

# Scope

*Kawasaki Heavy Industries* Quarterly Newsletter

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# KMM Operates the Biggest Production Plant in the State of Nebraska An Overview of Where It All Began

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Jet Ski Ultra 300X models are produced at the historic KMM Lincoln Plant. See Frontline for more.

KAWASAKI HEAVY INDUSTRIES, LTD.

## Scope

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If there is one thing the Kawasaki Motors Manufacturing (KMM) plant in Lincoln, Nebraska has that no other manufacturing facility will ever have, it's the distinction of being first. Opened in 1975, the Lincoln Plant enjoys the unique honor of being the first-ever production facility to be built on American soil by a foreign motor vehicle manufacturer. The idea of producing its globally renowned motorcycles right where its customers live has made a world of difference for Kawasaki: the proximity has enabled it to immediately respond to local market needs. Today the KMM Lincoln Plant is operating full swing to manufacture ATVs, utility vehicles and Jet Ski watercraft, out of which approximately 90% are sold domestically and the balance exported worldwide to markets like Europe and Japan. KMM has also recently expanded its rolling stock business.

Read on for an in-depth look at the KMM Lincoln Plant's Consumer Products Division, an American success story still in the making.





The Lincoln Plant's vast 1,344,000 m<sup>2</sup> site includes 170,000 m<sup>2</sup> of building space for the CP Division. In the forefront is the division's building cluster, dating back to 1975.

● **Part of the American Fabric for the Last 36 Years**

Let your eyes wander over the suburban Lincoln terrain and the first thing they're likely to see is the vast KMM plant, which stretches out across the plains. Currently headed by Matsuhiro Asano, the facility is ideally located just outside this capital of the Midwestern U.S. state of Nebraska.

Kawasaki first laid down roots in the U.S. back in 1975. Since then it has established a number of thriving U.S. operations, including the Kawasaki Rail Car, Inc. (KRC) plant in Yonkers, New York, which is responsible for final assembly and rigging of railway vehicles; the Kawasaki Construction Machinery of America (KCMA) plant in Newnan, Georgia;

and the KMM plant in Maryville, Missouri, which manufactures general-purpose gasoline engines. These facilities — along with a growing legion of local production plants — have given Kawasaki's global profile a huge facelift. The company currently has 4 overseas offices and 56 subsidiaries in 20 countries around the world.

After 36 years of operation, the Lincoln Plant is part of the social fabric and a key pillar of support in the lives of many Americans. As the biggest production plant in Nebraska, KMM Lincoln is a major area employer that continues to fuel the local economy. The facility consists of the Consumer Products (CP) Division and the Rail Car Division, and employs approximately 1,650 workers. About 1,100 of these are

employed by the CP Division and 550 by the Rail Car Division. Valued as a good neighbor, KMM plays an active role in the community, participating in local volunteer activities and providing support to area schools like the University of Nebraska.

● **Three Million Unit Milestone**

The CP Division occupies 170,000 m<sup>2</sup> of building space on the sprawling 1,344,000 m<sup>2</sup> Lincoln Plant campus. The building area has grown four times its original size since KMM first set up shop. Over the years, production has been tailored to suit continually evolving consumer needs and now the plant mainly manufactures Jet Ski watercraft, ATVs, recreation utility vehicles



Mule 610 4x4 utility vehicle.



Teryx 750 FI 4x4 LE (Special Graphic Edition) RUV.



Brute Force 750 4x4i EPS ATV.

(RUVs), utility vehicles, and wheel rims.

In September 2010, the CP Division reached a production milestone when its three-millionth vehicle rolled off the production lines of ATVs and Jet Skis. It was a momentous occasion celebrated by every employee at the Lincoln Plant.

● **Always Enhancing Quality and Efficiency**

The CP Division is spread out over five buildings housing Jet Ski and ATV production

lines, where KMM has implemented the Kawasaki Production System (KPS). KPS is Kawasaki's "Just in Time-" based production control system, designed to completely eliminate waste. It is the Lincoln Plant's key to continually improving quality and boosting production efficiency. The foundation of KPS rests on human resources development, the introduction of new technology and equipment, and a consistent tweaking of the system itself.

