

JSMEA International Activities Scheduled for April 2008 - March 2009

- Participation in International Conference on Marine Technology

Technical experts on diesel engines will be sent to IMO, CIMAC and other meetings.

- International Seminar on Ship Machinery in India

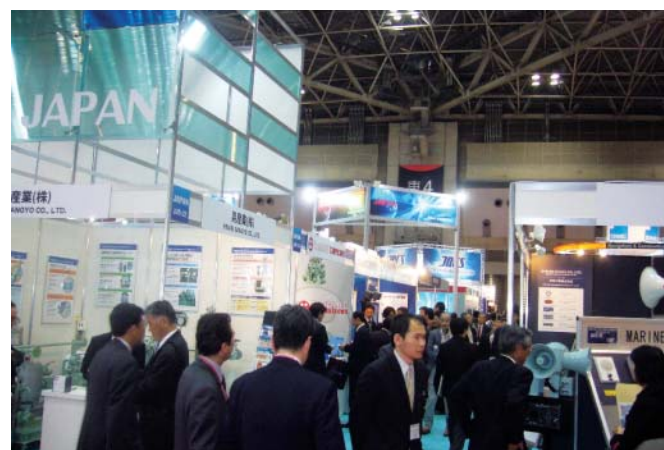
A seminar concerning Japanese-built ship machinery and the current state of the Japanese ship machinery industry will be held in India in January 2009.

- Participation in International Maritime Exhibitions

To extensively promote overseas the products and technologies of the Japanese ship machinery industry, JSMEA has participated and will participate in the following prestigious international events:

• SEA JAPAN 2008 (The 8th International Maritime Exhibition)

April 9-11, 2008
Tokyo Big Site, Tokyo, Japan



SEA JAPAN 2008

• Posidonia 2008 (The 21st International Shipping Exhibition)

June 2-6, 2008
Hellenikon Exhibition Center, Helleniko, Hellenic Republic



Posidonia 2008

• SMM 2008 (The 23rd Shipbuilding, Machinery & Marine Technology International Trade Fair, Hamburg)

September 23-26, 2008
Hamburg Exhibition Center and Congress Centrum, Hamburg, Federal Republic of Germany

- Publication of Promotional Periodical in English

The association publishes a periodical in English, highlighting the latest technologies and products from the Japanese ship machinery industry, in an effort to promote them to foreign shipowners and shipbuilders. Two issues are scheduled from April 2008 to March 2009.

Jsmea News

IWJ Water Jet Propulsion Device



JSMEA

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ISHIGAKI COMPANY, LTD. was initially established in 1958 to engage in the manufacture, sales and repairs of machines for salteries. Under the corporate motto of "return trust with technical excellence," Ishigaki has developed and manufactured unique filters, separators, pumps and propellers.

The variety of products the company offers embodies the development and design philosophy of protecting the global environment. Such products are not only highly appreciated in

Japan, but also in international markets - they assist in saving energy, material cost and unnecessary labor.

Ishigaki has acquired certificates under the international quality assurance standards ISO 9001 and the international environmental standards ISO 14001. Under thorough quality management conforming to these standards, the company is supplying the world with environmentally friendly filters, separators, pumps and water jet (IWJ) propulsion devices.

Features of IWJ Water Jet Propulsion Device

In July 1997, after a decade of research, Ishigaki introduced to the market its IWJ water jet, an offspring of hydrodynamic technology integrating the water-related technological assets the company had accumulated over the years.

1. Use of the Pull-Spin Vane Wheel

Capitalizing on its long history in pump production, Ishigaki developed a screwed, diagonal flow vane wheel (registered name: Pull-Spin Vane Wheel) that has good intake performance, is highly efficient and passes relatively large grains. Both IWJ and IWJO water jet propulsion devices use this Pull-Spin Vane Wheel.

2. High Efficiency

High efficiency has been achieved due to the company's ability to make full use of three-dimensional analysis and three-dimensional CAD computer technology, and (five-axis) NC vane wheel machining.

3. Anti-Cavitation Performance

Intake performance is good enough to ensure a sufficient allowance against cavitation. As a result, a high thrust can be achieved even at low speeds, and quick acceleration is made possible.

4. Low Vibration, Low Noise

An excellent hydrodynamic design has succeeded in keeping both vibration and noise at low levels.

5. Excellent Durability

The use of anti-corrosive materials, including two-layered stainless steel and thorough precautions taken against electric corrosion, has made the water jet highly durable.

