SKF

# CIRCULAR USE OF OIL

Oil as an asset, not a consumable

RecondOil

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## Discover the circular use of oil

Scan the QR code to learn more about SKF RecondOil and how we're helping industries turn oil from a disposable cost into a long-term asset. Explore the technology behind our Double Separation Technology (DST), hear from real customers, and find out how 'Oil as a service' can help you cut emissions, reduce waste and save money – without compromising performance.

# Oil as an asset, not a consumable

**SKF RecondOil can help turn your industrial oil from a costly, environmentally harmful consumable, into a circular and sustainable asset. We do this by combining SKF's application experience with RecondOil's groundbreaking technology and chemistry for oil regeneration.**

## 40%

**Oil can account for 5% of your maintenance budget, but affects 40% of maintenance costs**

RecondOil is built around its patented Double Separation Technology (DST). DST removes all sizes of contaminants down to nano size, preventing oil degradation and varnish formation, extending the lifespan of the oil almost endlessly and ending waste.

DST offers oil so clean it can last the lifetime of the machine it is lubricating, meaning one-off purchases and an end to waste. We call this the "circular use of oil" – oil as an asset, not a consumable.


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# Pressure on industry to reduce footprint

**The global focus on climate change has intensified the need for industries to reduce their carbon footprint. Businesses are under increasing pressure to meet international climate targets and adhere to a range of new environmental regulations. Businesses are also under pressure from stakeholders and investors for greater environmental transparency. To stay competitive – and attractive to potential job-seekers – it's essential for businesses to demonstrate their environmental credentials and commitment to sustainability.**

## The industrial oil challenge

Oil degrades over time. Today's linear approach to industrial oil use – where oil is discarded after degradation and replaced with new oil – is unsustainable and inefficient.

To satisfy global demand, vast quantities of crude oil are extracted, shipped, refined, shipped again, and then modified for specific uses before reaching distributors and end users. This complex process is resource-intensive and environmentally detrimental.

At the end of its useful life, only a small fraction of industrial oil is recycled.

Typically, recycled oil is converted into base oil, stripped of its original additives, transported, re-modified and redistributed. Often, used oil is simply burned as fuel.

**Reuse oil again and again**
One of the primary causes of premature equipment failure is lubricant contamination. Shockingly, up to 40% of maintenance costs are attributed to lubrication issues, making effective lubrication management crucial for profitability. Beyond the financial implications, the environmental cost of lubricants is significant.

## What if you could reuse all your industrial oil again and again, without losing any of its original qualities?

Traditionally, oil's limited lifespan has required it to be discarded and replaced, as there were no effective methods to remove the causes of degradation.

Conventional filter methods struggle to remove contaminants smaller than a micron, without also stripping out essential additives critical for maintaining the oil's properties and functionality.

These tiny, nanoparticles accumulate and accelerate oxidation, leading to oil degradation.

# 80%

Nanoparticles, which make up 80% of the contaminated surface area in oil and typically bypass conventional filters, pose significant harm.

## The smallest particles are your biggest problem

The lifetime of oil is influenced by contamination – if left unchecked in a system, the contaminants cause the oil to continually degrade, until it is no longer functional.

**Nanoparticles**
Microparticles that most often can be removed from oils with conventional filters make up just 20% of the contaminated surface area of all particles in an oil. At the same time, nanoparticles that normally slip through conventional filters constitute the remaining 80% of the contaminated area. The nanoparticles cause severe harm – and they are a catalyst for oxidation in the oil. Oxidation accelerates the oil's aging process.

**Varnish**
The growing popularity of the highly-refined Group II and Group III base oil composition has played a role in the increasing prevalence of varnish-related issues in oil – these base stock oils have lower solubility for varnish-forming materials. And while there are several causes for varnish formation in an oil, oxidation by-products are seen as the primary source. Varnish causes machine wear and thermal stress as well as accelerates the oil's degradation process.

**Water**
For most oils, water ingression can compromise nearly every beneficial property. The presence of water in a system can cause corrosion and reduce component life. Water also affects the oil's viscosity and deteriorates its lubricating properties.

