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Japan Report

(FOUO 31/81)

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JAPAN REPORT

(FOUO 31/81)

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SCIENCE AND TECHNOLOGY

COOPERATION WITH WORLD'S STEEL INDUSTRIES PROMOTED

Tokyo DIAMOND'S INDUSTRIA in English Vol 11, No 4 Apr 81 pp 9-18

[Text]

Many Requests

On January 23, 1981, Nippon Kokan K.K. (NKK) concluded a technological cooperation agreement with Kaiser Steel Corp. of the United States to modernize its main production plant in Fontana, Calif. Kaiser Steel is the 8th largest integrated steel producer in the U.S., but has suffered business setbacks due mainly to a delay in modernization efforts and sounded NKK on the possibility of its buying the steelmaker. Having learned that the deal would not materialize, Kaiser Steel presented a modernization program for the Fontana Plant to NKK and asked for technological cooperation. Kaiser Steel will now strive to reconstruct its business under the cooperation of NKK.

Not only Kaiser Steel but also many other U.S. steelmakers are far behind their Japanese rivals in the modernization of production facilities. Especially during the past two to three years, many U.S. steelmakers have sought technical cooperation of the Japanese steel industry. United States Steel Corp., the top U.S. steelmaker, introduced blast furnace renovation technology from Nippon Steel and computerized control systems technology for coke oven from NKK in the past. And on January 8, 1980, it concluded a contract to introduce industrial know-how to raise the quality of large-diameter steel pipes and their yield rate. The contract covers technical guidance in steel production, continuous casting, rolling and piping at the plant in Baytown, Texas.

In June, 1980, Nippon Steel also concluded a comprehensive ten-year technology cooperation agreement with Armco Steel Corp., the thrid largest steelmaker in the U.S. And in September, it agreed to help Armco raise productivity and improve cost effectiveness at its plant in Houston, Texas. In the same month Kawasaki Steel Corp.

signed a technology exchange agreement with the 5th largest U.S. steel producer, Republic Steel Corp.

In the past there had been many instances in which Japanese steelmakers would provide specific technologies for foreign makers. However, the recent trend is, as mentioned above, that U.S. steelmakers seek more extensive technical guidance covering the operation of an entire production plant or even that of the whole business.

Requests for technical guidance are coming into the Japanese steel industry not only from the U.S. but also many other countries. According to a survey by the Japan Iron and Steel Federation, Japanese steelmakers concluded contracts for technical cooperation with 62 firms in 25 countries during 1980. Those firms include the world's top ranking steelmakers, such as August Thyssen-Hütte of West Germany, USINOR of France, Italsider of Italy and ENSIDESA of Spain, in addition to the above-mentioned U.S. firms.

The Japanese steel industry is also engaged in large-scale steel plant construction projects overseas. Kawasaki Steel, for example, leads a joint project with Italy and Brazil to build Tubarão Steel Works in Brazil. Nippon Steel is undertaking the construction of the Baoshan Steel Plant in China. Also among business inquiries received are technical cooperation concering a steel casting and forging plant and a large-diameter steel pipe production plant in Mexico, an expansion of the Somisa Steel Mill in Argentina and the construction of a steel plant in Siberia.

The economic recession since the oil crisis of 1973 hit the Japanese steel industry hard, and it tried to cover falls in domestic demand with exports. Japan's steel exports increased from 25,560,000 tons in 1973 to 33,120,000 tons in 1974 and to 37,040,000 tons in 1976. The sharp increase in exports caused trade frictions with importing countries. In 1976, the share of Japanese steel products rose to 56% of total U.S. steel imports, and the U.S. Government invoked a "trigger price system."

Then the Japanese steel industry changed business strategy to increase earnings from overseas business rather than trying to expand the volume of exports. Japan's steel exports in 1980 were 30,400,000 tons, down 18% from the peak year of 1976. But earnings from exports totaled ¥14,000 million, up 17% over 1976. Thus the 1973 oil crisis provided a chance to prove the real competitiveness of Japanese steel products to the world. This induced many requests for technical cooperation from abroad. Thus the Japanese steel industry is serving as a "teacher" for the world's steel industry through wide-ranging technological exports, while continuing to export high-quality products to many parts of the world.

Advanced Technology

The Japanese steel industry was devastated to a nearly total destruction by World War II. After the end of the war it started from scratch. Having little natural resources, Japan needs to import almost all raw materials from abroad. They include iron ore and coking coal. Therefore, new steel mills were mostly built in coastal areas. Concervation of energy and materials is a must for the Japanese steel industry. Cost reduction is also important. Demand for steel products increased considerably as the Japanese economy continued rapid growth. This favorable situation enabled steelmakers to build advanced large-scale production facilities and also to raise productivity by new technologies of its own on the basis of imported advanced industrial know-how and equipment.

Situated in the Ogishima area of the Keihin Industrial Area lying between Tokyo and Yokohama, Keihin Works of NKK is a typical coastal steel plant equipped with the most advanced facilities. Keihin Works had been an integrated steel plant since it was built in 1912. But NKK built entirely new integrated steel production facilities having two blast furnaces. Land reclamation work on the sea adjacent to the plant began in November, 1971, and the new steel complex was completed in July, 1979. NKK sank about ¥1,000,000 million in the project. Thus the old plant facilities were scrapped. The new complex is a model of the most advanced steel plant that fully employs the latest engineering techniques to raise productivity, save raw materials and energy, and minimize pollution.

