

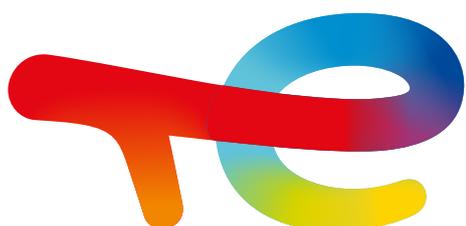


# Collaboration Case Study



**SK Shipping, WinGD and Lubmarine join forces to unearth perfect match cylinder oil for brand new dual-fuel engines.**

Having installed brand-new X-DF engines on the SK Audace LNG vessel, Lubmarine's customer SK Shipping needed to improve its operating efficiency beyond what the current cylinder oil was permitting. WinGD's engines are state-of-the-art, but were yet to be accompanied by a validated fit-for-purpose lubricant, prompting a three-party collaborative mission to find the ideal solution.



**TotalEnergies**



**WIN GD**

## THE COLLABORATORS

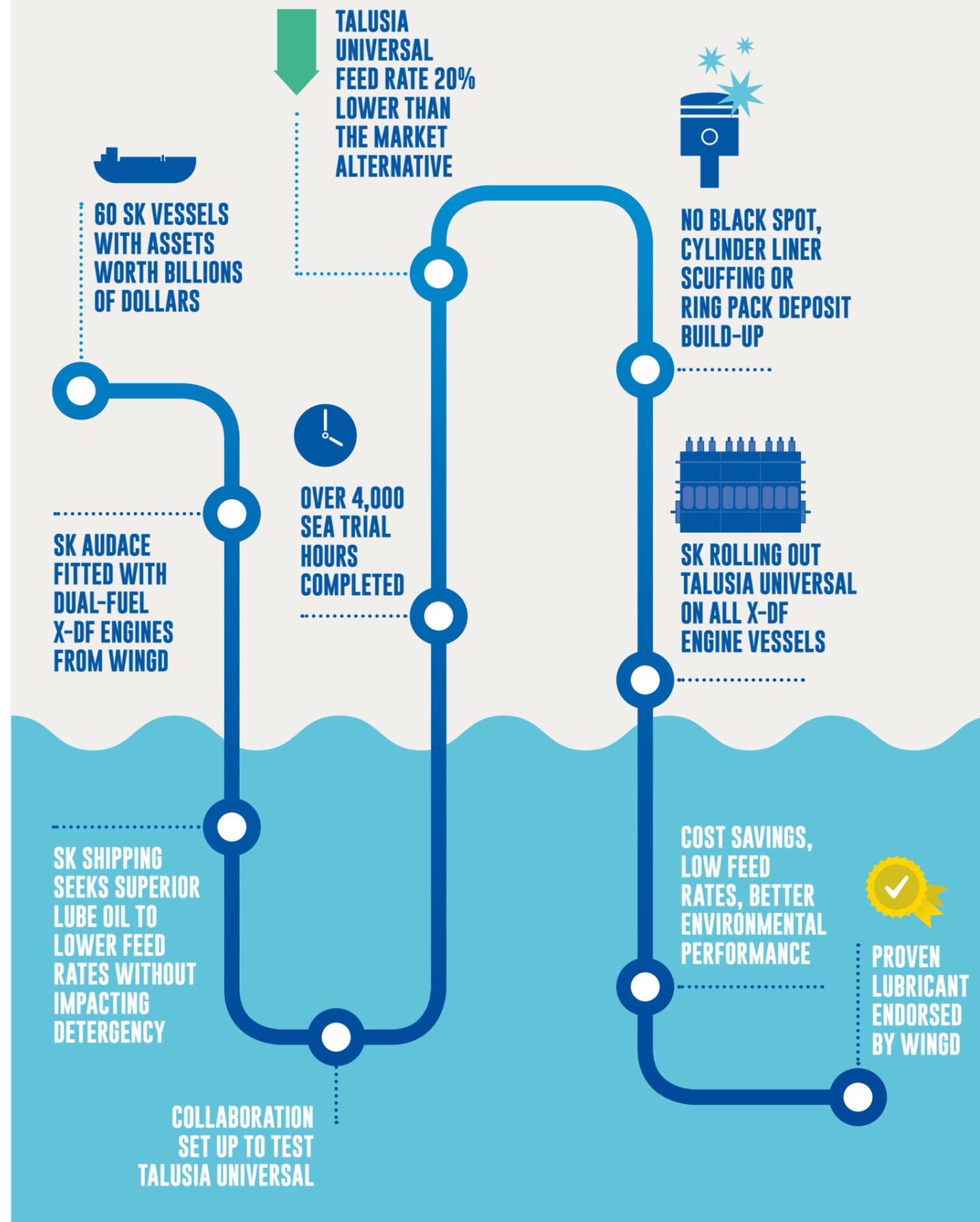
SK Shipping is a global shipping firm engaged in the sea transportation of crude oil, petroleum, LNG, LPG and dry bulk goods, as well as ocean bunkering, through its dedicated SK B&T division. Headquartered in Seoul, South Korea, the company has been operating since 1982. SK Shipping is the first of its kind in the world to own three types of LNG vessel, its intellectual assets and approach to innovation being key features which help to differentiate it from a competitive field.