6. Freedom from Dust Clogging Problems

Relatively large grains are

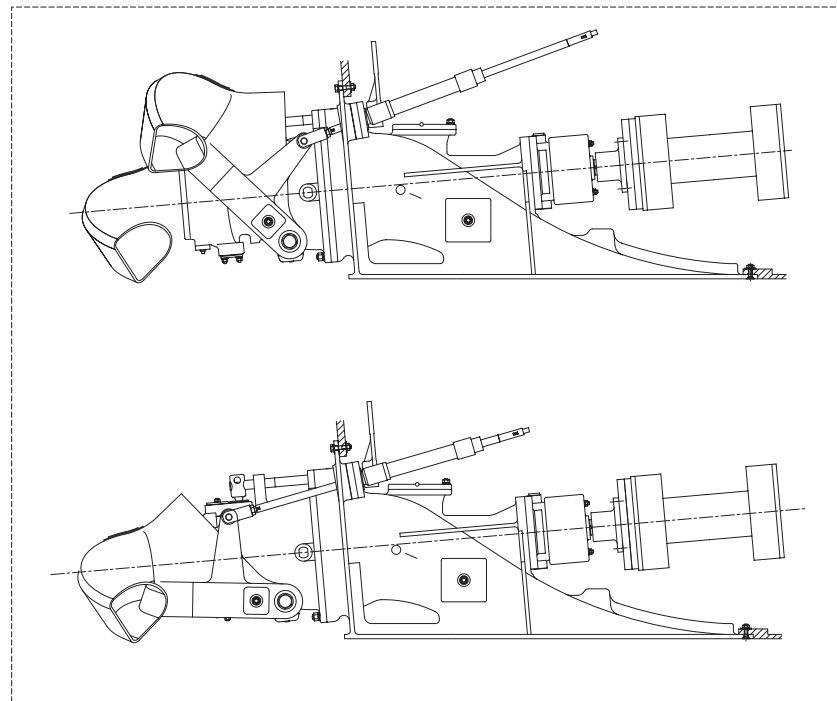
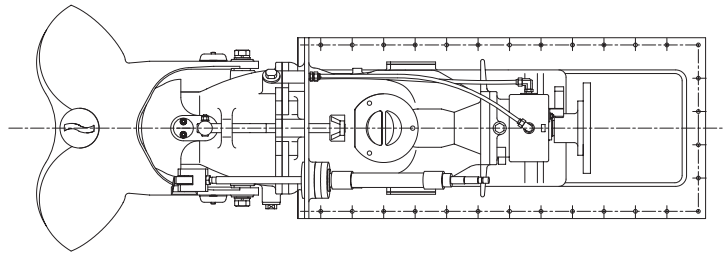
allowed to pass, resulting in a reduction of dust clogs within the propulsion device.

7. Post-Delivery Servicing

The company has in place complete maintenance arrangements for its products, which allow for prompt responses to customers' requests.

8. Control System

The water jet is regulated with a unique IWJ control system, which is applicable to a wide variety of watercraft ranging from pleasure boats to work boats. A boat powered by plural water jet units can be maneuvered with a single joystick, if equipped with a joystick system (optional), in all desired directions including transverse and oblique ways.



Tsuji receives first order for fully electric-driven hatch cover Nine vessels at Japanese yard to be equipped with e-HATCH

The e-HATCH, a fully electric-driven hatch cover was developed and extensively tested at Tsuji Heavy Industries Co., Ltd. Sasebo Works in Japan in 2006. The first nine vessels have now been contracted to Namura Shipbuilding Co., Ltd. with deliveries starting in 2009.

The side-rolling type e-HATCH covers are to be used on Panamax and Capesize bulk carriers, offering the following main advantages:

For shipowners:

- less maintenance compared to hydraulic driven hatch covers
- easy operation through the auto-cleat system, no jack-up
- it is environmentally friendly; there is no risk of pollution due to leakage from the hydraulic system

For shipyards:

- no heavy, long piping and flushing work for the hydraulic system

- less outfitting due to simple designs without hydraulic jacks or cylinders

Electric-driven CRANE-e

Tsuji's inverter-controlled electric-driven deck crane, CRANE-e greatly reduces energy consumption, and through elimination of hydraulics, the simplified and robust new-type crane is almost completely maintenance free.

The need to address environmental issues related to the shipbuilding and shipping industry has become obvious, thus fewer emissions of harmful CO₂, NO_x and SO_x exhausts are important to environmentally conscious shipowners and charterers. Acceleration and deceleration is very smooth and precise. Other advantages include less noise and vibration. The electric system is also preferable when working in very cold or hot environments. Tsuji recently delivered four electric cranes that can withstand ambient temperatures of up to -40 degrees Celsius for Japan's new icebreaker for Antarctic expeditions MV Shirase.



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Fire Protection System of Electrical Cables for Marine Use "TK CABLE PROTECT"

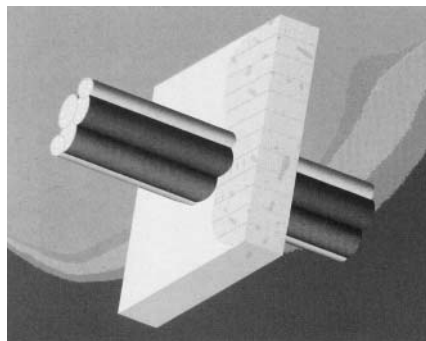
Taiko Sangyo Co., Ltd. has developed "TK Cable Protect," a new type of fire prevention system for marine use in the event that cables penetrate through parts of the vessel.

In this new system, electric cables within bulkheads are packed with ceramic containing a specific ore to prevent any fires occurring onboard from spreading. As it is a completely dry system, cables do not have to be unbundled and thus can be installed easily.

Conventional fire protection systems for decks or bulkheads of decks usually involve packing the spaces between electric cables with putty containing styrene foam, but Taiko's new product features ceramic mixed with an ore known as vermiculite, which expands when heated. In the event of a fire, the ore particles in the ceramic packing expand to compress the electric cables, and thereby prevent the fire from spreading to other bulkheads.