Through this type of large-scale plant and equipment investment, the Japanese steel industry has attained the world's highest productivity. The high-temperature, high-pressure operation in a large blast furnace has considerably raised productivity in pig iron production. In Japan there are 15 blast furnaces having the inner volume of more than 4,000 m^3. Two of these have the inner volumes of more than 5,000 m^3. Twenty-nine of the blast furnaces operating in Japan are equipped with electric power generators that utilize the pressure at the top of the furnace. Their power generation capacity totals 320,000 kW. The industry also employs a coke dry quench system in which nitrogen gas is used to extinguish coke flames and thus utilizes the waste heat produced in the process. It also utilizes waste heat produced not only by the coke oven but also by heating boilers and other facilities.

In Japan open hearth furnaces completely disappeared two years ago. They were replaced by more efficient converters or electric furnaces. The number of continuous casting facilities began increasing during the latter half of the 1960s, and they now account for 60.6% of the total steel

production facilities. The continuous casting system is far more energy-efficient and has higher productivity than the previous system in which ingot is removed from the cast after cooling and it is heated again to be rolled. The hot charge of slab is also being carried out. In the past the slab was cooled first to clean up the surface and then heated up again for rolling. Now the surface treatment of slab is made while it is hot, and the slab is sent directly to the heating furnace.

Thus many different kinds of technological advances altogether have contributed to raising the productivity of steel plants in this country. Another contributing factor is that Japanese workers have higher technological level than their counterparts in other countries. They are skillfully operating various computerized systems introduced to the steel industry. Another point to be noted is that for the past 20 years workers of Japanese steel mills have established a self-governing system in which they are working actively for innovation of their workshops. Their activites extend to areas not covered by the quality control activities of ordinary industries. This system, in fact, is known overseas as "JK (*Jishu Kanri*) activity." In Japanese steel plants, employers and workers have made concerted efforts to save materials and energy and raise productivity. Thus the Japanese steel industry has gained strong international competitive strength.

Oilless Operation

The prospering Japanese steel industry came to a major turning point when the first oil crisis occurred at the end of 1973. It was not just to cope with sagging demand caused by recession. It had also to tackle skyrocketing raw material and energy costs. In Japan, it was used to blow heavy oil into large blast furnaces to speed iron ore reduction, raise the productivity and maintain its stable operation. During the 1960s all blast furnaces in Japan had turned to burn heavy oil. But the price of heavy oil rose sharply, and the increase in oil costs exceeded the surplus produced by increased productivity.

During the 1960s steelmakers concentrated their effort on raising productivity. Since the 1973 oil crisis, their biggest task has been to lower production costs by energy conservation. This is especially serious after the second round of oil price increases in 1979. If the use of heavy oil is suspended, coke consumption will rise and productivity will decline. But even in the "oilless operation," fuel consumption is lower and productivity is higher than in the past thanks to operational improvements, such as better control on the blow-air temperature and the feeding of raw material.

Meanwhile, some blast furnaces have attained high productivity by using powdered coal or tar instead of heavy oil. Tar is a byproduct of the coke oven. The operation of "oilless" blast furnaces would push up coke consumption, and the production of coke oven gas would increase. Therefore, an effective use of the byproduct would result in reducing total energy consumption and costs. Of the 44 blast furnaces operating in Japan, the number of non-oil burning plants increased to 30 at the end of 1980. Oil saving measures were also taken in areas other than blast furnaces. Oil consumption to produce a ton of crude steel dropped from 128 liters in fiscal 1973 to 79 liters in fiscal 1979. The consumption for fiscal 1980 is estimated to have fallen to 56 liters.

In the meantime, efforts were also made to increase the productivity of continuous casting and other facilities. Thus the Japanese steel industry has overcome difficulties that arose in the wake of the 1973 oil crisis and has retained a high productivity. In the "oilless operation" of blast furnances, the Japanese industry is developing technologies – the first of its kind in the world – to use a coal-oil mixture (COM) or a tar-coal mixture (TCM) to replace oil.

Strong Feature

In crude steel production, Japan outpaced West Germany in 1963 to rank third in the world following the Soviet Union and the United States. In 1980, it ranked second, surpassing the United States. The U.S. crude steel output in 1980 dropped by 18% from the previous year to 100,900,000 tons, reflecting the sag in business activity. Japan's output was 111,410,000 tons, a fall of only 0.3%.

In the production of rolled steel products, Japan already surpassed the U.S. in 1975. It was because Japan's yield rate was higher than that of the U.S. The output of hot rolled products in 1979 was a record 100,273,675 tons, excluding reclaimed products – a slight increase from the previous high of 100,201,240 tons in 1973. Crude steel output in 1979 was below the record 119,321,596 tons of 1973, while the production of rolled products surpassed the previous record. This indicates nothing but that the yield rate of rolled products increased.

Production cutbacks on crude steel began in mid-1980. According to the estimate published by the Japan Iron and Steel Federation at the end of 1980, crude steel production for fiscal 1981 (April, 1981~March, 1982) would total 105 million tons, down 2% from the final 1980 production estimate of 107 million tons. Since the oil crisis, the Japanese steel industry has been striving for cost reduction, putting up a target of making ends meet at 70% of capacity production, and it is nearing the target.

The Japanese steel industry now has such a large production scale that it is affected not only by business activity at home but also by fluctuations of the world economy. And it may be true that the industry has attained enough competitive strength to stand the changes. That's why many steelmakers overseas have come to seek technological cooperation from the Japanese industry, which is willingly meeting them. This may also be a new way for the Japanese iron and steel industry to survive the era of energy conservation.