## Ready to revolutionize your oil use?

Contact us today to learn how **Oil as a service** can transform your maintenance strategy and set you on a path to a more sustainable future.

About RecondOil
RecondOil is part of SKF, a global leader in lubrication management. Originally a cleantech startup, RecondOil became a unit of SKF in June 2019. RecondOil is developing rapidly. The RecondOil Box, a compact and versatile offline oil cleaning system, was launched onto the market in April 2022.

# Oil as a service

**Oil as a service** from SKF RecondOil regenerates industrial oil so it can be re-used over and over again. Our promise is to transform the use of oil to make it truly circular, so future oil changes can be minimized or even eliminated altogether. **Oil as a service** turns oil into an asset, to be maintained and re-used indefinitely.

## Lead the way in sustainability

By choosing **Oil as a service**, you're not only enhancing your operational efficiency but also taking a lead in sustainability. SKF RecondOil is committed to delivering positive net savings and a rapid return on investment, all while helping you meet your sustainability targets.

**Independent tests prove our DST technology dramatically reduces $CO_2$ emissions:**

- Standard lifecycle of oil = 3 830 kg of $CO_2$ (per cubic meter)
- RecondOil Box = 8 kg of $CO_2$ (per cubic meter)

**Oil as a service** combines innovative product solutions and comprehensive services to ensure your oil remains in optimal condition, minimizing or even eliminating the need for future oil changes. At the heart of this offering is the **RecondOil Box** equipped with **Double-Separation Technology (DST)**, which cleans out nano-sized contaminants and soluble varnish, effectively halting oil degradation.

## Here's how Oil as a service can benefit you:

**Extended oil life**
Continuously regenerates oil to its as-new condition.

**Environmental responsibility**
Significantly cuts $CO_2$ emissions and reduces environmental impact.

**Cost savings**
Reduces the frequency of oil changes and associated costs.

**Enhanced equipment performance**
Keeps your machines running smoothly with less wear and tear, with significantly improved machine reliability, higher quality output with reduced variation, and fewer interruptions for maintenance or parts replacement.

**99%**

**RecondOil Box reduces $CO_2$ emissions by 99%.**


# We make it easy not to change oil

**RecondOil Box uses DST-activated filters to remove impurities less than 0.1 µm. It also removes both soluble and insoluble varnish, which clog systems, as well as water.**

In one compact system, easily installed to your application, you get continuously clean oil, resulting in reliable and stable processes. The **RecondOil Box** is also an investment with a short payback time, offered with flexible payment models, where you can choose between different service packages.

**Comprehensive service packages**
Our service packages ensure a seamless transition to circular oil use, including:

- **Installation and commissioning:** We help set up the RecondOil Box and integrate it into your system.
- **Oil condition monitoring:** Regular oil analysis, including oxidization levels, to maintain optimal quality.
- **Technical support:** On-site and remote support to troubleshoot and maintain the system.
- **Filter changes:** Condition-based maintenance to ensure the oil remains effective.

**Flexible payment models**
We offer flexible payment models to suit your financial preferences so you can manage costs, tailor the solution to your needs, and still gain from all the RecondOil Box has to offer:

- **Initial one-time fee:** Covers hardware installation and commissioning.
- **Monthly service fee:** Includes ongoing services and consumables.
- **Adjustable fees:** Options to balance the initial and monthly fees according to your preference.

# A truly circular use of oil with Double Separation Technology

**DST is a new technology for industrial oil regeneration. This groundbreaking, patented technology can change the way we view industrial oils – from a costly consumable to a fully circular asset.**

## What makes DST different?

DST does not replace conventional filters. Instead, it is an addition that takes you beyond conventional filtering. Your oil becomes cleaner than ever before. And by removing even the smallest contaminants, we can prevent your oil from aging. This means that the same oil can be used again and again. In some cases, indefinitely.

**Where can DST be used?**
In almost any industry: energy, manufacturing, marine, metal working, mining, pulp and paper, and more. Almost anywhere where industrial oil is used.

