

Evidence for RecondOil's DST technology

How RecondOil's Double Separation Technology (DST) effectively removed submicron contaminants enhancing lubricant life and performance.

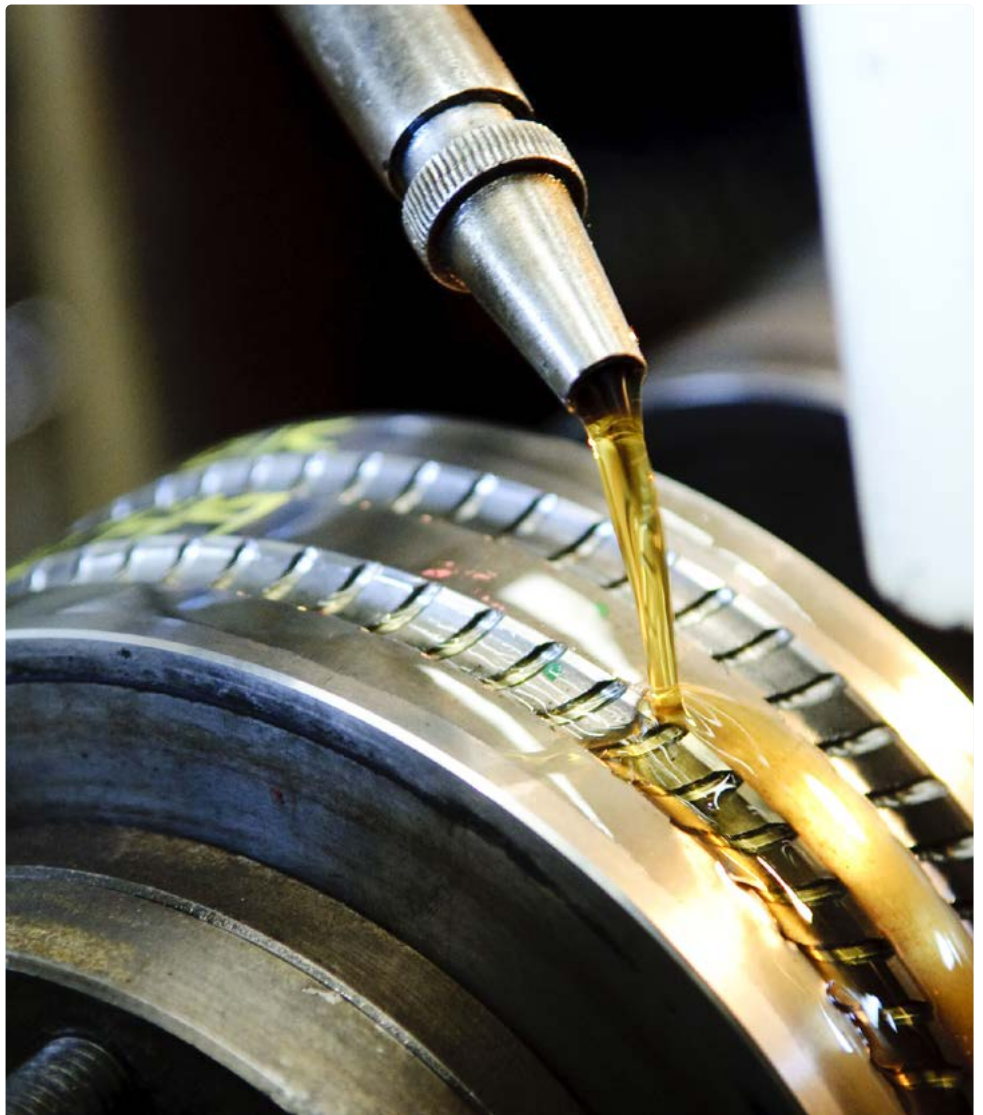
Oil as an asset, not a consumable

Lubricants are critical for industrial operations, ensuring efficiency and longevity of machinery. However, contamination, oxidation and additive depletion degrade lubricants over time, leading to increased maintenance costs, downtime and environmental waste.

Existing filtration methods focus primarily on removing particles above 4 μm (microns), yet recent research highlights the potential damage caused by sub-micron particles.

This white paper presents new findings confirming that RecondOil's Double Separation Technology (DST) effectively removes these submicron contaminants, significantly improving machinery performance and extending lubricant life indefinitely.

