JPRS L/10701

30 July 1982

# Japan Report

(FOUO 47/82)

FBIS FOREIGN BROADCAST INFORMATION SERVICE

FOR OFFICIAL USE ONLY

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500080075-6

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.



APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500080075-6

JPRS L/10701

30 July 1982

# JAPAN REPORT

(FOUO 47/82)

## CONTENTS

POLITICAL AND SOCIOLOGICAL

PAPER VIEWS SUZUKI'S TANAKA CONNECTION

Tokyo MAINICHI DAILY NEWS in English 29 Jun 82 p 2

[Editorial: "Influence of Tanaka]

[Text]

Diet interpellations are made up of words without substance. So goes criticism we often hear. Judging from the latest interpellations, "deceptive" rather than "empty" seems to be the right adjective, and we see a coming political crisis because of this trend.

Budget deliberations start in the House of Councillors this week. But, since the decision to extend the current Diet session at the end of May, what have the Dietmen done? They were supposed to hold debates on the establishment of political ethics, tax revenue deficits and related economic management, and foreign and defense policies closely connected with disarmament, but we have heard no serious debates on these urgent issues. Question-and-answer sessions by robots — this might be a more accurate description of what has taken place.

Opposition questions lack punch and government answers are stereotyped, but apart from this their low-key tone is apparently the result of more basic causes. In short, Diet members do not have enough moral fiber, character, sense of responsibility or courage, which are the prerequisites of a politician.

We anticipated that the focus of Diet deliberations following Prime Minister Zenko Suzuki's return home from his two-week foreign trip would be on cleaning up politics, especially since guilty verdicts were handed down on two politicians in the Lockheed scandal. Contrary to such expectations, politicians did not react sharply. In fact, they have failed to take any action concerning the guilty politicians or even the "gray" ones who allegedly accepted money.

The fact that Prime Minister Suzuki seems to have left the matter to the Diet and political parties is intolerable. Suzuki earlier said that "the establishment of political ethics is the starting point of parliamentary politics and I am taking the guilty verdicts seriously," but we do not see any serious attitude in Suzuki.

His actions do not agree with his words and his answers in the Diet are "deceptive." He has apparently failed to distinguish right from wrong because he seems to have exerted his efforts to protect Susumu Nikaido, secretary general of the Liberal-Democratic Party, regarded as one of the "gray" officials.

If Nikaido is driven into a corner, the Suzuki Establishment would be adversely affected because of Nikaido's importance in the ruling party. Suzuki must remember that he himself appointed Nikaido to the post in defiance of public opinion.

If Suzuki continues to support Nikaido, he deserves the criticism that he has placed priority on self-protection over political ethics.

The problems related to Nikaido's treatment contain deeper-rooted issues than the fate of Suzuki's government. If they remain, nationality will be lost damaging the very basis of party politics. We urge Nikaido to resign from his post and answer the summons of the Diet to clarify his position.

At his meeting with Suzuki, former Prime Minister Takeo Miki said: "The present-day Liberal-Democratic Party is apparently under the influence of Mr. Kakuei Tanaka. You must try to make the party cleaner and healthier..." Miki made a very important observation which is shared by the public. If the ruling party is controlled by a person who has been criminally indicted, what can be more immoral?

We cannot expect the Liberal-Democratic Party to be cleaned up if Tanaka is in control. Why, for instance, has the ruling party done its utmost to delay the proposed revision of the Dietmen's testimony law?

In the ruling party, former Prime Minister Takeo Fukuda together with Miki mildly criticized Tanaka and his influence, but other so-called "new leaders" who are supposed to bear political responsibility in the 1980s, have kept silent due to the heavy pressure of Tanaka's control and to protect themselves. Every politician must give deep thought to what Miki has urged.





CSO: 4120/333

POLITICAL AND SOCIOLOGICAL

## NEW LIBERAL CLUB'S MANEUVER DISCUSSED

Tokyo MAINICHI DAILY NEWS in English 30 Jun 82 p 2

[From "Nagatacho Doings" column by Takehiko Takahashi: "6 Years Since Founding of NLC"]

[Text]

Six years have passed since the establishment of the New Liberal Club (NLC) on June 22, 1976. In the first election in which the NLC candidates were entered, an "NLC boom" occurred and 18 candidates of the fledgling party were elected.

In the 1979 election, however, the number of NLC's Diet seats fell to four, and some people expected that the New Liberal Club would fade away.

A recovery was made to 12 seats in the dual House of Representatives and House of Councillors elections of 1980, and the NLC was resuscitated.

Those who took part in the formation of the New Liberal Club were Diet members attached to the Liberal-Democratic Party. Yohei Kono, who became the NLC's first Representative, was the son of Ichiro Kono, the late politician who wielded great influence in the political world. High expectations were placed in Yohei Kono. Young Diet members had gathered around him and formed a group that aimed at bringing a breath of fresh air into politics.