You can see KPS at work in the making of the any Jet Ski or ATV. Jet Ski hulls are manufactured using special loader equipment, SMC molding presses and a water-jet boring process employing Kawasaki robots to ensure maximum productivity and precision accuracy. The robots are also behind the graphic designs sported by vehicles like the ATV, as they are an integral part of the hydrographic dipping process that directly transcribes pre-printed film bearing different designs right onto the vehicle's body parts. Many other robotic technologies are also at work in a wide variety of processes, including ATV parts welding, Jet Ski bonding

applications and wheel rim production.

The latest RUV assembly line boasts a mechanism that automatically adjusts the height of the assembly platform depending on the type of work being performed. This saves workers from constantly bending, and in the process, boosts productivity as well as employee health and safety.

On top of all this the plant makes as many components entirely in house as it can, including rail car parts, in addition to manufacturing finished products — all with an eye to enhancing quality, cost and delivery.

● **Getting Back on Track After Hard Times**

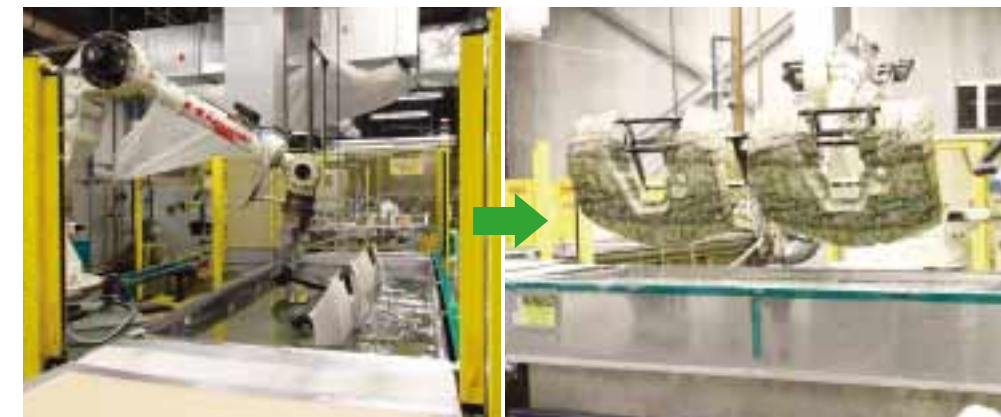
The CP Division is continually looking for new ways to keep operations running like a well-oiled machine steadily advancing toward its performance goals. While it's been a bumpy ride in the wake of the recent global financial crisis, the road ahead looks promising. Performance is back on track at the CP Division, and the Jet Ski, RUV and utility vehicle production lines are shifting into high gear.



A Jet Ski body is formed via an SMC press.



A huge SMC press machine, with a Jet Ski body moving on to the next process.



During hydrographic dipping, the robot lifts the submerged vehicle body part to transcribe the pre-printed film floating on the water's surface.



The RUV Teryx 750 was the 3 millionth vehicle.



Three Million Milestone Ceremony in September 2010 for all Lincoln Plant employees.



KMM President Matsuhiro Asano speaks at the ceremony.

