

Oil and Gas Related Product Catalog

OIL & GAS

Cutting-edge technologies to support
stable supply of energy



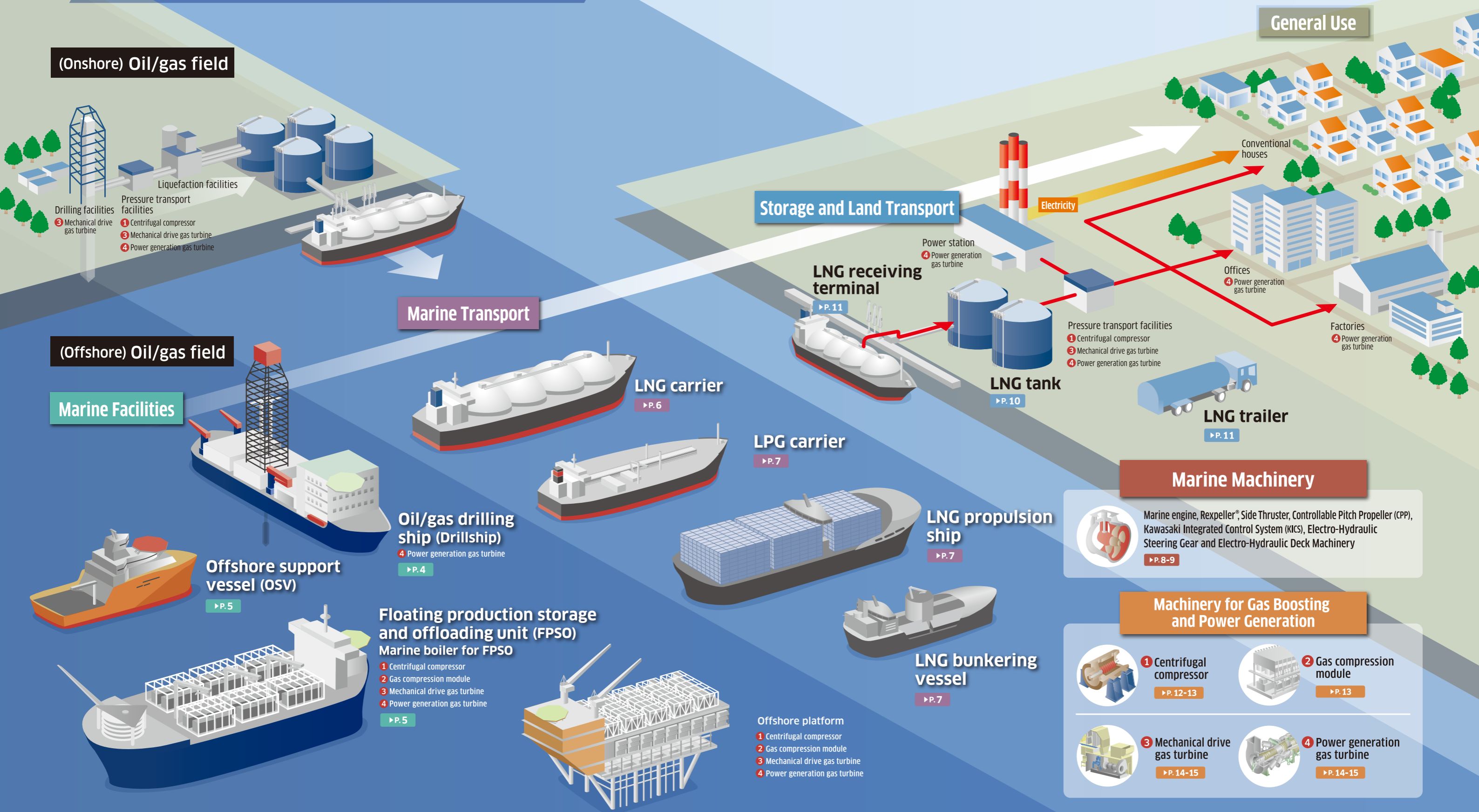
Kawasaki Heavy Industries, Ltd.

