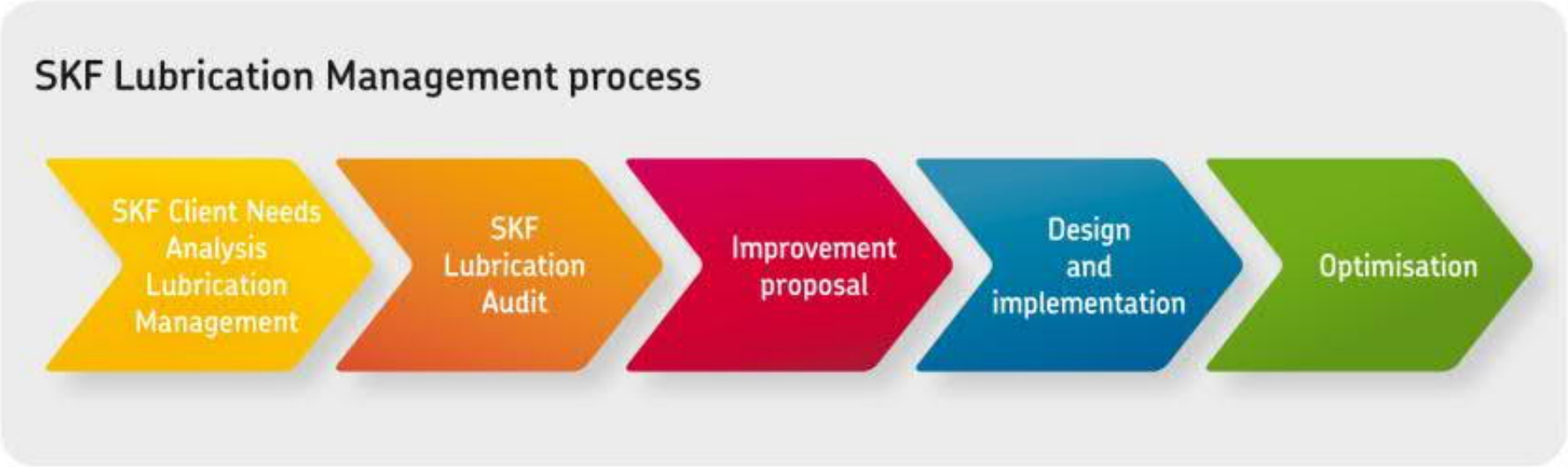
Lubrication program

- Is the criticality of your assets defined?
- Do your lubrication routines follow those criticality parameters?
- Is your workload well balanced?
- Are there machines that require too much time or run a risk in being lubricated manually ?
- Do you keep track of the activities performed?
- Are all procedures well documented, implemented and kept up to date?
- Which KPIs do you measure?

The SKF Lubrication Management program

SKF Lubrication Management

A structured program has been designed to help identify the required improvements in your lubrication program and to guide you towards lubrication excellence:



SKF Lubrication Management: The process

40 basic questions

1 day visit

Questions follow AEO model

Output:

- appraisal of the maturity level of the customer's lubrication program
- Identification of the main strengths and the areas with major opportunities for improvement.

AEO Model

Strategize: why & what

Do you know why you do what you do?

Identify: what & when

Does it matter?

Control: when & how

Did you do what you should do well?

Execute: how & who

Do you know what it means?

Optimize: why not

Do you learn and improve?

Potential Savings Calculator

Consider maintenance and downtime costs that could be saved by means of:

- better lubrication practices
- high-performance lubricants
- automatic lubrication systems

SKF can help you estimate the potential savings that you could gain by improving your lubrication program.

SKF Lubrication Management – The Process

- 270 questions
- 3 – 5 days visit
- Questions are grouped in 10 sections

Output:

- comprehensive report of current lubrication program and its efficiency
- Recommendations to take your lubrication program to a world-class level.
- The report can also include a calculation of the potential financial benefits of improving your lubrication program

SKF Lubrication Audit sections

- Supplier selection
- Lubricant delivery, storage and handling
- Lubricant selection
- Lubricant application
- Lubricant analysis
- Lubricant contamination & condition control
- Lubrication programme management & personnel
- Lubrication practices standardization
- Safety, health and environmental practices
- Automatic Lubrication Systems (ALS) policies and practices

SKF Lubrication Management – The Process

Proposals based on the opportunities found in the assessments

Virtual support tools:

- ✓ SKF @ptitude Exchange
- ✓ SKF LubeSelect
- ✓ SKF Lubrication Planner

In-the field support

- ✓ Consultancy
- ✓ Execution

Follow up of the program's evolution and results

Improvement proposal examples

- ✓Planning and scheduling design
- ✓Oil analysis programme design
- ✓Standard procedures generation
- ✓Storage room design
- ✓Training
- ✓Lubrication tools and centralised lubrication systems
- ✓Operator driven reliability programme
- ✓Root cause failure analysis
- ✓EAM/CMMS data population: asset register, bill of materials, standardized job plans, etc.
- ✓SKF integrated maintenance solutions

Reference cases

Application: Copper smelter and refinery
Country: Peru
Scope: Lubrication engineering tasks and oil analysis

Application: Pulp line
Country: Brazil
Scope: Lubrication engineering, training and bearing supply

Application: Rolling mill
Country: Colombia
Scope: Design and implementation of the lubrication program