# How the Innovative T-IDG is Taking Aircraft Electric Power Supply to New Heights

## Generator on Board

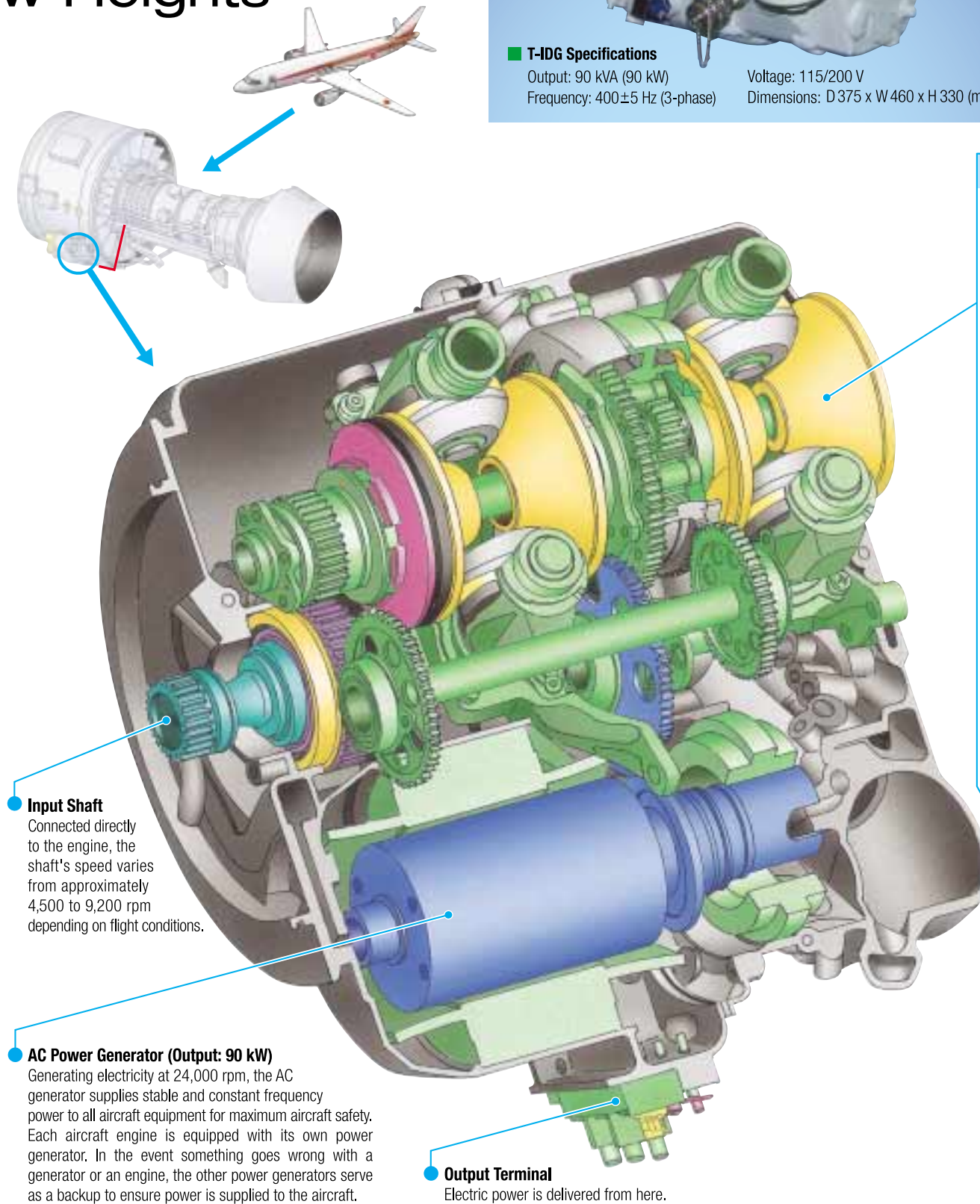
All aircraft are equipped with an auxiliary power supply unit that supplies electricity for lighting, communication, cooking and other operations when the plane is on the ground. Once the engine starts, an alternating current (AC) electric power generator driven by the aircraft's engine is activated to provide electric power to the plane, making the switch to AC power without interruption (see illustration).

Aircraft engine rotational speeds vary significantly before and during takeoff as well as in flight. In a large commercial aircraft that difference can range from 4,500 to 9,200 rpm. Since the generator is connected to the engine, the speed of rotation changes with the engine speed. This means that the generator cannot generate electric power at a constant frequency, leading to an unstable supply of electricity. That's what makes the development of an integrated drive generator (IDG) so vitally important: essentially a constant speed drive (continuously variable transmission or CVT) and generator combined into one unit, it drives the generator at a constant speed regardless of engine speed.

## Revolutionary Aircraft CVT

The T-IDG® (traction-drive IDG) leverages Kawasaki's unique technological strengths, gained through the company's research and development of helicopters. It's the world's first aircraft IDG employing a high-speed traction-drive CVT, rather than a conventional hydraulic CVT, as the constant speed drive unit (see illustration).

The traction-drive CVT utilizes the viscous resistance of a special oil to transmit power, resulting in less power loss than in conventional hydraulic CVTs. Since the thin oil film serves as the contact medium between the disks and rollers, it prevents wear and works to extend the life of the mechanical parts. The traction-drive CVT is an innovative CVT that's more lightweight, efficient, and durable than any hydraulic CVT, with the additional benefit of superior controllability.



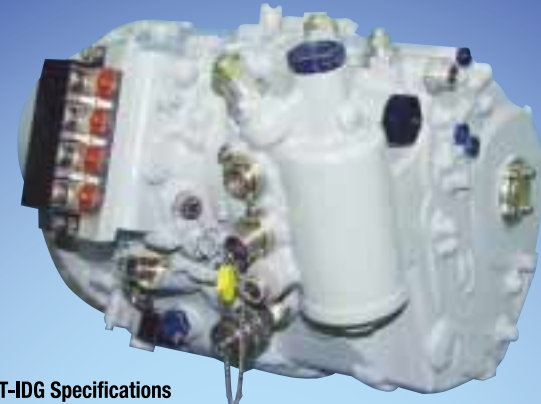
**Input Shaft**  
Connected directly to the engine, the shaft's speed varies from approximately 4,500 to 9,200 rpm depending on flight conditions.

