

The Magazine for Supply Chain & Logistics Professionals in Asia | May/June 2016

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ISSN 1793 5377



MCI (P) 022/05/2016
www.supplychainasia.org



SMART SHIPPING, GREENER FUTURE

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In an increasingly globalised world, the need for transportation has become even more important. Consumption is increasing as new consumer markets in China and India develop. At the same time new regulatory, environmental, safety and energy efficiency issues have emerged, specifically in maritime transportation.

Compared to air and land traffic, the maritime sector produces fewer emissions in terms of the load and distance transported, and is substantially more energy-efficient. While seagoing vessels handle 90 per cent of intercontinental freight transport, this only accounts for about 2.2 per cent of global emissions. However, as with all modes of transport, substantial energy savings can also be attained in maritime shipping, thereby reducing costs.

The European Energy Efficiency Directive that came into effect in 2015 requires large energy customers to cut energy use by 1.5 per cent annually. The measure aims to realise Europe's ambitious 2020 energy-saving plans. The European Union (EU) is also contributing to the International Maritime Organization's (IMO's) process, with the adoption of the EU MRV Regulation (Regulation [EU] 2015/757) for the monitoring, reporting and verification of CO₂ emissions from maritime transport. The Regulation is the first step towards a global solution to ascertain the real contribution of shipping to global CO₂ emissions, beginning in 2018.

Elsewhere, numerous technologies are being developed to make shipping more eco-friendly. The IMO's new rules on the transition from heavy fuel oil to the

much more expensive marine diesel have resulted in ongoing efforts to conserve energy. In fact, mandatory regulations adopted by IMO ensure that all ships built after 2025 will be at least 30 per cent more efficient than ships operating today. Combined with further technical and operational measures plus new technology, international shipping should be able to reduce its CO₂ per ton-kilometer by 50 per cent before 2050.

Pressured by new regulations and a highly competitive market environment where cost efficiency is top priority, the shipping industry is constantly looking to reduce energy consumption. Marine companies know that they have to change the way they operate, if they are to increase productivity, meet environmental regulations, and cost effectively manage and produce vessels.

Rise of big data

Digital technology is not only changing how ships operate, it is also having a transformative effect on how shipping companies manage their fleets and run their businesses. As well as enabling ships to sail more efficiently and safely, technology has the power to streamline management processes and ease some of the immense commercial, administrative and operational pressures on ship owners, operators and managers. With increasing connectivity and improvements in data analytics, there are new opportunities to capture value from operations and maintenance improvements by turning low value data into high value actionable information. The marine industry is currently heading down the path that other industries have - using data and analytics to improve reliability, safety, efficiency and productivity. Data and analytics can predict and prevent failures, identify opportunities for fuel savings opportunities, and avoid downtime.

A new breed of software packages, such as the ClassNK-NAPA GREEN, is one such solution, offering real time big-data analysis, performance monitoring and optimisation of vessel performance. By passing the data through advanced and highly accurate predictive algorithms, it delivers information on current operations, and on potential operational changes, ranging from route to speed profile and floating position, to allow the vessel to reduce fuel consumption, and correspondingly achieve cost savings.

Advances in automated monitoring and ship-to-shore communications have made the data collection accessible to all maritime and ship owners, big and small. Whether the information is used to design for efficiency or simply to manage vessel maintenance, effective implementation of the right tools can have a real impact. Applied wisely, big data can better connect and provide support for more productive and greener shipping.

Compressed air efficiency

As with many industrial air compressors, energy consumption can be high due to poor volumetric and motor efficiency, inadequate cooling at high ambient temperatures, compressor controls, over pressurisation and lack of preventive maintenance. In the maritime industry, shipping operators are looking to improve the performance and energy efficiency of compressed air installations. Compressors are essential components of a ship, and unlike other industrial compressors that do not require such high reliability, high-

quality compressors for marine use are built to last the lifetime of a ship. However, the need to install new systems in ships that are already operating does occur from time to time due to various reasons, such as more capacity, higher air quality, environmental requirements and energy costs.

BOGE, a leader in compressed air systems, recently added marine applications to their range. The new series of low speed SRH-/RH-starting air compressors provide a steady supply of compressed air to start up diesel engines. The air-cooled, belt-driven piston compressors are available from 3 to 37 kW output for 2-stage, 3-stage and 4-stage compressors, with two or four cylinders. Each comes in a compact design and delivers peak performance at high ambient temperatures ranging up to 45°C, and works well in humid and confined machine rooms with space constraints.

The utilisation of the advanced tongue valve technology allows for efficient control of inlet and outlet air in the cylinder chamber of these piston compressors. Tongue valves, which have fewer components than conventional ones, enable friction-free operation with minimal dead space flow resistance, which means more free air delivery and higher valve working life. For ship owners and operators, this translates to a longer life cycle with minimal maintenance and maximum reliability, as well as lower energy consumption due to its volumetric efficiency and substantially reduced life cycle costs.

Accelerating technology transfer

To meet emerging challenges and environmental demands, the maritime industry needs to embrace new innovations and be willing to adapt to change. The development, utilisation and adoption of new technology towards improving energy efficiency offer many opportunities for cost savings in the industry, boost competitiveness, and develop world-class products. It is important for the entire maritime value chain to work together to accelerate both knowledge and technology transfer.

Heeding the call, Singapore's Nanyang Technological University launched the region's first advanced maritime energy test facility in November 2015. With more stringent regulations on ship emissions and energy efficiency standards in years to come, the S\$8m Maritime Energy Test Bed aims to develop cleaner and more sustainable maritime energy solutions. These include advanced filters called

scrubbers, namely devices that curb harmful ship emissions, and alternative energy sources. The facility comes equipped with a fully-fledged 1.5 megawatt diesel ship engine, which can run on most of the conventional liquid fuel types for energy research such as biodiesel, gas-to-liquid, and synthetic diesel. Also on board are advanced sensors and monitoring devices to facilitate research innovation in energy storage, noise pollution, and waste heat recovery.

Earlier this year, the EU announced its plans to provide an investment funding of €10m towards an ambitious scheme to create a global network of 'centres of excellence' to support the IMO's plans to establish maritime technology co-operation centres (MTCCs) in five regions - Africa, Asia, the Caribbean, Latin America and the Pacific. The four-year project will assist developing countries limit and reduce greenhouse gas emissions from their shipping and maritime businesses through technical assistance and capacity building.

This crucial investment for both Singapore and the EU demonstrates the respective region's commitment to a range of potentially game-changing maritime initiatives aimed at reducing shipping emissions and raising energy efficiency to improve the industry's global environmental footprint. 🌱



About the Author

Nalin Amunugama is the General Manager of BOGE Kompressoren Asia Pacific and has over 25 years of experience in the air compressor business and its applications for the marine, engineering, plastics, pharmaceutical and food industries. As a global leader in compressed air systems, BOGE's focus is on creating energy-saving solutions from both an economic and ecological viewpoint to benefit customers, and, more importantly, the planet.