**What are the benefits?**
You might never have to buy new oil again. Or dispose of used oil. Besides saving you money, it can also result in a significant reduction of your carbon footprint. In addition, for many processes, ultra-clean oil can bring substantial performance improvements and longer machine life.

**The RecondOil Box is an offline oil cleaning system that incorporates Double Separation Technology (DST).** Cellulose depth filters work by trapping bigger impurities in the network of fibers, and chemically attracting smaller particles to the cellulose fiber walls – where they stay.

With the RecondOil Box, a chemical booster is added to the cellulose filter media, enhancing the chemical attraction of oil impurities to the filter media, and tightening the network of fibers. The booster addition enables the system to clean out even smaller particles: contamination and oxidation by-products can be removed – even particles with a size less than 0.1 µm – while keeping the active additive functions intact.

## Our methods for oil regeneration

We have two main methods for regenerating industrial oil:

**Continuous regeneration**
A DST system is integrated into the oil reservoir of your application as a kidney-loop. The oil passes through the system continuously, maintaining a very high cleanliness level and keeping the oil in optimal condition.

With the continuous cleaning, not only is the oil kept ultra-clean, but also the application itself. As the oil gets cleaner, the contaminants on the surfaces of the application components are also removed.

Continuous oil regeneration is ideal for processes and applications where constant optimal oil condition is critical.

**Batch regeneration**
Oil is drained from your application and regenerated in batches on the side. The oil is cleaned with the DST system, while oil analysis confirms the restored oil quality. The oil is then returned to the application's oil system.

Batch cleaning is typically suitable for:

- systems that are small and distributed
- large quantities of oil in poor condition with still functional additives
- oils which need a quick turnaround time to improve oil quality
- pre-treatment of an oil before installing a RecondOil Box

## DST systems to suit your needs

The DST systems are available in a range of different sizes and setups.

Based on your application, processes, and oil volumes, we figure out which systems and regeneration method best match your needs.


## One system – three functions

The RecondOil Box, powered by Double Separation Technology (DST), removes contaminants without being limited by filter pore size. This means there is no lower limit to the particle size it can eliminate.

### Nanoparticles

Our system removes nanoparticles and all other particles, effectively preventing oxidation before it starts – potentially extending oil life indefinitely.

### Varnish

The DST-activated filter removes both soluble and insoluble varnish, preventing clogs, reducing operating temperatures, and extending the lifespan of both components and oil.

### Water

The RecondOil Box efficiently removes dissolved, emulsified and free water from oil, ensuring optimal system performance.

### Core functionality

**Nano-filtration.** Removing even the smallest particles.

- Preventing oxidation
- Maximizing seal life with fewer leakages
- Preventing silting in critical components
- Prolonging the life of the oil

**Varnish mitigation.** With DST, the RecondOil Box removes both soluble and insoluble varnish from oil lubricants.

- Avoid clogged systems
- Cooler operational temperature of hydraulic oil (and longer life)

**Water removal.** Removes free, bound, and emulsified water.

- Controls viscosity
- Protects components from corrosion
- Mitigates risk of foaming

### Key value offerings

- Extend oil change intervals
- Avoid buying new oil
- Reduce logistics – shipping, storage, and disposal
- Reduce $CO_2$ footprint

### Key features

- Offline – RecondOil Box units are ‘kidney loops’ and do not affect function of core system
- Compact and robust – these systems are small but powerful
- Easily retrofitted to existing systems
- Enables circular use of oil

### Removes all types of contaminants

- Soft and hard particles down to nano-size
- Bacteria
- Water (free, bound and emulsified)
- Sludge and insolubles (e.g. varnish)
- Soluble oxidation products (i.e. pre-varnish)

### Applications

RecondOil Box is suitable for use with most mineral and synthetic oils. We have RecondOil Box solutions for a broad array of machine sizes ranging from a few hundred litres of oil up to 30 000 litres of oil.

### Benefits

Cleaner oil can result in optimized machine and process performance.

