



Skysails - Using Wind Power Profitably

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Maritime shipping is entirely dependent on oil. Over the past 20 years, crude oil prices have risen annually by 11% on average, with a disproportionate increase in the last few years. This development places tremendous financial pressure on the shipping industry as fuel costs account for a great proportion of a ship's operating expenses already today.

Cost pressures from high oil prices will once again increase significantly in the foreseeable future; as experts expect a rapid (by the end of the year) and substantial upturn in the price of oil to US-\$75 to US-\$100 per barrel. The International Energy Agency (IEA) estimated in a recent interview that oil prices will rise once more to US-\$200 by the year 2013.

In addition to that, shipping companies will also be burdened by the costs stemming from rules on emissions. It has already been established as binding under international law that the inexpensive heavy oil that has been being used as ship's fuel will be gradually prohibited. The distillate fuel grades, such as MGO and MDO, which emit fewer pollutants and will be required to be used, cost twice as much regardless of the price of oil. Furthermore, it is expected that the shipping industry will be incorporated into the emissions trading regime during the UN Climate Change Conference to be held in Copenhagen in December 2009.



Against this background and especially in times of an economic crisis, it makes perfect (and for shipping companies vital) business sense to invest in innovative technologies that reduce costs. By harnessing the most economic and environmentally sound source of energy available on the high seas – wind energy – the SkySails-System thus provides a very attractive alternative for shipping companies addressing both economic and environmental considerations.

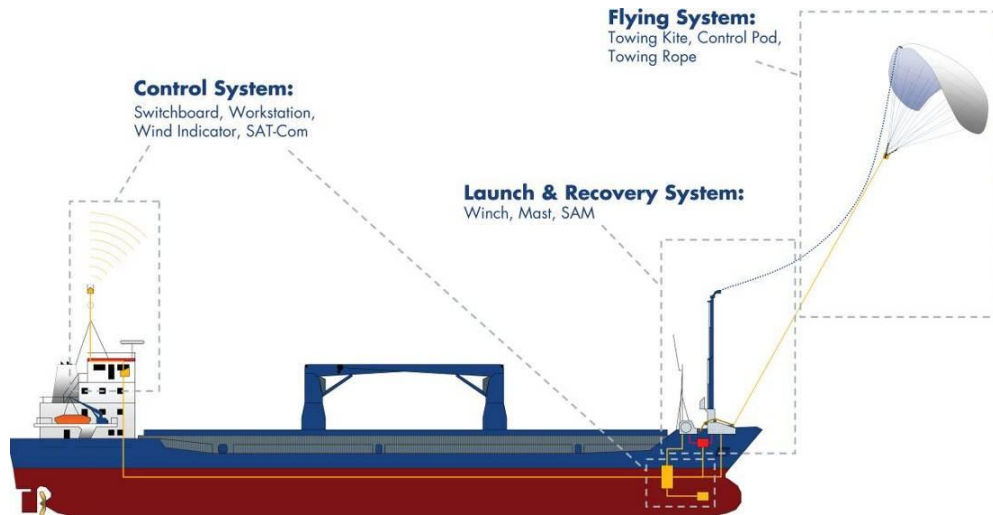
Depending on the prevailing wind conditions, a ship's average annual fuel costs can be reduced by 10 to 35% by using the SkySails-System. Under optimal wind conditions, fuel consumption can temporarily be cut by up to 50%. This allows considerable amounts of expensive oil to be saved, conserves petroleum resources as they become ever scarcer in the future and simultaneously reduces climate-damaging emissions.

SkySails - Reliable and High-Performance Technology

The SkySails-System consists of three simple main components: A towing kite with rope, a launch and recovery system, and a control system for automatic operation.

Instead of a traditional sail fitted to a mast, SkySails uses large towing kites for the propulsion of the ship. They are made of high-strength and weatherproof textiles and their shape is comparable to that of a paraglider.

SkySails can operate at altitudes between 100 and 300 m where stronger and more stable winds prevail. By means of dynamic flight maneuvers, e.g. the figure of "8", SkySails easily generate five times more power per square meter sail area than conventional sails. It is thus possible to gain significant savings by using comparatively small sail areas.



SkySails System Components

SkySails - From Vision to Reality

SkySails started with the development of the world's first practicable towing kite propulsion system for commercial shipping in 2001. Having successfully completed the basic research and engineering in 2005, the system's towing kite area was scaled up to 160m² and thoroughly tested on the 55m-long former buoy tender MS "Beaufort" in the years 2006 and 2007.

Starting in early 2008, SkySails took the last major step in developing the technology into a production-ready product with the first-time use of the system aboard the cargo ships "Beluga SkySails" (Beluga Shipping; first installation on a newly built vessel) and "Michael A." (Wessels Reederei; first retrofit system), followed by a long-term pilot testing phase of one and a half years during regular (commercial) shipping operations.

