

How an effective lubrication strategy enhances fleet reliability

Maintenance is a top priority for most ship operators. Failure to maintain machinery properly may not only lead to safety risks, but also expensive vessel downtime or even penalties for non-compliance with regulations. To keep all on-board machinery in fully functional condition, careful planning and an experienced, well-trained crew are required.

One of the most crucial aspects in terms of machine reliability is lubrication. Depending on how you manage it, lubrication can make or break your maintenance efforts. The conventional approach is to follow a lubrication schedule and manually lubricate applications on board the vessel. However, this can be extremely time-consuming, inefficient, and – in some cases – can even pose a safety risk to the crew. Moreover, technicians must maintain a large pool of knowledge and the maritime industry's aging workforce is making it increasingly difficult to find and retain skilled employees.

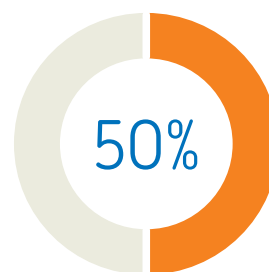
This paper examines some of the best lubrication management practices and

compares the strengths and weaknesses of different lubrication technologies.

Key considerations for successful lubrication management

Tight maintenance budgets make it especially important to deploy the available funds as efficiently as possible and avoid wasting money fixing recurring, preventable issues. Although developing a lubrication strategy requires careful planning and systems can require high initial outlay, these investments will ultimately pay off over time. When successfully implemented, a comprehensive lubrication strategy will help keep maintenance costs under control while improving vessel reliability at the same time.

Here are some of the key factors to consider when formulating your strategy.



Approximately >50% of all bearing failures are caused by improper lubrication.

Lubricant selection

Choosing the most suitable lubricant can be a challenge. The first step is to decide whether to use grease or oil. Due to its cost-effectiveness and simplicity, grease is used in the vast majority of applications. On the other hand, oil is easier to purge than grease and is therefore more suitable when operating requirements dictate shorter relubrication intervals.

Your first port of call should be the OEM manual. This will help you identify your machinery's requirements so you can find the right lubricant. Your supplier can also be an excellent source of support: some offer tools and software to facilitate your decision making.



Environmental factors

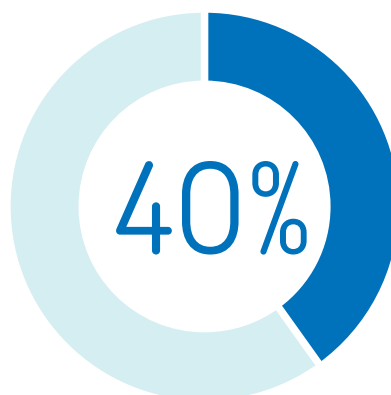
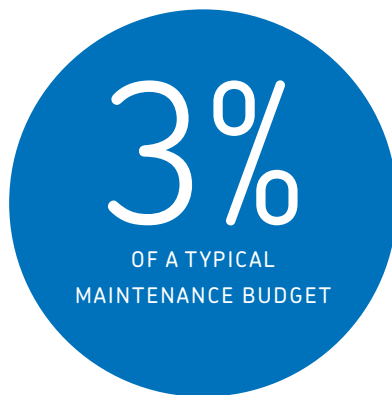
The marine industry is one of the most heavily regulated industries and regulatory bodies such as the IMO and US EPA are upping the pressure. When sailing in certain areas, regulations may restrict the type and amount of lubricant you are allowed to use in oil-to-sea interfaces and deck equipment. For example, regulations stipulate that ships sailing in polar regions or US waters must use environmentally acceptable lubricants (EALs), unless it is technically infeasible to do so. These lubricants must be biodegradable and “minimally toxic”. A reliable supplier should be able to advise you on EALs and ideally have the facilities to test the compatibility of lubricants with component materials.

Storage and handling

Once you have selected your lubricant it is important to establish clear processes to look after it. Grease and oil need to be stored at the correct temperature and be protected against contamination. They should also be clearly labelled to ensure the right lubricant is used and to prevent cross-contamination. Finally, you should conduct regular checks and take samples to ensure lubricants are clean and have not exceeded their expiry date.

Training and education

Your crew should have an extensive knowledge of all lubrication applications on board, including frequency and the amount of lubricant required. Even if you use an automated lubrication system your crew still needs to be trained to handle any troubleshooting that may be required. You might also want to consider creating a role such as lubrication technician to oversee all procedures.



Just 3% of a typical maintenance budget is spent on lubricants. However, ineffective management and techniques can result in lubrication-related costs consuming up to 40% of that budget.

Performance monitoring and assessment

Finally, in order to continuously improve your maintenance strategy, you should regularly analyze and review lubrication processes. By measuring certain parameters such as failure rate and component lifespan, you can identify areas for improvement and optimize your processes.

What are the key lubrication applications on a ship?

The lubrication applications aboard a vessel vary from ship-to-ship. Here is a brief overview of the most critical systems and components that require lubrication. If these applications are not properly lubricated they are likely to fail, causing downtime and, in the worst case, costly delays and losses.

