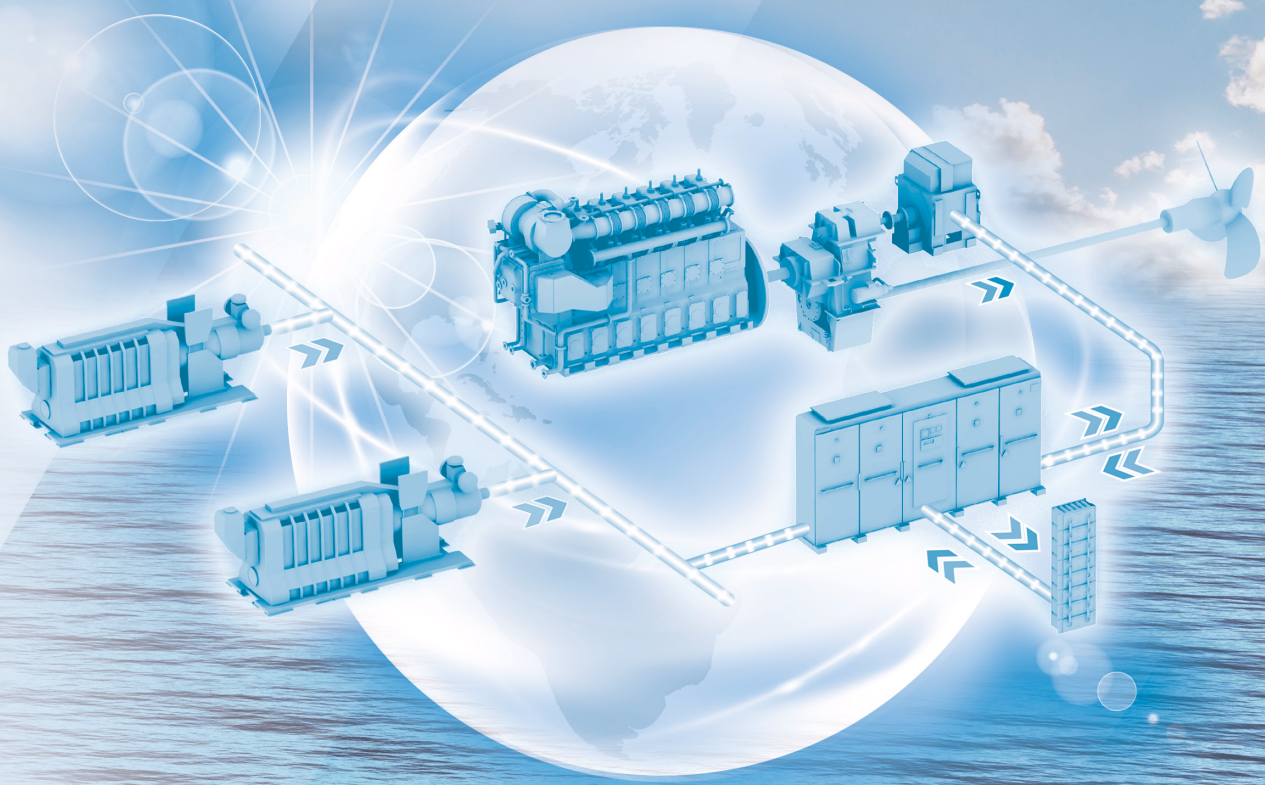
Kawasaki
Powering your potential

Kawasaki HYBRID PROPULSION SYSTEM



Low Fuel Cost

Low Emission

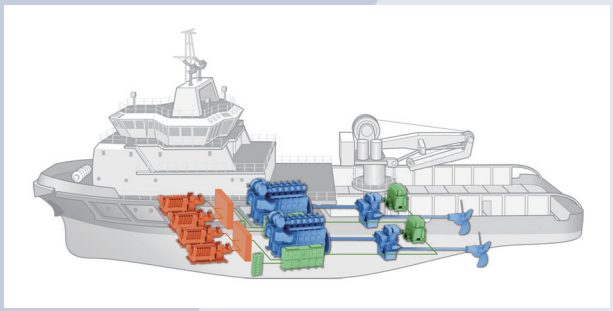
The “Kawasaki Hybrid Propulsion System” is the efficient solution for various kinds of ships.