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Transport of onshore and offshore natural resources to users

Cutting-edge technologies to support quick and highly efficient oil and gas delivery

The demand for natural resources is expected to increase in the future energy market. Kawasaki will help you establishing a quick and highly efficient oil/gas supply system from onshore/offshore drilling to delivery to users by employing various cutting-edge technologies.



MARINE FACILITIES

Ships and facilities for drilling, storage, and offloading of marine resources



FLOATING PRODUCTION STORAGE AND OFFLOADING UNIT (FPSO)

A low-cost and easy-to-locate floating unit that does not require fixed pipelines.

Facilities that produce and store oil/gas at sea and load it directly onto tankers. Approximately 160 units are currently operating worldwide, accounting for more than 60% of all floating platforms in the world.



Features

Low cost and easy to deploy

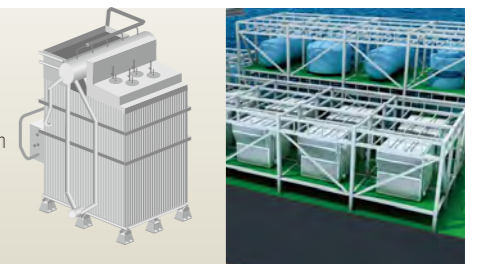
Capable of being deployed at a lower cost than fixed facilities because construction of infrastructure such as storage tanks is not required.

Enables remote oil field development

Enables the development of oil fields far from land facilities since pipelines are not required.

Marine boiler for FPSO

A marine boiler for FPSO that withstand use in an offshore plant. This boiler is highly resistant to wave vibration because of its compact body, and is protected from corrosion by an anti-corrosive overcoat. Kawasaki has delivered the world's largest marine boiler (high-temperature and high-pressure steam generation rate: 220 t/hr).



OIL/GAS DRILLING SHIP (DRILLSHIP)

Enables safe and low-cost drilling in deep water oil fields

A drilling ship for offshore resource including oil and gas fields. The oil/gas drilling ship enables safe and low-cost drilling in deep water oil fields by adopting a drill pipe, a mud circulation system to collect cuttings and control formation pressure, a riser pipe to circulate mud, and advanced ship positioning equipment.



OFFSHORE SUPPORT VESSEL (OSV)

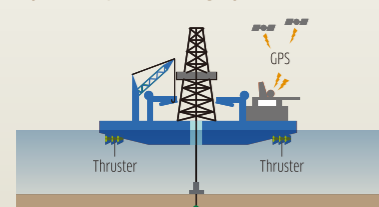
A support vessel having a wide working deck and larger accommodation while ensuring the high safety of DP3

The offshore support vessel is designed for construction of oil and gas production plants, pipelines and risers as well as subsea operation using an unmanned underwater vehicle. This is a large-scale high-safety support vessel.



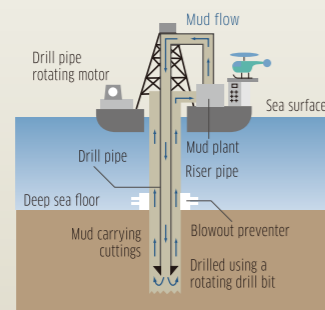
Cutting-edge technologies to support drilling

Dynamic positioning system (DPS)



This system constantly measures the ship's position and prevents drifting due to wind or tide, keeping it within a certain area above the drilling point by using thrusters.

Mud flow during drilling



Features

Drilling capacity

Capable of drilling approximately 7,000 m below a 3,000 m deep sea floor.

Safety

Achieves highest ship positioning performance (DP3) thanks to high-safety drilling facilities.

Cost effectiveness

Without mooring and related additional operations, ship positioning equipment enables low-cost drilling. Smaller hull size enables to achieve the same drilling performance as conventional ships.

