

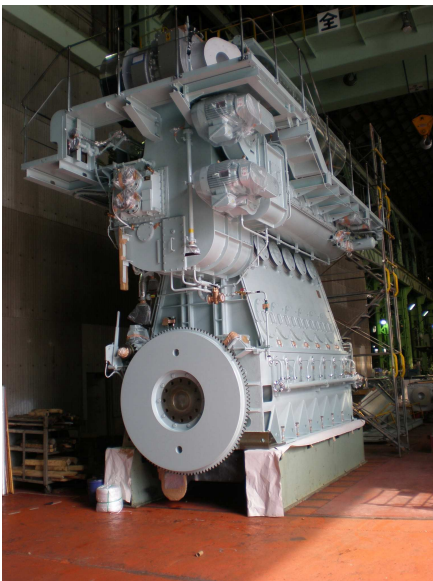
Marine equipment industry

There are many shipyards in the surrounding vicinity, including in Onomichi, Mukaishima, Innoshima, and Ikuchijima. One feature of Onomichi is the many established manufacturers that fabricate equipment to be delivered to those shipyards. One point that makes Onomichi different from other maritime cities is the fact that many plants produce hull blocks in addition to equipment related to engines, propulsion devices, deck machinery, and rigging. This section will introduce some of Onomichi's marine equipment manufacturers.

Aiming to popularize small electronically controlled engines

IMEX

IMEX is the result of a merger in 1990 by four companies established by Hitachi Zosen. As for its name, the I stands for Innoshima, the M for machinery, the E for engineering, and the X for unlimited growth potential. Currently, the company is separated into three divisions, namely boilers, diesel engines, and environmental equipment. The core product it is currently producing in terms of marine equipment is diesel engines for 20,000-30,000 grt ships, such as the Hitachi-MAN B&W S/L35MC and S/L42MC models, which are delivered to small and midsize domestic shipyards. Thus far, it has produced over 450 units. While electronic control is becoming more widespread with large diesel engines, the company is currently developing small two-cycle electronically controlled diesel engines to become a licensor of the technology and widen its product menu.



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All products fabricated along the Shimanami Kaido

Iwakitec

Iwakitec's establishment can be traced back to 1957 when it set out in the hull block fabrication business on Iwagijima. It constructed a yard in the Innoshima Iron Industry Complex in 1966, and then built its Mukaishima yard in 2006. Its main yard has one 300-ton and two 200-ton jib cranes, and specializes in the fabrication of large structures. While its Innoshima yard produces mainly hatch covers, it also fabricates liftable car



decks for PCTCs and RORO equipment, as well as places a focus on design and after market services. Its Mukaishima yard has a full production system that engages in everything from shot blasting to cutting and assembly. One unique feature of Iwakitec is the full production system it has established along the Shimanami Kaido with each of its three yards playing a distinct role.

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Producer of hull blocks and machinery

Innoshima Tekko

Innoshima Tekko was established in 1954. In 1964, it constructed its Shigei plant within the Innoshima Iron Industry Complex and began fabricating hull blocks. It has two yards, namely its main yard and its Shigei plant. Its shipbuilding operations division fabricates blocks and above-deck structures, while its machinery division produces facility investment equipment. Currently, it produces a ratio of 60% blocks to 40% machinery. It has four block fabrication plants within its Shigei plant, which engage in the full fabrication process from marking to cutting and assembly, which are

then delivered mainly to shipyards within the Seto Inland Sea. Its machinery



operations are handled by both its Shigei and main plants. Its main yard has three five-faced machining centers, and engages in start-to-finish production from material processing to assembly. The company is able to deepen mutual communication through meetings, making for an open atmosphere. It employs approximately 180 staff.

Innoshima Tekko

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Improving hull block competitiveness through collaboration

Innoshima Iron Industry

Innoshima Iron Industry was established in 1964. It was spun off with the goal of lowering costs by having dedicated manufacturers of hull blocks and other products come together and collaborating in the areas of material import, production control, quality management, and product delivery while maintaining competitiveness. Through utilizing the benefits of joint facilities, it has come to be known as a concentrated base of large scale and sophisticated hull block production technologies. It has 13 members, namely Iwakitec, Frontier, Innoshima Kako Center, Okamoto Seisakusho, Katayama Kogyo, Miyaji Seisakusho, Nissho Wireless, Matsumoto Ironworks, Innoshima Ironworks, Shinmatsuura Sangyo, Innoshima Gas, Innoshima Seiki, and Enko Sangyo. The total number of employees inside the complex is nearly 800. Of that, approximately 130 are foreign interns, and there has been an increasing number of interns from Indonesia and Thailand lately.



