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Japan Report

(FOUO 2/81)

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ECONOMIC

REPORTAGE ON VOLKSWAGEN, NISSAN TIE UP

Agreement Covers Passenger Cars

Tokyo MAINICHI DAILY NEWS in English 4 Dec 80 p 1

[Article: "Volkswagen, Nissan Tie Up"]

[Text]

The world's fourth largest automaker, Nissan Motor Co. of Japan, and West Germany's largest automaker Volkswagenwerk A.G., reached basic agreement Wednesday on a worldwide tie-up, Nissan President Takashi Ishihara announced. The tie-up includes, besides the two companies, Fuji Heavy Industries in the Nissan group and Audi NSU Auto Union A.G. in the Volkswagen group.

The agreement covers the production (production on commission) of medium-size passenger cars — either Audi or Passart — in Japan as well as auto production in the United States. Nissan and Volkswagen are to work out the details of the tie-up agreement by June next year by setting up a project team.

The details include such points as production model and volume in Japan, the plant site, and cooperation outside Japan. But cooperation in terms of capital will not be considered "for the time being," said Nissan President Ishihara at a press conference, while announcing his company's tie-up with Volkswagen.

The overall tie-up between Nissan and VW is aimed to contribute largely to resolving the automotive trade friction between Japan and the European Economic Community.

The tie-up will also have a great impact on the American automotive industry which has been troubled by ever-increasing imports of Japanese-made automobiles.

The agreement, which was reached amid the intensifying "world automotive war," will inevitably accelerate a global shakeout in the automobile industry.

The negotiations between Nissan and VW started at the time of the talks between the Japanese and European automotive industries in Tokyo Nov. 18 and 19.

After the joint press meeting on the morning of Nov. 19, VW Chairman Toni Schmucker called on Nissan President Ishihara at Nissan headquarters in the Ginza and made the tie-up proposal. The ensuing negotiations culminated in the basic agreement Wednesday.

The tie-up covers technological development, production, sales, technological cross-licensing and other fields. The most important point is the production of VW cars in Japan.

Annual production is expected to range from 100,000 to 200,000 units. The production site is likely to be Nissan's Kyushu plant in Fukuoka Prefecture which is partly idle. Another prospective plant site is one of Fuji Heavy Industries' plants in the Kanto Plain.

The production start-up is

anticipated to be after the fall of 1983. The plant is currently producing one-ton pickup trucks for sale at home and abroad, the U.S. in particular. The major portion of Nissan's pickup truck production is to be shifted to the Tennessee plant in the fall of 1983. Nissan is to start construction of the Tennessee plant soon.

Talks With Fuji

Ishihara said in the press conference that Volkswagenwerk is keenly interested in the Subaru automobiles being produced by Fuji Heavy Industries. Fuji Heavy Industries is producing small unique front-wheel drive passenger cars including 550cc mini cars and small commercial vehicles.

The Nissan president said that talks will begin with Fuji Heavy Industries on VW car production in Japan as soon as possible. Nissan and Fuji Heavy Industries have been maintaining close relations. The current Fuji Heavy Industries president is a former Nissan vice president, and Fuji has been producing Nissan cars on commission.

Regarding sales of Japanese-made VW cars, Ishihara said Nissan is going to play a major role by selling them through Nissan's existing sales channel.

He said the position of Yanase & Co., the sole importer-distributor of VW cars in Japan, will be left entirely to Volkswagenwerk.

Ishihara quoted VW Chairman Schmucker as saying at the Nov. 19 meeting that VW was fully satisfied with Yanase's performance. But Ishihara added that Yanase's VW car sales were not large enough to justify local production, and that now Nissan was going to produce VW cars here it would have to play a big role in sales. He also said a portion of production would be exported.

Since the tie-up also covers production outside Japan, production in the U.S. is also being considered.

Nissan's Tennessee plant site will be big enough to accommodate its pickup assembly plant as well as a passenger car plant with Volkswagen, to meet U.S. governmental and labor demands for the production of passenger cars in the U.S.

Nissan had previously rejected such demands as being unviable.

The Nissan-VW tie-up materialized out of the common desire to maintain their existing superiority over other manufacturers.

Since the two automakers decided to combine on their own long-term strategies, the tie-up differentiates from the on-going negotiations for production in the U.S. between Toyota and Ford. The Toyota-Ford talks were being started with the aim of helping to resolve the Japan-U.S. trade friction. Therefore, the Nissan-VW tie-up will inevitably have a much greater impact on other automakers around the world.

Volkswagenwerk outstrips other automakers in Europe in technology, scale and capital. Britain's BL Ltd., France's Regie Renault, and Italy's Fiat Auto S.P.A. are on a long-term downtrend and often enlist state assistance.

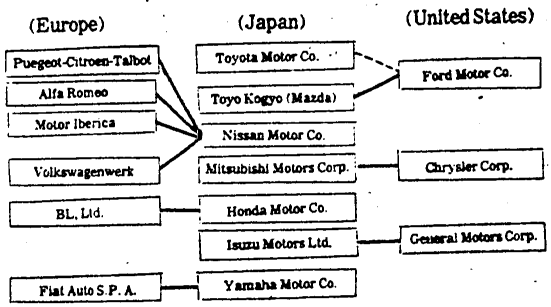
For Free Trade

Backed by strong production and sales operations in Europe as well as in other regions, VW alone has displayed confidence by sticking to the principle of free trade, even at the Tokyo talks between European and Japanese automakers. At the talks other European automakers urged Japanese makers to exercise export restraint and end production expansion.

Nissan and VW decided on the cooperation for their own survival before protectionism becomes too powerful to oppose. Other makers are also covertly maneuvering for similar tie-ups.

Volkswagenwerk has its own

Tie-ups between Japanese and foreign automakers



global strategy. Japan is one of the three largest automotive markets. The others are the United States and Europe.

In Japan, about 5 million automobiles are sold each year. Volkswagen cars, which enjoy the highest sales among imported cars in Japan, sell only 20,000-plus units a year. When VW car production begins here, it may well boost VW car sales here as well as in Southeast Asian countries.

For Nissan the VW proposal was timely and meritorious as domestic auto sales are in a slump this year. So far, sales have registered a double-digit decline from last year.

The advancement of a foreign automaker into Japan will also mitigate the sentiment that Japan is exporting one-sidely.

The Nissan-VW venture is a tie-up between equals in global sales network, high technology reputation, and high productivity. A minor difference is that Nissan has outstripped VW at the production level.

In the background of Nissan's tie-up were the negotiations between Ford and Toyota, an archrival of Nissan. In the world automotive arena, General Motors is the superstar, with the world's second largest, Ford, and third largest, Toyota, in the process of forming a second power. The Nissan-VW tie-up will enable the two automakers to compete on a par with these titans.

In view of this emerging global reorganization, the focus will be on the moves of other European automakers — whether they will opt to form a third force among themselves or not.

Attention will also shift to Chrysler Corp, which is in dire straits, and Ford, which is slipping into the mire in which Chrysler fell.

'Endless Corporation War'

Tokyo MAINICHI DAILY NEWS in English 6 Dec 80 p 2

[Article: "Nissan-Volkswagen Shock"]

[Text]

The agreement between Nissan Motor Co. and West Germany's Volkswagenwerk to jointly produce medium-sized passenger cars signifies the start of another "endless corporation war" by the world automobile industry, involving the production of smaller, fuel-efficient and high performance automobiles.

We say "another" because the Nissan-Volkswagenwerk accord is the formation of the third largest auto company group following the General Motors-Isuzu and Toyota-Ford tie-ups, and is expected to have a new and different impact on the American auto market.

The tie-up between the Japanese and European companies will intensify the existing friction between the Japanese and American automobile industries, while easing the friction between the Japanese and European auto industries.

At present, Japan enjoys a lopsided favorable trade balance in its auto exports to the European Community nations. In particular, the large and rapid increase of Japanese car exports to West Germany has been remarkable, driving a considerable amount of British, French and Italian cars from the West German market resulting in bringing unemployment among European automobile workers to 500,000.

Medium-sized VW cars made in Japan will be sold locally and exported to Southeast Asian countries, helping the British, French and Italian automakers regain and expand their West German market. Judging from the fact that Japan has been reluctant to open its doors to European cars, the Japanese-German agreement will likely alleviate the European-Japanese trade friction.

The same reasoning cannot be applied to the American market, however. The American automobile market is restless at present. American consumers want to drive fuel-efficient and medium-sized cars while Detroit faces a gloomy business situation.

In spite of the recent U.S. International Trade Commission's decision that Japanese automobile exports to the United States is not hurting the American auto industry, nobody believes that the decision will end the U.S.-Japan automobile industry friction.

About 250,000 American auto workers have lost their jobs and receive special aid from the government. The Big Three have recorded large deficits, and Wall Street officials estimate that the American automobile industry's loss this year will be about $4,000 million (more than 800,000 million yen).

The cause of this unfavorable situation cannot be solely attributed to the expanded sales in the United States of Japanese cars or to the American automakers' failure to implement strategic changes for the production of smaller cars. And we know that the American authorities were not idle in the face of such serious damage to this key industry.

Ronald Reagan, who will assume the American presidency in January, is expected to take some restrictive measures against foreign-made cars. We fear that the Nissan-VW agreement may prompt Reagan to act in that direction, and he might well ignore the recommendation of the ITC.

The U.S. Congress can also take certain measures to restrict the import of foreign cars. We know that the export of Japanese and European cars to the United States is welcomed by American drivers although it injures the American auto industry. At the same time, we must remember that the president and Congress may take the initiative to protect the American auto industry, which faces enormous competition from the Japanese-German axis.

For the world's gigantic automobile manufacturers, surveys on frictions and survival strategies will be essential. We will see further reorganizations among other auto makers and an intensification of friction. In some cases, consumers will benefit from the fierce competition.

One undesirable situation for both consumers and automobile makers would be the emergence of an international monopolistic set-up should reorganization efforts fail. We hope that Nissan Motor Co. will bravely resist such an undesirable possibility.

Export-Import Effects

Tokyo THE DAILY YOMIURI in English 5 Dec 80 p 2

[Editorial: "Nissan-VW Cooperation"]

[Text]

Nissan Motor Company and Volkswagen group of West Germany have agreed on overall cooperation, including the possibility of jointly manufacturing small cars in Japan. The agreement is considered to be an important move because it will accelerate the realignment of the world's auto industry and contribute toward reducing economic friction between Japan and Western Europe.

The price of gasoline has gone up sharply as a result of the two oil crises, thus increasing demand for small cars in every country of the world. This trend will continue to follow its present path, and it is certain that those automakers which win the small car competition will eventually capture the global automobile market.

At the same time, the cost of developing new technology will continue to soar, making it possible for only a handful of automakers to go it alone. Consequently, carmakers in the world are trying to come up with bold measures for cooperation. Their main rival seems to be General Motors of the US.

Worldwide Reaction

Business cooperation between Nissan and VW, which is an example of this growing trend, is certain to invite a worldwide reaction. It will also have an effect on negotiations between Toyota Motor Company and Ford Motor Company of the US, which are presently facing a roughgoing. The Nissan-VW agreement is not a novel development at a time when all major Japanese automobile companies are working out their respective global strategies to survive in the increasingly competitive market. This kind of tie-ups will become popular in the future.

With the increasing trade imbalance in the background, economic friction is mounting between Japan and West European countries. While Japan is pointing to Europe's insufficient efforts for increasing exports to Japan, Europeans are criticizing Japan's "downpour" of exports of automobiles and color television sets. They are also repeatedly claiming that the Japanese market is closed to their exports.

Restriction On Exports

It will be realistic for Japan to voluntarily restrict its exports of automobiles and color TV sets to some extent. At the same time, Japan should increase its imports from Europe and carry out widescale industrial cooperation with that region.

When we talk about industrial cooperation, we usually mean production in Europe by Japanese companies or joint development of advanced technology. The Nissan-VW tie-up may be something special in that it is cooperation between two strong automakers including joint car production in Japan.

It goes without saying, however, that the establishment of friendly relation between the two enterprises will help resolve the trade friction between Japan and Western Europe, while European carmakers other than VW may not welcome the tie-up between the two auto giants. The government should tackle the task of resolving the trade friction with Western Europe with these points in mind.

U. S. Interest

Tokyo MAINICHI DAILY NEWS in English 5 Dec 80 p 5

[Article: "Nissan-VW Accord Interests US Firms"]

[Text]

NEW YORK (Kyodo) — U.S. automakers showed strong interest Wednesday in reports that Nissan Motor Co. and West Germany's Volkswagen have agreed to cooperate in car production, industry sources said.

Their interest, the sources said, mainly concerns whether the Japanese and German automakers will embark on joint car production in the United States.

Under the agreement, announced in Tokyo Wednesday, Nissan and Volkswagen will initially study the possibility of cooperating in production of Volkswagen's small cars in Japan. But in the future, they will also consider undertaking similar ventures in other nations, including the United States.

The sources said U.S. automakers, like General Motors and Ford, believe chances are big that Nissan and Volkswagen will eventually begin joint production in the United States, because of the size of its car market.

It is highly possible for the Japanese and German companies to undertake such a joint venture at either the Volkswagen factory now under construction in Michigan or Nissan's pickup truck plant in Tennessee, the sources noted.

The sources said the Nissan-Volkswagen tie-up will accelerate moves among U.S. auto companies to step up cooperation with foreign automakers, possibly resulting in an across-the-board reorganization of the world's automobile industry.

Already, the sources said, negotiations for joint small car production are under way or have been concluded between U.S. automakers General Motors, Ford, Chrysler and American Motors and Toyota and Isuzu of Japan and French automakers Peugeot and Renault.

The Nissan-Volkswagen tie-up, the sources noted, will have a particularly significant impact on negotiations now going on between Ford and Japan's Toyota Motor Co. on their cooperation in car production in the United States.

They said Toyota and Ford are now expected to quicken the tempo of their negotiations to cope with the Nissan-Volkswagen tie-up.