For this reason, electric cables can remain bundled, unlike in conventional systems where work on individual cables is required. As a result, the installation is quick and efficient.

The new product has already passed tests conforming to international fire protection standards, and is expected to be authorized by JG-MED and ClassNK. A patent is also pending.



TK Cable Protect

Features

1. Dry Installation Method

- Only requires filling of the material.
- Cables can be dismantled and rewired; additional cables can also be added.
- Economical because the material can be reused for re-installations.
- The finished dry material will not deteriorate over time.

2. Simple Installation (by cable bundling)

- Cable bundling facilitates installation
- The material can be easily manipulated with a snap-off blade knife (no special tools are required).
- Adaptable to coaming length of 75mm or more

3. Flexible material

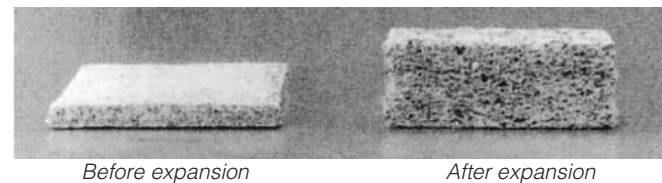
The material is very elastic and can endure the ship's heavy vibration.

- Lightweight material

The material has a density of only 0.66g/m³, which helps reduce the installation workload.

- Foam material

A thermo-sensitive material is used, which serves to fill small gaps around the cable when heated by fire and thereby preventing fires from spreading.



Before expansion

After expansion

Working Procedure

Step 1



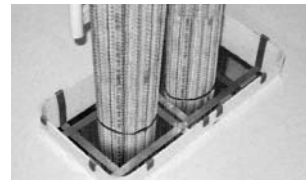
Remove oil sludge, etc. from coamings before putting cables together.

Step 2



After putting cables together to between 150 and 200 Ø, fix it in place with binding lines or winding belts.

On-deck type



Fit the lines or belts in a lattice shape to prevent the thermal foam blocks from falling.

Step 3



Pack the space around the cable in the coaming with thermal foam blocks (gaps of about 5 mm will not pose a problem).

Completed



Fill block seams and the space around the cable with silicon to prevent the small thermal foam blocks from falling. The installation is now complete.

Cable addition possible



Consider the size of any additional cables to be used by cutting the thermal foam blocks, and packing the space with the cut-off pieces of the blocks after laying the cable.

Onshore Power Supply (Cold Ironing) System

1. General Description

Onshore Power Supply (hereafter called "Cold Ironing") is an eco-friendly system where vessels shut down all power supply units and draw electric power from the shore during cargo handling.

It is suggested that emissions of CO₂, SO_x, NO_x, and PM can be greatly reduced by using this "Cold Ironing" method.

The Port of Los Angeles has already been operating a system of "Cold Ironing," called Alternative Maritime Power (AMP), and the Port of Long Beach will start "Cold Ironing" operations in 2008. Other ports in California are also considering implementing this system.

As a leading manufacturer of electrical marine equipment, JRCS CORPORATION (JRCS) has worked on "Cold Ironing" projects and supplied the electrical equipment for it.

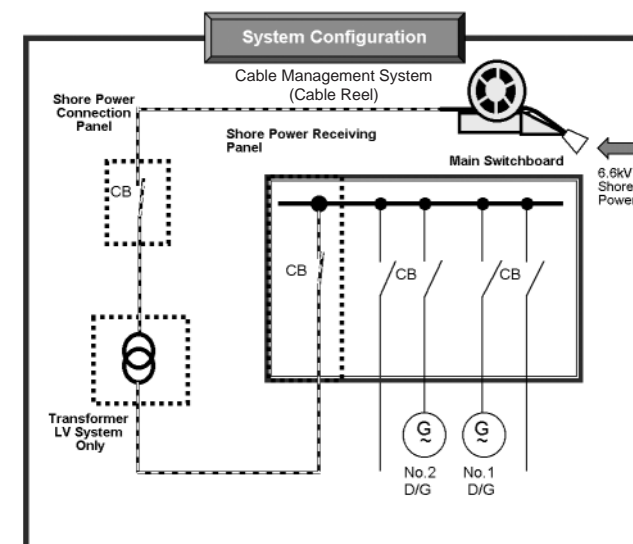
2. Equipment supplied by JRCS

JRCS is able to supply all of the electrical equipment necessary for "Cold Ironing" operations including:

- Cable Reel (Cable Management System)
 - Shore Power Connection Panel
 - Shore Power Receiving Panel
- etc. (See Figure 1.)

JRCS can also provide advice regarding individual ship requirements based on discussions with port authorities, shipowners, field and onboard surveys.

Figure 1



3. Cable Reel & HVSB Container Unit

For "Cold Ironing" of container vessels, JRCS offers a "Cable Reel & HVSB (HV Switchboard) Container Unit" where a Shore Power Connection Panel (HV Switchboard), a Cable Reel, and a Cable Reel Control Panel are installed. (See Figure 2.)