Innoshima Iron Industry Corporation

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Installing BWMS with laser scanners

Kashihara Kogyo

Since its establishment in 1962, it has produced ship engine room tanks as its core product. It also takes on contract requests from other equipment manufacturers for the fabrication of fire extinguishers and explosion-proof equipment. It has also recently begun a laser scanning service with the aim of using it in the installation of ballast water management systems (BWMS). The technology, which converts the point cloud data into a 3D CAD file, is currently used by its subsidiary established in Ho Chi Minh, Vietnam. This technology of using measurement data to create 3D CAD files is also being used in the reconstruction and expansion of structures protected as cultural assets such as temples. Henceforth, the company president says that it will use its small size, which gives it a high freedom of movement, to form a management style that will create its own markets.



Kashihara Kogyo Co., Ltd.

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Overseas: Ho Chi Minh (Vietnam)

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Designing specialized ships

Kitada Ship Design

Company president Minoru Kitada left his position as assistant chief of Onomichi Dockyard's design division to establish Kitada Ship Design Office in 1984. At that time, the company took on basic design work for Mukaishima Marine of the Hitachi Zosen group. It also received orders for design work from Singapore's Sembawang Shipyard. It has also established a joint-venture design company in Hanoi with Vietnam's Vinashin Shipyard. In addition to Vinashin, it has also received orders for design work from another shipyard in Vietnam, namely Dong Bac Shipbuilding. Domestically, it also



designs specialized ships, such as asphalt carriers constructed by Shinozaki Shipbuilding.

Currently, it also takes on design work for RORO-type ferries from Taiwan's Jong Shyn Shipbuilding. It employs approximately 10 people, including design staff. Executive director Akio Kitada handles the bulk of negotiations with shipyards.

Kitada Ship Design Co., Ltd.

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Patent acquired for oil-tight hatch

Kyoizumi Industry

Kyoizumi Industry started in 1969 as a dedicated rigging equipment manufacturer. It produces products such as anchor chain stoppers, oil-tight hatches, square hatches, manholes, watertight doors, wire reels, and mooring hardware. In addition to its yard in Mukaishima, it also imports products under a partnership with its yard in Shanghai, China. It began its partnership with the Shanghai yard 14-15 years ago, making one of Japan's first corporations to foray into China. It has been able to improve product quality, and the company claims that approximately 25% of its products are produced in China. The company's core product is oil-tight hatches, of which many are installed on

tankers, including chemical carriers. Normally, oil-tight hatches have windows, but water droplets make it impossible to see inside the cargo hold. Kyoizumi Industry's oil-tight hatches, however, are completely sealed but come with wipers, which allows for verification of the cargo hold's contents. Developed about ten years ago, the company also has a patent for the design. The product has also been well-received by chemical carrier operators. It has also produced and sold many of its anchor chain stoppers since



it began making the product approximately 20 years ago. In order to improve its engineering features, it has also been trying to improve its design department, which includes the adoption of 3D CAD usage about 10 years ago. It also plans on manufacturing other large-scale rigging equipment, such as funnels and deck crane posts.

Kyoizumi Industry Co., Ltd.

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E-mail: info@kyoizumi.ecnet.jp

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Proprietary pipe fabrication technology

Sunlight Industry

Since its establishment in 1970, Sunlight Industry's core business has consisted of the fabrication, shaping, and finishing of stainless steel, iron, and various other kinds of



pipes for ship rigging. Pipe bending work is normally done by welding pipes to joints. Sunlight, however, does its bending work without cutting or heating pipes, but rather through a proprietary cold pipe bending process to create seamless, joint-free pipes. In addition, a T-piece is normally used to open many holes in a single pipe, but Sunlight has

another proprietary 'barring' process in which T-pieces are not used. The company says that much of its product is used on chemical carriers, which use a great deal of piping. In addition to delivering its products to on-land machinery plants using its proprietary pipe working technologies, it also fabricates hull blocks.

Sunlight Industry

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Homepage: <http://www.sunlight-ind.co.jp>

Integrated production, from steel procurement to block fabrication

JFE Shoji Zosen Kako

JFE Shoji Zosen Kako was established in 2006 as a start-to-finish production hub, from the procurement of steel to block fabrication. It utilizes the land, buildings, and facilities of the former Mukaishima Nishi yard of Hitachi Zosen. It operates a start-to-finish production system through the cooperation of various companies that perform shot blasting, cutting, and block fabrication. JFE Shoji Zosen Kako has procured its fabrication capabilities through coordinating the block fabrication process.

