SKF RecondOil Box:

Customer Experiences

RecondOil®

Contents

Our customers: a valuable data source

The RecondOil Box is the latest addition to the growing family of oil regeneration technologies from SKF. We believe it can change the way that industry perceives oil, transforming it from a costly carbon footprint into a sustainable asset that also improves mechanical performance.

Before the RecondOil Box was launched officially in April 2022, several customers joined a trial program. Data from their installations has provided new and valuable insights. This document is a short summary of the experiences of two of them – one in Mexico, one in Finland. We will publish more customer reports as soon as they become available.

The goal of SKF's Double Separation Technology (DST) is to achieve circular use of oil. Eliminating the need to change oil in industrial processes delivers direct cost savings connected with purchase, transport and disposal. In addition, machines, and processes that run on oil that is constantly filtered down to the level of the tiniest nanoparticles also see improved performance with respect to maintenance, operational availability, reliability and overall productivity.

The longest that our trial customers have used the RecondOil Box is almost a year, while others have used it for only a few months. So far, however, the feedback is very promising and we want to share it with you here.

This is Part I in a series of reports. We will publish Part II during 2022.

Circular use of oil

Today's linear approach – where oil is used until it degrades, then is discarded and replaced – is extremely inefficient and unsustainable. Besides the implications for the environment and climate, it generates both direct and indirect costs for the application's owner. Besides the direct cost of purchase and logistics, the traditional approach to oil is also associated with indirect costs such as repair, maintenance and parts replacement, and reduced productivity from process interruptions.

What then is required to enable circular use of oil? The starting point is to eliminate the three main causes of oil degradation – contamination, oxidation, and additive depletion.

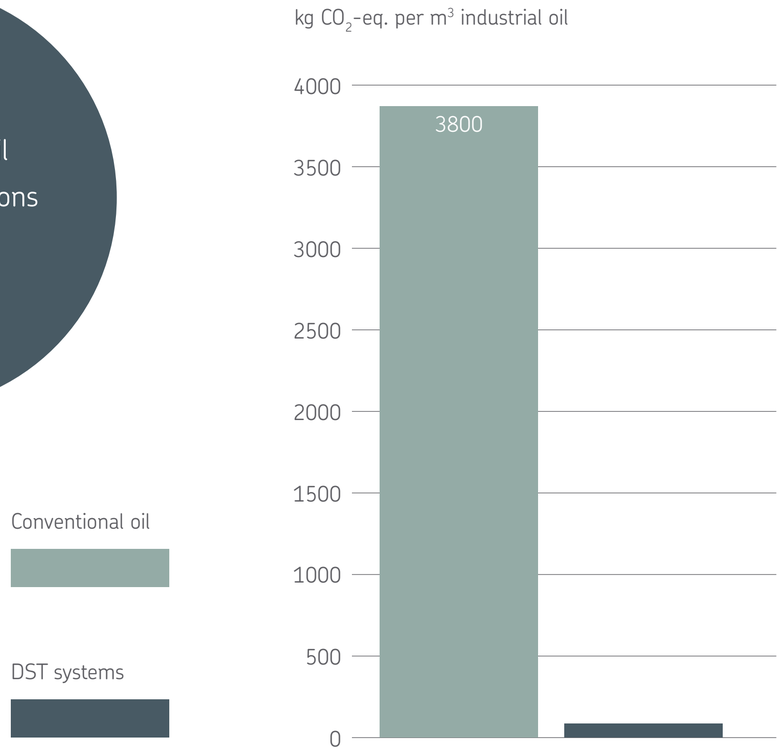
- Oil becomes contaminated by small particles such as dirt, swarf, fibres, water, air and so on.
- Particles, water and heat create oxidation, a chain reaction that accelerates exponentially once it has begun, causing viscosity to change and forming varnish and sludge.
- Additives that give the oil its specific properties are consumed in the application's processes.

When oil has degraded to an extent that it loses its functionality, it must be replaced to prevent damage to the application or process. The RecondOil Box removes these causes of degradation. Through our monitoring program, we have followed the status of oil over time for our trial customers. We see the following common results across the trials:

- Significantly improved ISO 4406 cleanliness levels
- Drastically reduced varnish
- Improved oxidation stability
- Decreased water content
- Stable acid levels
- Stable viscosity.