We call this the "circular use of oil" – oil as an asset, not a consumable.





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.

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.

Each step in the oil's supply chain and lifecycle contributes to environmental degradation and CO₂ emissions.

99%

RecondOil Box reduces CO₂ emissions by 99%.

Lubricant degradation and particle contamination

Industrial lubricants face multiple contamination challenges, including water, metal particles, and degradation byproducts.

ISO cleanliness codes measure particles at 4, 6, and 14 µm, yet smaller particles remain undetected. Studies suggest that these submicron particles can interact with lubricant additives, accelerating

oxidation and reducing efficiency. Traditional filtration systems, reliant on mechanical sieving, struggle to address this issue. They allow smaller particles to pass through, where they continue to affect lubricant integrity. The result is premature oil replacement and increased operational costs.

80%

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

Standard filtration vs. DST

A recent study, conducted by the Research and Innovation team at RecondOil, evaluated the impact of RecondOil's DST on commercially used oil with high concentrations of metallic particles.

This lubricant was known to contain high concentrations of metallic particles.

The research conducted a comparative analysis of used, conventionally filtered and DST-treated oil samples.

Key methodologies included:

- **Filtration and sample preparation:** Used oil underwent both standard filtration and DST. Residual contaminants were extracted, centrifuged and filtered through membranes down to 0.2 μm .
- **SEM and EDS analysis:** High-resolution scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS) analyzed particle composition and size distribution.
- **Image segmentation:** MATLAB image processing quantified contaminant reduction after each filtration step.



DST removed 93% of submicron contaminants

The results clearly demonstrated that RecondOil's DST technology significantly outperformed standard filtration.

1. Reduction in submicron contaminants

- Standard filtration removed 49% of submicron contaminant particles compared to the unfiltered sample.
- DST achieved a 93% reduction in submicron contaminant particles, capturing significantly more submicron debris.

2. Particle size and composition analysis

- Particle sizes ranged from 200-1000 nm (nanometer), confirming the presence of contaminants undetectable by conventional filtration methods.
- Key elements such as iron, zinc and phosphorus were found, likely originating from wear metals and also additive degradation.
- SEM imaging highlighted a sharp contrast between DST-treated and untreated samples, confirming the superior submicron contaminant removal.

3. Potential impact on lubricant degradation

- Previous research in diesel engine oils suggests that submicron contaminants accelerate oxidation and strip additives from lubricants.
- The study's findings imply a similar risk for industrial lubricants, reinforcing the importance of removing the smallest particles to prolong lubricant service life.

93%

DST reduced submicron contaminant particles by 93%








Findings:

Significant implications for industry

These findings provide strong evidence that RecondOil's DST offers a transformative improvement in lubricant management. DST technology not only removes visible contaminants but also tackles the invisible threats that standard filters miss.

By effectively removing submicron contaminants, DST:

-  Extends lubricant lifespan, reducing oil replacement frequency and associated costs.
-  Enhances machine reliability and reduces unplanned downtime.
-  Lowers environmental impact by minimizing oil waste and disposal requirements.

Conclusion:

Unparalleled levels of oil cleanliness

The results from this study provide evidence that RecondOil's DST system effectively removes submicron particles, outperforming traditional filtration methods.

This breakthrough not only improves oil cleanliness far beyond conventional filtration methods, but also has far-reaching implications for industrial efficiency, sustainability and cost savings.

Further research is needed to explore the implications of submicron contamination in different lubricant applications. However, the current results show that DST provides unparalleled level of oil cleanliness, ensuring longer-lasting, high-performance lubricants to enhance operations across industries.

As businesses seek sustainable and cost-efficient solutions, RecondOil's DST technology emerges as a vital innovation in lubricant maintenance.



Want to know more?

Read the full findings in the published paper [here](#).

skf.com

© SKF and RECONDOIL are registered trademarks of AB SKF (publ).

© SKF Group 2025. All rights reserved. Please note that this publication may not be copied or distributed, in whole or in part, unless prior written permission is granted.

Every care has been taken to ensure the accuracy of the information contained in this publication, but no liability can be accepted for any loss or damage whether direct, indirect or consequential arising out of the use of the information contained herein.

PUB LS/S2 20149 EN · October 2025

Certain image(s) used under license from shutterstock.com