Overall, the results of this pilot testing phase exceeded expectations in regards to the tractive force produced by SkySails propulsion. The fuel consumption aboard the "Michael A." was at times able to be reduced by up to 57% with the help of SkySails propulsion. For comparison: The "Michael A." needs approximately 11 tons of thrust for full cruising speed. Alternatively, the ship's speed can be increased by approximately 1.6 knots thanks to the additional power that the SkySails-System provides.

SkySails propulsion has been integrated ideally into the ship's operations; it required no major effort or expense to be installed onto the vessels. And, it has been proven that ships remain fully maneuverable while employing the SkySails-System. What's more, trials have confirmed that present crew strengths are fully adequate for operating the system and that the operational concept works as intended.

The insights and experience gained by the shipping companies, crews and SkySails engineers during countless launches and recoveries while operating SkySails propulsion on board the ships were fed simultaneously into the SkySails product development effort. As a result, SkySails redesigned the system concept and developed the so-called "SkySails Arrangement Module" (SAM), an integrated launch and recovery module in which all of the SkySails-System's fore-deck components (except the towing rope winch) are housed and protected from the force of the waves. This design led to a significant improvement in the system components' endurance. The SAM also has a sea-state compensation feature that prevents the motions of the ship from being conveyed to the towing kite during the launch. This feature vastly improves the ability to launch the SkySails-System in rough seas.

First-hand use revealed a number of other important benefits that this module concept brings in its wake. Installation is now easier and faster since most of the system's components can be assembled, mounted and tested right at the factory. Even operating the system has become simpler and easier for the crews. This module concept has shown itself to be so advantageous during practical testing that all ships will be equipped with it in the future.



Currently, SkySails is equipping a series of three Rhine class ships being built for Wessels at the Komarno shipyard in Slovakia with its wind propulsion system. The MV “Theseus” has become the first ship in this series to be equipped with the latest-generation SkySails-System, into whose development were channelled the many important lessons learned during pilot testing.

The “Theseus” is the same type of ship as the “Michael A.” and is 90 meters long, has a capacity of some 3,700 dwt and a MaK main engine that produces 1,500 kW of power. A 160 m² SkySails propulsion system works to relieve the main engine of the “Theseus” the same way it does on board the “Michael A.”

Final installation and commissioning of the towing-kite propulsion system on the “Theseus” was completed in early August at SkySails’ manufacturing facilities in Wismar.



SkySails – Outlook 2009/2010

As part of advanced product development, SkySails is working right now on perfecting system performance, and engineering the next larger SkySails propulsion system. Designated the SKS C 320, it will have an approximately 300 m² large towing kite and generate 16 tons of tractive force in good winds – and thus save twice as much fuel as an SKS C 160. Later this year the “Beluga SkySails” will become the first ship to be fitted with an SKS C 320, which of course also incorporates the new module concept.



SkySails is working full steam to expand production at the same time. The start of series production of the SKS C 160 system is scheduled for 2010.

In early 2009 SkySails, together with the renowned Zeppelin Group, established a joint venture company called “Zeppelin SkySails Sales & Service” to handle the worldwide sales and servicing of SkySails propulsion. The company started operations in March of this year and will use the existing service network of Zeppelin Power Systems, one of the most respected suppliers of marine engines, to ensure that all SkySails-Systems can be rapidly serviced and supplied with replacement parts across the globe.

Market Potential & Contribution to Climate Change

Due to its universal and compact design, virtually all sea-going cargo vessels can be retro- or outfitted with the SkySails propulsion. The SkySails-System can be installed on ship new builds as well as on existing ships without extensive modifications. Best suited for using the system are cargo ships with an average cruising speed of under 18 knots, as well as super yachts and fish trawlers of over 30 meters in length.

This opens up an attractive market for the SkySails-System: Some 60,000 (e.g. bulk carrier, tanker, multipurpose vessels, etc.) of the worldwide approximately 100,000 ships listed in Lloyd's Register and about 1,100 of the 1,900 newly built vessels joining the world's merchant fleet each year are suited for SkySails propulsion.

SkySails has set itself ambitious production goals for the next few years, planning to equip 1,500 ships by the year 2015, and thus also the potential to make a major contribution to curbing climate change. The systematic and worldwide use of SkySails technology would make it possible to save over 150 million tons of CO₂ a year, an amount equivalent to about 15% of Germany's CO₂ emissions.

It is SkySails' objective as a company to be an example for how working with nature – and not against it – makes business success possible – for its customers and SkySails alike.

Stephan Brabeck graduated from the RWTH University, Aachen in 1989 with a Master of Science in Aerospace Engineering. He held various positions within the Schottel Group (e. g. director of R&D in Spay, managing director of Schottel Propulsion Technology in Wismar, technical director and proxy in Spay) before he became the CTO of SkySails. SkySails is the market leader for automated towing kite systems.