**AC Power Generator (Output: 90 kW)**  
Generating electricity at 24,000 rpm, the AC generator supplies stable and constant frequency power to all aircraft equipment for maximum aircraft safety. Each aircraft engine is equipped with its own power generator. In the event something goes wrong with a generator or an engine, the other power generators serve as a backup to ensure power is supplied to the aircraft.

**Output Terminal**  
Electric power is delivered from here.

### T-IDG Specifications

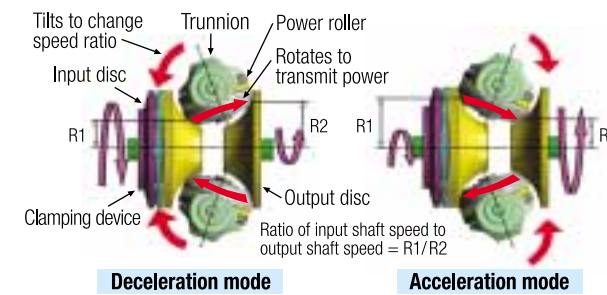
Output: 90 kVA (90 kW)      Voltage: 115/200 V  
Frequency: 400±5 Hz (3-phase)      Dimensions: D375 x W 460 x H 330 (mm)



### On Board the P-1 and XC-2

The T-IDG has been employed in the Japanese Ministry of Defense's next-generation P-1 maritime patrol aircraft and XC-2 transport aircraft. Kawasaki is the prime contractor for the development of both these aircraft. The T-IDG has been proven to work effectively in flight tests for both models.

### How High-Speed Traction-Drive CVTs Work



### The Secret to Steady Speed Output

As shown in the figure, power is transmitted by two opposing conical input and output discs and two power rollers sandwiched between them. The power rollers rotate along each axis to transmit power from input disc to output disc. As they rotate around the axes, they can tilt to change the speed ratio. Depending on where the rollers touch the discs, the CVT's speed ratio changes to either decrease (left) or increase speed (right). This enables the traction-drive CVT to maintain the output shaft (AC power generator) speed at a constant rate even when the rotational speed of the engine changes.

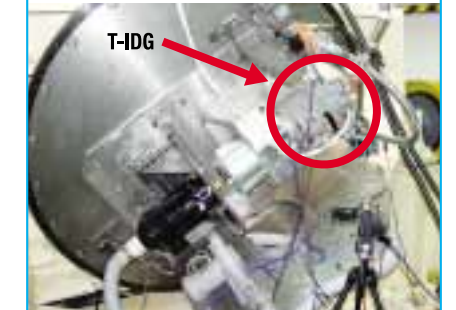
### What Is Traction Drive?

Traction drive is a mechanism for transmitting power via the viscous property of a special oil, dubbed "traction oil." Traction oil exhibits high viscosity under extreme pressure. As shown in the diagram, as the oil between the surfaces of the input/output discs and power rollers becomes increasingly viscous, the two surfaces come into contact. The pressure builds and the oil effectively works like a gear to transmit power. Kawasaki employs a traction oil that has been especially designed for the T-IDG.

### Designed for Any Flight and Environmental Conditions

The T-IDG is designed to accommodate various flight conditions, such as flight attitude, zero gravity, a low-pressure environment due to high altitudes, and atmospheric temperatures of -54°C to 200°C. It has been thoroughly tested and proven to work under various conditions.

Attitude test: The T-IDG is operated while tilted at an extreme angle.

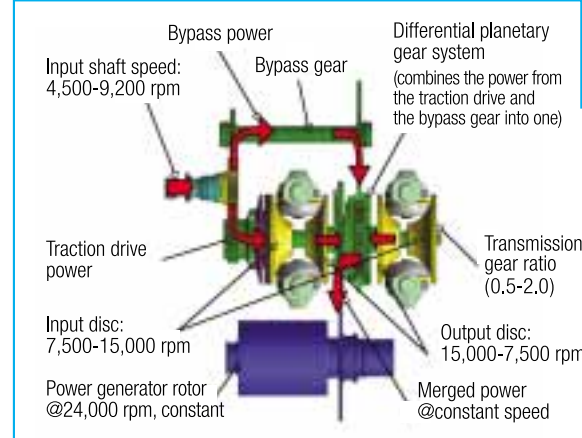


### Eyeing Commercial Market and Larger Models

The latest T-IDG model, with an output of 90 kW, can be used on midsize passenger planes that carry 150 to 200 passengers. Kawasaki is looking ahead to cultivating sales in the commercial aircraft market with plans for bigger models designed to suit large passenger planes.