CSO: 4120

SCIENCE AND TECHNOLOGY

SHIPBUILDING INDUSTRY COPES WITH NEW ENERGY SITUATION

Tokyo DIAMOND'S INDUSTRIA in English Vol 11, No 4 Apr 81 pp 14-18

[Text]

Energy-Saving Ships and Energy-Saving Equipment

If someone says, "Any energy-saving equipment sells well," no salesmen will deny it. Shipping companies will not deny it, either. This is because the ratio of bunker oil costs to the total costs of six leading Japanese shipping companies went up from 6~9% in 1972 to 12~15% between 1974 and 1978, and to 28% in 1980, or more than a quarter of the total costs. Thus the rising fuel costs began to adversely affect shipowners' management.

Here is a good example of energy-saving vessels. They are VLCCs (very large crude oil carriers), ULCCs (ultra large crude oil carriers) and large container ships whose main engines have been switched from turbines to diesel engines in an effort to save energy. The switch of main engines began around 1978. At present, Ishikawajima-Harima Heavy Industries has a backlog of orders for 7 units, Mitsubishi Heavy Industries 6 units, Kawasaki Heavy Industries and Mitsui Engineering & Shipbuilding 3 units each and Hitachi Zosen (Shipbuilding & Engineering) 2 units. The backlog of orders for 21 units means that shipbuilders are enjoying thriving business in this field. The cost of work, which was around ¥3,000 million per unit at the beginning, has risen to ¥4,500 million per unit. This shows how shipowners are concentrating their energies on energy-saving ships.

It is for this engine switch work that ship repair business prospered in Japan in fiscal 1979 and 1980. This active placing of orders for switching main engines might be described as the first boom of energy-saving ships. Judging from the present situation, the switch of main engines has passed its peak. The development of ships of energy-saving type and energy-saving equipment, which take the place of

the switching of engines, is already on a commercial basis and is assuming an aspect of a "mini" boom. This is likely to lead to "a second boom."

Now, let us state systematically promising equipment related to the energy conservation for vessels.

Energy-saving for ships concerns propulsion efficiency, power source and energy source.

Propulsion Efficiency

Improving propulsion efficiency requires diminishing propulsion resistance. An effective means of reducing propulsion resistance is to improve the shape or bow of the ship. In concrete terms, the ship's bow is turned into the bulbous bow, as is done at shipyards. And, Hitachi Zosen has developed the Panamax Mark II-type, which makes it possible to rotate a large-diameter propeller at a slow speed by adopting a "Marina" type stern, thus saving energy.

Another way to reduce propulsion resistance is to diminish the viscosity resistance caused by seaweeds and shellfish which stick to the waterline and bottom of the ship. It slows down navigation speed and increases the use of fuel. An effective way to prevent the seaweeds and shellfish from sticking to the ship is to use filth-proof paint. Nippon Paint, Nippon Oil & Fats and other paint manufacturers are producing effective paint by using cuprous oxide and a compound of triphenyl and tin. Since the use of this paint reduces fuel costs by 10 to 12%, this method should not be made light of.

Next, the improvement of propulsion efficiency is realized by improving the efficiency of the propeller, hull and speed reduction system of the ship. The technologically-established and best-selling products are propellers with improved efficiency. The "duct propellers" of Mitsui Engineering & Shipbuilding have been mounted on 90 ships since the first product was attached to Exxon's "Esso Copenhagen" (a 250,000-dead-weight-ton tanker). The company leads other manufacturers in this field. Mitsubishi Heavy Industries has developed what it calls the "reaction fin," which is a radiant, fixed-wing-type device to be attached to the propeller at the stern. It is to be mounted on a large coal carrier for Shinwa Kaiun Kaisha. Hitachi Zosen also developed a device under the brand name of "HZ Nozzle," which has been mounted on the 170,000-dead-weight-ton ore/oil carrier, Kimitsuru Maru, of Yamashita-Shinnihon Steamship. It has already been proved that the fuel costs are reduced by 5 to 10%.

At present, four shipbuilders – the above-mentioned three and Kawasaki Heavy Industries – are trying to improve the efficiency of propellers. All of them have achieved energy-saving by reducing the irregular flow of

seawater around the propeller and making it possible to use engines of smaller horsepower to make the same speed as before.

The remaining method of conserving energy is to improve maneuverability and to make ship hull light. Under the present situation, however, only the improvement of steering gear is likely to produce some effects on energy-saving and it is hoped that progress will be made in this field in the future. (Mitsubishi Heavy Industries has developed a system to maintain efficient steering angles by controlling the hull resistance with a microcomputer. The system is being tested on a tanker of Mobil Oil. The fuel-saving target is set at 20%.)

Power Source

More efficient power source is obtained by the improvement of existing engines, development of engines of new type (mainly compound cycle engines and highly-efficient engines) and the rationalized use of energy in the ship (mainly the recovery of discharged heat and the improvement of cooling equipment and generators).

At present, however, shipbuilders are concentrating their efforts on the improvement of efficiency of existing engines and are setting the goal of energy-saving on this point.

Manufacturers of marine diesel engines not only in Japan but other countries are staging a "hot war on fuel" over the fuel-cost ratio of 135 grams per horsepower and per hour under the condition of navigation with optimum fuel costs. Burmeister & Wain of Denmark – Hitachi Zosen and Mitsui Engineering & Shipbuilding; Sulzer of Switzerland – Mitsubishi Heavy Industries, Ishikawajima-Harima Heavy Industries (IHI), Hitachi Zosen and Sumitomo Heavy Industries; M.A.N. of West Germany – Mitsubishi Heavy Industries and Kawasaki Heavy Industries; and Pielstick of France – IHI and Nippon Kokan. These are groups of companies each in the relations of licensers and licensees. They are competing for lowering the cost-fuel ratio jointly or independently.