We will continue to monitor the oil condition of our trial customers – and all new customers for that matter – and communicate the results. But the initial findings demonstrate that the RecondOil Box removes contaminants from oil and maintains it "as new" at a level of cleanliness that allows it to be used over and over again without affecting performance. This is an essential condition for achieving the circular use of oil.

Circular use of oil reduces CO_2 emissions by up to 99%



CO_2 emissions reduced by up to 99%

Life cycle analysis* demonstrates that the climate footprint associated with SKF's Double Separation Technology is far lower than that of the conventional approach to oil. By regenerating oil, less needs to be produced and therefore less needs to be disposed of and incinerated.

The climate impact of the conventional oil cycle is 3 830 kg CO_2-equivalent per m^3, compared to 8.2 kg CO_2-equivalent for the RecondOil Box. The RecondOil Box reduces carbon emissions by up to 99%, depending on the energy mix.

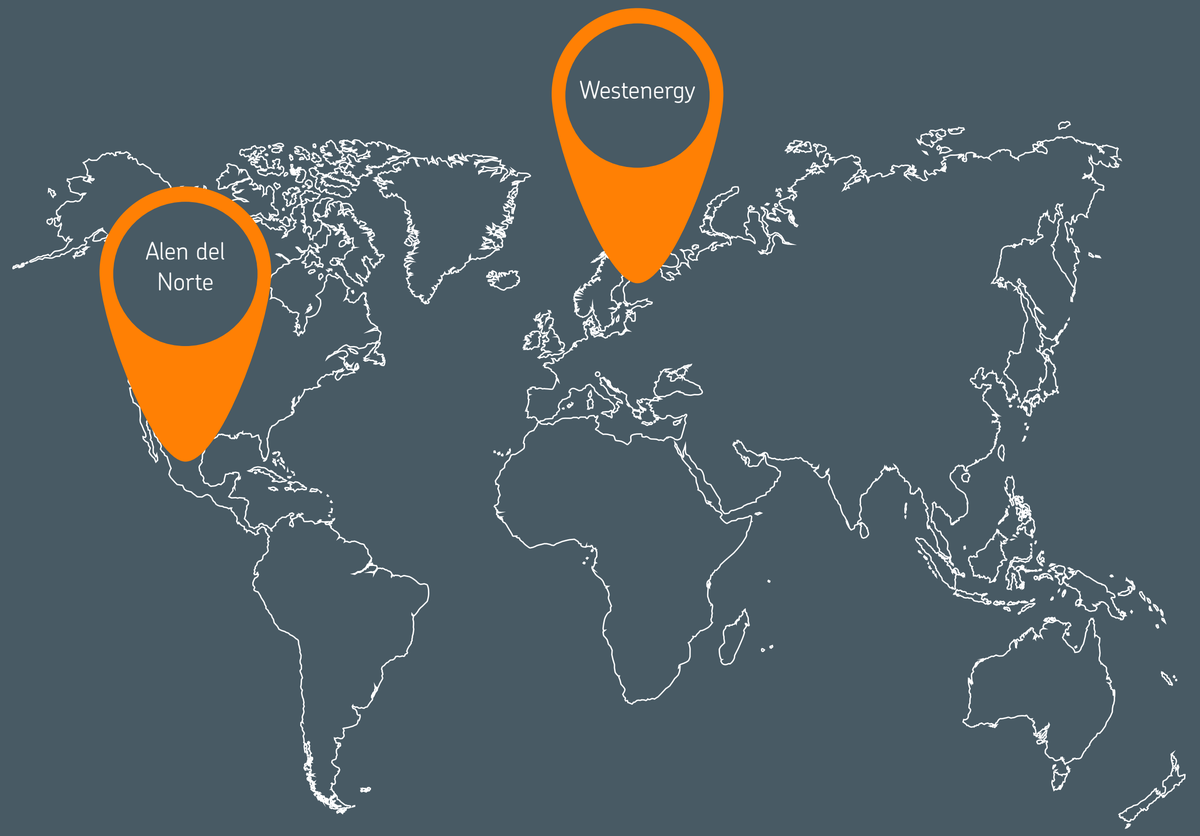
*CO_2 reduction when compared with traditional oil cycle. Source: Life cycle analysis performed by IVL Swedish Environmental Research Institute (2021).