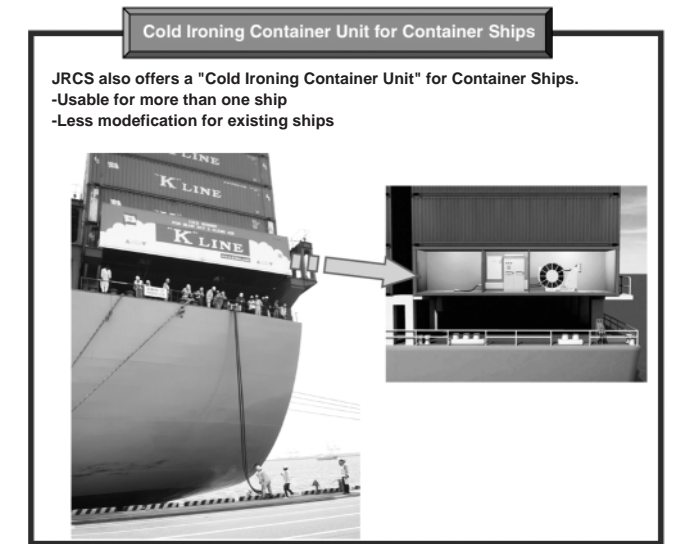
This Container Unit is mobile; therefore, it can be moved from port to starboard. It can also be transported for use on other vessels. For example, if the vessel no longer requires the Container Unit (e.g. due a change in route), it is possible to use it aboard other vessels requiring "Cold Ironing."

This mobility enables containerships to eliminate the need for a permanent installation of an HV switchboard and 2 sets of cable reel for both port and starboard.

4. Specification of the "Container Unit"

- Receiving Power Capacity: 5.5MW
- Receiving Voltage Capacity: 6.6kV
- Container Type: 40-foot Reefer Container
- Change-over Method: Non-blackout Change-over
- Control Source: AC440V, DC24V

Figure 2



Taiko Sangyo Co., Ltd.

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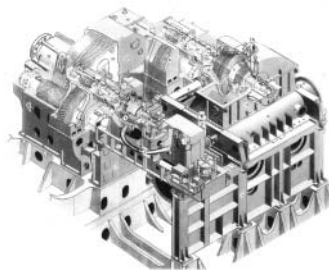
KAWASAKI Advanced, URA Main Propulsion Turbine for Reheat Steam Cycle Plant

1. Outline

Kawasaki Heavy Industries, Ltd. (KHI) in 1997 developed the non-reheat type Kawasaki UA turbine, which represented improvements in turbine efficiency and reliability over than existing steam turbines, and has built some 120 units of the UA type to date. About 100 of these units are installed in vessels in active service now, demonstrating anew the advantage of freedom from maintenance needs and troubles of UA turbines.

On the other hand, DFD (heavy oil or gas-fired diesel) electric propulsion engines and diesel engines equipped for re-liquefaction, which are superior in thermal efficiency to steam turbines, have come to be used as main propulsion plants for LNG carriers in recent years, and accordingly steam turbine-powered vessels are now called upon to improve their thermal efficiency, the only problem with steam turbines.

The most effective way to enhance the thermal efficiency of a steam turbine is to reheat steam at the intermediate stage to a higher temperature and return it to the turbine. KHI in the 1970s developed the reheat type Kawasaki UR turbine, and installed them in eight large tankers, which confirmed their effectiveness and helped gather variable operational data. This experience was verified anew by applying the latest techniques including numerical analysis to improve the earlier type, and the



technical know-how built up with the conventional UA type has been inherited in the development of the new reheat type Kawasaki URA turbine, further improved in efficiency and reliability over the UR type.

2. Main Particulars

The main particulars of the URA type are shown in Table 1 in comparison with those of the UR and UA types.

3. Technological Bases of High Efficiency and High Reliability

(1) High and intermediate pressure turbines

They are the same in basic configuration as those of the earlier UA type. However, in the reheat type URA turbine, the main steam flows into the high pressure turbine toward the bow while the reheated steam flows into the intermediate pressure turbine toward the stern, due to concentrating the components coming into contact with high temperature steam into the central part of the casing. The revolutions of the turbine are increased to make possible reductions in the turbine size and in the wall thickness of the casing, resulting in reduced thermal stress and thermal deformation.

(2) Low pressure turbine

The low pressure turbine is the same as the UR type in the main particulars and materials of the rotor, and its reliability is secured by keeping the strengths within the limits endorsed by past performances.

(3) Reduction gear

According to the design concept of the UR type reduction gear, the limitation on the machining of gears made it necessary to use a locked train system (dual tandem articulated) in which the input power from the high and low pressure turbines are distributed to two gear wheels respectively. The recently developed URA type reduction gear uses pinions with carburizing heat treatment and the gears, of ultra hard material. Furthermore, the cutting-edge designing and fabrication techniques which ensure the material quality, accuracy and the welding quality of the gears have made possible the use of a smaller and lighter-weight single train system (tandem articulated) in which the input power from each turbines is transmitted by a pinion to a single gear wheel.