### What Is a Power-Split System?

The T-IDG employs Kawasaki's proprietary power-split system (patent pending) to split the input power into two flows that pass through the traction drive and bypass gear. Splitting engine power into two flows reduces the load on components while extending the life and reliability of the traction drive in addition to boosting the T-IDG's overall power transmission efficiency.



T-IDG is a registered trademark of Kawasaki Heavy Industries, Ltd.

## Natural Gas Compressors Shipped to Korea

Kawasaki recently shipped two natural gas compressors from its Kobe Works to Korea's state-owned energy company, Korea National Oil Corporation Ltd. (KNOC). They will be installed in a gas compression module that is being upgraded under KNOC's Donghae-1 Gas Platform Modification Project (Phase 2), now under way off the coast of Ulsan.

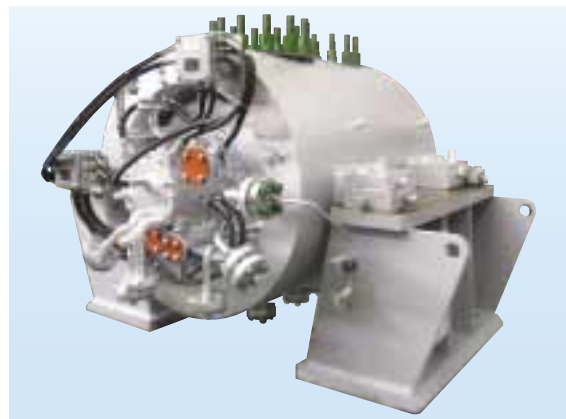
Korea's Hyundai Engineering & Construction placed the order for the compressors in September 2009. These two additional units will enhance the compression module's capability to boost gas pressure from older natural gas wells where the pressure has declined due to years of production.

A natural gas compression module is a

compact unit comprised of compressors, a driver, gas cooler, scrubber, valves, controllers and other equipment used to compress natural gas on an offshore platform and transport it to land via underwater pipelines. Its modular concept allows for optimal installation within the limited space available on an offshore platform.

A trusted compressor manufacturer and compression module supplier, Kawasaki is committed to providing ideal solutions to meet a variety of production requirements,

as well as contributing to the protection of environment. ::



## Contract Signed for Taichung City Railway System

Kawasaki recently signed a contract with Alstom Transport S.A. of France and CTCI Corporation of Taiwan to provide the Taipei City Government's Department of Rapid Transit Systems (DORTS) with a railway system for the new 18-station Wuri-Wenxin-Beitun Line (Green Line) that will link Beitun Depot in Taichung City with Xinwuri Station (Taiwan High Speed Rail Taichung Station). The contract is valued at roughly NT\$10.9 billion, with design and construction of the electrical and mechanical system package scheduled for completion by October 2017.

In addition to 36 medium-capacity transit (MCT) cars, the tri-party consortium will

collectively supply the systems for signaling, power supply, communications and automatic fare collection (AFC), and depot equipment. As the contracting employer, DORTS will administer the construction of the new line. In addition to manufacturing the 36 MCT cars and supplying the depot equipment, Kawasaki will be in charge of project management and system integration as head of the consortium. Alstom will supply the signaling system, CTCI will provide the power supply system, and both firms will supply the communications and AFC systems.

Taipei's urban development plans include implementation of a transit network system. Kawasaki delivered 132 mass rapid transit

(MRT) rail cars to DORTS between 1992-1993, and another 321 MRT rail cars between 2005-2010. Additionally, since receiving an order in March 2007 for the Xinyi Songshan Line, Kawasaki has been involved with CTCI and others in the joint construction of the railway system. Kawasaki is responsible for supplying the signaling system and 138 MRT rail cars, delivery of which commenced in 2010.

In addition to supplying 360 700T Series high-speed train cars for the Taiwan High Speed Rail Corporation, Kawasaki is currently manufacturing 123 MRT rail cars for the Taoyuan International Airport Access MRT System.