Concerning the Sulzer-type engine, IHI developed the "RLB series" of new energy-saving, low-speed diesel engines and attained the ratio of 135.5 grams per horsepower and per hour, while Sumitomo Heavy Industries' 4RLA90-type engine recorded the ratio of 129.1 grams. As to the M.A.N. (medium-speed) engine, Mitsubishi Heavy Industries improved a fuel-injection device and made it possible for its 18V52/55A type to attain the ratio of 129 grams per horsepower and per hour. Mitsubishi Heavy Industries also attained the ratio of the 130-gram level per horsepower and per hour with the UE engine it had developed. Concerning the B&W type engine, Hitachi Zosen attained the ratio of

131 grams with its engine of the "GFCA" series. The company is now developing an ultra-energy-saving, low-speed diesel engine, "GFCB," aimed at attaining the ratio of the 120-gram level.

Energy Sources

The diversification of energy sources includes the utilization of alternative energy sources (powdered coal, coal-oil mixture and LNG) and the utilization of new energy sources. However, it will take more time before the use of alternative energy sources is technologically established. The new energy sources include fuel batteries and air turbine systems, but they are still at the stage of presenting ideas. Regarding the use of energy of winds, there is a sail equipped motor ship. Nippon Kokan built last year the 669-ton sail-equipped motor ship, Shin-Aitoku Maru, which is said to save energy by 50%.

Shipbuilding companies will continue to place emphasis on technological development for energy saving as long as Japan has to buy C-grade heavy oil at the exorbitant price of $220 per ton. Japanese ships (including ocean-going vessels, coasters and fishing boats) consume 34 million kiloliters of oil a year. It is the supreme task for Japan to save energy because this amount accounts for 12% of the nation's total oil imports.

LPG and LNG Carriers and Building Technology

LPG Carriers

As of 1980, the number of LPG carriers in the world totaled 528, or 5,900,000 cubic meters in tank volume. Of the total, those more than 20,000 cubic meters were 81, which totaled 4,700,000 cubic meters in tank volume. Small coasters account for more than 80% of the total number of LPG carriers. Japan built 237 LPG carriers, or 2,300,000 cubic meters, accounting for 45% of the number of ships and 39% of the tank volume. The figures are by far larger than those of second-ranked France (52 carriers and 1,400,000 cubic meters) and third-ranked Norway (56 carriers and 500,000 cubic meters).

The full-scale construction of LPG carriers in Japan began in 1962, when Mitsubishi Heavy Industries built one with the tank volume of 28,000 cubic meters for the Philippines. About 20 years later, not only leading shipbuilders but medium-standing companies have the capacity to build LPG tankers.

Unlike LNG carriers, LPG carriers have no problem of freezing temperatures. It might be said that all technological problems related to the construction of LPG carriers

were solved more than 10 years ago. Concerning the standardization of the carriers, those with tank volumes ranging from 70,000 to 80,000 cubic meters have already been completed. Carriers with the maximum tank volume of 130,000 cubic meters are expected to be constructed in the future. Hitachi Zosen built a carrier with the tank volume of 100,200 cubic meters for Esso Tankers in 1973, and engineers say that there is no technological problem in the construction of large carriers.

According to the data of the U.S. State Department, the volume of LPG transportation in the world is estimated at 38 million tons in 1985 and at 56 million tons in 1990. (Japan's consumption of LPG in 1979 totaled 14 million tons.) Calculated in terms of the tank volume of 70,000 cubic meters for a standard type carrier, the number of LPG carriers in 1990 will be 50 to 60 at the lowest limit and 60 to 70 at the highest limit, even if the replacement of ships is taken into account.

On the annual average, therefore, the number of carriers that must be built is 5 to 7. So, the demand is not so large as to make the use of building slipways tight. (There may be a shortage of labor in the work to stick thin metal plates to the inside of tanks.) It can be said definitely that the shipbuilding companies are fully capable of building that number of LPG carriers.

LNG Carriers

The number of LNG carriers in the world now totals 55, and 23 others are under construction (including those still being designed). France has built the largest number of LNG carriers. It leads other countries by building 31 carriers, followed by such shipbuilding countries as Norway (seven carriers), and Sweden and Britain (four carriers each).

Japan has not built any LNG carrier yet while eight carriers are under construction. They are for a project on LNG shipment from East Kalimantan, Indonesia. The shipowners will be Nippon Yusen, Kawasaki Kisen Kaisha and Mitsui O.S.K. Lines and the shipbuilding companies involved are Mitsubishi Heavy Industries, which is constructing three LNG carriers, Kawasaki Heavy Industries with two (plus one being built for Gotaas-Larsen) and Mitsui Engineering & Shipbuilding with two.

The Japanese shipbuilders have been trying to build ships with high value-added for more than 10 years. Now, the era of high value-added LNG carrier construction has begun with the building of the eight carriers now in the shipyards.

There will be many LNG development projects in various parts of the world over the next 10 years. They will involve Africa, centered on Algeria and Nigeria; Southeast

Asia, mainly Indonesia; the Middle East, mainly Abu Dhabi; Canada, Alaska and the Soviet Union. The volume of LNG transportation in 1985 is estimated to be 2.5 times and the volume in 1990 3 times that of 1980, respectively. Based on these estimates, about 50 LNG carriers each with the tank volume of 120,000 cubic meters will be needed in the world.