Stable Trade Relations Expected

Tokyo ASAHI EVENING NEWS in English 9 Dec 80 p 5

[Article by Kentaro Koshiba: "Nissan Ties With VW Hailed"]

[Text]

The announcement made last week by Nissan Motor Co. has been welcomed here as a positive step toward the long-term reduction of friction in the car trade between Japan and EEC nations.

In a hastily called news conference, Takashi Ishihara, Nissan president, disclosed that his company had reached agreement with Volkswagen on the feasibility of producing Volkswagen cars at a Nissan plant here.

The current speculation here is that Nissan, the second largest Japanese auto firm, will begin producing Volkswagens under license from the German firm sometime in 1982.

There is also talk of the possibility that Nissan might eventually build its own cars in West Germany. Analysts believe that is a logical step to follow the Japanese production of German cars.

It is apparently anybody's guess, however, whether Nissan and Volkswagen will start joint production in the United States, where the German maker has its own manufacturing facilities.

Considered in the context of the lopsided automobile trade between Japan and the European Common Market, the Nissan-Volkswagen accord has been hailed here for a number of reasons.

First, it is expected to contribute favorably, in the longer term, to developing more stable trade relations in this sensitive sector, because it opens the way for expansion of the sales of European cars on the Japanese market.

At present, the Common Market as a whole is exporting only one car to Japan for every 20 cars it is importing from this country. This is considered one of the reasons for the wide trade gap, which is estimated to reach about $9 billion this year.

The Europeans, as well as the Americans, believe that the Japanese car market is "closed." It is not that the market is protected by high tariffs or quotas.

The problem as they see it is that there exist a bristling array of "invisible" barriers — or so-called "nontariff barriers" — that effectively bar the free entry of foreign cars into the Japanese market.

One fact that is often cited is that foreign cars account for only a fraction of the auto sales in Japan, while Japanese vehicles continue to flood the U.S. and European markets.

Volkswagen, for instance, now holds a minuscule 0.7 percent share of the Japanese market. That is the single largest share of any foreign carmaker.

Production of Volkswagen cars here would significantly increase that share because the venture now in the works is said to be aimed at the domestic market, and not at export markets.

If that is the case, increased sales of German cars would help improve the foreign "image" of the Japanese market as a "closed" one that is hard to penetrate.

One important change that is likely to happen is in the entrenched distribution system of imported cars — a system that is claimed to be responsible for the high retail prices of foreign-made autos as compared with domestic models.

At least some of the expensive imported cars will likely be priced out of the market if foreign cars domestically produced are made available to Japanese consumers at competitive prices.

Second, the latest agreement has elicited favorable reactions because production of Nissan cars, if it materializes, will help reduce Nissan's heavy dependence on export markets.

It is widely acknowledged that recent friction in the nation's car trade with the United States and European countries stems chiefly from the concentration of Japanese autos in these markets.

In this sense, the Nissan-Volkswagen accord has essentially the same implication as plans revealed earlier by other Japanese makers to build cars in the United States.

Honda, for example, recently broke ground for an assembly plant in Ohio, while Toyota is now negotiating with Ford on a co-production scheme in the U.S. Nissan, for its part, plans to build light trucks in Tennessee.

Third, a Nissan production venture in Germany would also have a positive impact on the employment situation there. The job-creating effect of auto production is often cited as a major factor that can help ward off protectionism.

At a time when most of the industrial nations are beset by the serious unemployment problem, investment by Japanese automakers has been urged strongly by the Ministry of International Trade and Industry (MITI), for example.

However, all these welcome aspects of Nissan-Volkswagen cooperation and other production ventures involving Japanese automakers are long-term and therefore are not likely to provide immediate solutions to the current car trade problems vis-a-vis the U.S. and Europe.

French Reaction

Tokyo THE JAPAN TIMES in English 5 Dec 80 p 5

[Article: "French Paper Blasts VW Plan"]

[Text]

PARIS (AP) — A French newspaper charged Wednesday that the head of Volkswagen, the West German car firm, used a recent trip to Tokyo as part of a European delegation to reach an agreement with a Japanese automaker.

Commenting on plans for the production of a Volkswagen car in Japan in association with Nissan, Les Echos, a business daily, said that Toni Schmucker, head of Volkswagen, was "against the Japanese during the day and with them at night."

Schmucker was a member of a group of European automakers that was trying to get the Japanese to restrict exports of their cars and open up their markets to European autos.

Le Figaro noted that less than 15 days after the Tokyo summit which, for the first time brought together European and Japanese car makers "Volkswagen is attempting a risky operation in the empire of the rising sun."

Former French Ambassador Francois Missoffe, who is in Tokyo to try to persuade Japanese industrialists to voluntarily restrain exports to Europe in general and to France in particular, expressed surprise at the announcement of the Volkswagen-Nissan project.

"The accord shows that the European solidarity expressed in Tokyo two weeks ago wasn't without second thoughts on the German side," Missoffe said.

Feasibility Studies Start

Tokyo THE DAILY YOMIURI in English 10 Dec 80 p 4

[Article: "VW Head Stresses Japan Output Plans"]

[Text]

Schmuecker told Spiegel magazine "we want to produce a Volkswagen in a Nissan factory that will be sold as a Volkswagen in Japan."

Under the production arrangement, Schmuecker said VW would deliver parts for assembly of VW models at a Nissan plant fully under Nissan management.

Last week, VW and Nissan jointly announced they were conducting a study of the feasibility of producing VW models in Japan for the Japanese market.

At that time, however, VW officials cautiously avoided saying the automaker had a firm intent to produce in Japan, indicating that the feasibility study lasting some six months would be the basis for further decisions.

Speaking in Frankfurt, Schmuecker took a tentative tone, saying that 200,000 or more VWs could be produced in Japan yearly if the study was successful.

He told Spiegel that "economically, production makes sense starting at about 200,000 autos."

Schmuecker emphasized in the magazine interview that if any of the VW's produced in Japan were exported, they would not be sent to Europe.

Schmuecker said VW's "primary goal isn't to produce in Japan, but to sell more autos in Japan."

Yanase Reaction

The president of Yanase and Company, the sole import agent for Volkswagen cars, Monday took a dim view about the prospect for the proposed tie-up between the West Germany automaker and Japan's Nissan, Kyodo reports.

Jiro Yanase told a press conference that in his view, the chance of the proposed Nissan-Volkswagen tie-up being materialized is 50-50.

He said if Volkswagen pushes the tie-up plan, it will be placed in a difficult position in the European Common Market, adding that other European automakers are already criticizing the German company's move.

He added that he would ask Volkswagen to pay due attention to his company's interest while promoting the tie-up plan with Nissan.

Industry Reorganization Seen

Tokyo ASAHI EVENING NEWS in English 4 Dec 80 p 1

[Commentary: "Nissan-VW plan seen leading to industry reorganization"]

[Text]

The agreement announced Wednesday by Nissan Motor Co. and Volkswagenwerk A.G. (VW) of West Germany to study the possibility of manufacturing VW's small cars at a Nissan plant here and other cooperation is certain to accelerate the realignment of the world's auto industry.

Disclosing the agreement at a press conference in Tokyo, Takashi Ishihara, president of Japan's No. 2 automaker, explained that the aim of the cooperation with VW is to help a European maker to penetrate more the Japanese market, which has been often criticized as being closed to foreign manufacturers, and, thereby, to reduce trade friction with Western Europe.

In this respect, as the Ministry of International Trade and Industry pointed out in welcoming the agreement the same day, it will be a big step toward the settlement of the car trade problem.

However, the true intentions of Nissan, No. 4 maker in the world, and VW, No. 7 in the world and No. 1 in Europe, are to expand their shares of the global market.

VW is already assembling vehicles in the United States, and, through a tieup with Nissan, it can build a production and marketing base in Japan for sales not only in Japan but in other parts of the world, including the uncultivated Southeast Asian market.

For Nissan, the tieup with VW, a successful and well-managed European company, will be of great assistance to its worldwide expansion, unlike the proposed joint-production plan between Toyota Motor Co. and Ford Motor Co. of the U.S. which has the nature of a successful Japanese maker coming to the rescue of an ailing U.S. giant.

Analysis

The direct cause of the current global realignment, which involves large makers in the U.S., Europe and Japan, is the soaring price of gasoline, which has made the development of fuel-efficient small cars absolutely necessary if makers are to survive in the increasingly competitive market.

However, it is too costly and risky for each maker to go it alone in the development of new cars, technology to reduce harmful emissions and electronic technology. Under the circumstances, other independent European makers are expected to approach Japanese companies for cooperation.

According to Ishihara's explanations at the press conference, a joint project team set up by Nissan and VW will study the type of cars to be assembled in Japan and the scale of co-production. If everything goes smoothly, the details will be worked out by next June and assembly will start one year after that.

No capital tieup is under study at present. It is yet to be decided whether joint production will be conducted on a so-called knockdown (KD) basis or an integrated basis. It will not be a joint venture but will take the form of VW commissioning Nissan to make VW vehicles.

It is likely that either the Audi or the Passat, both compact cars produced by VW's subsidiary, Audi NSU Auto Union A.G., will be picked as the car for joint production. Nissan is expected to participate in the marketing of the jointly-assembled cars.

In the second phase of cooperation, Fuji Heavy Industries Co., which makes Subaru cars and is owned seven percent by Nissan, is expected to join the tieup, giving rise to speculation that the cooperation will spread to the area of mini cars of less than 550 cc in the future.

Mideast, Latin America Markets

Tokyo NIHON KOGYO SHIMBUN in Japanese 4 Dec 80 p 1

[Excerpt] Officially MITI said that it feels Nissan's move would serve to ease mounting tension over trade relations between Japan and the EC, and MITI welcomes Nissan's proposed business link with VW as a positive step towards the Japanese automotive industry's long-term global strategy. However, according to a MITI source, the primary goal of Nissan's arrangement with VW is to solidify its production base in Japan and to export cars to third countries. At present, markets under consideration apparently include the Mideast and Central and South America.

According to the MITI survey, during January-October 1980, these markets had the highest increase in the number of cars exported from Japan: Central and South American markets showed a 74.7 percent increase compared to the corresponding period of the preceding year; and the Mideast, a 55 percent increase. It is widely believed that the arrangement between Nissan and VW will eventually be expanded and developed into joint 'license' production in the U.S. and EC.

CSO: 4105

ECONOMIC

NISSAN-ALFA MARRIAGE BRINGS HOPES FOR BOTH SIDES

Tokyo THE DAILY YOMIURI in English 9 Dec 80 p 3

[Article by Roy Harry]

[Text]

London—The word in the automobile industry is that Ford Motor Company of the US and Toyota Motor Company of Japan are "having talks." And that Ford officials—said to be of the highest rank—were only too willing to go all the way to Tokyo to meet the Japanese executives. Prime topic of discussion is reportedly a joint smaller car manufacturing project in the US.

Everybody's doing it—in one way or another: the furor about BL and Honda Motor Company will be almost forgotten in a couple of years and perhaps a few commentators will be generous enough to admit that, at least in the mind if not in the heart, you know it makes sense. It took almost a year of bickering amid forceful opposition from Fiat but the deal between Nissan (which in UK terms means Datsun) and Alfa Romeo is now signed.

There are plenty of people in the Italian motor industry who will tell you that Nissan wanted Alfa solely for prestige purposes, but it is not as simple as that. Japanese cars are virtually banned from the Italian market and Fiat saw the proposals as a Trojan horse, a contrived device for letting Datsun cars into the Italian home patch.

But Alfa, too, has its troubles. The low productivity of the politically inspired Alfasud plant not too far from Naples has been an industrial albatross for many years. But they do have plenty of engines, and in Rome recently one of their senior officials admitted to me that they had been searching for partners for some time. Losses at the southern Pomigliano plant have totaled almost £100 million during the past two years. No wonder that Alfa produce their recently introduced executive "Six" saloon in the traditional Northern factories.

They did hope that charity could begin at home but talks with Fiat came to nothing, and with Alfa's financial background few others in Europe were interested. Thoughts of Alfasud (surprisingly) go back to 1967 and there was a plan for 300,000 units a year. In fact, only about one third of this figure has been achieved though the running gear—the mechanical bits that form the basis of the Nissan link—come off the line at about 130,000 to 140,000 each year. Clearly, something had to be done.

So the deal has been signed—and in Tokyo at that. The two companies are to create an organization known as ARNA—Alfa Romeo Nissan Autoveicoli—with a capital of £15 million and what is said to be an equal partnership. The plan is to build a new factory near the present quake affected Alfasud plant in Southern Italy.

In fact, the new plant is planned to have a capacity of 60,000 cars a year with an undertaking that only half of these will be sold in Italy. That is a not inconsiderable increase for Alfa—last year they built a total of just over 200,000 cars—but it is a drop in the Nissan bucket of 1.7 million output.

No name has yet been chosen for the new car though the wags are already busy: Half-a-Romeo is a strong runner. What is certain is that it will have two engines, 1100cc for home sales, 1300cc for export, and that it will slot in below the ten-year-old Alfasud, which is steadily being upmarketed. And equally certain is the fact that Nissan will have its much sought after foothold in Europe.

CSO: 4120

SCIENCE AND TECHNOLOGY

MICROWAVE LANDING SYSTEM DESCRIBED

Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 pp 52-54

[Text] A microwave landing system (MLS) is attracting much attention as "the aircraft landing guidance system of the 21st century" and worldwide is under active research and development. In Japan, the Civil Aviation Promotion Foundation has taken the initiative for R&D of this system and recently, with the cooperation of Nippon Electric Co. and Toshiba Corp. has completed an approach azimuth antenna, an elevation antenna and aircraft instruments as major instruments of MLS.