This latest contract is further testament to the superior engineering and reliability of Kawasaki-made rolling stock, as well as the substantial experience and expertise of the Kawasaki Group. Kawasaki will continue to pursue overseas contracts not only for rolling stock but also as a solution provider of total railway systems. ::



### City Transit System Overview

**Track length:** 16.71 km total  
**Stations:** 18  
**Train Configuration:** 18 2-car trains (36 cars total)  
**Operation:** Unmanned operation  
**Signaling:** CBTC (Communication-Based Train Control System)  
**Power supply:** Third-rail (750 V DC)

## Jet Ski Series Gets a Boost

Kawasaki launched a new Jet Ski flagship model in Japan in April, the Jet Ski Ultra 300X. It features a 4-stroke, 4-valve, liquid-cooled, DOHC engine (1,498 cm<sup>3</sup>) equipped with a new Eaton TVS (Twin Vortices Series)\* Roots-type supercharger. This combination produces a significant increase in engine power over previous models and a very smooth throttle response. The hull employs a newly designed Deep-V structure that is both rigid and lightweight, and incorporates Electric Trim Control to enable vertical angle adjustment of the jet nozzle for superior handling and stability and excellent turning performance even on rough water. Use of the Electronic Throttle Valve, which effectively and precisely controls the engine's enormous

power, makes Electronic Cruise Control and switching between various engine operation modes possible. A newly designed nose section represents the powerful and aggressive image of the product. With powerful acceleration, superior handling, and the convenience and comfort of electronic controls, the Jet Ski Ultra 300X is the flagship model for a higher class of Jet Ski.

The luxury edition of the Jet Ski Ultra 300LX, which shares the same engine and hull as the Ultra 300X, was launched in May. It is equipped with a luxury seat for superior contact and comfort (LXurysat) and its exterior features chrome parts and metallic paint for a greater sense of luxury.

Both models are equipped with new

features to assist fuel-efficient riding, including a Fuel Economy Assistance Mode with engine mapping to prioritize fuel efficiency, and an Economical Riding Indicator that illuminates during operation at high fuel efficiency. The two models also have superior environmental performance to comply with the Phase 2 voluntary emission standards of the Japan Boating Industry Association, which are applicable from year 2011 models, and also with the CARB's highest three-star rating, the most stringent emission standards in the world. ::

\* In contrast to the previous Roots-type supercharger, where supercharging is intermittent due to twin intermeshing 2-lobe rotors, the TVS employs twin 4-lobe screw-type rotors that produce smooth, continuous supercharging.



Jet Ski Ultra 300X



Jet Ski Ultra 300LX

## Cement Plant Delivered to Vietnam

Kawasaki recently delivered a cement plant to But Son Cement Joint Stock Company, a subsidiary of Hanoi-based Vietnam Cement Industry Corporation, which is controlled by the Vietnam Ministry of Construction.

The plant was ordered in July 2006 as a new

addition to an existing cement plant in the Kim Bang district of Ha Nam. One of Vietnam's large-scale cement plants, with a production capacity of 4000 tons/day, it provides integrated production from raw material receiving to grinding, burning and shipping.

Kawasaki was responsible for the design and delivery of a full set of process machines used on the line, and will also supervise construction, erection and commissioning. With completion of this expansion project, But Son Cement Joint Stock Company will have doubled its production capacity. In addition, the plant's high-performance dust-collecting facility and low-noise and low-vibration systems will contribute

significantly to preserving the natural environment.

Kawasaki has already delivered roughly 90 cement plants worldwide. In Vietnam, where demand for cement has been growing rapidly, Kawasaki previously delivered the Cam Pha Cement Plant, the nation's largest with a production capacity of 6000 tons/day, to Vinaconex Corporation in 2008. The current delivery thus marks Kawasaki's second such plant. With this record of proven deliveries, Kawasaki will have positioned itself at the fore not only in Vietnam but in new large-scale cement plant projects anticipated elsewhere.

Leveraging its superior technological expertise and reliability, Kawasaki will continue to actively develop its cement plant business throughout the world. ::



## First IPC Module Shipped for Trent XWB Engines

Kawasaki recently completed assembly of its first intermediate pressure compressor (IPC) module for the Trent XWB, Rolls-Royce's state-of-the-art engine for passenger planes. This is the first IPC module to be completely assembled by KHI, with modules for earlier Trent XWB engines being completed by Rolls-Royce in Derby, U.K.