The seven leading Japanese shipbuilding companies are in technological tie-ups with foreign shipbuilders. They include tie-ups between Gas Transport and six Japanese shipbuilders, excluding Sumitomo Heavy Industries, between Technigaz and six companies, excluding Kawasaki Heavy Industries, and between Conch and three firms (Mitsubishi Heavy Industries, Sumitomo Heavy Industries and Nippon Kokan). Besides, there are technological tie-ups on the construction of tanks of the BS semi-membrane type (involving IHI), of the SENER independent cylindrical tank type (Nippon Kokan) and of the ESSO independent square tank type (Hitachi Zosen). Japanese shipbuilders are constructing various types of carriers to meet the clients' needs.

Concerning technologies on the construction of LNG carriers, all problems have been settled, although Japanese shipbuilders have not yet launched carriers. And, in view of the present facilities and technological staffs, it might be said the Japanese shipbuilders have full international competitiveness with regard to construction costs. Accordingly, there is no major problem in the shipbuilders' preparedness and technologies.

The only problem is whether funds for the construction of carriers will be available on easy terms since the construction costs will amount ¥30,000 million to ¥40,000 million per carrier and there will be risks in doing the business on a private basis.

In conclusion, the headache for shipbuilders may not exist in their preparedness or technologies but in how to avoid risks and how to deal with loans. The long-term policy of Japanese shipbuilders – the construction of vessels with high-value added – has been the building of LNG carriers. In this sense, this is the time when cooperation between the Government and private firms is most needed to avoid risks involved and settle other related problems.

Japan is known as the leading shipbuilding country in the world. But, this does not hold good until Japan is fully prepared for LNG carrier construction and establishes a good record of construction.

CSO: 4120

SCIENCE AND TECHNOLOGY

SOVIETS WANT JAPAN TO JOIN IN YAMBURG NATURAL GAS PIPELINE PROJECT

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 951, 21 Apr 81 p 1

[Text] The Soviet Union has made inquiries to Hitachi, Ltd. and Marubeni Corp. for business deals totaling $1 billion to purchase gas booster stations for the Yamburg natural gas pipeline project in Western Siberia, it was learned recently.

Informed sources said Hitachi and Marubeni will start substantive talks on the deal in Moscow this May and are very likely to receive orders. Sources also speculated that this business deal will open the way for the more concrete talks to set up credit lines to the Soviet Union for the project.

According to plans, sources said, a total of 42 gas booster stations are to be set up along the 5,000-kilometer long pipelines. These stations are deemed indispensable for maintaining the pressures of natural gas inside the pipelines at a certain level. Business talks to procure gas booster stations came to light immediately after the Soviet Union informed Japan recently that pipelines will be laid down along the southern route from Yamburg to Ujgorod and that, instead of the original plan to reduce the gas pressure from 100 to 75, two 1,420-millimeter-diameter pipelines will be laid out side by side.

Informed sources said the gas booster stations inquired about by the Soviet Union will each be equipped with six large-scale gas turbines with a capacity of 33,500 horsepower, and each station is estimated to cost about ¥30 billion. The Soviet Union is expected to purchase 10 stations at the maximum or five at the minimum, meaning that the deal will be worth a total of ¥150-300 billion.

Informed sources attributed the reason for the inquiry to Hitachi to the fact that the Soviets highly rate Hitachi's technology and past achievements with gas turbines, which are considered to be the heart of gas booster stations. The gas turbine needed is a special double-axle type and only Hitachi produces such turbines in Japan. This turbine was first developed by General Electric Co. of the U.S. and, besides Hitachi, AEG-Telefunken of West Germany, Nuovo Pignone S.p.A. of Italy and a few others are engaged in its production. Hitachi concluded an agreement with GE to jointly produce those special gas turbines in 1966 and has

already sold 50 of them to the Soviet Union.

In addition, large compressors, valves and control devices are needed for gas booster stations and consequently, sources said, West Germany and Italy are keenly interested in getting orders for these products from the Soviet Union, thereby intensifying the bidding competiton.

Sources also said the business talks on gas booster stations will lead to more concrete talks to set up credit lines to the Soviet Union, which were delayed because of the West's economic sanctions against the Soviets imposed in the wake of the Soviet invasion of Afghanistan. But sources warned that since the U.S. asked West Germany to reconsider giving credits to the Yamburg project and GE's technology is involved, the possibility exists that the whole deal to procure gas booster stations will be scrapped if economic sanctions against the Soviets by the West are strengthened in the future.

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SCIENCE AND TECHNOLOGY

MATSUSHITA WILL EMPHASIZE DEVELOPING FACTORY ROBOTS

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 951, 21 Apr 81 p 7

[Text]

Matsushita Electric Industrial Co. will marshall the entire staff of its technological divisions in an ambitious project to develop industrial robots not only for use at its factories but for sales to outsiders.

Japan's top electric-electronic product maker plans to devise multi-purpose robots capable of handling simple work and also complicated processing jobs.

The company has launched this project with the aim of eventually realizing all-out plant automation after probing what robots its group enterprises need to attain higher productivity and more labor-saving.

Matsushita envisions employing the "Building Block" method, with which it will combine a multitude of robot units to produce mechanical, relay-type robots and microprocessor-controlled, intelligent robots in accordance with the needs of production lines.

This versatile system, considered suitable for the manufacture of home electric appliances with their frequent model changes, has already been employed at the company's automated belt conveyor lines.

To be produced initially are three kinds of robots for positioning, adjustment and assembly.

The position-setting robot will be designed to work continuously with a positioning capacity of less than 1/100th millimeters. This robot will be engaged chiefly in assembly of electronic parts and equipment.