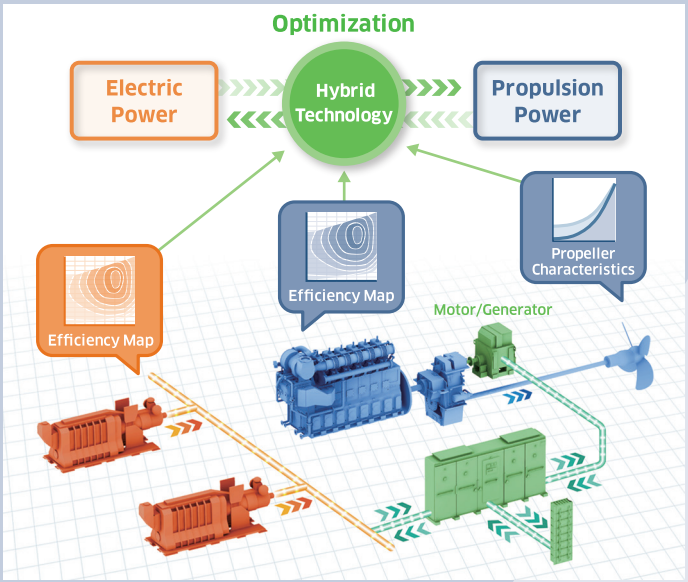
KEEP REALIZING YOUR INTEREST

Kawasaki Hybrid Propulsion Technology

Optimizing fuel consumption

Kawasaki Hybrid Propulsion System is the highly integrated propulsion system packaged with Kawasaki-made attractive marine machinery products such as engines, propellers, etc. Additionally, the motor/generator, inverter and energy storage module (ESM) in the system can convert propulsion power and electric power mutually.



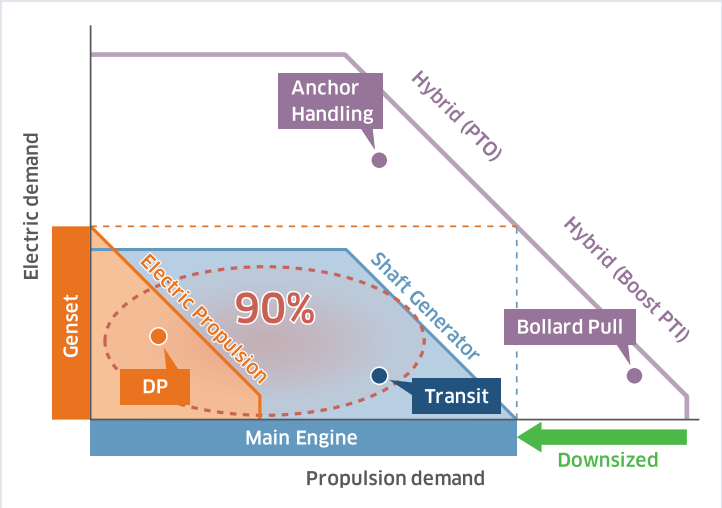


The Kawasaki Hybrid Propulsion Technology can realize **the optimized propulsion system configuration based on the efficiency map of engines and propellers**. The distribution of electric power and propulsion power is controlled depending on the vessel operation.
This approach is based on our superior technologies and knowledge of marine machineries acquired in the course of our continual innovation.

Applications for AHTS

High Efficiency Propulsion Control

By using Kawasaki Hybrid Propulsion Technology, The sizes of the main engine and the genset are selected to fit to “transit” and “DP” operations that is account for 90% of all vessel operations. So, **the main engine is downsized significantly and is used at highly-efficient operation points mainly**.
Under our estimation for AHTS, Hybrid Propulsion System can achieve **about 25% reduction of fuel consumption** compared with conventional propulsion by the efficient usage of CPP/FPP mode in addition to the efficient engine operation.