Building on lubrication schedules for improved efficiency

While lubrication schedules are necessary, they are not always sufficient by themselves. Inefficient practices or a lack of the right tools and technology for support mean you might not be getting the most out of your time and available resources. Without the right training and equipment, applying precisely the right amount of lubricant to the right lubrication point at the right time is also extremely challenging. As a result, you may find that your machinery failure rates are too high or that your crew is overworked and can only react to issues after they have occurred.

Main lubrication applications

- Engines
- Gearboxes
- Propeller shafts
- Shaft lines
- Steering gear
- Deck cranes

- Jacking systems
- Winch drives
- Ropes and cables

Specialized lubrication applications

- Dredging pumps
- Streamer winches

Taking a more precise and efficient approach to lubrication management can provide many benefits for your fleet. By selecting the right methodology for your specific situation, it is possible to lower operating costs, reduce environmental impact and free up your crew for other important tasks.

The main approaches to lubrication

The most suitable approach and technology for your vessel depends on the size, number and type of applications. During selection it is crucial to take into account a number of factors. These include the type of lubricant used, environmental conditions such as temperature and potential contaminants, and application-specific requirements such as bearing speed and load. These considerations are especially important when it comes to calculating the return on investment of each approach or system. Other aspects, such as the age of the vessel and area of operation, will also influence cost and ROI.

Here are the most common approaches along with their advantages and limitations.

Manual lubrication

On many ships manual lubrication is still the norm for the majority of applications. This approach requires low initial investment, but can only be effective as part of a detailed lubrication program. While affordable tools such as grease guns and meters can support you, considerable effort and training is required to ensure accurate, contamination-free application.

Single-point lubrication systems

For lubrication points that are difficult to access or require more frequent lubrication, single-point lubricators are often the best option. These compact systems are easy to set up, are suitable for many applications and reduce manual labor by dispensing grease or oil at predefined

intervals. In addition, you do not have to shut down your machinery for relubrication.

Automatic lubrication systems

Fully automatic lubrication solutions are highly effective for achieving maximum accuracy with minimal manual effort. Due to their high initial costs they are usually only viable for critical and heavy-duty applications. However, they can provide a considerable return on investment over time. They are also easy to integrate with condition monitoring systems, giving you a more complete view of your machinery's requirements.

Benefits of the different lubrication approaches – an overview

Manual	Single-point	Automatic
Affordable tools for support	More consistent and regular lubrication at predefined intervals	Precise, fully automated lubrication with equal distribution
Low initial investment	Compact and easy to set up and operate	Pre-adjusted and easy to combine with condition monitoring systems
Effective as part of a lubrication program	Suitable for a wide range of applications with nearby lubrication points	Suitable for a wide range of applications, even over longer distances
	Controlled lubrication reduces component wear and helps prevent downtime	Continuous lubrication significantly improves reliability and prevents downtime
	High crew safety	Highest crew safety
	Reduced labor once installed	Highest precision, lowest manual effort
	Reduced risk of lubricant contamination	Lower costs in the long term
	No need to shut down machinery for lubricating	Customized setting in control unit / integration into the ship's maintenance control system possible
	Simple training	Minimum lubricant consumption and environmental impact

Return on investment: manual vs. automated

Despite their higher initial investment, automatic lubrication systems can pay off in just five years or less – and that's without taking the costs of machinery breakdowns and downtime into consideration. The table below shows the typical annual costs associated with the two approaches.

Costs were calculated based on SKF experience for a machine with 100 lubrication points. Manual lubrication includes a one-off initial investment of 1,500 euros for tools, 10 euros per lubrication point (totaling 1,000 euros)

and an estimated failure rate of 10 percent per year resulting in costs of 10,000 euros for replacement bearings.

Automatic lubrication costs were based on a one-off investment of 40,000

euros for the system, 5 euros per lubrication point and an estimated failure rate of 3 percent per year resulting in replacement parts expenditure of just 3,000 euros.

	Manual lubrication	Automatic lubrication system
1st year	€12,500	€43,500
2nd year	€11,000	€3,500
3rd year	€11,000	€3,500
4th year	€11,000	€3,500
5th year	€11,000	€3,500
Total	€56,500	€57,500

Resolve reliability issues and boost crew efficiency

Following the methods and best practices above will pay off in numerous ways. Not only do you solve persistent maintenance and reliability issues and prevent unexpected downtime, you also save money by reducing spare parts requirements and lubricant wastage. A properly planned and well-executed lubrication strategy helps your crew work more precisely, productively and safely. Moreover, you reduce your impact on the environment and comply with regulations.

Investing in a comprehensive lubrication strategy pays off faster than you might think and can yield a high return on investment. But it is crucial to constantly

monitor and regularly evaluate the performance of your program. Assessment criteria can range from machinery failure rates and root causes to lubrication frequency and lubricant consumption. This allows you to continuously optimize reliability. A trusted supplier can support you in all aspects – from developing your strategy to identifying room for improvement.

Important criteria for selecting a supplier

- All-in-one supplier
- Global service network for reliable and fast support
- Worldwide availability of spare parts
- Experience and expertise in lubrication for the marine industry
- Tailors solutions to specific needs
- Advanced facilities for research, development and testing