The Trent XWB, with a thrust range from 75,000 to at least 97,000 pounds, is the newest addition to the Rolls-Royce Trent engine family. It will be used to power the new Airbus A350, which is currently under development by Airbus S.A.S.

Kawasaki has been participating in the development and production of the Trent XWB as a risk- and revenue-sharing partner. It is responsible for the production and assembly of the IPC module, and played a key role in its design and development in conjunction with Rolls-Royce. In March 2010, Kawasaki began shipping IPC components and has now completed the entire process, from parts manufacturing to assembly of the module. The Trent XWB is the second model to follow the Trent 1000, for which Kawasaki

participated in the design work and took responsibility for the production and assembly of the entire module.

As one of the eight main modules that constitute the engine, the IPC module has a diameter of about 1.5 m, a length of about 1.5 m and is comprised of approximately 4,000 components. It is a critical engine part



and is fitted with an IPC rotor, which includes the IPC drum with eight titanium alloy discs welded together using electron beam welding, rotors and stators, an IPC case and front-bearing housing. The IPC module will be used in the flying test bed engine scheduled to fly later this year. Kawasaki will continue to manufacture the modules for flight test engines and production engines.

The close working relationship between Kawasaki and Rolls-Royce dates back to 1959, when the two companies formed a technical alliance for the overhaul of the Orpheus jet engine. Since then, the partnership has expanded to encompass a wide range of areas, including defense aircraft engines and commercial aircraft.

In the commercial aircraft field, Kawasaki has participated in engine development and production programs as a risk- and revenue-sharing partner for Rolls-Royce's RB211, as well as the Trent series of engines numbered 500, 700, 800 and 1000. Both Kawasaki and Rolls-Royce are working on the development and production of International Aero Engines' V2500 engine. ::

## BK117C-2 TV News Helicopter Delivered

Kawasaki recently delivered its latest BK117 C-2 helicopter to Nishi Nippon Airlines Co., Ltd., marking the nineteenth C-2 model Kawasaki has delivered and the second C-2 model to be used by a media company.

The BK117 helicopter was developed jointly by Kawasaki and European helicopter manufacturer Eurocopter Deutschland (ECD),

formerly Messerschmitt-Bolkow-Blohm (MBB). The BK117 is a medium-sized twin-engine multipurpose aircraft that's used for everything from broadcasting to transporting cargo and passengers, fighting fires, police work, emergency medical services and more. It has been continually upgraded since its market debut in 1983. Cutting-edge technology

and outstanding reliability have proven to be a winning combination for the BK117, which has earned the distinction of being the bestselling model in the world today. Kawasaki has delivered 152 BK117s, and together with those delivered by ECD, there are over 850 in use around the globe.

The latest C-2 model features the lowest noise level in its class as well as

significantly reduced vibration. Its increased maximum gross weight capacity enables it to accommodate today's heavier and more advanced media equipment. More and more media outlets are discovering the C-2's appeal and orders are expected to increase.

Kawasaki continues to outpace the competition with its proven superior technological capabilities and outstanding customer services, as it actively markets its BK117C-2 helicopter. ::

### Specifications of Kawasaki BK117C-2 helicopter

**Length:** 13.03 m  
**Width:** 1.73 m (body)  
**Capacity:** 11 (max. number of seats)  
**Maximum load:** 3,585 kg  
**Cruise speed:** 246 km/h  
**Cruise range:** 675 km (standard tank)  
**Major equipment:** Automatic pilot system, rescue winch, repair kit, etc.



## LPG Carrier *Derby* Delivered



Kawasaki recently delivered an 80,000 m<sup>3</sup> LPG carrier, the *Derby* (Kawasaki hull No. 1666), to Xing Long Maritime S.A. The ship is the 47th LPG carrier built by Kawasaki, and the 8th of this particular model.

The ship employs Kawasaki's SEA-Arrow (Sharp Entrance Angle bow as an arrow), developed to minimize bow wave resistance and improve propulsive performance. Its cargo hold has four separate insulated storage tanks that absorb low-temperature contraction separately

from the ship. The tanks are made of special steel and are surrounded with urethane foam insulation to permit loading of liquefied petroleum gas at temperatures as low as -46°C.

The vessel features a fuel-efficient ultralong-stroke two-cycle low-speed diesel engine, as well as the Kawasaki rudder bulb system with fins (RBS-F), designed to reduce fuel consumption. The environmentally designed fuel tank has a double-wall construction to prevent ocean pollution. ::

## Green Gas Engine Ordered

Kawasaki recently received an order for its Green Gas Engine, boasting the highest power-generating efficiency in the world, from a leading Japanese chemical company.