- Reduced friction and wear
- Fewer unplanned stops
- Improved availability
- Reduced maintenance requirements
- Extended component life
- Reduced energy cost thanks to reduced friction
- Processes more predictable and stable
- Increased cycle times and repeatability
- Higher productivity

## RecondOil Box

| | |
|---|---|
| Oil temperature: | Max. 80 °C (In case of higher temperatures contact RecondOil) |
| Working pressure: | 0.8–5 bar |
| Pressure: | Max. 5 bar, relief valve opens at 5 bar |
| Power consumption: | 0.01-0.17 kW (variable speed) |
| Power supply: | 80-230 VAC |
| Hose connection IN: | 1/2" BSP |
| Hose connection OUT: | 1/2" BSP |
| Installation: | Connect as an offline unit. «IN» = hose to tank and «OUT» = hose to tank |
| Filter insert: | SKF RecondOil DST-activated depth filter (ROBX500DST) or Standard depth filter (ROBX500HY) |

| Type designation | Housings | xxx = DSL: Display + Spill tray + Legs | | | | | xxx = DS: Display + Spill tray | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Dry weight | Op weight | Width | Depth | Height | Dry weight | Op weight | Width | Depth | Height |
| | | kg | | mm | | | kg | | mm | | |
| **Side by side:** | | | | | | | | | | | |
| ROBX3115xxx | 1 | 33 | 42 | 560 | 550 | 850 | 30 | 39 | 560 | 290 | 600 |
| ROBX3125xxx | 2 | 46 | 64 | 830 | 550 | 850 | 43 | 61 | 830 | 290 | 600 |
| ROBX3135xxx | 3 | 63 | 90 | 1 120 | 550 | 850 | 59 | 86 | 1 120 | 290 | 600 |
| ROBX3145xxx | 4 | 76 | 112 | 1 390 | 550 | 850 | 70 | 106 | 1 390 | 290 | 600 |
| ROBX3155xxx | 5 | 89 | 134 | 1 660 | 550 | 850 | 83 | 128 | 1 660 | 290 | 600 |
| ROBX3165xxx | 6 | 106 | 160 | 1 950 | 550 | 850 | 97 | 151 | 1 950 | 290 | 600 |
| ROBX3175xxx | 7 | 119 | 182 | 2 220 | 550 | 850 | 110 | 173 | 2 220 | 290 | 600 |
| ROBX3185xxx | 8 | 132 | 204 | 2 490 | 550 | 850 | 123 | 195 | 2 490 | 290 | 600 |
| **Back to back:** | | | | | | | | | | | |
| ROBX3125xxx/B | 2 | 42 | 60 | 560 | 550 | 850 | - | - | - | - | - |
| ROBX3135xxx/B | 3 | 51 | 78 | 560 | 550 | 850 | - | - | - | - | - |
| ROBX3145xxx/B | 4 | 64 | 100 | 830 | 550 | 850 | - | - | - | - | - |
| ROBX3155xxx/B | 5 | 73 | 118 | 830 | 550 | 850 | - | - | - | - | - |
| ROBX3165xxx/B | 6 | 90 | 144 | 1 120 | 550 | 850 | - | - | - | - | - |
| ROBX3175xxx/B | 7 | 99 | 162 | 1 120 | 550 | 850 | - | - | - | - | - |
| ROBX3185xxx/B | 8 | 112 | 184 | 1 390 | 550 | 850 | - | - | - | - | - |