Table 1

		URA	UR	UA	
Maximum power transmitted (kW)		36,800	36,800	29,400	
High and intermediate pressure turbines	Steam conditions	Pressure (MPaG)	11.7	9.8	5.7
		Temperature (°C)	560	520	520
		Reheat temperature (°C)	540	520	-
	Materials	No. of stages	12	12	10
		Casing	CrMoV cast steel	CrMoV cast steel	CrMoV cast steel
Materials	Rotor	CrMoV forged steel	CrMoV forged steel	CrMoV forged steel	
	Blade	12% CrMoNbV steel and 13% CrMo steel	13% CrMo steel	13% CrMo steel	
Low pressure turbine	Steam conditions (MPaG)	0.7	0.47	0.55	
	No. of stages	10+2 (Astern)	8+2 (Astern)	8+2 (Astern)	
Gear type		Single train double reduction geared	Locked train double reduction geared	Single train double reduction geared	
Main shaft revolutions (rpm)		76	80	80	
2nd Gear wheel diameter (m)		About 4.8	About 5.5	About 4.5	
Tooth surface finish		Ground	Shaved	Ground/shaved	
Materials	Pinions	NiCr steel (Carburizing)	CrMo steel	NiCr steel (Carburizing)	
	Gears	NiCrMoV steel	CrMo steel	NiCrMoV steel	



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Hull Rolling Reduction Advanced with "Anti-Rolling Tank" STABILO develops Variable Period Stabilo Valve

STABILO Co., Ltd. has successfully developed the adaptively auto-controlled Stabilo Valve for fluid control (including period variability) of its Anti-Rolling Tank (ART).

Fully Automatic System Unparalleled in the World

STABILO's Stacon MX can analyze the state of oscillation the ship is likely to encounter by taking information on the wind velocity and wind direction, head sea, following sea, ship's speed and rudder angle commands. Based on this analysis, it can achieve the best possible anti-rolling effect by instantaneously actuating dampers in liquid passages and butterfly valves for air ducts. Further, it has the latest hybrid control system, which is unparalleled in the world in that it can eliminate the previously fatal disadvantage of free water in the ART adversely affecting the stability of the hull. Stacon MX is now installed in about 100 vessels.

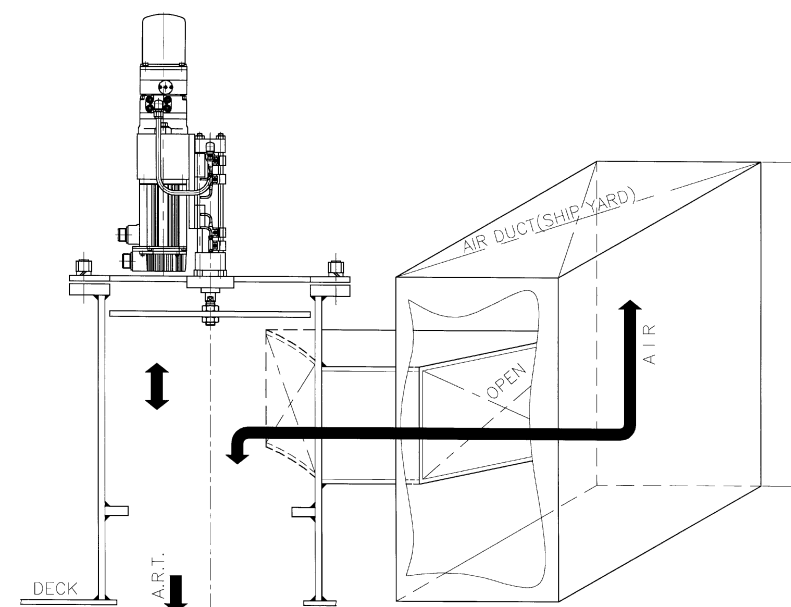
Hardware Problem

The driving system that is indispensable for period variability and the control of liquid is usually electric, pneumatic, hydraulic or combination of two or more types. A certain manufacturer uses electric driving for dampers and pneumatic driving for butterfly valves, but STABILO uses hydraulic driving for both dampers and butterfly valves. In both cases, pneumatic or hydraulic piping would be required.

Development of Stabilo Valve

In recent years, the call for development of environmentally friendly marine equipment has increased. Responding to this call, STABILO has successfully developed the Stabilo Valve, which contributes to conservation of the global environment through energy saving. Its main features are outlined below.

- Integration of electro-hydraulic actuator dispenses with hydraulic or pneumatic piping onboard the hull.
- Neither dampers nor butterfly valves are needed, resulting in saving on their installation cost and related work.
- Only "electric wiring" is needed where piping and wiring would be otherwise necessary, a feature which makes possible a substantial cost cutback.
- Above all, a remarkable saving in energy can be achieved (in comparison with other similar products of STABILO).
- Noise emitted from the driving power source and the valve itself when they are at work has been reduced dramatically.
- Furthermore, the valve is modularized, an even more epochal achievement.
- As an overall result, the new product enables the shipbuilder and equipment manufacturer to reduce their overall initial cost by 15% to 20%.



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Electric Shaft System

What is an Electric Shaft?

When a large ship is berthed or unberthed, the quay is invisible from the center of the wheelhouse. To eliminate this inconvenience, a lever is provided on each of the ship's port and starboard wings to facilitate berthing and unberthing.

Electric Shaft is so-named because when the lever in control position (master lever) is operated, the other levers are synchronized electrically as if they were connected by a single shaft.