The instrument landing system (ILS) as an aircraft approach guidance system currently in widest use in airports over the guidance system currently in widest use in airports over the world, is designed to provide a reference approach course of electromagnetic waves (ultra-short waves) in space above landing runways, enabling landing aircraft to be guided along it. As aircraft traffic increases and airports become overcrowded with their surroundings increasingly heavily urbanized, the ILS is coming to face the following difficulties: 1) it limits approach courses to only one, making it impossible to select desired courses, e.g., avoiding crowded urban areas. 2) A single approach course inevitably limits aircraft arrangement to a straight line, failing to cope with increasing traffic. 3) To provide an approach course sufficiently long to meet required operation, it requires a large flat area. However, it is generally difficult to acquire such spaces. 4) A limited approach course fails to meet a variety of needs of aircraft with different descent angles.

Thus, the MLS has been attracting attention as a new landing system which is able to solve the above difficulties and has a higher operational ability with fully automatic landing. It has been under development by countries around the world, and at present the American TRSB system is being adopted as an international standard MLS system.

The TRSB system is based on measurement on a time reference to determine the location of the aircraft in space (three-dimensional coordinates). Under the system, the approach azimuth antenna and the elevation antenna installed at the edge of the runway scan beams in an azimuth range of ± 40 degrees and an elevation range of 1 degree to 15 degrees. These antenna cover a fan-like space extending 20 nautical miles (about 37,000m) from the front of the runway and 20,000 feet (about 6,000m) upward.

The space thus covered is scanned reciprocally at constant speed with beams from the antenna. An aircraft receives the beam from each antenna twice and measures the time gap between the two pulses to obtain its azimuth and elevation. Information about distance from the runway is obtained from a high-accuracy measuring instrument installed on the ground. An approach course can be determined by processing this data on location using a computer system in the aircraft.

Thus, the MLS has the following advantages over the current ILS.

1) While the ILS limits approach courses to one, the MLS has a sufficiently wide guide space to allow the aircraft to approach the airport from a wide range of direction and elevation within the space covered depending on its type and direction of flight.

2) The MLS allows not only straight approach courses but also curved courses, making it possible to make an approach avoiding residential areas.

3) The MLS allows multiple approach courses, possibly promising an increase in navigation efficiency resulting from improved efficiency in space utilization.

4) The MLS is unlikely to be affected by buildings and terrain in the neighborhood of an airport, so it does not require a large flat area.

In Japan, the study of MLS was started in 1974 when the Civil Aviation Promotion Foundation organized an All-Weather Landing System Committee to discuss a landing system for the New Kansai Airport off Senshu in Osaka. In 1978 when an international standard system was determined, the Foundation started an MLS Development Committee, to develop major equipment. Recently it has completed trial manufacture of an approach azimuth antenna, an elevation antenna, a transmitter, a monitor, etc. This has partly enabled flight tests with MLS. In the speed of this development, Japan directly follows the U.S. and England.

Instruments made recently also include an antenna control, a transmitter, a monitor and a receiver for aircraft which receives radio transmission from the ground station to obtain data on the aircraft's azimuth, elevation, etc., necessary for approach and landing, in addition to the approach azimuth antenna and the elevation antenna. Among the equipment, the transmitter developed by Nippon Electric Co. is the world's first innovative system made all solid and is expected to serve more than 10 times as long as conventional wave guide tubing.

Other than these devices, however, the TRSB system also requires ground devices including a high-accuracy measuring instrument, a Flare angle antenna for raising the nose directly before landing and a back azimuth antenna for providing azimuth data for ascending in relanding or taking off. In Japan, even designs have not yet been drawn up for them.

Thus, although a flight test is scheduled to start in fall, a variety of equipment will have to be developed before a complete test of the MLS can be carried out.

However, a plan determined by the 8th all-weather navigation panel for switching from ILS to MLS indicates that MLS will be the international standard replacing the ILS by 1995. Thus, the Civil Aviation Bureau of the Ministry of Transport intends to make efforts to start real aircraft tests in around 1985.

CSO: 4120

SCIENCE AND TECHNOLOGY

SOLIDIFICATION PROCESS FOR RADIOACTIVE WASTES UTILIZING HOT-PRESS SINTERING

Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 59

[Text] The Government Industrial Research Institute, Osaka, is continuing the study on solidification techniques to isolate from human society, and safely dispose of the high-level radioactive liquid waste discharged while re-processing spent nuclear fuels from power stations. From among several such methods, the institute has proposed a hot-press sintering process for radioactive waste mixed with glass powder and is eagerly concentrating on its development. Nevertheless, the difficulty of performing a continuous hot-press operation has thus far limited the effort to a laboratory scale. Accordingly, the need has arisen for greater efforts to establish the continuous hot-press process.

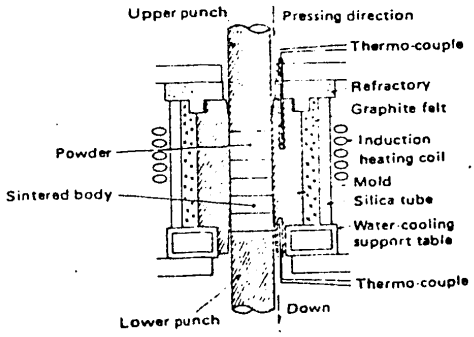
Furthermore, solidified radioactive wastes predictably reach a considerably high temperature by decay heat of radioactive substances during long-term storage. A variety of countermeasures are being studied to remove the heat: one instance is to embed marble-like glass in metals (lead etc.), and another tries to form compound ceramics of glass and metallic powder. The institute has developed a technique to sinter a mixture of relatively coarse glass powder and finely powdered copper, to prove that the thermal conductivity of the solidified body will increase 3-10 times over that of the original glass. With this result, a pressurized sintering apparatus was designed to hot-press the powdered glass-copper mixture continuously, intending to prepare ceramic bars.

The continuous pressurized sintering unit that the institute succeeded this time in operating has been built as a trial, basically for rather low-temperature uses (less than 1,000°C). Fig. 1 schematically shows pressurized furnace surroundings. The device is capable of forming columnar ceramics 5cm in diameter and 50cm in maximum length. The material of the molding die and upper/lower punches in high-grade carbon, and as a heating system, a high frequency of 3kHz is adopted, with a normal pressurizing force of 100-200kg/cm^2.

The operating steps of the device are as follows: First a certain amount of raw powder is injected into the heated mold, and then the upper punch lowers to initiate a pressurized sintering. After the upper punch halts with the completion of sintering, a sintered specimen, still pressed, descends as it is sandwiched between the upper and lower punches. Subsequently, the upper punch is drawn from the mold, which is again fed with raw powder for repeated cycles starting with the upper punch pressing. The last sintered body is therefore a base for the

following pressed sintering. The piled and lengthened ceramics will gradually be forced out of the bottom of the mold, so that the lower mold outlet needs to be cooled down enough so that the sintered body does not deform. Because of this, a mold support table is equipped with a water-cooling pipe that regulates the temperature of the mold outlet by the amount of water coolant.

Fig. 1. Pressing Furnace Surroundings of Continuous Press Sintering Unit



In the experiment in which compound ceramics of comparably low-temperature glass and copper were prepared by the equipment, borosilicate glass trapping dummy high-level radioactive waste (produced by the Tokai Establishment of the Power Reactor and Nuclear Fuel Development Corporation) was mixed with fine, dendritic, electrolytic copper powder, and was sintered while pressing. The sintering temperature (560°C) is in the vicinity of the yield point (the temperature at which the viscosity is about 10^{11} poises) of the glass, and a dense, sintered body with a porosity ratio of nearly zero was obtained at this temperature. The outlet temperature (350°C) was sufficiently lower than the transition point of the glass, producing compact bodies free of deformation or fracture. In addition, the time required for one cycle of the sintering operation was 15 minutes or so. Although the sintering boundary of each cycle is marked by contaminating graphite from the molds, the binding is exceedingly firm and has no risk of separation. Test products are sintered bodies with a glass-copper powder weight ration of 7:3, having a thermal conductivity about 4.5 times that of glass itself, which are regarded as extremely favorable characteristics with respect to decay-heat removal.

Thus, research and development in the continuous hot pressing are underway so far, as part of efforts to establish solidification treatment technology of high-level radioactive wastes. In the next stage to come, a stainless steel can will be used as a mold where the powder mixture of wastes, glass and metal is to be supplied continuously for press sintering--the development of so-called an "in-can hot-press method." In addition, as raw powder, the porous borosilicate glass mentioned

previously (the glass that has 100-1,000Å fine pores occupying about 30% of the volume and is intensely active to the sintering reaction) is to be employed, and preparations are being made to adopt the system in which such glass powder and calcined high-level radioactive liquid waste are continuously mixed and charged into the mold. In this case, sintering temperatures can probably be controlled at 600-700°C, so that hardly any toxic components will escape while processing, proving to be one of the excellent solidification techniques in this regard.

The development of this continuous hot pressing is limited to the solidification of nuclear wastes but is considered to offer wide applications for the fine ceramics industry, particularly the field where lengthy products are needed. Current technical and developmental issues of fine ceramics are focussing on the study of fabrication techniques coupled with that of the materials themselves. This newly-developed continuous press sintering equipment is a test case that requires further improvements to accommodate higher-temperation, and the device is expected to play an important role in expanding remarkably the scope of utilization of ceramics.

CSO: 4120

PRODUCTION OF ASSEMBLY-LINE ROBOTS ACCELERATED

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 4 Dec 80 p 10

[Article: "Spurred by Sensor Advances; Machine and Electrical Equipment Manufacturers May Begin Sales in Latter Half of Next Year"]

[Text] Composite manufacturing systems (FMS) are being actively developed for automation and elimination of labor in machinery manufacture involving diverse products produced in small quantities. The nucleus of the FMS is the assembly-line robot and it is rapidly being made practical. Its purpose is to take the place of a human operator doing assembly-line work in such processes as material cutting, fabrication, and machining, complex assembly, and product inspection. The design combines precision control technology with greater compactness and lighter weight than conventional robots. Not only machine manufacturers. but also electrical equipment and computer manufacturers, are actively involved. After the robot manufacturers put the robots to use in their own plants, it is highly probable that they will put them on the open market by, at the earliest, the second half of next year.

Until recently, the assembly-line robot has been under development in research facilities of national and local governments, universities, and some manufacturers. Optical recognition of the form and position of the workpiece, decision-making based on such recognition, and precision control technology are necessary in the robot for automation of assembly-line processes and a great deal of time was spent solving these technical problems. Recently, in addition to progress in optical sensor technology and devices, the robot body has been made compact and control technology has been improved with the use of microcomputers, so the robot has reached the stage of practical application.

Hitachi, Ltd., showed an intelligent assembly-line robot at the company's technology exhibit this fall and has succeeded in automating a simple assembly operation with a compact jointed robot. The same company is actively developing these robots in its Central Research Laboratory as well as in its Production Engineering Research Laboratory. After they are produced for company factories they will gradually be put on the market.

Fujitsu FANAC, a nanufacturer of numerically controlled devices, has completed development of an assembly-line robot, the Model 4, for use in the assembly of the company's DC motor. The plan is to have it in full scale use at the main plant as soon as next fall.

Next January, Kawasaki Heavy Industries is going to begin importing the Unimate 500 robot (a programmable universal manipulator for assembly or PUMA) developed by Unimation, a U.S. firm with which it is collaborating. Customers for the product have been unofficially lined up already and the company is in a hurry to make sales.

In addition to these early birds, the electrical equipment and computer manufacturers, who are responsible for Japan's electronics technology, are getting conspicuously involved. These companies are going all out, with their production technology departments taking the lead, to develop these robots, especially for application in assembly processes for semiconductors and computers. The leading computer manufacturer, Fujitsu, is promoting automation of assembly and testing processes in its electronic computer plant. Mitsubishi Electric has developed a system using ITV for assembly of hybrid ICs and Sharp is automating its electronic calculator assembly line. Toshiba and NEC are also developing their own robots and the number of companies involved is still growing.

Technology for recognition and decision-making (including failure diagnosis) is especially important in the assembly-line robot. The companies involved plan to further refine the circuit element technology. These intelligent robots have better performance than the present memory regeneration type of robot, so all the manufacturers are expected to move aggressively, while exploring the tradeoff between price and technological level, to make the robots practical and get them into commercial production by next year.

9651
CSO: 4105

SCIENCE AND TECHNOLOGY

FLEXIBLE LASER MANUFACTURING SYSTEM FOR RATIONALIZATION OF LARGE VARIETY/SMALL LOT PRODUCTION

Tokyo BUSINESS JAPAN in English Nov 80 p 94

[Text] EFFICIENT methods of production based on automation and mainly used for machinery have already been established in the field of production in small variety and large lots represented by the automobile and household electric appliance industries.

But rationalization and labor saving are a difficult task for such production which constitutes 70% of machine production which still depends heavily on human power and the skilled hands of the workers.

Industrial products are expected to become even more greatly diversified during the 1980s so that production in large variety and small lots will gain in importance. How to raise productivity against this background has become a crucial problem.

To contribute to the solution of thie problem, the Agency of Industrial Science & Technology, a government agency, started a seven-year program for the development of "Extra High Efficiency Flexible Manufacturing System Complex Provided With Laser" in 1977 with a budget of ¥13 billion. At present this is the largest development project for Japan's machinery industry as it prepares for full-scale utilization of electronics. The development is now progressing as a joint project including electric machinery, electronics and materials.

The project is participated in by three state laboratories and 20 companies affiliated with the Technology Research Association. The budget for fiscal 1980 amounts to ¥2,825 million while that for fiscal 1981 will total ¥3,000 million. The objective of this project is to develop and establish basic technology for a flexible manufacturing system complex which will be capable of flexible and fast integrated production, in large variety and small lots, of machine components from metal materials to finished products.

Concept design and basic design of the flexible manufacturing system complex have been already completed. The development of elementary technology is proceeding over two years from fiscal 1979. Detailed design of a pilot plant is envisaged in fiscal 1981, construction of the plant in fiscal 1982 and comprehensive operating tests and evaluation in fiscal 1983.

Products which can be made with the new flexible manufacturing system complex include construction machines, printing machines and machine tools comprising numerous machine parts and components.