| Type designation | Housings | xxx = DL: Display + Legs | | | | | xxx = D: Display | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Dry weight | Op weight | Width | Depth | Height | Dry weight | Op weight | Width | Depth | Height |
| | | kg | | mm | | | kg | | mm | | |
| **Side by side:** | | | | | | | | | | | |
| ROBX3115xxx | 1 | 31 | 40 | 560 | 550 | 850 | 28 | 37 | 560 | 290 | 600 |
| ROBX3125xxx | 2 | 43 | 61 | 830 | 550 | 850 | 40 | 58 | 830 | 290 | 600 |
| ROBX3135xxx | 3 | 59 | 86 | 1 120 | 550 | 850 | 53 | 80 | 1 120 | 290 | 600 |
| ROBX3145xxx | 4 | 71 | 107 | 1 390 | 550 | 850 | 65 | 101 | 1 390 | 290 | 600 |
| ROBX3155xxx | 5 | 83 | 128 | 1 660 | 550 | 850 | 77 | 122 | 1 660 | 290 | 600 |
| ROBX3165xxx | 6 | 99 | 153 | 1 950 | 550 | 850 | 90 | 144 | 1 950 | 290 | 600 |
| ROBX3175xxx | 7 | 111 | 174 | 2 220 | 550 | 850 | 102 | 165 | 2 220 | 290 | 600 |
| ROBX3185xxx | 8 | 123 | 195 | 2 490 | 550 | 850 | 114 | 186 | 2 490 | 290 | 600 |
| **Back to back:** | | | | | | | | | | | |
| ROBX3125xxx/B | 2 | 40 | 58 | 560 | 550 | 850 | - | - | - | - | - |
| ROBX3135xxx/B | 3 | 49 | 76 | 560 | 550 | 850 | - | - | - | - | - |
| ROBX3145xxx/B | 4 | 61 | 97 | 830 | 550 | 850 | - | - | - | - | - |
| ROBX3155xxx/B | 5 | 70 | 115 | 830 | 550 | 850 | - | - | - | - | - |
| ROBX3165xxx/B | 6 | 86 | 140 | 1 120 | 550 | 850 | - | - | - | - | - |
| ROBX3175xxx/B | 7 | 95 | 158 | 1 120 | 550 | 850 | - | - | - | - | - |
| ROBX3185xxx/B | 8 | 107 | 179 | 1 390 | 550 | 850 | - | - | - | - | - |

# Oil condition monitoring

**Maintaining optimal oil quality is part of our service and crucial for the performance and longevity of your equipment. SKF RecondOil's comprehensive oil condition monitoring services are designed to ensure that your industrial oil remains in peak condition, minimizing downtime and maximizing efficiency.**

## Key features of our oil condition monitoring services

**Routine monitoring**
We recommend quarterly monitoring of oil condition during operation. Samples are sent to specialist labs for testing and we then recommend action based on the results. This is a valuable decision-making aid for maintenance planning.

**Oil condition monitoring program**
Our program ensures that oil cleanliness and condition are continuously assessed in your specific application, addressing potential issues before they affect performance.

**Analysis process**
Our detailed analysis process covers every step from sample collection to results interpretation. This systematic approach ensures accurate and actionable insights.

**Oil analysis**
Our analysis provides critical information, including:

- **Particles:** Assesses particle contamination in the oil, which can cause rapid machine wear and accelerate its degradation
- **Viscosity:** Measures the oil's resistance to flow, indicating its suitability for lubrication.
- **Water content:** Detects the presence of water, which can compromise oil effectiveness and lead to equipment damage.
- **Oxidation, acidity and nitration:** Evaluates chemical changes in the oil that can affect its performance and lead to degradation.
- **Varnish:** Identifies the presence of varnish deposits, which can impact equipment efficiency and reliability.
- **Demulsibility:** Assesses the oil's ability to separate from water, ensuring effective lubrication even in the presence of contaminants.

Our oil condition monitoring services help you maintain the highest standards of operational efficiency and equipment reliability, ensuring your machinery performs at its best for years to come.

## Comprehensive service packages

**Oil as a Service** offers flexible service packages tailored to your specific needs:

**Light package:** Includes commissioning of the DST system, regular oil sampling and analysis, detailed reporting, and remote technical support.

**Premium package:** Provides a full suite of services, including installation and commissioning of the DST system, regular oil sampling and analysis, detailed reporting, condition-based filter changes, remote and on-site technical support.

**Partner with SKF RecondOil for optimal oil health**
Our comprehensive monitoring solutions are designed to meet the demands of modern industry, providing you with the tools and insights needed to maintain optimal oil health.

With SKF RecondOil's oil condition monitoring services, you can be confident that your industrial oil remains in peak condition, enhancing equipment performance and reducing maintenance costs.


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