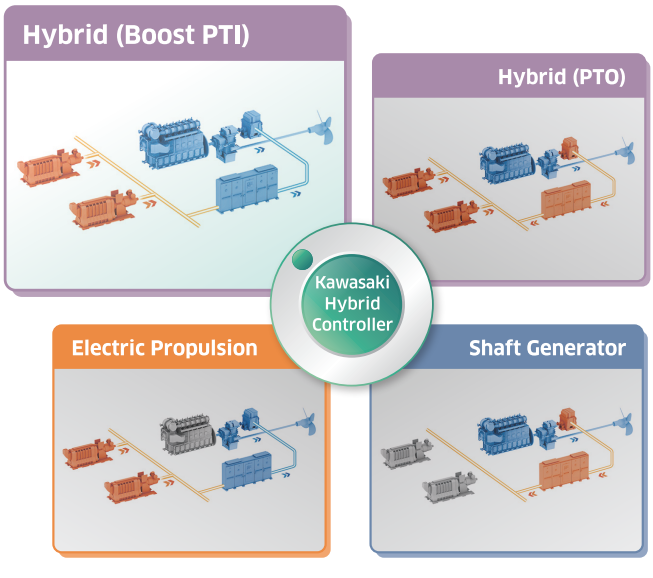


Auto Mode Shift Control

Patent pending

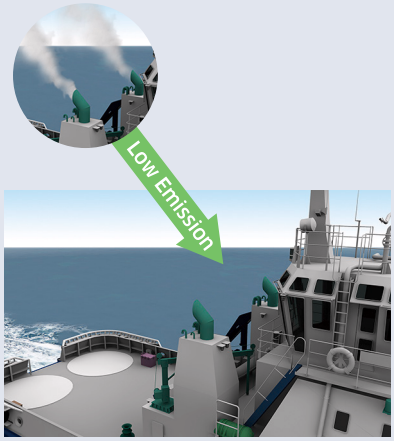
The Kawasaki Hybrid Propulsion Technology can offer the easy operation for Hybrid Propulsion System by using the “**Auto Mode Shift**” control.

When both the main engine and the genset are running, switching between the electric propulsion, boost PTI (motor), PTO (generator) and shaft generator modes **seamlessly and automatically** enables a vessel to operate with optimum fuel efficiency at any time.



Applications for Tugboat

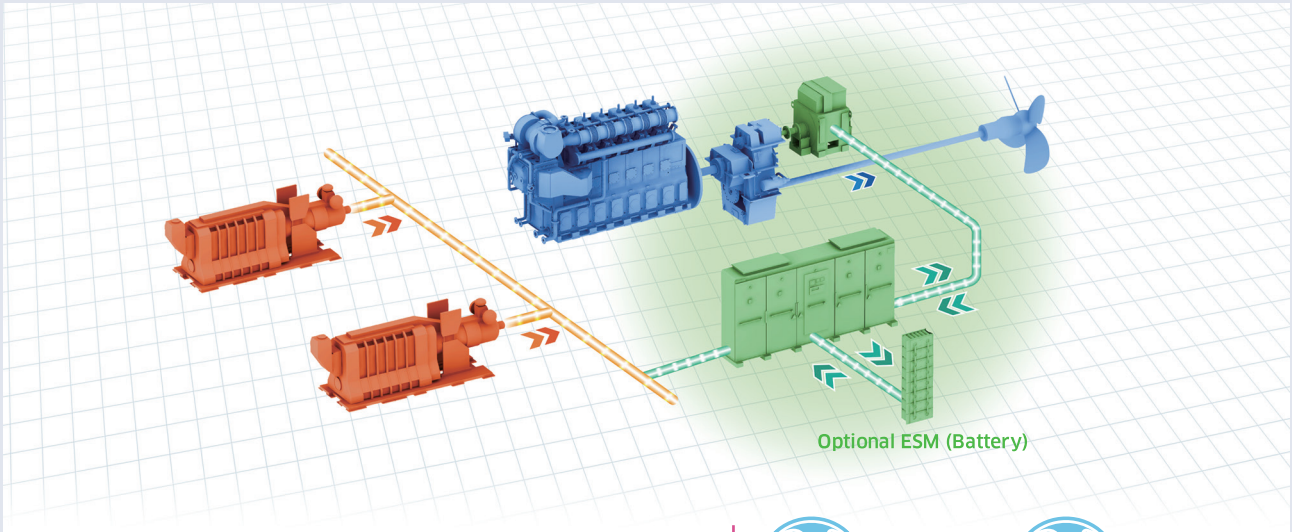
Reduction of Exhaust Gas Emission Patent pending