The largest model in the Green Gas Engine line, featuring an electrical output of 7,800 kW, will be installed on a cogeneration system to provide electricity, steam and hot water. Kawasaki is responsible for turnkey delivery of the plant, and is taking charge of everything from design of the overall system to installation and testing.

Kawasaki has leveraged a wealth of

innovative home-grown technologies to develop its cutting-edge Green Gas Engine. The engine's record-breaking electrical efficiency of 48.5% and world's lowest NOx emissions level (less than 200 ppm at 0% O<sub>2</sub>) makes it extremely cost efficient as well as environmentally friendly. The Green Gas Engine beats all conventional gas engines in its class by cutting fuel costs by more than 5%. Owing to its low-NOx emissions, the engine eliminates the need for any denitration equipment in most areas of Japan. Lightweight and compact, it also

features an electric spark ignition system that does away with the need to use liquid fuel. In addition to everything else, this state-of-the-art engine provides outstanding power-generating efficiency across a wider operating range, spanning 30% to 100%.

Demand for energy-efficient and environmentally friendly solutions is soaring and Kawasaki is answering the call with clean and efficient generators, like its gas engine-driven power generation systems, as it takes its energy and environmental business to new heights. ::

## Support for Earthquake and Tsunami Victims

On March 14, just days after the tragedy, the Kawasaki decided to make a donation of 200 million yen to the people and communities affected by the devastating earthquake and tsunami that hit northeastern Japan on March 11. In addition to a monetary donation of 100 million yen, Kawasaki also donated products worth 100 million yen. The products included the Kawasaki D-Tracker X and D-Tracker 125 motorcycles, KCM-made wheel loaders, and crushing machines supplied by EarthTechnica to support reconstruction efforts.

The motorcycles have been used to transport relief supplies to the stricken areas

and to lead cars in areas where road conditions are bad, as well as for emergency transport of quake victims. The wheel

loaders are still being put to good use almost every day in removing debris and land-leveling work. ::



# Kawasaki Gallery Heizo Kanayama's World



*Sunny*, 1956-60, 53.1 x 72.5 cm, oil on canvas. From the collection of Kawasaki Heavy Industries, Ltd.

## Colors of the Sea and Shore Speak to the Senses

*Shusaku Sagara*, Associate Curator, Hyogo Prefectural Museum of Art

One of the greatest joys of viewing landscape paintings by Heizo Kanayama, or any artist, is in discovering how they perceived the scenery, how they captured it in their mind and how they expressed what they saw.

In this painting, the horizon is pushed toward the top of the canvas, indicating that the artist was looking down onto the scene from a vantage point of considerable height. The low-pitched roofs covering the houses at the bottom of the canvas are depicted accurately with simple yet strong brushstrokes, making them perfect for the work's title *Sunny*, hinting that this scene was bathed in strong sunshine.

However, the spirit of the artist can be captured not so much

in the sun and cloud-covered sky, which acts as the source of light, as in the subtle and ever-changing colors of the sea and shore, which capture the light. The sea, which covers half of the canvas, is portrayed in an almost abstract style, with the changing colors of the whitecaps on the water's edge, the rolling waves crashing one upon the other, and the different shades of the tides arrayed in horizontal lines across the canvas. Nevertheless, Kanayama has captured the scenery with his characteristic depth and breadth, bringing the sounds of rippling waves, the smells of the water and even the temperature of the day to life in the viewer's mind, evoking an emotional reaction to the world before their eyes through their senses.



### Heizo Kanayama and Kawasaki

Heizo Kanayama (1883 -1964) went to Europe in 1912, after graduating at the top of his class from the Tokyo University of the Arts. He won the second prize at the Ministry of Education Art Exhibition in 1916, and went on to create many masterpieces in which nature is a recurring theme. Kanayama left an indelible imprint on the history of modern art in Japan.

*The Shipyard*, exhibited at the Ministry of Education Art Exhibition in 1917 (and featured in *Scope 83*), is the work that first brought Kawasaki and Kanayama together. Toward the end of Kanayama's life, Kawasaki agreed to the artist's request to permanently house 138 pieces of his artwork. Kawasaki has since donated a major portion of this collection to the Hyogo Prefectural Museum of Art.