It obviates the need for matching the levers when control position is changed from one lever to another.

System configuration

The system configuration and control blocks of the Nabtesco Corporation's Electric Shaft are illustrated below. The levers, each having a motor for moving

itself and a potentiometer for detecting its own position, are connected to one another by a control board and a CAN network.

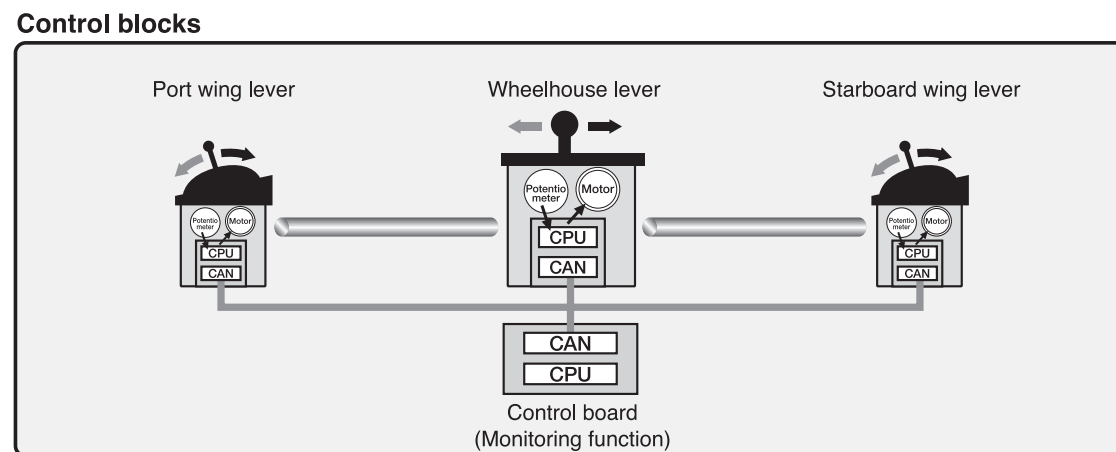
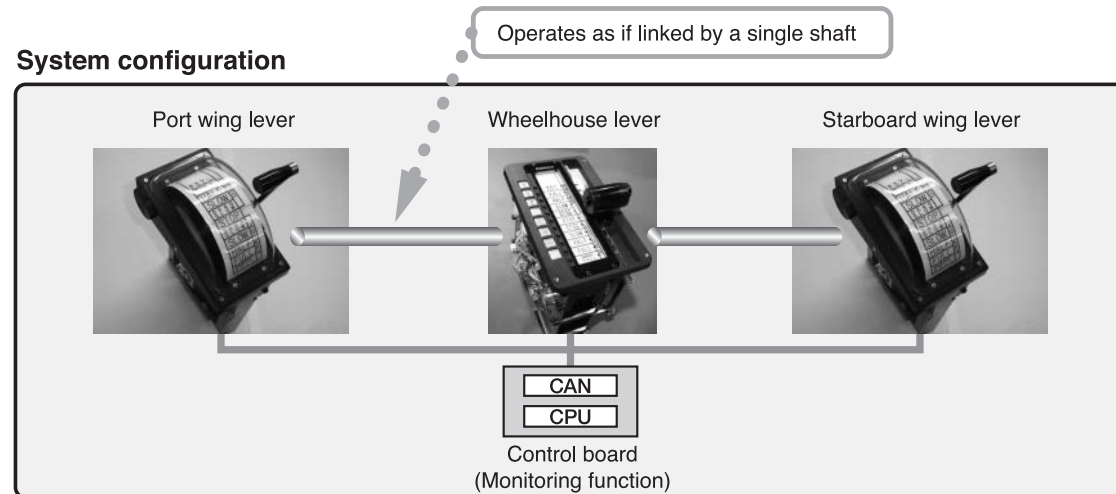
The motor is controlled by stopping it if it is the master lever's or, if it is not the master lever's, information on the position of the master lever is received and the motor is controlled accordingly.

Features

This digital system using CAN has the following advantages over the conventional analog system.

- Fewer wiring lines
- Capability of long distance transmission
- Greater reliability of data
- Greater extensibility (additional levers can be provided elsewhere than wings)
- Greater immunity to noise

The wing levers are compact waterproof type units (IP56), most suitable for installation on wings.



Nabtesco

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KEI Develops World's First Self-Traveling, Monitoring Robot for Fire Detection

KEI SYSTEM CO., LTD. (KEI) is an R&D-oriented company, established in 1986 with technological innovation as its declared objective and now engaged in the development and commercialization of hardware and software to meet ever-more diverse customer needs, capitalizing on its expertise in computer and communications technology.

The main products KEI has developed and is manufacturing include systems and software for collective control of indispensable parts for ship operation, centering on the data logger system and the valve control system.

Holding the biggest share in the world market for ship monitoring and control systems, KEI recently developed the world's self-regulating and self-traveling Hazard Robot (prototype) to prevent fires in the cargo holds of oceangoing car carriers, among others.

Outline

The robot, equipped with an infrared temperature sensor (radiation thermometer), a CCD camera and a wireless LAN function, detects any fire on cargo or in cargo space, and conveys the information to the inboard LAN. As it has an obstacle sensor and is compactly built, the robot travels under self-regulation and detects any hazard while running under vehicles loaded aboard a car carrier.