Features

Large hull

Drastically reduces rolling and pitching. Provides a wide working deck and larger accommodation to achieve high performance in equipment transportation.

High safety

Achieves outstanding ship positioning performance (DP3) and maintains the ship's position by using high-power thrusters even in stormy weather.

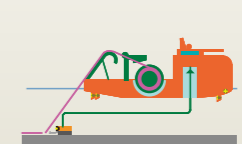
Compatible with various missions

Allows a variety of operations by changing the on-board equipment.

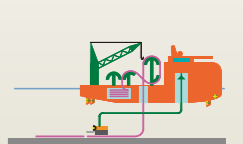
Application examples



Subsea construction
Constructs a subsea production plant using a large deep-sea crane and ROV.



Laying pipes
Unwinds a pipe from a reel on the stern and lays the pipe on the sea floor while sailing.



Laying flexible pipes
Constructs risers using a vertical lay system (VLS).

MARINE TRANSPORT

Kawasaki has developed various types of Eco-Ships that save energy and reduce environmental load, including high-performance and highly reliable liquefied gas carriers.



LPG CARRIER

Kawasaki has developed various LPG carriers, leading the world since 1969.

The LPG carrier is capable of loading low-temperature LPG of up to -46°C . With its double-hull-structure fuel tanks, this carrier prevents marine pollution in the case of an accident. Fuel consumption is drastically reduced by the fuel-efficient main engine. Also, thanks to an in-house-developed bow shape, this carrier reduces wave resistance and drastically improves propulsion performance.



LNG CARRIER

A world-leading MOSS type LNG carrier

The LNG carrier transports LNG (liquefied natural gas) at -162°C . Kawasaki Heavy Industries built the first LNG carrier (Golar Spirit, tank capacity: $128,600\text{ m}^3$) in Japan in 1981.



World's largest MOSS type LNG carrier

Kawasaki received an order for the world's largest MOSS type LNG carrier (tank capacity: $182,000\text{ m}^3$) in June 2013.

Features

World's highest thermal insulation performance

Achieves the world's lowest boil-off rate of 0.08% per day.

Excellent fuel efficiency

Improves the propulsion performance by optimization of hull shape, weight reduction, and adoption of energy-saving attachments. Also uses high-performance and fuel-efficient main engines, such as the Kawasaki URA type reheat steam turbine plant and 4-stroke/low-speed 2-stroke dual fuel diesel engine, depending on the intended use.

LNG PROPULSION SHIP

Almost completely eliminates SOx emissions and reduces CO₂ emissions by 30% compared with conventional types

Kawasaki has developed a volumetrically efficient independent prismatic LNG tank. The LNG propulsion ship adopts a low-speed 2-stroke dual fuel diesel engine that provides excellent fuel efficiency.



LNG BUNKERING VESSEL

Meets the exhaust fume standards and supplies fuel to LNG propulsion ships, which are increasingly demanded, at sea

This bunkering vessel is loaded with fuel (LNG) at an LNG storage base, and then supplies the fuel (LNG) to LNG propulsion ships at sea. Kawasaki established technology for constructing LNG bunkering vessels ahead of other companies by utilizing construction technologies developed for large LNG carriers and small coastal LNG carriers.

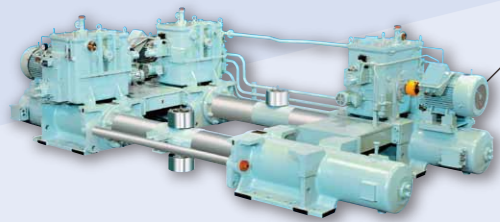


MARINE MACHINERY

With its history and performance of delivering various marine machinery starting with the marine steam turbine in 1907, Kawasaki continues to develop and supply high-performance marine products.

ELECTRO-HYDRAULIC STEERING GEAR

This steering gear is driven by hydraulic pumps and plays an important role in operating a vessel. This steering gear provides excellent response, durability, and reliability, contributing to the safety marine transportation.