Its process consists of (1) the shot blasting and shot blast primer process, (2) the cutting



and bending process of rolled steel and shaped steel, (4) fabricating hull blocks, and (4) handling the cargo at ports, sorting, and land/sea transport. This integrated system has allowed it to reduce costs and deal with the block processing needs of shipyards. It engaged in transactions with 40 companies in 2011, including indirect transactions.

JFE Shoji Zosen Kako Corporation

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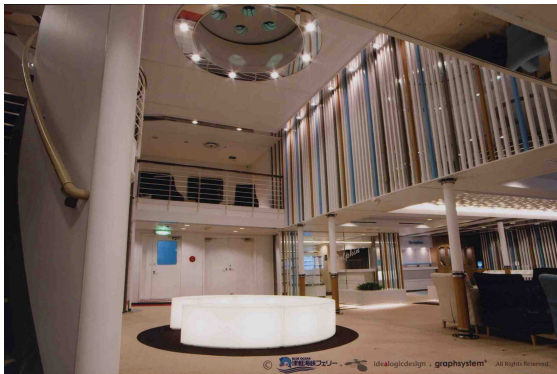
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Ship interiors are its main business

Shin-ei Sangyo

Shin-ei Sangyo was established in 1938 as a manufacturer of household furnishings. While it also manufactures special-order furnishings for schools and hospitals, its current core business is its ship division, which fabricates interior equipment for living quarters on ships. Those operations have grown to exceed 85% of its total sales. In addition to fabricating the living quarter furnishings, it has also begun importing products from China recently. While the imports are in response to requests to reduce costs from shipyards, the company puts a thorough focus on product quality management. With its long history of handling furnishings, it makes thorough efforts to maintain product quality. While it often engages in the interior construction of general



cargo carriers, it also often deals with ferries from Naikai Zosen, one of its nearby customers, which has allowed it to specialize in ferry interior operations. For example, it also participated in the interior outfitting of the Tsugaru Kaikyo ferry Blue Dolphin. It employs approximately 40 staff.

Shin-ei Sangyo Co., Ltd.

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Trading marine equipment at the the Seto Inland Sea

Sojitz Marine & Engineering Corp., Onomichi Office

Sojitz Marine & Engineering is a dedicated trading company working in the shipbuilding, marine transportation, and any solution for maritime business with main office in Tokyo and Osaka. It was formed by a merger between Nissho Iwai Marine Corp. and News Maritime in April 2004. Onomichi office was set in spring of 2003 to has domestic and import/export business transactions of marine equipment with the customers in shipbuilders and marine equipment manufacturers located in the wide

range in the Seto Inland Sea area. It has presently five(5) staffs including Mr. Shigeto Morita, General Manager engaged in the marine related business and enjoy its



advantage of traffic convenience of Onomichi where is the starting point of the Shimanami coastal highway as well as to access in Imabari to the south across the Kurushima-Kaikyo Bridge. Sojitz Marine engages in transactions with customers based on its broad-ranging network and information sources that spans both domestic and overseas locations.

Sojitz Marine & Engineering Corporation, Onomichi Office

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Homepage: <http://www.somec.co.jp>

Testing exhaust heat recovery silencers

Taiko Sangyo

Taiko Sangyo was established in 1968 based on the fabrication of fire doors for ships, and later began sales of ship silencers in 1987. In addition to expanding its product menu to include interior products for ship living quarters, its ship emergency power generation module, of which it had developed and delivered its first unit by 1999, has also been installed on many domestically constructed ships. In addition, it also partnered with a Chinese corporation last year in the area of heat insulation materials for ships. In recent years, it has continued to expand the scope of its operations, including the development of ballast water management systems, and various proposals for antipiracy equipment. It also recently acquired the rights to test its exhaust heat recovery silencer, which was developed through the Japan Ship Machinery & Equipment Association's (JSMEA) product development operations (with support from the Nippon Foundation) and is a product that extracts high-temperature exhaust heat produced from the exhaust system of a ship's power generation engine to supply the necessary energy for a ship while docked. The company intends to focus on new efforts that contribute to reducing energy consumption on ships.