For instance, the new system is believed to be ideal for products requiring a high level of processing, assembly and examination techniques such as transmission of power (reduction gears and bearings), oil hydraulic and pneumatic equipment (pumps, cylinders and valves) and drive mechanisms (engines and motors).

Successful completion of the program should assure:

(1) The introduction of large-scale automation in large variety/small lot production through the amalgamation of electronics and mechanical techniques. A 24-hour operation attended by a very small number of personnel (unmanned operation at night) will become possible.

(2) Mechanization of processing and assembly work as well as the application of high-speed laser operation will raise the productivity of machine parts in a revolutionary fashion. It is expected that production time can be reduced by half.

(3) Production techniques for machine parts, expected to become the mainstay of Japan's export industries in the 1980s, will undergo a phenomenal improvement, laying the foundation for a technology-intensive industry.

(4) Scarcity of skilled labor in the machinery industry will be obviated. This will contribute to the improvement in exacting work environments such as dirty or risky sites.

(5) Smaller enterprises will be in a position to select the ideal system in the field of processing, assembly and laser. Significant improvement of productivity will be realized.

The basis of this project as well as the main themes of research and development are as follows:

(1) Cutting operation: Emphasis will be laid on complex processing, modular machine structure and high degree of automation.

(2) Processing of basic materials: Intensive development of technology linked with cutting operations. Main themes are reduction of the quantity of chips through improved cutting precision as well as perfection of automation techniques.

(3) Automatic assembly: Development of assembly techniques including driving, thrusting and screwing and the development of an adaptable manipulator.

(4) Laser applications: Development of a processing CO_2 laser (20 KW) applicable to cutting, welding and surface treatment, and of a medium-output laser (Argon, 200W, YAG, 300W).

(5) Automatic diagnosis: Development of technology for automatic diagnosis of mechanical troubles, precision compensation and examination of products.

Equipment and devices which have been developed so far include a chuck withstanding high-speed rotation of the main spindle (up to 20,000 rpm) for cutting operations and a trial model of a precision multispindle (6 spindles) forging machine for making small joggled pivots for processing basic materials. Interesting experiments are under way in the automatic assembly of gear boxes and spindle belts consisting of hundreds of parts.

CSO: 4120

SCIENCE AND TECHNOLOGY

MODEL PLANT FOR HOT WATER TRANSPORT SYSTEM COMPLETED

Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 67

[Text] A model plant for the "thermo-siphon" hot water transport system, which provides a density differential in the fluid in piping to transport waste heat to a desired place, has been completed and will shortly be put to the world's first proof test. This hot-water transport system has been under development at the Agency of Industrial Science and Technology of the Ministry of International Trade and Industry in its large-scale energy saving technology research and development (their Moonlight Project) in response to the suggestions made by Nippon Kokan K.K.

The thermo-siphon is a new heat transport system which allows a fluid contained in piping to circulate without pumps by providing density differentials in the fluids in the system. The system consists of an up-pipe, a down-pipe, a vapor-water separation drum and a horizontal pipe which transports heat horizontally.

The rising force of the mixed flow (a vapor-liquid two-phase flow) consisting of a hot fluid produced by being heated at the bottom of the up-pipe and liquid bubbles produced by evaporation, is used for the overall driving force. The two-phase flow coming upwards separates the vapor in the vapor-water separation drum, causing only the hot water to come down and flow in the horizontal pipe. This hot water is used by heat exchangers in the plants and surrounding facilities, and after it cools down, is returned to the heating section. The separated vapor is also used for power generation boilers. Meanwhile, liquid of the same quantity as this vapor is newly supplied into the system to consistently allow a constant flow to circulate. If the supply of waste heat to boilers decreases, the fluid automatically stops circulating in the system. Thus, the system has the merit of not wasting any unnecessary operating expenses and labor.

The proof test plant recently installed by Nippon Kokan, uses water for the fluid acting as the heat carrier. Both the up-pipe and down-pipe are 20m long and the horizontal loop is 300m long. The pipes are 150mm in diameter except that the up-pipe is designed to be switched over to a 250mm pipe if necessary. For heating, a heat exchanger using plant waste heat is used having a steam infeed of 5-6t per min. To increase pressure, the water is heated to about 180°C.

Test items include study of bubble behaviour and the density gradient of water in the up-pipe, the relation between heat input and the distance of horizontal transport and separation of steam from water. Excessive bubble generation compared with pipe diameter, will cause a kind of choking effect, resulting in a decrease

in rising efficiency. Insufficient bubbles, on the other hand, will cause a "blow-through phenomenon," causing the difference in density between the up- and down-pipes and ultimately resulting in a decrease in transport power. Heat dissipation through the pipes and removal of steam from the steam-water separation drum will have a great effect on the entire transportation efficiency. Thus, the Institute intends to seek an appropriate balance of the whole system including the above factors.

CSO: 4120

SCIENCE AND TECHNOLOGY

NON-INDUCTIVE ELEMENT ALUMINUM ELECTROLYTIC CONDENSER DESCRIBED

Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 70

[Text] Nippon Chemical Condenser Co. has developed a non-inductive-element aluminum-electrolytic condenser with both end faces of electrode foils welded overall by a special technique. Used for power supply circuits, the condenser is intended to improve the sound quality of audio appliances.

The company has now succeeded in putting this technique into mass production and at the same time has made use of established techniques in using special materials for electrode foils, electrolytes and leads from electrodes to nearly halve ESR (equivalent series resistors) (5.2mΩ at 63V, 15,000 μF and 120Hz) compared with conventional products, together with a reduced impedance of 0.004Ω . Products are available in rated voltages: 50V and 60V, 5 capacities from 470 to 2,200 μF and two types of external terminals: leads and screw terminals.

The condenser has the following specifications.

Temperature range:	--25 to + 85°C
Leakage current:	below 0.04CV or 10mA 3 min. after application of rated voltate
Dielectric loss tangent:	below 0.15 (50V) below 0.13 (60V)
Case size:	25 x 30 x 50 (minimum) 50 x 55 x 110 (maximum)

CSO: 4120

SCIENCE AND TECHNOLOGY

SCIENCE, TECHNOLOGY AGENCY PUBLISHES 'WHITE BOOK'

Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 82

[Text] The Science and Technology Agency has released a "Technology White Book." The White Book emphasizes that in order for Japan with a lot of people living in a small country to continue to ensure an annual average real economic growth rate of 5.5% she has no choice but to rely on technological development. In other words, Japan in the 1980's should aim to become a large source of technological innovations in the world on the basis of the results of accumulated research and techniques.

The White Book develops an outlook for the 1980's listing future important technological fields, such as energy-related technology, electronics, life science, materials, traffic, universe development, marine development and hazards prevention. Here, among these, life science in particular is outlined.

Life science has the purpose of synoptically reviewing the entire life phenomena of a variety of living creatures and explaining complicated and delicate mechanisms found in life phenomena such as the self-defending and adjusting mechanisms, heredity and energy metabolism, all peculiar to life, to make use of the findings of such studies in resolving various problems in human lives.

For the application of life science, efforts are being made in the following ways. In the medical field, development of pharmaceuticals, early diagnosis of geriatric disorders, search for causes and treatment of incurable diseases (such as betzettis disease and progressive muscular atrophy). In the agricultural field, food producing technology by developing biological agricultural chemicals and plant and animal breeding. In the fields of environmental preservation, maintenance and improvement of the natural environment around man by discovering the mechanisms of material circulation in ecological systems. In industrial fields, energy saving, resources saving and the utilization of unexploited resources. And these fields are expected to develop much in future.

For information, the weight of the themes expected from technological estimation made by the Agency of Industrial Science and Technology indicates that the advance of life science is expected to bring about possibility of new technology in such fields as health and medicare, agriculture and environmental preservation.

Here, a prospect is given mainly for problems in the medical field, for which in particular useful solutions are anticipated in technological development in the 1980's.

Here, let us review causes for death in Japan. Death rates for diseases resulting from bacteria infections, such as pneumonia and enterogastritis have decreased significantly because of the advance in preventive measures, propagation of hygienic precautions, advance in treatment, particularly chemical treatment and improvement of people's living conditions such as improved nutrition. On the other hand, despite technological advances in present medical treatment cerebral vascular diseases (cerebral apoplexy), cardiac diseases (heart failures) and malignant neoplasm (cancer) account for an increasing percentage of causes of death and preventive and therapeutic measures for them are important problems in terms of people's health.

Early Diagnosis:

One of the geriatric measures is early diagnosis and treatment, which is considered to be important particularly for "cancer," because it is very effective for this disease.

Technological developments for early diagnosis and treatment have been promoted, particularly by the development of medical engineering in the fields of optical and electronic engineering including the development of a variety of examination systems for quantitatively determining biological components accurately and promptly, from samples of a trace quantity by using chemical reactions (enzyme reactions) in biological bodies, gastrofiberscopes, ultrasonic diagnosis systems and computer tomographs and these developments have permitted diagnosis of high probability.

Artificial organs:

Development and research are being promoted for methods of aiding or substituting patients' organs which have partially or totally lost their functions due to traffic accidents and organic troubles, due to such diseases as renal insufficiency by performing organic transplantation or using artificial organs.

In case of organic transplantation, histological incompatibility between the donor and the receiver or rejection symptoms by transplanted antigens is a great obstacle. Efforts are being made to overcome this difficulty by the use of immunity inhibitors and the typing of HLA (human leococyte antigens).

For artificial organs, developments are being promoted particularly for artificially substituting functions inherent in organs and also research and development are being promoted for small and durable systems. Large external dialysis systems have been used; on the other hand, animal tests for dialysis and reabsorption are being studied with small portable or inserted systems, making much effort to approach actual live organs. Also, developments are being promoted for artificial sense organs and artificial dentures.

These purposes can be achieved by development in the fields of new biological body compatible materials such as fine ceramics and compound materials and precision engineering and development of control techniques using computers, and it is hoped that artificial organs which work permanently and freely when necessary in accordance with the need of the physical body.

Pharmaceutical Manufacture Using DNA Rearrangement Manipulation:

Conventionally pharmaceuticals have been manufactured by such methods of extraction from natural products, fermentation, chemical synthesis and fixing enzymes. Now, a new manufacturing method applying DNA rearrangement manipulation is attracting much attention. Manufacturing which applies DNA rearrangement manipulation will be described below.

The techniques which produce a new DNA arrangement by severing DNA's derived from different kinds of biological entity with the aid of restricting enzymes and rearranging them are called DNA rearrangement techniques.

An example of manufacturing pharmaceuticals by using these techniques is this. A gene DNA of human insulin is planted in a plasmid DNA of a colibacillus to provide the colibacillus with ability to produce human insulin. As such colibacilli propagates, a larger quantity of human insulin will be manufactured.

The DNA rearrangement techniques are also considered to be hopeful in application in the production of interferon (a substance which is capable of controlling virus propagation) for which efforts are being continued to make production practical, including research and development for mass production using human leucocytes in the hope of its ability to resist viruses and cancer and mass produced growth hormones which are in insufficient supply despite large demands.

To ensure safety in DNA rearrangement techniques, the government has provided "guidelines for DNA rearrangement tests." Research is being promoted in compliance with these guidelines.

As observed above, research and development are being actively promoted in the medical field and it is hoped that efforts will be continued further in the 1980's to achieve the above purposes successfully.

CSO: 4120

SCIENCE AND TECHNOLOGY

SYSTEM TO PRODUCE HYDROGEN ENERGY FROM NATURAL ENERGY

Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 57

[Text] A group led by Prof Koh, Department of Metallurgical Engineering, Tokai University, has developed a unique system to convert natural energy, such as solar energy and wind power into hydrogen energy. Electricity generated by using natural energy is unput to an electrolytic cell filled with a solid electrolyte. Hydrogen generated by electrolysis of water is stored in the form of metallic hydrogen which can discharge hydrogen to be used as a fuel or a chemical material when necessary. Most current research and development efforts are toward power generation by using natural energy. One of the largest problems associated with realization of commercial power generation is to stabilize the power output at constant levels which strongly depends on natural conditions such as weather. The Agency of Science and Technology has started a research program in which wind power is converted into thermal energy instead of electric energy by combining a windmill, a heat exchanger and metallic hydrogen compounds. The newly developed system is a part of the program. The system concept shown in Fig 1 is that electricity obtained from natural energies is used as the power supply for a solid electrolyte bath and the metallic hydrogen compound absorbs the hydrogen generated by the eletrolysis of water. Conversely with fuel cells, the solid electrolytic cell electrolyses water by means of electrodes coated with special ion exchange membranes at both sides as shown in Fig. 2. Water in contact with the anode is decomposed into hydrogens ions and oxygen gas. Only hydrogen ions can pass through the ion exchange membrane and comes out as hydrogen gas at the cathode. GE and Billings Energy Co. in the U.S.A. have put equipment on the market.

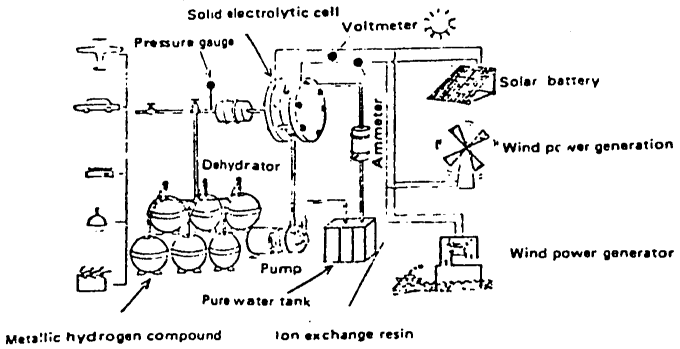


Fig. 1. Schematic Diagram for the New System

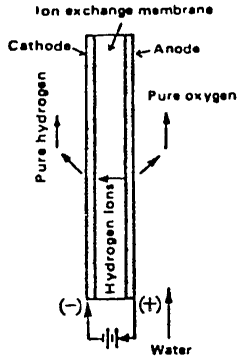


Fig. 2. Solid Electrolyte Electrolytic Cell Concept

The system uses a 750W electlytic cell made by Billings Energy and 60W solar cells made by Komatsu Denshi Kinzoku Co. and the hydrogen generated is absorbed by misch metal. Prof Koh reports that 10l/h of hydrogen was obtained by the experiments.