CONTROLLABLE PITCH PROPELLER (CPP)

A Controllable Pitch Propeller is a screw propeller with a changeable blade angle (pitch). This propeller is environmentally friendly and economical, since it enables a vessel to operate with optimal fuel efficiency, and makes it easy to control speed and quickly bring a vessel to a standstill without reversing the engine.



MARINE ENGINE

GREEN GAS ENGINE

The marine engine improves the load change tolerance while satisfying the ship class rule based on the world's most efficient land gas engine technology. This marine engine also provides excellent environmental performance including reduction of CO₂ emissions by 20%.



KAWASAKI-MAN B&W ME-GI

Kawasaki-MAN B&W ME-GI is a dual fuel version of the 2-stroke diesel engine, based on a MAN B&W type 2-stroke diesel engine. This engine provides excellent fuel efficiency and reduces the environmental load.



KAWASAKI INTEGRATED CONTROL SYSTEM (KICS)

Kawasaki Integrated Control System (KICS) integrates the control of multiple vessel devices via the simple operation of a joystick and heading control dial. KICS can be interfaced to different navigational devices, enabling a DPS designed to maintain a vessel's position and heading automatically.



ELECTRO-HYDRAULIC DECK MACHINERY (WINDLASS/MOORING WINCH)

Windlass which consists of chain drum and mooring winch, working for lifting up and down the anchor during the anchoring, and mooring winches are handling the hawser/wire ropes when berthing the vessels at the terminal. These deck machinery are necessary for cargo handling operation. The windlass/mooring winch makes little noise, provides high performance, and superior in safety and maneuverability.



Oil tanker

Offshore support vessel (OSV)

Side Thruster

Kawasaki Integrated Control System

Rexpeller

REPELLER®

Rexpeller is known as a Azimuth Thruster which steers 360 degrees around its vertical axis. This propeller aims at not only delivering excellent maneuverability but also maintaining superior positional accuracy working with navigational devices and positioning systems such as a DPS for any kinds of offshore vessels.



SIDE THRUSTER

Side Thruster enables a vessel to turn or move sideways when docking or departing port. Moreover this is used for heading control and dynamic positioning with outstanding maneuverability. Built tough enough to withstand long periods of continuous operation in vessels outfitted with a DPS.



STORAGE AND LAND TRANSPORT

In-house-manufactured storage facilities with highly reliable construction performance and in-house-developed high-performance transport vehicles



LNG TANK

Proven by the performance of delivering all types of tanks, including a single/double/full containment tank, In-pit tank, underground tank, and fully buried tank

Kawasaki has constructed 31 LNG tanks with a wide range of capacity since the construction of a 95,000 KL underground tank in 1982, from small tanks of 2,000 KL to large tanks of 200,000 KL. We are currently constructing the world's largest onshore storage tank having a capacity of 230,000 KL. Only Kawasaki has constructed all types of tanks in the world.



Full containment tank



Underground tank



Single containment tank



In-pit tank

High thermal insulation performance to contain LNG

The thermal insulator on the outside of the inner tank that stores LNG keeps the temperature of LNG at -160°C or lower, which helps reduce the boil-off rate.

Features

Reliable delivery and quality management

We can flexibly manage delivery dates by manufacturing main members in our seaside factory while ensuring high quality through quality control.

Short-term construction performance

Short-term construction is made possible through high performance and superior on-site construction ability. We can construct a PC outer tank type storage tank (180,000 KL) in 35 months.

Flexible response to construction

We can flexibly handle various construction orders including mechanical work and civil engineering work.

LNG RECEIVING TERMINAL

Kawasaki has constructed high-safety and high-operability facilities in three years.

The LNG receiving terminal receives, stores, and vaporizes LNG. Kawasaki signed a full-turnkey contract for construction of the Sakaide LNG receiving base in January 2006 and completed the construction of all base facilities, including LNG tanks, receiving and delivery facilities, and civil engineering and construction work, in three years as planned.