Customer cases

We asked two of our trial customers about their experience in using the technology. We wanted to understand what clean oil means to them: what levels of sustainability, cost and performance value do they see?

Alen del Norte, a producer of environmentally sustainable homecare products in Mexico, was one of the first customers for the RecondOil Box. Our second case is Westenergy, a green energy producer in Finland.

Both companies talk about the value of avoiding the need to change oil. The frequency of oil changes varies significantly with the type of application, but common to both customers is that they want to prolong the service life of their oil.



Alen del Norte

For Alen del Norte, the plastic blow moulding machine is one of the most critical applications in the factory. Traditionally, the oil in this machine had to be changed every three months, by which time the oil was normally heavily contaminated.

In October 2021, a RecondOil Box with one DST filter was connected to the hydraulic oil tank. Alen del Norte hoped to avoid the yearly purchases of oil and the labour costs involved in frequent changes. Even more importantly, they expected more stable machine performance, helping them to reduce downtime.

Almost eight months later, Alen del Norte identified several advantages of using the RecondOil Box. For example, the company used to pre-filter new oil on-site before putting it into the blow moulding machine, but now it has been able to eliminate this filtration stage. It is also seeing more stable performance from the machine.

Since installing the RecondOil Box, the company has not had to do a single oil change in the blow molding machine. Previously, the oil was changed every three months. Nor has it been necessary to change the machine's hydraulic valves, which previously had to be done every two or three months.

Avoiding changing the oil and hydraulic valves naturally means savings for Alen del Norte. In addition to these direct savings, the company can also add the cost of labour and machine downtime.

Alen del Norte has recently purchased another six RecondOil Boxes to install in similar applications at the factory.

Westenergy

In the power plant where Westernergy refines waste into power, a critical hydraulic system controls the boiler grates. The service life of the oil is relatively short, and normally it must be changed every four years. Oil is contaminated with dirt and degraded by heat from the incineration process. In the past, contaminated oil has caused component and equipment failures and leaks.

In March 2022, Westenergy's oil supplier recommended that they replace the oil since it had reached the end of its service life. Westenergy was about to do so when SKF had the opportunity to analyze and evaluate the oil. Based on this analysis, we recommended Westenergy to clean the oil instead.

A RecondOil Box with two filter housings was installed, including an oil condition monitoring program with gravimetric and pre-varnish testing.

Since the installation, Westenergy has run the hydraulic system with the very oil that its supplier recommended should be replaced – and the condition of that oil looks better than ever.

Before the installation, there were leakages of oil at different connection points in the application, most likely because of varnish build-up damaging the seals. These leakages have now stopped, because cleaner oil keeps the sealings in better condition. Thanks to this, Westenergy has avoided the typical top-ups of fresh oil. No new oil has been purchased or used as a top-up since the installation of the RecondOil Box.

Westenergy says it expects to save more than 80% of maintenance costs related to contaminated over the two-year contract period. They also expect to achieve increased availability for the critical hydraulic system. In addition, the CO_2 emission savings are estimated to be about 5.4 tonnes.

Westenergy says that "It is still too early to make firm conclusions on the full value of the RecondOil Box. However, initial observations suggest that we will achieve the set goals stated in the contract with SKF: minimal costs for oil-related purchase and maintenance, and savings thanks to higher machine availability. Plus of course, a substantial reduction in CO_2".

Looking ahead

These initial findings are very encouraging, and support our conviction at SKF RecondOil that circular use of oil offers significant benefits, including:

- Improved sustainability
- Reduced total oil costs
- Better system performance and availability

But it is still too early to assess the full cost and performance benefits of the ultra-clean oil that can be achieved using the RecondOil Box for various applications and under different circumstances. The technology needs to be tailored to specific needs and conditions. As our understanding grows together with our customers' experience, can we better calibrate the KPIs – productivity, downtime, energy use and other relevant parameters – that we establish to ensure that customers maximise the benefits for their machinery's productivity, reliability and efficiency.

As more customer experience becomes available, we will keep you updated. Make sure you receive the further reports in this series by signing up for them here: **xxxxx.xxxxx@skf.com**

Improved sustainability

Reduced total oil costs

Better system performance and availability

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