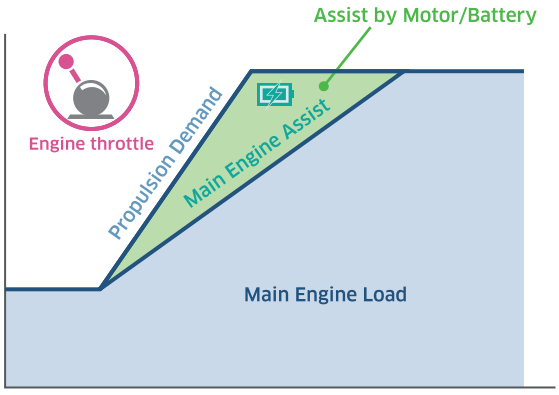


In Tugboat, the fluctuation of the load put on the engine (e.g. quick tug operation or propeller racing) causes to increase exhaust gas emissions and output harmful dark smoke.

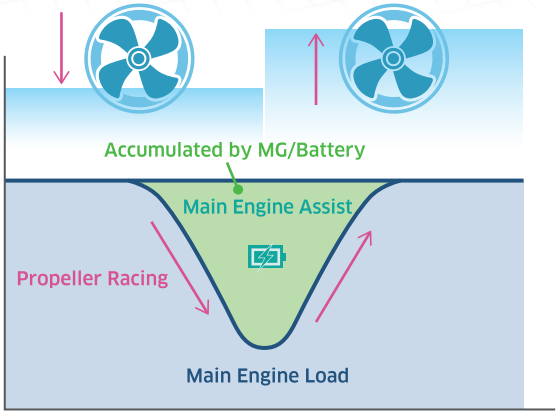
The Kawasaki Hybrid Propulsion System can also achieve the **reduction of this exhaust gas emissions** more aggressively by using the assist of motor/generator's electric power.

The **optional ESM (battery)** can charge or discharge the total quantity of electric power consumed due to load fluctuation, therefore **stable supply of electric power to the vessel grid** can be maintained.





Rapid Boost of Propulsion



Propeller Racing

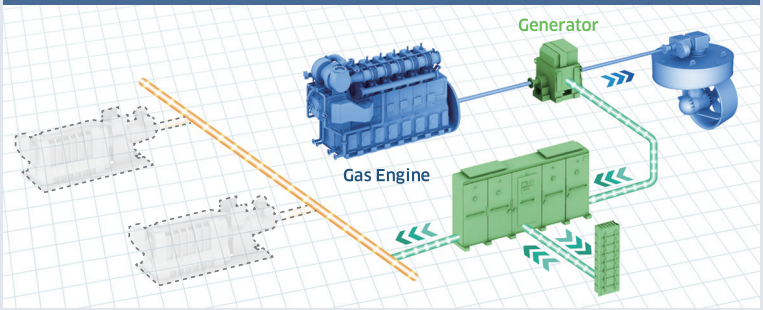
High efficiency and Low Emission

Patent pending

Best Combination of Hybrid and Gas Engine

Kawasaki Green Gas Engine for Marine L30KG — Kawasaki has the high competency pure gas engine for marine with an output capacity from 2.6MW to 4MW.
Kawasaki had already launched a gas engine developed for the distributed power generation market, boasting the world's highest electrical efficiency of 49.5% and NOx emissions below 200 ppm (at 0% O_2).
The gas engine L30KG is based on this technology, addressing needs for maritime application such as load fluctuation, double walled fuel gas pipe, redundancy, etc.
L30KG is the first Japanese-made gas engine to obtain type approval from DNV.
Kawasaki can also offer Fuel Gas Supply System including LNG tank.

Genset-less Hybrid Propulsion System



Recently the emission regulation such as NOx, SOx, GHG has promoted LNG fuelled Vessel increasing. Kawasaki Green Gas Engine for Marine-L30KG is one of the best solution to comply with the rules.

"**Genset-less hybrid Propulsion system**" can offer the more advantage to L30KG by **the best combination of "Kawasaki Hybrid Propulsion Technology" and L30KG**.
"Genset-less hybrid Propulsion system" can also utilize the output power of L30KG as **the electric power with high efficiency and low emission feature**. Consequently, this system can realize the diesel genset-less system **for Space-Saving in the vessel**.
Kawasaki strongly recommends this “Genset-less hybrid system" **for smaller vessel like tugboat**.
The concept of this application is granted AIP(Approval In Principle) by ABS.

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