Loading arm



BOG compressor



Secondary pump

Reduces the construction period by using a roof air raising system

The steel roof was assembled simultaneously with civil engineering work and inner tank work in the construction of the LNG tanks. The steel roof was pneumatically lifted up to the prescribed height after the inner tank was completed (roof air raising method). Thus, the construction period of the LNG tanks, which accounts for much of the total construction period of the base, was reduced.

Features

Enables one-man operation

Establishes a system that can automatically or remotely control various processes.

Redundancy of the control system, important instruments, and incoming circuit

Configures the instrumentation system through risk analysis and ensures high safety.

Enables short-term construction without accidents

Completes construction in three years without accidents even with the entry of up to 500 persons a day and approximately 600 subcontractors.

LNG TRAILER

A dedicated LNG transport vehicle that provides high thermal insulating performance and high versatility

By using the superinsulation system of cryogenic tanks, we realized a large-capacity LNG trailer with high thermal insulation performance. The LNG trailer is highly versatile and does not require special traffic conditions.



MACHINERY FOR GAS BOOSTING AND POWER GENERATION

Centrifugal Compressor

CENTRIFUGAL COMPRESSOR

Proven track record in the oil and gas industry

Kawasaki Centrifugal Compressor has been widely used in the oil and gas industry for over 40 years and has established a solid reputation.

Complies with API-617, which is a worldwide design guideline for centrifugal compressor in the oil and gas industry.

Kawasaki is offering optimally-designed centrifugal compressor package in conformity with API-617. It is Kawasaki's mission to endeavor to support a safe and stable gas production under severe operating conditions.



R-B type (barrel type)

R-S type (horizontal split type)

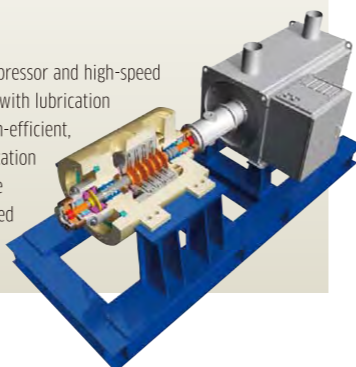
3D impeller

A high-performance 3D impeller design based on the latest analytic technology can be applied as needed. This impeller achieves high efficiency and provides a wide operation range for optimum operation.



Oil-free

Applied with magnetic bearings for the compressor and high-speed drive motor, the oil-free package dispenses with lubrication and speed increasing gear and achieves high-efficient, environmental, low-cost operation. As lubrication devices are no longer required, space can be effectively saved for the site layout compared with the conventional compressor package.



Application to onshore facilities

We produce and supply compressors for onshore oil and gas fields, pipelines, and refineries.



Motor-driven centrifugal compressor for pipeline (Saudi Arabia)



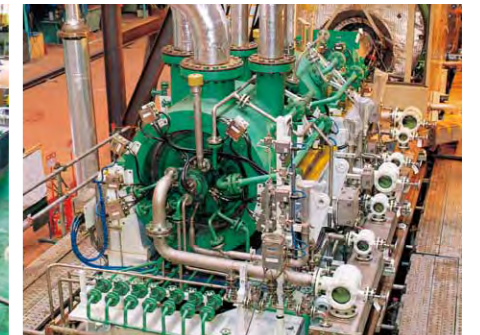
Gas turbine-driven centrifugal compressor for natural gas processing plant (Nigeria)

Application to offshore facilities

We produce and supply centrifugal compressor packages designed for gas injection and gas boosting for offshore oil and gas fields. Despite difficulty in maintaining compressor packages at offshore facilities, constant operation under extreme environmental conditions is required for compressor packages. Thus, higher reliability is required for compressor packages for offshore applications.