The adjustment robot, aimed at all-out automation in video taperecorder production lines, will adjust the faculties of finished products so that they can function as originally designed.

CSO: 4120/217

SCIENCE AND TECHNOLOGY

SHIPBUILDERS ARE ENTERING OIL PLATFORM SECTOR

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 951, 21 Apr 81 p 8

[Text]

Shipbuilding companies in Japan have successively advanced into the semi-submersible, self-propelled oil drilling platform sector.

Up to now, Mitsubishi Heavy Industries, Ltd. and Mitsui Engineering & Shipbuilding Co. were the only Japanese makers turning out these oil drilling platforms.

Since late last year, however, other shipbuilding firms, such as Hitachi Shipbuilding & Engineering Co., Nippon Kokan K.K. and Sumitomo Heavy Industries, Ltd., succeeded in winning orders for such platforms.

Reflecting the sharp rise in oil prices and uneasiness over supply, exploration of offshore oil resources has spread to deep-sea areas, resulting in a sharp increase in demand for semi-submersible, self-propelled oil drilling platforms.

Ishikawajima-Harima Heavy Industries Co. and Kawasaki Heavy Industries, Ltd. thus also are planning to produce such platforms.

As a result, competition among the shipbuilders to secure orders has intensified.

A semi-submersible, self-propelled oil drilling platform, whose legs supporting the platform can be submerged to a prescribed depth, is used mostly in waters around 300 meters deep.

At present, some 500 oil drilling platforms are being used in the world and about a one-fourth of them are said to be of the semi-submersible, self-propelled type.

Major Japanese shipbuilders thus have been actively engaged in winning orders for such platforms which can be made by utilizing shipbuilding technology and large docks. They succeeded in securing orders successively since last year.

Mitsubishi HI and Mitsui E&S won orders for two and four platforms, respectively.

Of the newcomer makers, Hitachi E&S secured an order for a platform last November from an American oil drilling company.

Nippon Kokan also obtained an order for two platforms and Sumitomo Heavy Industries for one platform from the same American firm.

Hitachi S&E received an order for two platforms from Liberia late last year. At present, the five Japanese makers have orders for 12 platforms.

Ishikawajima-Harima HI and Kawasaki HI, which have not yet received orders for platforms, are conducting negotiations with drilling firms and design consultants abroad on cooperation in designing and development of semi-submersible, self-propelled oil drilling platforms. They are hoping to start production of such platforms this year.

The major shipbuilders plan to strengthen their marine machinery divisions as one of their growth sectors in the future.

CSO: 4120/217

SCIENCE AND TECHNOLOGY

TSUGAMI PROVIDES TAIWAN WITH TECHNOLOGY ON MACHINE TOOLS

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 951, 21 Apr 81 p 8

[Text]

Tsugami Corp. of Tokyo has reached a basic agreement with Taiwan's Tatung Engineering Co. to provide the latter with technological know-how on the manufacture of machine tools.

The influential Taipei enterprise, which has been long planning to branch out into the machine tool field, will thus produce and sell automatic lathers and grinders with the Tsugami expertise.

Tsugami will receive some 100 engineers from Tatung for technical training at its Nagaoka, Niigata Prefecture, plant, starting this fall.

The license contract, to be signed shortly, will be effective for the next seven years. It will allow the Taipei firm to sell its lathes and grinders in Taiwan on an exclusive basis and also to export them to 11 Asian countries, including the Philippines, Indonesia, Singapore and Malaysia.

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SCIENCE AND TECHNOLOGY

SEMICONDUCTOR FIRMS INCREASE CHIP SALES BY 30-50 PERCENT

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 951, 21 Apr 81 p 9

[Text]

Japan's Big Three semiconductor makers are believed to have boosted their chip sales by 30-50 per cent in the 1980 business year ended March 31. The Big Three are Nippon Electric Co. (NEC), Hitachi, Ltd. and Toshiba Corp. in that order.

NEC increased its semiconductor sales by 40 per cent to an estimated ¥222 billion, maintaining the world's No. 2 position. Texas Instruments Inc. is by far the largest producer with sales reaching the equivalent of around ¥300 billion.

NEC has made up for slowing sales of 16-kilobit dynamic random access memory (RAM) chips with a boost in those of complementary metal-oxide semiconductor (MOS) chips, bipolar microprocessors, custom-made large-scale integrated circuits (LSIs) and other semiconductors.

Toshiba Corp.'s sales are estimated to have shot up 50 per cent to ¥150 billion in the 1980 term. Toshiba boosted sales of discrete semiconductors and microprocessors.

However, the sales gain of second-ranked Hitachi, Ltd. was limited to 27 per cent, as the No. 2 maker last year shifted emphasis to production of 64K dynamic RAMs, the "strategic commodity" in the next generation. Hitachi's semiconductor sales stood at ¥165 billion.

Semiconductor Sales of Japan's Big 3 Makers

(April, 1980-March, 1981; estimated)

1.	NEC	¥222 bil. (+40%)
2.	Hitachi	¥165 bil. (+27%)
3.	Toshiba	¥150 bil. (+50%)

Note: Change from the previous term in parenthesis.

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SCIENCE AND TECHNOLOGY

INFORMATION PROCESSING BOOMING IN COUNTRY

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 951, 21 Apr 81 p 9

[Text]

The information processing industry grows at a tremendously fast pace in Japan.

A survey of the Information-Technology Promotion Association revealed that total revenues of the nation's information processing industry in fiscal 1979 rose 17.4 per cent from the preceding year to ¥366,280 million.