WinGD has been powering merchant shipping since 1898. Its propulsion power technology can be found in a range of vessels that travel the oceans today, including oil tankers, bulk carriers, car carriers, cargo ships and container ships. Based in Winterthur, Switzerland, the company operates with a vision to power transformation for a sustainable future.

## THE SITUATION

Lubmarine has been proudly supplying SK Shipping for well over a decade, working closely with the company's procurement and technical departments. Lubricants form a significant proportion of vessel operator expenditure, and the need for cost effective cylinder oils that perform well is essential. This is likely to develop further as marine 2-stroke cylinder oils will also have to work with future alternative gas and liquid fuels, while still providing their core lubrication, basicity (where needed) and cleaning functions to the piston running components of an engine.

SK Shipping and WinGD are long-time collaborators. To meet its future emissions goals SK Shipping chose the dual-fuel X-DF engine manufactured under license for WinGD by Korean specialist HSD. The switch to LNG to reduce CO<sub>2</sub> emissions combined with the advanced X-DF engine capability operating a low-pressure Otto-Cycle combustion system, further reduces NOx emissions without the need for additional emission reduction technologies (Tier III emissions compliant). To help increase environmental performance and drive further cost savings, SK Shipping required a superior cylinder oil to keep the engine clean and provide a high level of engine protection while aiming to reduce cylinder oil feed rates to significantly lower and sustainably safe levels.



## THE COLLABORATION

SK Audace is the first vessel fitted with the dual-fuel X-DF engine from WinGD. SK Shipping needed to find the right cylinder oil for the new engine that was able to offer sufficient lubrication at lower feed rates, and keep the piston running components clean and free from excess deposit build up to optimize engine performance. Cylinder oils, while burning LNG as fuel (ie. in gas mode), undergo significantly more thermal stress than in liquid fuel mode.

Working closely with engineers from SK Shipping and WinGD, Lubmarine trialled its Talusia Universal cylinder oil on the SK Audace for over 4,000 hours while operating mostly on LNG. In addition, Lubmarine ran 2 separate liquid fuel trials including 2,000 hours on ULSFO and 2,000 hours on VLSFO, both on current WinGD X Generation engines, making it one of the most tested cylinder oils currently available on the market. Talusia Universal is, as a result, fully validated and approved for unrestricted use on all these fuel grades.

Crucially during the LNG trial, the SK Audace operated in a variety of sea and ambient conditions with the engines running almost 24/7. Trials on-board the SK Audace used two WinGD X-DF engines, allowing for simultaneous, direct comparison between Talusia Universal and another lubricant. Vessel inspections at port and drain-oil analysis samples from the sea trials, were sent to Lubmarine's laboratory for analysis and interpretation. Findings were shared with all partners to help inform decisions and next steps.

## OUTSTANDING RESULTS

By the end of the trial on the SK Audace, the engine using Talusia Universal was able to operate at a feed rate 20% lower than the second engine running with an alternative lubricant, and with improved cleanliness levels. Talusia Universal showed significantly improved piston and component running performance as a result of greatly reduced and in places negligible carbon deposits found on engine components, including the piston and piston rings. To date, Talusia Universal has proven a commercially viable option and is currently one of just two cylinder lubricants on the market to have passed WinGD's gas mode validation while using LNG as a marine fuel. Talusia Universal is 'DF' dual-fuel validated among other products. SK Shipping is now supplying all of its X-DF engine carriers with Talusia Universal from Lubmarine.

## WHAT THE ENGINE OEM SAYS

FRANK VENTER, PROJECT ENGINEER,  
TRIBOLOGY FUELS AND LUBRICANTS, WINGD

What struck us was the level to which LUBMARINE wanted to test. They wanted it to be rigorous. We ran three full validations – one on gas and two on different liquid fuels. It's certainly one of the most tested-on lubricants we have seen.

## WHAT THE VESSEL OWNER SAYS

RONNIE LEE, MANAGER, FLEET  
MANAGEMENT TEAM II, SK SHIPPING

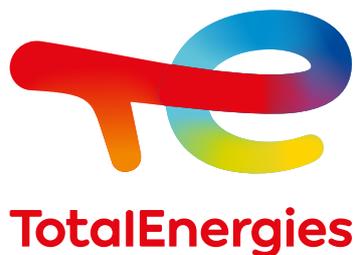
LUBMARINE's Technical team and Marine Lubricant Engineers supported us through the process with both vessel inspections and also Drain Oil Analysis services in its labs. WinGD took part in those inspections as did our crews, creating a very effective collaboration.

## About Lubmarine

Lubmarine is part of TotalEnergies Lubrifiants S.A., a division within TotalEnergies.

With a worldwide presence in over 100 countries and 1,000 ports, our logistics ensure that we are exactly where our customers need us to be.

No matter where you are, we can safely deliver the right marine lubricant and provide the technical support you need, and have been doing so since we established the division in 1952. Our lubricants are used in more than 7,000 vessels worldwide.



TotalEnergies Lubrifiants S.A.

Lubmarine Division  
562, avenue du parc de l'Île  
92029 Nanterre Cedex – France



For further information about our products and services, please visit:  
[lubmarine.totalenergies.com](http://lubmarine.totalenergies.com)