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Developer of jack up rig hoisting equipment

Teramoto Iron Works

Established in 1920, Teramoto Iron Works got its start in the fabrication of blocks for derrick cranes to be used on ships. It has established a reputation in the business, and currently manufactures large blocks with lifting capacities of 750 tons. The fabrication of blocks requires both mechanical processing and forging technologies, which it has utilized to continuously broaden its product menu. In addition to its current core product of deck crane posts, it also deals in ramp doors and dredger equipment. It also



has experience with the fabrication of masts and mast equipment for sailing-type cargo ships. It is also developing hoisting equipment for jack up rigs, an area in which the company plans on making increased efforts once production of offshore wind power increases. Its ship division currently makes up about 90% of the company's activities, and has thus far delivered crane posts to more than 1,000 ships. It employs approximately 50 staff.

Teramoto Iron Works Co., Ltd.

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Specializing in ventilation ducts and exhaust pipes

Toko Kaiun

Toko Kaiun is a shipowner of coastal ships whose main office is in Kobe, and has a fabrication division that makes ship engine room ventilation ducts and main engine exhaust pipes at its Sasaki Heavy Industries division in Innoshima. The company's beginnings go back to 1945 when it established Sasaki Heavy Industries in Innoshima with the purpose of delivering ship rigging equipment to Hitachi Zosen's Innoshima yard. After foraying into the shipping industry, it relocated its headquarters to Kobe in 1965. Sasaki Heavy Industries was absorbed into the later-established Toko Kaiun, creating the organization that exists today. Sasaki Heavy Industries specializes in



ventilation ducts and exhaust pipes. It implemented cutting-edge laser fabrication equipment six years ago. This has allowed it to fabricate highly precise products, and the company says it has also increased its degree of confidence in customers. The company's motto is 'Accurate, fast, and waste-free' (Hajime Iwamoto, director of Sasaki Heavy Industries Innoshima sales office).

Toko Kaiun Co., Ltd.

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Comprehensive manufacturer of marine equipment

Toyo Dennetsu Kogyo

Toyo Dennetsu Kogyo is a dedicated marine equipment manufacturer established in 1979. It has three core products, namely fresh water heaters, ship strainers, and marine equipment fabrication machines such as lathes. In addition to fabrication at its main plant, it also manufactures some equipment at partnered yards in Dalian and Shanghai, China. Once products are imported from China, it unitizes equipment by adding control panels, for example, in the case of fresh water heaters, and delivers the final product to



domestic shipyards. In addition to high-value added products, another feature of Toyo Dennetsu is its ability to provide excellent cost performance to its customers. It focuses on gaining trust and providing its customers peace of mind by providing inspections and after market services.

Toyo Dennetsu Kogyo Co., Ltd.

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Dedicated rudder manufacturer that also deals in propulsion peripherals

Fuso Kogyo

Fuso Kogyo is a marine equipment manufacturer established in 1961, and celebrated its 50th year in business last year. Rudders are its core product, and it undertakes the entire fabrication process, from the purchasing of materials to completion of the finished product, for helms for ship ranging in size from small ships less than 100 grt to large vessels such as VLCCs, which are then delivered to domestic shipyards. Recently,



it has begun fabricating helms for 150 ships per year. In addition to helms, it has also dealt in propulsion equipment, producing equipment such as stern frames, stern rotating shaft equipment, Kort nozzles, and shaft brackets. In addition to cargo ships, it has also supplied products to vessels such as escort ships from the Maritime Self-Defense Force, patrol vessels from the Japan Coast Guard, 10,000-grt-class car ferries, and to two of the National Institute for Sea Training's (NIST) large training sailing ships, namely the Nippon-Maru and Kaio-Maru, indicating the company's high technical prowess. It employs approximately 70 staff.

Fuso Kogyo Co., Ltd.

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Producer of cylinder frames

Miyoshi Iron Corporation

One of the oldest companies, established in 1925, Miyoshi Iron Corporation changed to an incorporated organization in 1962. The company's main plant is located to the north of Shin-Onomichi station, inside the Cooperative Onomichi Ironworks Center. Using large machinery, it produces products for marine engines and rudders, as well as fabricating deck crane posts. It also fabricates 50-type and 60-type cylinder frames for marine engines, and has produced as many as 30 units in busy years. Its high precision has earned it high evaluations from its customers, and the company is able to produce super-large products with a product weight of up to 60 tons. In the past, it machine produced a 10-ton crane hook for a 4,000-ton crane on heavy lifting ship called the Yosho. Recently, it converted its NC plano-millers to five-faced machining centers, boosting their operational efficiency by 20% and allowing for more complex processing.



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