The value was 70 per cent larger than in fiscal 1976. This means that the industry expanded at an average annual rate of 18.5 per cent during fiscal 1977 through 1979, the association said. The rate of increase compares the 9.8 per cent gain in gross national product during the same period.

The survey covered 352 companies, which broke down into 186 information processing service companies and 166 software development companies. Most of them were established in the early 1970's.

These young companies have been steadily strengthening their financial positions. The survey found that their internal reserves totaled ¥19,548 million in fiscal 1979, up 51.7 per cent from the preceding year.

Although figures for fiscal 1980, ending March 31, 1981, are not still available, the association predicts expansion of the industry at a similar pace.

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SCIENCE AND TECHNOLOGY

DIGITAL AUDIO DISC COUNCIL DISBANDS

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 p 951 21 Apr 81 p 9

[Text]

The attempt to work out a unified international standard on digital audio disc systems has failed as the industry-wide standardization association was dissolved recently before it could reach a conclusion.

The Digital Audio Disc (DAD) Council, comprising 49 Japanese, U.S. and European audio equipment makers and an industry association, had been examining three proposed formats for nearly three years.

The three are the optical digital compact disc (CD) system of the Philips-Sony team, the mini-disc (MD) system of Telefunken of West Germany, and the audio high-density (AHD) system of Victor Company of Japan Ltd. (JVC).

However, the council has failed to choose either of the three formats as a unified international standard. Instead, the council has published a report which describes merits of each format.

In the absence of a unified format, producers of digital audio discs and players are now free to choose any of the three formats. However, possibility is strong that a majority will employ the CD format, which features a solid state laser for picking up sound signals from a 12-centimeter disc.

Even, Matsushita Electric Industrial Co. which has a controlling equity in JVC, earlier announced that it would adopt the CD system, dealing a heavy blow to the affiliated company.

Other companies which opt for the optical format include Pioneer Electronic Corp., Hitachi, Ltd., Toshiba Corp. and Mitsubishi Electric Corp.

These companies are now competitively developing commercialization technique in order to introduce their own models in the market late next year.

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SCIENCE AND TECHNOLOGY

SUNTORY PRACTICALIZES ENERGY-SAVING FERMENTATION

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 951, 21 Apr 81 p 12

[Text]

Suntory Ltd. has commercialized its energy-less starch composition know-how for alcohol production at its Usuki, Oita Prefecture, plant.

In the new plant operation, an enzyme is used to eliminate grain steaming and boiling, which is followed by saccharification, fermentation and distillation. The new technique is designed to reduce the energy requirement for the whole alcohol production by about 60 per cent.

The company is seeking patent rights mainly in Japan and the U.S. The technique is described as "an epochal one" which Suntory is confident can be utilized for the biomass technique for fuel alcohol manufacture.

In the steaming and boiling process, grain and water are mixed before raising both temperature and pressure for easy composition of starch. Saccharification and fermentation follow before the distillation operation for alcohol production.

The requirement of high temperature used to cost Suntory ¥8,000 per kiloliter of product alcohol. Besides eliminating the steaming cost, the enzyme helps get rid of cooling facilities and raise alcohol content. The second advantage contributing to energy conservation in distribution and byproduct treatment.

The enzyme was discovered by the firm's central research institute, following the study since the 1973 oil crisis.

The technique featuring the new "special" enzyme will hopefully help promote biomass technology for fuel production.

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SCIENCE AND TECHNOLOGY

JOINT CARBON FIBER VENTURE IS DUE

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 951, 21 Apr 81 p 12

[Text]

Asahi Chemical Industry Co. and Nippon Carbon Co. have launched an equally-owned carbon fiber production and marketing company. The partners decided to build a plant with monthly capacity of 15 tons at Asahi's Fuji works by March, 1982. It will cost the Asahi-Nippon Carbon joint venture about ¥1 billion.

The output will be equally split for domestic sales and exports.

Asahi, a major producer of acrylic fibers, agreed to supply the raw material to the new company. Enka of West Germany, a licensee of Nippon Carbon's production know-how, will continue its right to market in West Europe. The plant will be run by Asahi Chemical, with technical and sales efforts to be shared by personnel to be dispatched by the parents.

For Nippon Carbon, the tieup is intended to eliminate its weakness of relatively small capacity (5 tons monthly at its Yokohama works). The company with technical know-how will also benefit from the tieup in terms of procuring raw material acrylic fibers. Mitsubishi Rayon Co., which used to provide Nippon Carbide with the fibers, decided to start integrated production by inducting fiber "roasting" technique from HITCO of the U.S.

Asahi has failed to develop its own roasting skills despite its status of the largest acrylic fiber maker here.

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SCIENCE AND TECHNOLOGY

JAPANESE INDUSTRIES' REACTION TO AMERICA'S SPACE SHUTTLE SUCCESS

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 951, 21 Apr 81 p 13

[Text]

The success of America's April 12-14 space shuttle venture has aroused all sorts of hopes and visions among many impressed Japanese industrial experts, including expectations of a revolutionary age of technological and social problem solutions as well as a new surge of demand for Japanese industrial products and services.

Eiichi Ohara, president of the Society of Japanese Aerospace Companies (SJAC), paid high tribute to the success, evaluating it "as the curtain-raiser of a new age of applying space development technologies to practical purposes."

Masatoshi Ito, president of Toray Industries, Inc., and Tadashi Sasaki, managing director of Sharp Corp., both also highly commended the achievement, with Ito expecting the feat to "bring cosmic space closer to mankind and also greater progress of space development," and Sasaki anticipating its "marked contribution to the renovation of electronics."