Though hydrogen is expected to be a prospective future energy, investigations on hydrogen manufacturing technology by thermo chemical method has encountered difficulties. Alternatively the hydrogen manufacturing approach by using solar energy has been attracting interest worldwide.

The results obtained this time indicates one of the ways to direct interests.

CSO: 4120

SCIENCE AND TECHNOLOGY

AGRICULTURE MINISTRY BIOMASS DEVELOPMENT PROGRAMS DESCRIBED

Ten-Year Study

Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 92

[Text] Ministry of Agriculture, Forestry and Fisheries Biomass Development Programs:

There are strong general trends towards starting research and development of technology for utilizing forms of biomass as reproducible resources. The Agriculture, Forestry and Fisheries, Technological Council of the Ministry of Agriculture, Forestry and Fisheries is planning to start a 10-year plan "an integrated study on the development of efficient utilization of biological resources" (a biomass conversion project) from 1981. The Council has estimated a total cost of about ¥10 billion for research and development, making a request for a budget of ¥300 million for 1981.

In government circles, primarily the Ministry of Science and Technology Agency are promoting studies for the utilization of biomass mainly as energy sources. In contrast, the Agriculture, Forestry and Fisheries Council has the following basic intentions: 1) Technical development will be promoted to utilize biomass not only for energy but also more generally for food and feed. 2) Those vegetables which conventionally have not been used as farm products will be turned into such materials for use as new biomass resources. 3) Local circulation type biomass utilization systems which are unlikely to affect local ecological systems will be developed in agricultural, fishery and forestal communities located closely to sites of biomass crops.

The Council has organized a "Biomass Utilization Technology Seminar" consisting of specialists to discuss practical details such as the selection of study themes, systems for promoting research and development, and annual programs. So far, the Council has the following basic plans:

Local utilization systems will be completed on the following five bases: assessment of biomass, introduction new resources, technology for transforming resources into materials, recycling technology and conversion technology.

First, as for the assessment of biomass, the amount of the existing biomass will be calculated and it will be made clear how biomass is utilized. Also, the amount of reproducible biomass will be estimated and it will also be made clear to what extent biomass can be utilized in circulating utilization in confined areas while conserving their environment without allowing any ill effect on their ecological systems.

As for the introduction of new resources, technology will be developed for transforming into farm products those vegetables which have high biomass productivity and which contain specific components by high percentages. Grain-amaranths, Wild-rice (Zizania) and Water hyacinth (Eichhornia crassipes) are considered to be weeds. However, they have very high productivity and contain rich protein in their leaves. Thus, they will be cultivated to make feed. New resources in forestry areas include species eucalyptus and poplar. Eucalyptus contains hydrocarbon components. When extracted out, these components make an oil-like liquid. Some types that are most suited to Japanese land land will be selected out of about the 500 kinds of eucalyptus available and studies will be promoted on techniques for their cultivation. Also for poplar, techniques will be developed for cultivating the most favorable kinds. Giant kelp growing off California of the U.S. grows very fast. Studies will be promoted to see if it can be cultivated around Japan and what effect it will have on the ecological systems when it covers up wide surfaces of coastal seas.

Preprocessing technology for converting the above new resources into food, feed and energy is the development of technology for transforming resources into materials. When utilizing wood resources, for example, in order to bring wood into cellulose saccharification and alcohol fermentation, it is necessary to remove lignin which accounts for 20-30% of wood. White colored pultrefactive fungi dissolve lignin but this process takes too long. Thus, it will be necessary to search for bacteria which accelerate the dissolution of lignin.

Recycling technology will probably be for turning drainage from fisheries processing plants back into resources. Because such drainage contains water-soluble protein, it causes environmental pollution of discharged as is. At present, this drainage is condensed and solidified by chemical treatment before being disposed. If a natural coagulant is used instead of chemical treatment, the resulting product can be used as a feed for fish. Raw materials thus pretreated will be converted into food, feed or energy sources and other useful substances will be extracted.

The above respective technologies will be combined to establish systems for circulating utilization of biomass in local communities.

Algae Cultivation

Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 92

[Text] Development of Large-Scale Biomass Cultivation:

The National Institute of Resources of the Science and Technology Agency has decided to carry out a 6-year plan from 1981 for the research and development of large-scale cultivation of small algae and sea algae, such as chlorella, as low cost energy resources. This plan aims to effectively utilize algae as a biomass resource by adopting tank cultivation to increase yields up to 5-10 times those attained by open cultivation.

In attempts to convert biomass into an energy resource, the most advanced method in the world of producing alcohol (ethanol) is by using sugar cane. In Brazil and the U.S., it has advanced to the stage of practicability. However, the efficiency with which these higher vegetables utilize solar energy in their photosynthesis is rather low 1-2%.

In contrast, it is estimated that small algae such as chlorella and Scenedesmus utilize solar energy up to some percent. Chlorella, for example, is at present used only as a health food. This inevitably requires adequate care of safety and purity, consequently raising costs and necessitating very intensive cultivation. If conversion into fuel (methane gas) is aimed at, the scale of production has to be drastically expanded. Thus, the Station intends to find small algae to fix solar energy with high efficiency and establish techniques in 6 years for low-cost and attention-free large-scale cultivation of small algae.

For sea algae, studies recently are becoming active in the U.S., and elsewhere, on the methods of obtaining methane gas by cultivating giant kelp, which grow very fast, in ocean areas. The station will promote studies so that sea algae can be produced industrially and converted into fuel on land by establishing technology for indoor cultivation using tanks instead of oceanic cultivation. For useful sea algae, such kinds as Gracilaria verrucosa gulf-weed (Sargassum bacciferum) has been picked up. Literature explains that while the yield of natural Gracilaria verrucosa is about 10-20t (dry) per ha per year, a tank cultivation system will yield 100 t likewise, which is about 5-10 times higher. The station expects the possibility not only of conversion into methane gas but also of the production of alcohol (ethanol).

CSO: 4120

SCIENCE AND TECHNOLOGY

BRIEFS

HYDRAULIC TURBINE POWER GENERATION--Mitsubishi Yuka Co. and Niigata Washington Co. have jointly developed and initiated sales of a hydraulic turbine power generation system which generates electricity by using cooling water and fluid flowing in process plants. Various waste heat recovery systems have been developed and put in practical use. However, waste pressure has been discarded except use as auxiliary motor power. The newly developed system is directed for unused energy recovery. The required investment can be recovered in about 2 years. The first system with 34kW output has already been in operation at Yokkaichi plant of Mitsubishi Yuka Co. Three other systems are under construction (20-50kW). The operation principle of the system is identical with that of hydraulic power generation. The combination of a hydraulic turbine and an induction generator converts pressure energy into electricity. About 2 atm differential pressure is sufficient to operate the system. Even if the amount of cooling water and pressure vary with the plant's operating conditions, the system automatically adjusts to supply at constant pressure and flow, the cooling water to the hydraulic turbine, so that the output may be kept constant. The cost is about ¥8 million for 28kW power output which saves about ¥4 million electricity cost a year. Thus, the investment can be recovered in 2 years. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 56]

COAL GASIFICATION--Tokyo Electric Co. which has been aiming to develop a new oil alternative energy is going to start from August "Development of coal gasification" and "High efficiency gasification combined power generation system," utilizing the coal gas produced by the former program. The company uses the most advanced gasificiation method called the "Jet Floor" method that can use all varieties of coal from all over the world and can achieve 90% calory conversion efficiency. The combined power generation system, which has a gas turbine using the coal gas and steam turbine, improves the generation efficiency up to 51% breaking through long time 40% barrier. Tokyo Electric Col has chosen the jet floor type coal gasification because (1) coal liquefaction requires enormous facility costs and 60-70% calory conversion efficiency is not satisfactory (2) investment required for coal gasification is nearly equal to that for desulfurization, denitrogenation and dedusting for direct coal burning and (3) 90% conversion efficiency of the latter method is better than the former. Operation of a pilot plant is scheduled to start in 1984. At least ¥500-600 million research and development fund will be necessary. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 56]

SAGA UNIVERSITY EXPERIMENT--Saga University, which has been conducting research and development of off-shore electric generation by temperature differences, started scaled-up more realistic experiments from last July. Since previous experiments had been done with a pilot plant using fresh water located on campus, this is the first long period continuous operation using sea water. Output of the plant is 1.9kW. According to the plan, one month's continuous operation will be necessary to collect and analize a variety of data such as power output dependence on sea water temperature variation and sea water influence on equipment, which has been unobtainable by the fresh water experiment. Following the present experiments, more practical oriented experiments will start with an increased power output of 50kW. In the U.S.A. a 1,000kW off-shore power generation experiment by temperature difference has been in progress. In Japan, a program is going on which includes provision for a 1,000kW off-shore experiment in 1982. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 56]

COAL GASIFICATION EXPERIMENT FACILITY--The Coal Technology Laboratory Foundation has recently conducted a successful 570 hour continuous and stable operation of a coal gasification experiment facility with 5 tons per day capacity at Yubari test site in Hokkaido. The work sponsored by MITI started in fiscal 1974. This is the first result of coal gasification in Japan. A pilot plant with a 40 ton per day capacity will be completed this fall for demonstration studies, followed by a practical coal gasification power generation plant with about 1,000 ton per day capacity which is expected to be completed in 1984. The research of the laboratory aims at low calory coal gas production. The power generation efficiency target is approximately 50% combined with a steam turbine which uses extra heat of the waste gas. The gasification process is as follows: First, coal is crushed into particles less than 0.6mm diameter, then lead to a fluid drying furnace to reduce moisture to less than 1%. The main gasification furnace has a 2 story structure. The upper part is the devolatile component reaction furnace and the lower part is the complete gasification furnace. The gasification process proceeds producing steam and hot air supplied from the lower part circulates the coal particles up and down. Ash is sent to a hopper. Carbon is recovered to be used for gasification and the boilers. The coarse gas produced is cleaned and cooled for further cleaning, is held and then is lead to an absorption and regenerating tower for denitrogenation and desulfurization. The gas produced is burnt in combustor to drive a gas turbine for power generation. The non coal gas at about 850°C is lead to a waste heat boiler to drive a steam turbine. Use of both turbines results in high efficiency combined power generation. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 56]

COM POWER GENERATION--The Nippon Kokan K.K. (NKK) and the Electric Power Development Co. (EPDC) jointly have established a manufacturing and sales company for coal and oil mixed (COM) fuel which has been receiving much attention as a promising means to reduce oil consumption. The company plans to construct a COM fuel production facility at the Fukuyama ironworks of NKK by 1983. The company takes advantage of combining COM technology of EPDC and a large coal yard and loading facility of NKK. The COM fuel produced will be provided to second generator of Takehara thermal power plant of EPDC in Hiroshima prefecture. Thus, the plant will change to the first domestic COM power plant. After the establishment of a new company financed by the two companies, a plant with a 100 ton per hour coal processing capacity will be constructed, be completed in about 1983. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 56]

ECONOMICAL SOLAR HEAT COLLECTOR--The Urban Engineering Center has been developing an economical household water heater using solar energy. The target retail price is about ¥20,000. Though the durable life of the equipment is designed to be 3 to 4 years, about half that of the current water heaters on the market, the less expensive price provides more substantial cost of fuel savings. A survey made of the water heater using solar energy conducted by the center shows that the new types on the market use expensive materials and ingenious mechanisms such as flat plate collectors made of copper and vacuous double glass tube collectors. Japanese consumer solar heat collectors are technically at top levels in the world with respect to heat collecting capability and insulation. The center aims to develop a new type of solar heat collector which can meet the basic target of heat collectors, that is reduction of total cost. Balance between equipment cost and the performance is stressed instead of only pursuing high performance. The temperature of the hot water is above 40°C since the main application is supposed to feed hot water for baths. To keep the retail price at the ¥20,000 level, a water pillow made of welded plastic film is used as the heat collector and storage tank. Foamed styrene plates are placed under and at each side of the water tank for insulation. An air pillow made of welded plastic film is used for upper insulation. Teflon derived film with high transparency will be used for the plastic film. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 57]

LONG OPERATING LWR'S--Improved standardization by joint public and private efforts to complete the "Japanese type light-water reactor (LWR)" will enter into its third stage next fiscal year. Requiring only a once in every 1.5-years interval, for fuel replacement and with a plant availability factor (hourly) of 85%, the need for a long-operating cycle PWR system is urgently awaited. The third improvement and standardization 5-year program is scheduled to end in 1985, with expecting completion of its conceptual design within next fiscal year. As for the BWR in particular, an increased output, some 1.3 million kW, is also being considered for adoption. At the same time, the addition of a special chemical will be sought to decontaminate the inside of reactors in an attempt to reduce greatly the chance of exposure to workers. Current reactors in Japan are ruled by law to undergo an annual regular check-up that takes around 90 days for inspection. LWR improvements and standardization starting in F.Y. 1975 will end formulating conceptual design of the second plant next fiscal year. As a result, the regular inspection period is expected to be shortened to about 70 days with an increased availability factor of up to 80% and reduced exposure of personnel down to 30-50% that for existing reactors. Moreover, the following items are being planned for further improvements and standardization: automated equipment for both PWR's and BWR's to ensure lower exposure; a built-in type reculation pump for BWR's; heavy-duty nuclear fuel capable of following BWR load fluctuation; high-temperature high-pressure loop fuel assemblies for PWR's; control rod driving mechanisms. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 58]