Motor-driven centrifugal compressor for FPSO (Vietnam)



Gas turbine-driven centrifugal compressor for offshore platform (Malaysia)



Gas compression module for offshore platform (India)

Gas Compression Module

We deliver not only centrifugal compressor packages but also gas compression module which consists of centrifugal compressor packages, gas coolers, scrubbers, process pipings, and instrumentation control systems, to offshore platforms and FPSO. Gas compression modules assembled at onshore fabrication yard are shipped out upon successful completion of running test, and are then installed onto offshore platforms and FPSO, which makes a contribution to reduce the construction period of the whole project.



Bird's-eye view of offshore platform (Brunei)



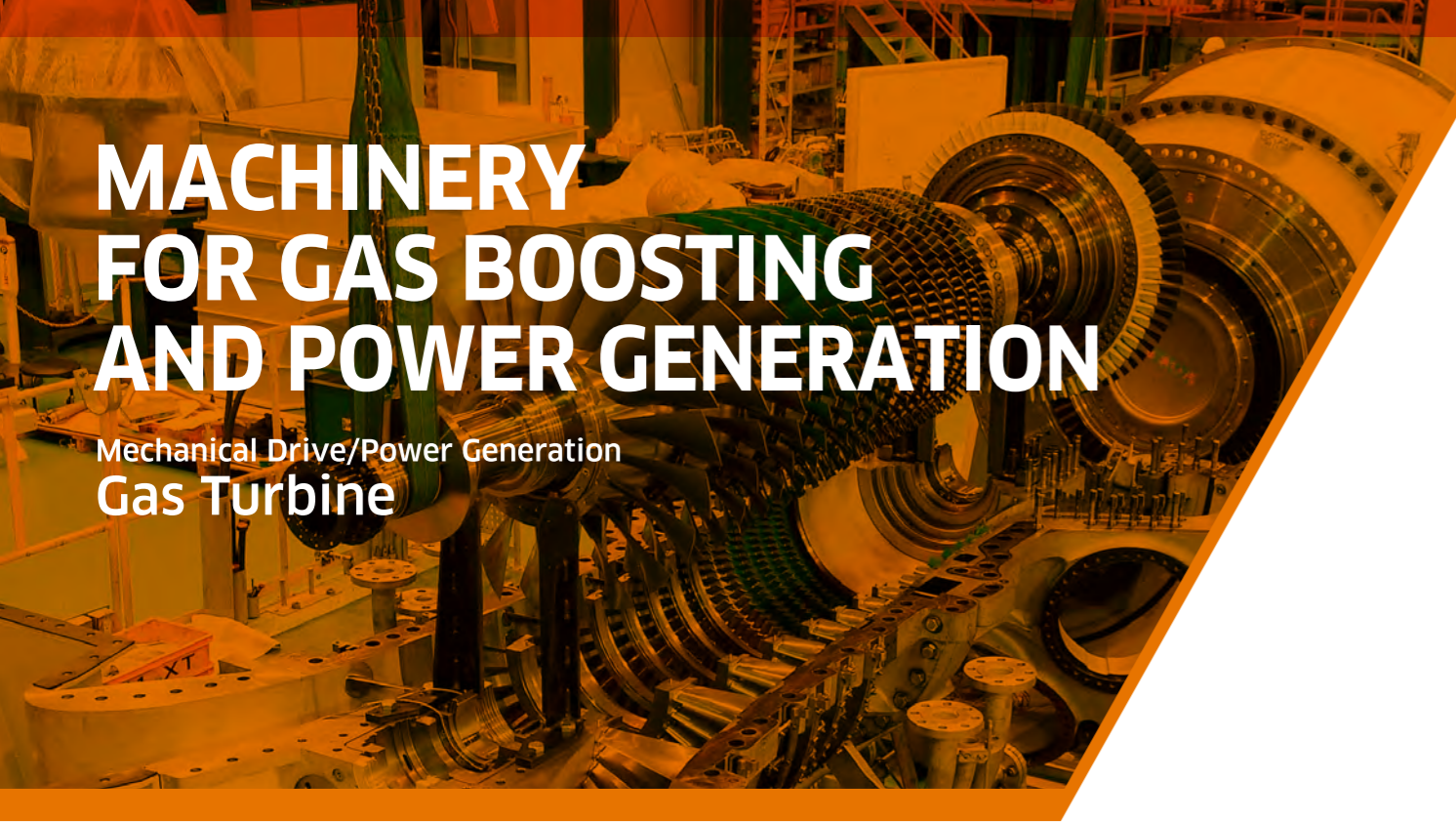
Gas compression offshore for FPSO



Gas compression module for offshore platform (Shipping out from Kobe Works)