This Hazard Robot (prototype) was displayed at SEA JAPAN 2008 on April 9-11, 2008 and found enthusiastic responses.

To adapt the new product to the needs of practical use, the manufacturer will make such improvements as the use of a soft material for the robot body to prevent it from damaging or being damaged by any vehicle it may come into contact with or the addition of gas leak detection if necessary.

The price of the robot system for practical use aboard a car carrier with a capacity for 6,000 vehicles (comprising 12 Hazard Robots), including the computer system, is expected to be around ¥10 million.

Features

1. Can operate continuously for many hours

Consisting of an ultra-low power consumption computer section, into which a compact yet high performance computer is incorporated, and a mechanical section, the system operates for many hours on a small battery.

2. Free to move even around narrow corners

Its small size allows the robot to run even around narrow corners where spaces are too low for humans to access.

3. Fast data transmission

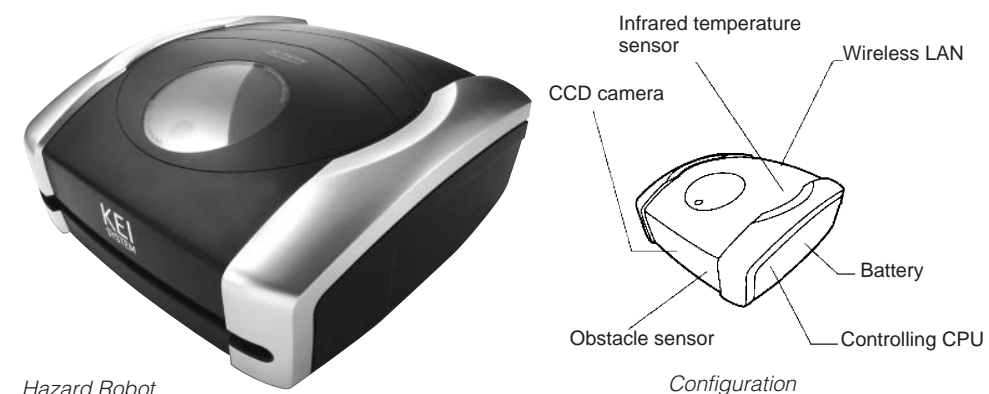
The system is connected to the inboard LAN by a wireless LAN to permit issuing of alarms when any abnormality is detected and data transmission via off-shore/onshore communication lines.

4. Remarkable sturdiness

The intended introduction of such a robot to be exposed to stringent inboard conditions (in terms of temperature, humidity, vibration, shock, rolling and so forth) is the first such attempt in the world.

5. Broad operating range

The robot can be operated in a broad range (300 m by 40 m) and in a place surrounded by iron, where neither GPS nor radio can be used.



Hazard Robot

Configuration

KEIsystem

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Multipoints Alarm monitoring and data Capture unit

MURAYAMA DENKI LTD. has released a new product from its MAC-6000 series, an integrated multi-channel, multi-functional monitor which brings together all of the engine monitoring devices previously arranged unit by unit. It includes a temperature monitor display, a hydraulic monitor display, an upper/lower limit alarm unit, a deviation-from-average alarm unit, an annunciator unit and an alarm display panel unit.

The most important feature of this new product is its design. Unlike a general-purpose monitor, the initial setting does not have to be configured. This is because the product was created with the sole purpose of engine monitoring in mind. By merely connecting sensors and the power supply, an engine monitor with built-in functions ranging from deviation-from-average alarming to annunciator is completed (though alarm setting for each individual channel is required).

The units are built into a box measuring 240(W) x 180(H) x 200(D) and include an input circuit for 60 channels of an all point isolated type, 60 alarm lamps and a monitored point display panel, an alarm output relay for one buzzer and 15 lamps, a JIS-conforming annunciator, an LED display with a dimmer function, flat type control keys and interfaces for various communication modes.

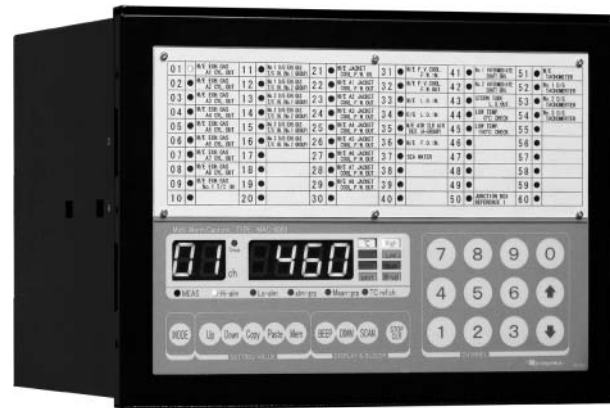
The input unit works on cards each having 10 channels. As each has a built-in sub-computer, it can be very easily replaced with another during maintenance.

Apart from the input unit, the main computer also permits the zero and span of each channel to be corrected, even if an error is observed due to a difference in sensor installed position after the system begins operation; correction can be readily accomplished without affecting other channels. The correction is stored into the main body, and does not need resetting when the input unit is replaced with another.