MIRROR-TYPE NUCLEAR FUSION--In the region of nuclear fusion research and development, the study of open system mirror types by the magnetic confinement method is now again in the limelight. The Plasma Research Center in the University of Tsukuba will construct in 3 years starting this fiscal year, a fast particle injection mirror plasma test facility, "Gamma 10," to realize towards the end of 1983, the world's highest density x confinement times value (nt) - 10^{13}. The mirror type

is a simple set-up and is easy to raise temperature as well as density. Although these features suggest practical reactor engineering advantages over the TOKAMAK type, the drawback is that both ends of the magnetic field are not closed resulting in large plasma loss which prevents the type from being adopted in the main stream of nuclear of fusion development. Nevertheless, the University of Tsukuba has physically proved and revealed its formula during a couple of years, that by utilizing the world's first multiple-mirror type test assembly, "Gamma 6," plasma confinement by ambipolar potential containment method can be improved a great number of times that previously obtained. Other than Japan and the U.S., the mirror type development is also being conducted by the U.S.S.R., which, in 1981, is to commence operation of "Umbale 1." [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 58]

URANIUM PROSPECTING DEAL--The Idemitsu Kosan Co., Ltd., one of Japan's largest national petroleum companies, has formed a business affiliation with Urangesellschaft GmbH which is the influential uranium resources development and prospecting company of West Germany. The two enterprises intend to cut into the international uranium prospecting and exploitation business, extending activities in various parts of the world with Australia as the start. Chief content of their co-operation is: 1. Urangesellschaft GmbH provides Idemitsu Kosan with uranium prospecting and development knowhow; 2. They both jointly proceed with uranium exploitation in various regions of the world; 3. Four years for the contract period. Prior to the concerted development, the two firms are respectively to establish affiliated companies in corresponding uranium development areas, and such companies will act in harmony. Among oil companies the Mitsubishi Oil Co., Ltd. is already prospecting and developing uranium resources in the United States in partnership with Getty Oil Co. of the U.S.; Idemitsu Kosan is the second runner. In the uranium development industry of Japan, some new companies such as the Overseas Uranium Resources Development Co. and the Australia Uranium Resources Development Co. have been established by electric power, non-ferrous, trading and other firms. Yet oil enterprises also are wedging their way into this field. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 58]

MIXED CONVERSION FACILITY--The Power Reactor and Nuclear Fuel Development Corporation (PNC) has started construction of a plutonium mixed conversion facility adjacent to the Tokai reprocessing plant. The plant is to extract plutonium and unused uranium in spent nuclear fuel in the form of a nitrate solution for storage. On utilizing it as reactor fuel it must be transformed into an oxide. The facility to be built will process the mixed plutonium nitrate solution and uranium into a mixed oxide powder for fast breeder reactors as well as advanced thermal reactors by means of a unique micro-wave heating direct denitration method developed by PNC. The capacity is 10kg of mixed oxide power per day. The facility will cost ¥6-7 billion and will start operation at the end of March, 1983. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 58]

ENERGY FROM SEWAGE SLUDGE--Sankyo Yuki Co. has developed a system for collecting thermal fermentation energy generated by sewage sludge with the addition of microorganisms, and has decided to construct a test plant. The system developed by the company for collecting fermentation heat from sewage sludge uses as a raw material cakes dehydrated to a water content of about 70% by a sludge dehydrator. The test

plant charges an "organic-substance fermentation tank" having a capacity of 100g with dehydrated cakes and feeds a large quantity of air including adequate microorganisms into it. The microorganisms dissolve organic substances in the dehydrated cakes, causing them to generate fermentation heat. The heat is about 80°C. Pressurizing the hot air up to 1.2 Atm by using a compressor causes the heat to rise to 170°C. This fermentation heat with elevated temperature is delivered to a heat exchanger, where the products are divided into hot water, steam and hot gas to be collected individually. The key factor in this system is the quantity of air fed into the organic-substance fermentation tank. Sankyo Yuki has applied for patents. Thermal fermentation energy is 8.51, in terms of kerosene, per t of sewage sludge or 14.6m^3 in terms of city gas. Sludge as a raw material is of course free. Energy invested in the fermentation heat collection system is electric power supplied to the compressor. This power can be produced by the system itself. Although sludge is not as high-calorie as material as coal and oil, it is likely to attract attention as a useful energy source in this age of high resource costs. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 64]

FLUIDIZED-BED BOILER TEST PLANT--The Agency of Natural Resources and Energy of the Ministry of International Trade and Industry will, within 1980, start construction of a 5,000kW output pilot plant in order to promote the land acquisition for thermal power plants using fluidized-bed boilers. Further, on the basis of the results of this trial, a 50,000kW output test plant will be put into operation in 1985, to investigate the prospects for the commercialization of fluidized-bed boilers. The boilers are intended for the utilization of coal, and in particular to achieve freedom from pollution. Also for the use of more than one type of coal. They are expected to become powerful "weapons" in the age of coal-heat power. The fluidized-bed boiler is a conversion of a fluidized furnace used in inceneration of urban waste materials, into coal combustion use. It allows coal dust (particles) and line power to be air-blown into the furnace in order to burn them in what is called a "fluidized state." The pilot plant will start operation sometime before 1982 to prove such aims as capacity size, high efficiency and freedom from pollution. Requirements for freedom from pollution are the removal of NOx, up to 60ppm and SOx, up to 90-95%. The Resources and Energy Agency points out the merits of fluidized-bed boilers are as follows: 1) They can be made compact. 2) They permit desulfurization in the furnace and because of low combustion temperature, enable NOx to be reduced. 3) They permit the use of low-calorie coal, thus are not limited to the kind of coal. 4) They permit the inclusion of asphalt and used tires in their fuel, and 5) They contribute to reducing investments in pollution control. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 67]

PRECISION MACHINING SYSTEM--The Japan Society for Promoting the Machine Industry has developed and begun practical tests of a precision machining system for multi-kind small-lot production, at Toshiba Tangaloy's Kawasaki premises. The machining system is intended for a cutter body and cramped bit holder machining with higher accuracy and productivity and productivity and composed sets of 6 sets of NC machine tools which are controlled as a group. Toshiba Tangaloy's tests the various functions and estimates the usefulness in multi-kind small-lot production by the system. The features of the system as follows: (1) 4,000 workpieces were fully automatically machined within IT7 accuracy; (2) each machine has a higher

rate of operation by automatic, loading and unloading equipment of workpieces and storage of 10 workpieces; (3) each machine has trouble diagnostic functions and machining condition monitoring equipment; (4) the horizontal machining center can machine complex workpieces with simultaneously controlled spindle rotation angle and has improved machining accuracy with applied spindle extension correction; (5) set up changes are speedily and easily performed with high accuracy for various workpiece by newly developed general purpose fixtures; (6) the internal diameter of the cutter body is measured with improved system. Using the production system, reduction of required machine tools, floor area and personnel expenses, an improved yield rate, easy and reliable production control, and shortening machining processes and delivery are realized. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 66]

NEW MACHINE TOOL PLANT--In 1978, the company having the largest output in the Japanese machine tool industry was the Toshiba Machine Co. Yamazaki Machinery Works was third behind the second, Okuma Machinery Works. In 1979, Yamazaki had the largest production. Furthermore the company is now receiving a sharply increased number of orders for NC lathes and machining centers. Under these circumstances, the company has decided to erect a new building (330,000m^2). The company now is producing 150 NC lathes and 80 machining centers a month, but in this fall production will be increased to 170 NC lathes and 100 machining centers. The company has a plan to invest ¥5 billion yearly from now and the new building is a past of this plan. In the new building, the Yamazaki Machining System, which is one of the strategical products of the company, will be manufactured using a mass production system. Furthermore, the company has another building plan, an unmanned plant, in its Oguchi premises. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 66]

DEMANDS FOR MACHINE TOOLS--Demands for Japanese machine tools are steadily increasing and the position remains favorable. According to the Japan Machine Tools Builders Association, the total of orders received by 7 leading companies including Fujitsu Fanuc, in July 1980 reached ¥22,615 million, including exports: 5.6% less than the previous month but 54.5% over than the same month in the previous year. A business recession tendency is shown based on the mining and manufacturing business index which lowered the previous point during during May and June, but in contrast to machine tools, the orders received continued favorably at a high level due to strong civil equipment investment for production rationalization and labor saving. In this month domestic orders received totals ¥15,890 million: 45% over than the same month last year and the exports are 6,725 million yen: 1.1% less than the previous month but 82.8 over than the same month in the previous year. Four companies, Toshiba Machine Co., Hitachi Seiki Co., Makino Milling Machine Co. and Fujitsu Fanuc have received over ¥1,000 in orders from foreign countries. [Text] [Tokyo TECHNOCRAT in English Vol 12, No 10, Oct 80 p 66]

LARGE MACHINE TOOL PRODUCTION--Shin Nippon Koki Co. has decided on a big equipment investment plan for increased production of large sized machine tools. The company is specialized in production of large machine tools and has received orders from domestic and foreign customers including aircraft makers in the U.S. Recently the company has succeeded in receiving orders for 20 sets (about ¥10 million) machine tools (profilers, maching centers etc.) from leading aircraft makers:

Rockheed, Gramann and Northwrop Co. Under such a favorable position, the company has decided to increase its production capacity, in November 1980, and the firm will install a large planomiller (domestic, ¥1 billion) to increase its machining capacity for large machine parts. At the next stage, in 1981, a new assembly plant and a temperature controlled room are to be built at their Shinodyama site. The assembling plant has 30m width, 130m length and 20m height and is used for machine tools to machine large parts of aircraft and nuclear plant. The temperature controlled room is used for production increase of three dimensional measuring machines for automobile makers and metal die production for precision can manufacturing machines. The total amount of these investments are about ¥2,700 million. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 66]

ENERGY SAVING ELECTRO-DISCHARGE MACHINE--JAPAX has developed an energy saving electric discharge machine with nano pulse electric sources which have less energy losses. Conventional capacitors and switches with low efficiency are eliminated from the new machine and the most suitable machining energy is accurately controlled automatically by fully solid state circuits and its electric power consumption is reduced to half that of a conventional machine. According to the company's calculation, the new machine has higher energy efficiency than lathes, press machines and grinding machines due to its doubled efficiency in total energy. The machining accuracy is also improved down to half that of a conventional machines by the nano pulse circuit which can control an ultra short time (10^{-9} sec) of the sharp pulse. A 3-5μm machining accuracy is realized with the machine in contrast to 5-7μm accuracy under the best conditions with conventional machines. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 66]

EXPANDED CAR BATTERY--Japan Storage Battery Co., Ltd. has adopted a high-speed rotary expand system as a method for manufacturing battery plates and at the same time, has developed a high-performance maintenance-free auto-battery equipped with a light emitting diode sensor for use in cars. Maintenance-free batteries currently in production include low-antimony types which contain less antimony in their plates, and calcium types which use a lead-calcium compound instead of antimony. The calcium type shows better performance, involving less liquid loss and less self-discharge. The calcium type shows better performance, involving less liquid loss and less self-discharge. The calcium type battery has become predominent in the U.S. after it was developed under "an expanded system" by GM in the U.S. last year. In contrast to GM, Japan Storage Battery Co. has developed and is marketing a calcium-type maintenance-free battery plate by applying a rotary system. The new battery has an output twice that of GM's and has been made with approximately a 10% reduction in size and weight. It exceeds low-antimony types currently in use in Japan by about 20 times in output and by about 30% in life. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 68]

FUEL-EFFICIENT AUTOMATIC TRANSMISSION--Toyota Motor Co. has announced that it has developed an automatic 4-speed gear change fitted with a lock-in clutch, and will start its full production by commissioning manufacture to Aishin-Warner. Conventional automatic 4-speed gear changes transmit power from the engine to the wheels by using a hydraulic fluid medium but this method involves power losses in the fluid. The use of the lock-in clutch effectively eliminates such power losses because the power of the engine is mechanically transmitted to the wheels during

medium- and high-speed running. This achieves as much as about a 10% increase in fuel consumption efficiency. Such an increase in fuel efficiency as large as this, achieved simply by a new gear change mechanism is quite something. The automatic gear change fitted with a lock-in clutch developed by the company uses an automatic hydraulic control mechanism to gauge engine and driving speed. When the driving speed exceeds 55kph, the clutch is automatically engaged to mechanically transmit engine power directly to the wheels. When the driving speed falls below 50kph, the clutch is disengaged to resume normal fluid transmission. Until now, the use of a lock-in clutch involved a demerit of making the entire gear change bulky. Toyota has made the unit sufficiently compact to be mounted in existing models by developing a flat torque converter. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 68]

TRANSPORTATION FIRMS IMPROVE FACILITIES--The Ministry of Transport has summarized the results of a survey of 1980 plans for investments in facilities of 18 sections of the transportation industry and companies related to it. The report shows that the investments in facilities this year will amount on a constriction basis, to ¥1,499.7 billion, being a 12% increase over the previous year and showing a steady growth continuously for the 3 years from 1978. In terms of area in the industry, the overseas maritime companies will invest ¥159.51 billion, with a 19.4% increase over the previous year, in shipbuilding and ¥21.19 billion, with a 13.5% increase in repairs and alterations to ships. Thus, the overseas maritime companies will invest ¥313.3 billion in total (with an 18.5% increase over the previous year), which accounts for 20.9% of all investments concerned. This shows a rather large increase which is partly because the industry plans to resume building tankers, container vessels and specially designed bulk carriers for ore and automobiles, which have been withheld because of the business depression. A second large amount investment is planned by the aircraft industry. It amounts to ¥321.7 billion (with a 40.4% increase over the previous year), which accounts for 21.5% of all. This large increase is because the industry plans to purchase large-size aircraft for international lines and ordinary aircraft for domestic lines. Following these areas, harbor transportation, the aeronautic facilities and automobile terminal companies are also planning to make widely increased investments in facilities. The procurements by these investments show a wide contrast against the previous year of decreased ratios of internal funds and increased ratios of external funds. This is because such areas as shipbuilding have not had sufficient funds to make large investments in facilities which would require external procurements. The highway construction industry and the harbor construction industry show large ratios of internal funds (86.8% and 62.8% respectively.) [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 68]