Koji Imakita, senior managing director of Mitsubishi Electric Corp., one of Japan's top-rate artificial satellite producers, cited the achievement as "opening the biggest epoch in the history of space development since man's landing on the moon." He also emphasized his corporation's new resolve "to concentrate our electronic technology in fields applicable to the space shuttle project."

Kenichiro Imai, managing director of Ishikawajima-Harima Heavy Industries Co., was so hopeful of the impact of the American success on Japan as to predict that "Japan will also come to plan its own space shuttles, possibly a mini-type, sooner or later."

This kind of hope for Japan's efforts to build up its own space development technology further was voiced by many observers. SJAC President Ohara also emphasized his belief in the need for Japan's greater efforts "not to fall behind the world's progress, while trying to make the most of the (U.S.) space shuttles."

Tsuguhide Fujiyoshi, board chairman of Toray Industries, envisioned a much greater demand for the carbon fibers his company has been producing for the U.S. space shuttle project as "one of the wide-ranging side-effects" of the success.

Answers to various realistic technological and even social problems from continuation of the space shuttle project were also visualized by many other experts. Tsutomu Isobe, development department deputy director and central research laboratory director of Furukawa Electric Co., looked forward to the creation of many kinds of nonferrous metal and other industrial materials of "completely uniform and faultless quality" by the space laboratories to be carried up by future space shuttles. Tairo Oshima, chief of the Laboratory of Biochemical Reactions and Biocatalysts of Mitsubishi-Kasei Institute of Life Sciences, likewise imagined "an alcohol factory in space" of great efficiency, an unknown kind of study on biorhythm in the weightlessness of space with no day-and-night change, and even "production of foodstuffs free from the earth's biology to suggest a new solution to the food supply problems of developing nations."

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SCIENCE AND TECHNOLOGY

MITSUBISHI ELECTRIC MAKES POWER LASER PROCESSING MACHINE

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 951, 21 Apr 81 p 13

[Text]

Mitsubishi Electric Corp. has developed an industrial laser beam processing machine of carbon dioxide gas type attaining 4,000 watts, the most powerful of its kind in Japan.

The company will shortly market the ML-4000 as an addition to its 1,000 to 3,000 watt-capacity models it had earlier developed and locally sold since last autumn.

The ML-4000 has a capacity to sever steel plates up to 15 millimeters thick at a stroke, to fuse together steel plates of 6 mm in thickness, and to bake steel sheets up to 2 mm in thickness. Hitherto, such annealing job had been difficult for laser processors short of 4,000 watts in rated output.

Using a 10.6-micron beam frequency oscillator, the new laser processor fluctuates only 5 per cent up and down from the official rating after eight hours of continuous operation.

Its oscillator measures 4 meters long with 300 discharge pins and consumes 900 liters of gas per 100 hours of running.

The Japanese market for such laser processors is still in its infancy, being expected to attain only ¥2 billion this year. But it is expected to expand five times by 1985. Mitsubishi's new product could arouse new demands for such processors as part of Japan's prospective industrial FMS (flexible manufacturing system). It could also represent a new step forward of major Japanese laser producers toward an aim of developing by early 1984 a 20,000-watt type as the Ministry of International Trade & Industry envisions.

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SCIENCE AND TECHNOLOGY

NEW REMOTE TEMPERATURE MEASURING SYSTEM DEVISED

Tokyo JAPAN ECONOMIC JOURNAL in English Vol 19 No 951, 21 Apr 81 p 13

[Text] A new remote temperature measuring system that involves running light beams through a fiber optics line and a light-absorbing and heat-sensitive semiconductor placed at the target spot to ascertain the temperature from returning beams has been developed by Mitsubishi Electric Corp.

Such remote gauging of heat had so far been done by analyzing the infrared ray emitted by the target when the latter's temperature is very high, possibly above 500 degrees C.

In the case of lower temperatures some contact types of electric heat sensors had been attached to the target to send the temperature readings in electric pulse signals.

But such contact types had been vulnerable to the noise-creating electromagnetic influence of some machinery, especially high voltage electric power equipment. Such gauges thus had been often unusuable when the target machinery or equipment were in operation.

The new system is entirely free from such troubles. It is usable even on a powerful electric generator during operation. The new system is also much less expensive to produce than an equivalent heat-sensitive fluorescent material-using fiber optics system earlier developed.

The company said its new remote heat sensor consists of a little slender semiconductor tube about 3 centimeters long and 1.8 millimeters across and a pair of fiber optics lines.

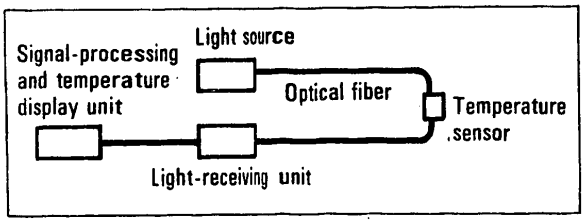
The semiconductor tube is a little semiconductor chip of 0.1 to 0.5 millimeters in thickness sandwiched between the two fiber optics lines.

A beam sent from the light source through one fiber line is absorbed or passed by the semiconductor into the other fiber line in different degrees depending on the temperatures it senses. The returning beam is checked as to its light pulses, and the result is indicated as the temperature.

The latest trial model of the new gauge uses as its light source either a light-emitting diode or a semiconductor laser for fiber optics communication purposes. But even an average tungsten-halogen electric lamp is usable.

Every possible technological obstacle in ensuring the full transmission of light, such as sharp bends of fiber or inadequate fiber connection has been detected and removed by also passing an experimental control type of light that is not absorbed by the semiconductor.

Concept of Fiber Optics-Applied Thermometer



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