MACHINERY FOR GAS BOOSTING AND POWER GENERATION

Mechanical Drive/Power Generation Gas Turbine



Application to offshore facilities



GPB30 for offshore facilities

Kawasaki gas turbines can be used for power generation and compressor drive for offshore platforms and so on because it is small and light weight, and no cooling water is required.



Example of application to offshore platforms

GPB30 is used for the offshore platform in the oil and gas field off Iwafune, Niigata Prefecture.

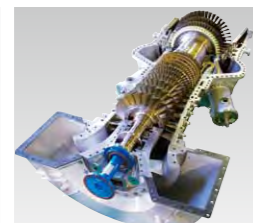
MECHANICAL DRIVE POWER GENERATION GAS TURBINE

Achieves world-leading efficiency and applicable to various purposes

Kawasaki gas turbines have an excellent efficiency and super low NOx emission based on Kawasaki's well proven design technology. They are suitable for various applications such as baseload power generation, standby power generation, and mechanical drive.



M1A-17D



M7A-03D

L30A

Application to onshore facilities

The gas turbine is used for various purposes including machine driving and power generation.

Baseload Power Generation

Baseload power generation systems for oil facilities and petrochemical plants, and co-generation systems supplying both electricity and heat (steams).



GPB180D (L20A) for methanol plant



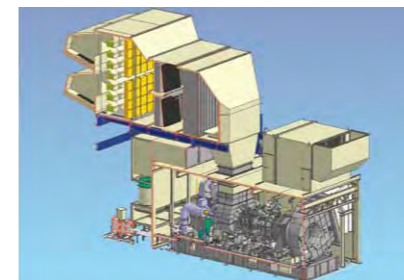
GPB30D (M1T-13) for pipeline booster station



GPB300D (L30A) for chemical plant

Mechanical Drive Gas Turbine

Mechanical drive gas turbines such as compressor drive in the oil & gas applications.



Standby Gas Turbine Generators

Standby gas turbine gen-sets with excellent starting reliability, and quick start-up and load input.



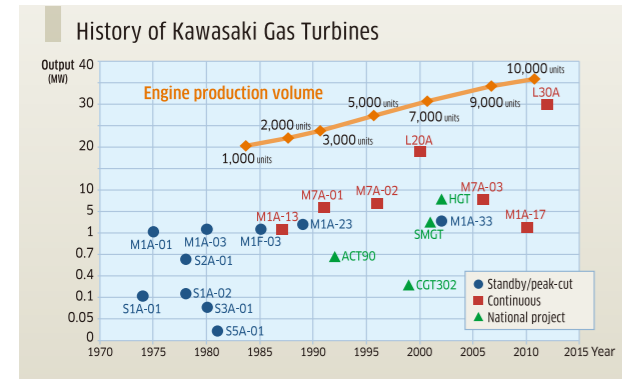
GPS3000 (M1T-03) for data center

Mobile Gas Turbine Generators

Gas turbines on trucks or on trailers for mobile generator.



MGPS2000 (M1A-23)



Features

High performance and highly economical

One of the world's highest electrical efficiency and total efficiency is achieved by using both thermal and electrical energies.

Multiple fuel capabilities

City gas, LPG, kerosene, diesel oil, and some other fuels can be used.

Flexible systems

Optimum and economical system according to the required power and heat.

Small and lightweight, requiring no cooling water

Small size and light weight compared with its power output by a self-cooling system that does not require cooling water.