FLYWHEEL-TYPE ELECTRIC POWER ACCUMULATOR--Mitsubishi Electric Corporation, who have been continuing development of a "flywheel type electric power accumulator" helpful in power saving for electric railway services, have recently completed a test model. At present in Japan, thyristor chopper trains (see TECHNOCRAT September, 1980) using semiconductor switches for power saving are being adopted widely. The train is designed to brake by operating the drive motors as generators and to use regenerated power for starting and acceleration of other trains by returning it to the overhead wires. However, if there is no trains in the vicinity which can consume the regenerated power, regenerative braking serves no purpose and

conventional pneumatic braking is the only avoidable means, resulting in wasting power which would otherwise be available for regeneration purposes. The new system can be installed in substations of electric railways. When nearby train traffic is light, the system receives regenerated power in place of trains and temporarily stores it after converting it into mechanical rotational energy. When there is a train starting or accelerating nearby, it returns the stored mechanical energy back into electric power for use. This system is expected to save power by as much as 10% on the average. The test model is 3.4m high and 2.8m in diameter. In order to eliminate the effect of air resistance, the flywheel rotates in a vacuum. Also, 95% of the weight: 14.6t of the flywheel is floated magnetically to reduce bearing resistance. The new system is able to accumulate about a 15kWH of energy, which is equivalent to that sufficient to start or accelerate a 4-coach train. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 69]

MARINE-USE ABSORPTION CHILLER--Nippon Kokan K.K. has built an ore freighter equipped with an absorption chiller, as a type of energy saving vessel. The absorption chiller forms the main system for vessel space cooling by making use of heat of exhaust gases from the main diesel engines. It consumes 40% less energy than the turbo refrigerating units using compressors. It requires no generators to operate compressors. Text results have shown that if the machine operates annually 150 days, the absorption refrigerating unit save ¥2.2 million of heavy oil per year. The application of the absorption refrigeration in vessels is the first attempt, although it is becoming predominent for space cooling in buildings. The new attempt involved the problem of how to cope with the rolling of vessels on the sea. This has been resolved by the additional use of techniques for directly cooling air with the cooling medium of the refrigerating unit. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 69]

LSI-FOR SPEECH SYNTHESIZING SYSTEM--Mitsubishi Electric Corp. has developed three types of "LSI's for speech synthesizing systems" and two types of speech synthesizing system has the following features: (1) The basic system consists of the following three types of LSI: speech synthesizing LSI "M58819P"; mask ROM with a memory capacity of 128k bits "M58818-XXXP"; and LSI for controllers; and uses the PARCOR system developed by the Mushashino Laboratory of NTT for its speech synthesis system; (2) It is able to synthesize male and female voices; (3) Bit rates can be selected at two steps. A single mask ROM with 128k bit memory capacity is able to give a voice for about 100 sec. at the lower bit rate and for about 50 sec at the higher bit rate; (4) It is able to use 128k bit mask ROM's up to 16 units and this maximum use will hold speech for 26 min.; (5) LSI "M58819S" for EPROM interfaces is available; (6) General-purpose 4-bit or 8-bit microcomputers can be used for LSI for controllers; (7) It is equipped with D-A converter and a speaker direct-driving circuit; (8) It uses a P channel process, making itself available at a low price. The speech synthesis output substrate uses an LSI for speech synthesizing systems incorporated as a substrate. "PCA7001" is equipped with a speech synthesis LSI "M588179" and a mask ROM "M58818-XXXP." "PCA7002" is equipped with 4EPROMs and an LSI "M58819S" for interfaces for connecting "M58817P" and EPROM's. The LSI "M58817P" for speech synthesis is priced at ¥1,400, the 128k bit mask ROM "M58818-XXXP" at ¥1,600, the LSI "M58819S" for EPROM interfacing at ¥4,000, the speech synthesis output substrate PCA 7001 at ¥8,000 and the PCA 7002 at ¥42,000. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 70]

MATRIX TYPE PROBE CARD--Japan Electronic Materials Co. has developed a matrix type probe card which is able to measure LSI's with more than 100 bonding points arranged in a matrix pattern. The probe card manufactured experimentally by the company is intended to measure 3.7mm IC's with 170 bonding points, 125μm in diameter, arranged in a matrix pattern at intervals of 250μm. For measuring IC's with a number of electrodes arranged in the center of waters, conventional probe cards are not available because probe pins contact each other. The company has resolved this difficulty by compacting 7 conventional probe cards. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 70]

SINGLE BGO CRYSTAL--In cooperation with the Central Laboratory of Hitachi Ltd., Hitachi Chemical Co. has developed a high-performance, practical-size single BGO crystal suited as a scientillator for radiological diagnosis systems, such as X-ray CT's, single-photon CT's and positron CT's. Hitachi Chemical has been eagerly developing single BGO crystals by a spinning vertical-life method in cooperation with Hitachi's Central Laboratory. Now it has successfully developed a high-efficiency, large-size (58mm in diameter and 180mm in length) single BGO crystal, making use of the following manufacturing knowhow: (1) increase of purity of raw materials; (2) the warning structure of the crucible system well-designed in respect of thermal balance and appropriate speed and revolving rates for lifting crystals, and (3) technology for high-accuracy and stable automatic diameter control. The new BGO crystal has a light emission efficiency about 20% higher than conventional types and has an energy resolving power of 14% for 68 Ga(511keV) γ-rays. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 70]

AMORPHOUS-SILICON SOLAR CELL--Fuji Electric Co., Ltd. has commercialized an amorphous-silicon solar cell for private use, intending to start marketing it for use with desk calculators. This amorphous-silicon solar cell is made by depositing a thin semiconductor layer of 1um or less, on a stainless steel or glass substrate by using a dissolved gas. It is expected to find wide application because it is able to provide the following excellent features not shared by conventional single crystal silicon cells: (1) it enables a series channel to be formed on a single substrate; (2) it can be shaped quite freely; and (3) it shows high photoelectric conversion efficiency even at low levels of room illumination. The amorphous silicon solar cell shortly to be marketed is available in two models: 44.5cm^2 (pocket-book size) and 15cm^2 (handy size) in cell size. The output is 3V 90μW for the pocket-book size and 3V, 30μW for the handy size (both at 200 lux). Prices initially will be ¥700-800 per desk calculator which is a little higher than that of conventional silver oxide cells. However prices are expected to become lower by increased production. In addition, it will possibly find further applications with clocks, watches, alarms and VTR's. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 71]

OPTICAL MAGNETIC-DISK MEMORY--Kokusai Denshin Denwa Co., Ltd. (KDD) has developed an optical magnetic disk using an alloy of gadolinium, terbium and iron as a material together with a memory. Characteristically, this optical magnetic disk is able to record data with a density of about 10 times as high as present magnetic disks commercially available. Conventional optical magnetic disks use an alloy of manganese and bismuth or an alloy of gadolinium and cobalt as a base material. This results in the drawback of requiring large optical energy at the level of

some 10mW to some 100mW in recording data and further the difficulty of manufacturing large disks of overall uniform quality. In contrast, KDD's optical magnetic disk using a filmy alloy of gadolinium, terbium and iron is able to record data at the high density of 5 million bits per cm^2 (about one-tenth of which is usual with commercially available magnetic disks, and 3 million bits per cm^2 has been considered to be the limit). Also, it is able to record with optical energy at a level of some mW. It has the following features: low noise in reading data and large optical reproduction output; and the possibility of manufacturing large uniform disks. The memory writes data on the disk using optical heat from a semi-conductor laser of aluminum, garium and arsenic and reads data using an interaction between magnetism and light. In reading out data, it reads reflected light with an optical detector using "linearly polarized light" in which the rotational direction of the light reflected will be reversed depending on the direction of magnetism of the part illuminated. Higher density with which data is recorded requires higher mechanical accuracy in reading out data and makes the system more complicated. The memory developed by KDD is equipped with a system which automatically focuses light on the disk and a system which automatically follows the recorded part of the data irrespective of vibration due to disk rotation, to enable data to be written in and read out using a relatively simple mechanism. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 71]

DIPS BASED OS COMPLETED--NTT has for 3 years been studying effective operation of an OS (operation system) used in data communications systems based on DIPS. Combining the OS for TSS (DEMOS-E: technological computation services) with the OS for RTS (DRESS: marketing inventory control services), it has now completed a DIPS based OS. This unification of OS's intended to rationalize investments in research and development of OS's, which have been soaring to meet expanding systems, and enable DIPS computers to be connected to computers of Fujutsu and Japan UNIVAC. Thus, it has largely built up functions at the beginning of the age of extensive data communications services. NTT expects that the above achievement will eliminate duplicate investments in development when expanding OS's for TSS and RTS and to establish systems to provide users with a variety of services. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 72]

MULTI-COMPONENT OPTICAL GLASS FIBER--Showa Electric Wire and Cable Co. has announced that it has developed technology for continuously spinning a multi-component optical glass fiber and has established a mass-production system using a new process providing reduced costs. The main conventional process for manufacturing mulfi-component glass fibers is a batch system, known as a double-crucible system. The new process developed by the company is able to spin continuously for days by supplying and replacing glass rods. It has stably produced long fibers having excellent characteristics as transmission loss fibers by using a variety of automatic control systems. Thus, it has widely reduced manufacturing costs for optical fibers. The newly developed fiber is a step index type with a band width of 20MHz-km and is available for ITV transmission over several km. [Excerpt] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 72]

FUTURE COMMUNICATIONS CITY PROJECT--The Ministry of Posts and Telecommunications has decided for 1985 to establish an "advanced integral information communications system" using the latest telecommunications facilities such as optical communications systems and wired television networks connected to computers, in the Science City of Tsukuba (in Ibaragi Prefecture). This project will be started as one of the new important policies for which budgets will be requested for 1981 for a 5-year plan beginning in 1981 with an investment of ¥10 billion. Under this plan, optical fibers will be installed in Tsukuba University, laboratory facilities, administrative facilities and residences to render a variety of services so that the academic city will exert its urban functions and to be of service as an information system for the international technological fair to be held in 1985. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 72]

FOURTH NTT LABORATORY--NTT has decided to establish a "4th Electrical Communications Laboratory" for the study of VLSI in particular and will start construction this fall. The laboratory will be located in Atsugi in Kanagawa Prefecture, and will be completed in 1982. After it is completed, the Semiconductor Section of the NTT's Musashino Electrical Communications Laboratory will be moved to this new laboratory to establish a special-purpose huge-scale VLSI research system unprecedented in the world. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 72]

UV COMBINATION ELECTRON TUNER--Matsushita Electronic Components Co. has developed a world's thinnest (16mm) high-performance U.V. combination electron tuner. In this development, the company has succeeded in integrating three-dimensional UHF circuitry compactly on a substrate, which was considered difficult. By the application of accuracy incorporation technology, the new tuner also incorporates about 60% of component parts such as resistors, condensors and switching diodes in chips on the substrate. This has effectively reduced the conventional thickness: 23-25mm to 16mm and weight: 160g to 110g, both about a 30% reduction. In respect of performance, Ga-As FET to be driven with 124 is used in the IF output filter circuit and the UHF unit to achieve an approximately 30% reduction in NF. Also, 12V driving will reduce power consumption by 20%. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 72]

POWER-SAVING SCREEN--Mitsubishi Rayon has developed a new screen for displaying pictures by using optical resin fibers. The screen is a plate 90cm long and 120cm wide and is provided over the surface with optical fiber ends arranged at a 1cm intervals. The other ends of the optical fibers are collected and face a light source or a picture. This causes light to pass through the fibers and be emitted from the individual fiber ends, and thus, a colored picture or a group of characters will appear on the screen. This screen is largely power-saving, to approximately 1/10 of power consumption of conventional electric news boards provided with a number of bulbs. Thus, it is expected to find wide use in advertizing boards and large-frame projection. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 72]

SYSTEM FOR INTERNATIONAL TELEX--KDD has decided to start by the end of 1981, a "deposit transmission service" and a "multi-address transmission service" for international telex. The former stores telegrams in exchangers and transmits them at designated times after calling at designated addressses. The latter

transmits the same telegram simultaneously to a number of addresses. Both are new services making use of store and forward exchange functions. Plans have already been promoted in the field of international communications to apply store and forward exchange services to data communications and facsimile communications. The new plan is to extend application to telex communications. There are some possibilities that the telex communications services might be started earlier than other international communication services. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 72]

INFORMATION COMMUNICATION SYSTEM--The Ministry of Posts and Telecommunications has disclosed an outline of its 5 year program for "Development tests for a highly comprehensive information communication system" scheduled to be held in Tsukuba Science City in Ibaraki Prefecture for 1981-85. This is an information communication system in which the Ministry, jointly with related ministries and agencies, will connect a wire network and computers in Tsukuba Science City using most advanced telecommunications technology. It is designed to supply a variety of services eligible for a science city such as TV retransmission and information on daily life, research and education. The development is expected to last for 5 years and in the first year of 1981 research, system design and hardware and software development will be the main themes. The Ministry lists the expected results to be obtained from the system as follows: (1) enhancement of the conveniences of daily life by obtaining easily various kinds of daily information, raising educational functions by promoting of open lectures to the general public, mutual exchange of research information, growth of research quality by common use of research results and enhancement of city functions by concentrated management; (2) high probability to realize a high-level utilization of large scale television broadcast network now installed nationwide and presentation of a wire city plan corresponding to the future information orientated society. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 73]