Similarly, the alarm output on each channel can be allocated as desired to 15 built-in relays, and can be set to share the same relays with the group of deviation-from-average alarms.

The communication interface has NMEA0183-conforming hardware as a standard device, which has a built-in program for communication with slave units under this device as the host unit.

The use of dedicated slave units makes monitoring possible elsewhere other than the engine monitoring room, similar to that of the host machine. (However, since the reception of measured data, alarm group and alarm setpoints reflect communication from the host unit, it is impossible to alter on the slave unit the zero and span corrections, alarm setpoints and so forth.)



MAC-6000X

[Main Particulars]

- Product name: Multi-point Alarm monitoring and data Capture unit (MAC)
- Type: MAC-6123A (AC)
MAC-6123D (DC)
 - First numeral: The digit of tens in the maximum number of channels (6 or 3)
 - Second numeral: Units No. for K thermocouple (1 to 6)
 - Third numeral: Units No. for Pt100 resistance thermometer sensors (1 to 6)
 - Fourth numeral: Units No. for 4 to 20 mA current output sensor units (1 to 6)
- Number of measuring points: Variable by tens according to the specification up to 60 points
- Sensors: K thermocouples, Pt100 resistance thermometer sensors and 4 to 20 mA current output sensors
- Measuring ranges:
 - K thermocouples...-200 to 1200°C
 - Pt100 resistance thermometers...-200 to 600°C
 - Current input for pressure sensors...4 to 20 mA
- Tolerance of measurement: $\pm 0.3\% + 1$ digit
- Sampling rate: About 50 ms/channel
- Indication: By 7-segment green LED indicator
- Communication interfaces:
 - Standard unit...NEMA0183
 - Optional...USB2.0/1.1, 10BaseT, RS-232C
- Power source: AC100/220V or DC24V (upon ordering)
- Power consumption: About 30 W
- External dimensions (in mm): 240(W) x 180(H) x 210 (D)

New Model LWA Developed for Radar Type High Level Alarm

Prototype displayed at POSIDONIA

MUSASINO exhibited its radar type high level alarm (LWA), the world's first product of the kind, at Sea Japan 2008 held in Tokyo on April 9-11, 2008. The same item was also displayed at Posidonia 2008 in Athens, Greece on June 2-6, 2008. Capitalizing on the technology and experience it established through the manufacture of diverse radar type level gauges, MUSASINO has developed LWA as a product of the Level Ace series intended to contribute to the campaign for the prevention of global warming, with particular emphasis on the ease of handling and maintenance.

Features of New Model (LWA)

LWA has the following notable features.

- ① Significant handling ease is achieved by the use of a newly developed compact and lightweight transceiver, with the alarm functions for the high level and overflow level housed in the same case.
- ② A flat insulated antenna is used to facilitate cleaning and other maintenance jobs and at the same time to prevent electric corrosion and damage by sloshing.
- ③ The tank has no metal protrusion inside and therefore no electrostatic sparking occurs with the cargo, thereby simplifying the in-tank work including prevention of electric discharging.
- ④ The alarm point can be preset by software and accordingly there is no limitation on tank dimensions, therefore production of standard items to meet anticipated demand makes it possible to deliver to customers in a short lead time.
- ⑤ The flange is eliminated and a monocoque cover with hoop-clamps is used instead, which contributes to handling ease with improvements in air tightness and reduction in weight.
- ⑥ Adaption of thin fitting flange and the cover with hoop-clamps contributes to significant weight reduction. The device weighs only about half that of the comparable older model, which effectively saves on the workload during outfitting.
- ⑦ Strengthened self-intelligent function has made it possible to confirm the normal functioning of the device, trouble analysis, and quick restoration following analysis.
- ⑧ Future build-up of a "network management system" for unified management of self-intelligent information on every terminal through a network (MMnet) is planned. LWA is considered a preparatory step, the first step toward further strengthening of after-deliv-

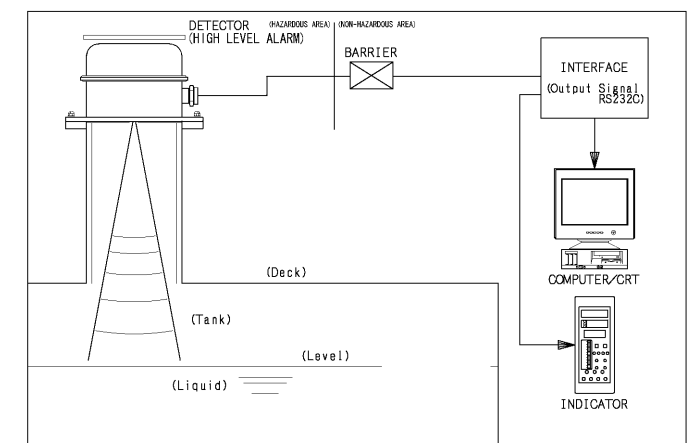
ery servicing, including maintenance and conservation.

Outline of radar type high level alarm (LWA)



Radar Type High Level Alarm (LWA)

- Two-point alarm functions for the high level and overflow level are housed in the same case.
- The detecting distance can be preset to any desired length between 0.4m and 2.0m, and can be easily changed if desired.
- The tolerance of detection is ± 5 mm.



Typical Configuration of Type: LWA