NEW PROGRAM LANGUAGE DF-COBOL--Mitsui Engineering & Shipbuilding Co. has developed and started marketing a high-level language "DF-COBOL," which enables the coding level to be reduced considerably as compared with the available computer language COBOL. COBOL, a programming language for processing office routines, uses a descriptive style near to plain English and is both readily available and widely used around the world. Based on this common use of COBOL, Mitsui have applied the idea of "data flow," which describes the specificiations of a system, particularly a flow of data, and has successfully developed DF-COBOL. The new language contributes largely to increasing productivity in various jobs including designing, development and maintenance of data processing, as it not only enables coding requirements and the number of man-hours for development to be reduced to less than a 1/4 and a 1/3 respectively, against the use of COBOL, but also requires only 1-4 cycles of processing from compiling to debugging. The main features of the new language are as follows: 1) it is easy to learn; 2) Because a description of the data flow makes up a program, specifications for data processing are directly connected to programs; 3) Because it is completely made up into modules, it is possible to deal with complicated processing by combining simple modules; 4) Because users are free to incorporate partial processing in COBOL, it also has general-purpose nature. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 74]

MITI ABOUT TO DEVELOP COMPLEX SOFTWARE--MITI intends to establish next year a "software technology center" in the Information Processing Promotion Association (IPA), in order to start research and development of complex software technology essential to further promoting computerization here in Japan, including CADS (computer aided designing systems) and DBMS (data base management systems). The research and development staff in IPA will take the form of a project team consisting of a number of guest personnel, experts from the software and hardware industries, users, industrial and academic circles and government organizations. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 74]

COMPUTERS SALES ABROAD--Hitachi has decided to ship computers under its own brand to the U.S. The company has already supplied OEM to NASCO, a subsidiary of National Semiconductors. For exportation to the U.S., the company has decided on a two-way tactic of Hitachi's brand or OEM. In worldwide exportation strategy, Fujitsu has taken the lead. But recently, Hitachi is rapidly promoting successive developments toward Olivetti in Italy, BASF in West Germany and now the U.S. with its own brand. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 74]

MITI PROJECT--As a project to follow the present term for "development of software production technology" which will end in 1981, MITI has decided to start development of tools and systems for software maintenance. Its term will probably last 5 years from 1982. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 74]

MAGNETIC DISK DRIVE--Hitachi has developed a large-capacity magnetic disk system, H-8598, to compete with the IBM 3380. It has the large capacity of 2.52 billion bytes/unit, about 4 times the memory capacity of the company's earlier H-8595. It has a data transmission speed of 3 million bytes/sec and has a mean positioning time of 16ns. In respect of space, it requires much less, only about 1/3 of usual requirements. Also it consumes less power and generates less heat. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 74]

SILICON CARBIDE BINDING TECHNOLOGY--Prof Suzuki and his group of the Research Laboratory for Nuclear Reactor in Tokyo Institute of Technology have developed binding technology for sintered silicon carbide which is being watched keenly as being a future new fine ceramics material. The use of fine ceramics is expected in the field of aircraft, engines for motor vehicles, nuclear fusion furnaces, high temperature gas furnaces, ocean exploitation instruments and super precision machine tools, because fine ceramics have excellent properties in heat resistance, corrosion resistance, strength and weight, compared with metals and organic materials. Silicon nitride, aluminium nitride, and silicon carbide especially are, expected as ceramics having high heat resistance and also high strength. The most hopeful ceramics among them are silicon mitride and silicon carbide. However, sizes and shapes are limited because of difficulty in sintering the powdered materials. It is necessary to develop new technology for binding such materials with each other as in welded metals. The binding method developed is shown in the following figure. A binder is inserted between two sintered bodies of silicon carbide, which are placed in dies of graphite and then hot pressed in an argon atmosphere. The composition of the binder is the most important point in this technology. Powders of boron, carbon and aluminum are added, one percent by weight, respectively, to high purity B-silocon carbide, of below 1μ granular size

as a binder. The silicon carbide is changed by the hot pressing. The silicon carbide used was 10mm square and 15mm length. The binder (50mg) was sandwiched between two pieces and was kept for 30 min. at 1,650°C temperature and 100atm pressure. The flexing strength of the binder thus obtained had 40kg/mm^2 at room temperature and 35kg/mm^2 at 1,500°C. A hot isostatic press (HIP) besides the hot press is expected to be used for this purpose in future. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 79]

FIBER REINFORCED CERAMICS--The National Laboratory for Industry in Osaka which has been conducting research of fiber reinforced ceramics is to start a new program for improvement of reinforcement effects. As results gained from preceding research in which FRC was made by winding fiber onto sintered ceramics, was not as satisfactory as it had been expected, they intend to introduce a filament winding method used in fiber reinforced plastics for manufacturing FRC. They aim to make FRC of toughness several hundred times higher than usual ceramics. In the laboratory's new manufacturing method, continuous fiber of silicon carbide or metalic tantalum is wound on to the mold, then a slurry of silicon nitride is applied. After winding several times and applying the nitride, it is baked under high pressure into a high density sintered composite material. It is expected that highly reinforced ceramics of complicated shape can be manufactured by this method. It is considered that ceramics will be widely used as heat-resistant materials in the field of energy-saving due to their high elastic modulus and strength under high temperature. However, as it is not able to surmount the defects against mechanical and thermal impact, its uses as mechanical parts still remain within extremely limited fields in industry. Laboratory started its development of FRC in order to remove the defects of ceramics. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 84]

ELECTRICITY FROM GARBAGE INCINERATION--For the purpose of encouraging the use of town garbage incinerating electricity generating systems, the Ministry of Health and Welfare has decided to make existing incinerators eligible for government subsidies when converted to generating electricity. Up to now the subsidies applied only to newly established incinerators. The Ministry will request a budget for the purpose for fiscal 1981. Data of the Ministry of Health and Welfare show that there are some 200 to 300 town garbage incinerators across the country, which have a garbage disposing capacity of 100t or more per day, and which will be required to install electrical generating systems utilizing remaining heat. Introduction of the electricity generating systems to these incinerators has significance from the standpoint of effective utilization of energy. Mostly, the electric power produced by such generation is not only consumed as power for operating incinerators but also the surplus in some cases is sold to local power companies. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 86]

INSULATION FROM SLUDGE--Professor Kanai, et al, of the Production Engineering Faculty of Nippon University have succeeded in the production of heat insulating materials having heat retaining property similar to that of glass fibers by utilizing surplus sludge produced from sewage disposal plants. The spread of sewerage facilities in Japan still covers only about one-third of the total population--lagging far behind Europe and the USA. However, how to dispose of massive volumes of surplus sludge produced from sewage disposal plants is a brain-boggling problem. This research concerns the use of such surplus sludge as

resources. The system is to mix in a given ratio the first settling sludge and surplus sludge accumulated in a settling pond of a sewage treatment plant, introduce them into an electrolyzer having a copper plate at the cathode and an aluminum plate at the anode, add calcium fluoride, sodium carbonate and calcium chloride, and electrolyze the sludge with direct current. Then, organic matters including chiefly microorganisms in sludge begin to change into a fibrous material like cholagen, and if metals such as heavy metals are included in the sludge, they become metal fluorides and cling to the fibrous material thus produced. Further, they react to cover the fibrous material with calcium carbonate. The sludge in a fibrous state is filter pressed and formed into a given shape and dried so as to obtain porous heat insulating materials. The heat retaining properties of the product have not yet been fully measured. It is however, said that chipped sludge consisting of a bundle of fibers has the same heat retaining property as glasswool. The professor has pointed it out that although it has a defect in that when dampened, the material swells and loses strength, coating the surface solves the problem. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 86]

FOAMS FROM INDUSTRIAL WASTES--The Institute for Industrial Guidance of Aichi Prefecture has developed a new technique for manufacturing a foamed glass-like material from blast furnace granulation and waste glass both of which are inorganic industrial wastes. The manufacture of this foamed material is to mix blast furnace granulation of 44 μm or less grading and waste glass of 74 μm or less, into three kinds of mixtures in given ratios, and to add 5 to 8% PVA (polyvinyl alcohol) and to press and heat-treat the materials for 10 minutes in an electric furnace. This manufacturing method is characterized in that it does not use any foaming agent. The foamed materials thus obtained have the small bulk specific gravity of 0:38 to 1, a thermal conductivity of 0.1 to 0.2 kcal/m.h.^{o}C. It is expected that the material will be used as an insulating light aggregate. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 86]

OCEANIC POWER GENERATION--The Agency of Industrial Science and Technology of MITI will start developing a new oceanic differential-power generation system using thermoelectric elements. Thermoelectric power generation makes use of the Seebeck effect, in that cooling one of two different metals or semiconductors in a unit made by bonding the two elements together, while at the same time heating the other metal, causes an electromotive force to be generated. Although thermoelectric elements originally have generated small amounts of electromotive force, recent advances in semiconductor technology have allowed them to generate much larger amounts of electromotive force. The Institute has invited experts from the Electrical Laboratory and private industries to develop a thermoelectric element of a world's highest level of 1kW output. In order to use such thermoelectric elements in oceanic differential-temperature power generation, a system is devised which contains a module made by connecting thermoelectric elements in series and allows warm water taken from the ocean's surface and cold water taken from deeper down to flow on each side of the module. Slightly over 1% of thermoelectric conversion efficiency has been attained. The Institute explains that a thermoelectric conversion efficiency of 2-3% promises practical use. In F.Y. 1979 the Agency reviewed use or a turbine system, another type of oceanic differential-temperature power generation, to find out that the system involved more difficulties than expected, such as that (1) the use of ammonia as a medium for operating turbines would involve oceanic pollution in the event of a fracture in the

equipment and (2) the use of freon would raise costs. The Agency intends to continue development of both systems: turbine-type and thermoelectric-type for the time being and choose between them at the end of 1981. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 88]

BIOMASS ENERGY COLLECTION PLANT--There is an increasing tendency toward developing biomass utilized energy in place of oil in the age of worldwide instability of energy supplies. Also in Japan, there is a high probability that the country's first large-scale biomass energy collection plant will be constructed in Izumi in Kagoshima Pref. In its research of a system to collect gaseous methane from sea weed by constructing "sea bottom farms" for cultivating sea bottom sea weed, the Japan Ocean Industries Association noticed laver (or sea lettuce) thickly growing in the coastal seas of the above site and has started a study including a submarine survey. The surveys thus far have conformed the possibility of collecting annually about 4,000t of methane from 200,000t of laver. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 88]

MARINE-URANIUM COLLECTOR--According to sources concerned, it seems that a test plant for a marine-uranium collection system developed by Kyoto University will be installed in the Second Himeji Thermal Plant of the Kansai Electric Power Co. In order to start large-scale tests of the system, Kyoto University has asked Kansai Electric Power Co. to offer a test site and the company had agreed with the University in cooperation. The uranium collection system is designed to collect uranium from sea water by using hexacarboxylic acid as an adsorbent. It has features of requiring lower manufacturing cost and higher adsorption efficiency than conventional systems using hydrous titanium oxide as an adsorbent. At present Kyoto University is studying materials for supporting the adsorbent such as fibers and films, while making detailed preparations to prevent accidents such as environmental pollution. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 88]

ULTRASONIC SUBMARINE DIRECTION FINDING--"Research and development of a submarine oil production system" intended to collect oil from sea bottoms 300m deep is being promoted as a large project by MITI. The Mechanical Engineering Laboratory of the Agency of Industrial Science and Technology has devised a new method of measuring locations of submarine bases, as part of technology for approaching submarine bases, and has succeeded in preliminary tests. The submarine oil production system is a new system, different from current stationary platform systems, and installs the facilities necessary for oil production, such as drilling plant and storage tanks on the sea bottom at about 300-350m deep. Although the facilities will be unmanned for operation, they periodically have to be visited by service capsules containing engineers and materials for maintenance and inspection. For this purpose, techniques are required for locating the submarine bases to be visited. For such purposes, the Mechanical Engineering Laboratory is promoting the development of a technique which makes use of ultrasonic waves. This system provides a sound source in the oceanic base. The sound source emits ultrasonic waves, which will be received by a receiver and displayed on a screen to enable the service capsule to locate its destination. This system is able to locate destinations clearly, making navigation easy. The only drawback to this system is its narrow searching range. Because the system is designed to display the sound source on a screen, the range of the receiver is as narrow as about 20°. This could very

likely lead to missing the target. In order to resolve this difficulty, the Machinery Laboratory has devised a rough direction finding system designed to search for the sound source over a wider range in advance and has been promoting its development. This system uses a pair of receiving elements and FM ultrasonic waves of 100kHz as the sound source. Receiving the FM ultrasonic waves by the two receiving elements, the system compares the phases of modulated waves received by them to find the direction of the sound source from the "lag" between them. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 88]

ELECTRICITY FROM WAVE FORCE--Takenaka Komu-ten Co. have announced that they have completed their basic research for an electricity generating system using wave-force, which is an energy source many are hoping to make use of as a substitute for petroleum products, and they inform that they are going to put the system to practical use. This is a stationary system by which a wave energy absorbing device is placed on a seashore breakwater to convert the energy of waves into air pressure which drives an air turbine to generate electricity. The company expects that a possible capacity is possible equal to a small or medium sized water-power generator. They feel it will create a large demand as a local source of energy for isolated islands or local self-governing bodies. The system consists of a wave force absorbing device sited on a breakwater, main and branch pipes for air, a constant-pressure tank, with variable capacity, an air turbine driven generator, a high pressure air reserve tank, an air compressor, etc. The mechanism for generating electricity is as follows: The passage of waves through the wave force absorbing device creates pressure in an air chamber of the device, and air pressure greater than a given level opens a valve and causes air to automatically flow into the branch pipes. The air is stored in the constant-pressure tank at a given pressure and rotates the air turbine to generate electricity. When more than required electric power is generated, the air compressor works to store air at high-pressure in the high-pressure tank for later use so that electric power can be produced in accordance with demands. The cost of generating power, which the company has calculated by supposing that the equipment will last 15 years, is still higher than that generated by using oil. It will, however, in the long-term become cheaper when considering present prices of oil are bound to rise higher. The company has already obtained patent rights and will apply for a government subsidy to conduct further tests using a test unit having an output of about 1,000kW. The company finally plans to put into practical use a plant having an output of 30,000kW or more. [Text] [Tokyo TECHNOCRAT in English Vol 13, No 10, Oct 80 p 89]

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