When Kono left the LDP, it was expected that a considerable number of this group would follow suit. Because of conditions surrounding their electoral districts, however, there were those who remained with the LDP.

The NLC was a conservative political party formed on the basis of criticism of the LDP. But inherently, the NLC stands on a common foundation with the LDP. Accordingly, while once participating in the New Liberal Club, there are some who have returned to the LDP fold. They include Morio Kimura (from Aomori Prefecture), Fukujiro Kikuchi (Miyagi), Sanpachi Taido (Chiba), Hidenao Nakagawa (Hiroshima), Takeo Nishioka (Nagasaki), Sukenari Nagano (Kagoshima), and Ichizo Ohara (Miyagi).

Koji Kakizawa, who was chairman of the NLC's policy committee, has left the party. He seems desirous of running as an LDP candidate in the next election but is acting as an independent at the present time.

In all, there are ten who were once elected on the NLC ticket but have since returned to the LDP. Among them, two were defeated in the last election, but eight are Diet members at

present (although Kakizawa is called an independent, he is virtually an LDP member).

In many cases, they did not become NLC candidates because they earnestly desired to do so. They ran on the NLC ticket because the LDP refused to recognize and recommend their candidacy. Therefore when conditions in the electoral district change and the LDP is ready to recommend them, they will quickly withdraw from the NLC and return to the LDP.

## Influence

The New Liberal Club's strongest influence at present is in the big cities. They include four Diet members from Tokyo and three in Kanagawa Prefecture.

Seiichi Tagawa, NLC Representative, says, "Although we are in the opposition, we have the experience of handling the administration." He calls this a characteristic of the NLC.

While with the opposition, the NLC has a nature that differentiates it from other opposition parties. Although an opposition party, the NLC has many friends in the LDP.

What the New Liberal Club has in mind now is a revamping of the political world. Representative Tagawa believes that a new party comprising the so-called middle-of-the-road parties (Komeito, Democratic Socialist Party, New Liberal Club, United Social Democratic Party) is impossible to achieve. Instead, he is looking forward to a schism within the LDP and the NLC combining with one of the divisions. In order to trigger such a movement, what Tagawa is attempting now is criticism of the Tanaka faction, the largest in the LDP.

By unfurling the banner of "clean politics," he is seeking to bring together the anti-Tanaka factions within the LDP. This is the reason why Tagawa criticized Tanaka when he met with former Prime Ministers Takeo Miki and Takeo Fukuda, and asked for their cooperation.

The combining of the four centrist parties undoubtedly faces great difficulties. The Komeito opposed the extension of the Diet session and has stayed away from the plenary session. The New Liberal Club and Japan Socialist Party attended and approved the extension. The Komeito is absolutely opposed to a revision of the House of Councillors national constituency election system. The NLC favors it.

Under such a situation, a revamping of the political world by the four middle-of-the-road parties is far from being easy. That is why Tagawa wants to hammer in the wedge of "political ethics" and split the LDP as a step toward revamping the political world.



CSO: 4120/334

POLITICAL AND SOCIOLOGICAL

## POSSIBILITY OF JCP CHAIRMAN MIYAMOTO'S RETIREMENT REPORTED

Tokyo THE DAILY YOMIURI in English 26 Jun 82 p 2

[Text] ***Kenji Miyamoto, who has been chairman of the Communist Party (JCP) for the past 12 years, will probably step down from his post during next month's party convention, the first for two years.***

The convention, which will open July 27, will be held just after the party celebrates its 60th anniversary on July 15.

Observers said Miyamoto's retirement was designed to rejuvenate the party since the party's popularity was on the decline.

The possibility of Miyamoto's retirement was first whispered among Liberal-Democrats last spring and their musings were recently echoed by Socialist Party (JSP) members and leaders of the Democratic-Socialist Party (DSP).

Their reasons for thinking this way are as follows:

- The Communist Party has been striving to increase its party membership to 500,000 and the circulation of the party organ, Akahata, to four million. These goals have almost been realized.
- The 60th anniversary of the party provides a suitable opportunity for Miyamoto to retire. He has been party chairman since July 1970.
- The party needs to change its image to increase its strength and to prepare for the coordinated nationwide local elections and the House of Councilors election next year.
- Miyamoto will turn 74 in October and there are a number of senior party officials who could fill his shoes, perhaps better than Miyamoto.

One DSP leader remarked: "It is certain that Miyamoto will retire. His successor will be Secretary-General Tetsuzo Fuwa and Mitsuhiro Kaneko, deputy secretary-general, will probably succeeded Fuwa."

Liberal-Democrats in a position to know point out that JCP conventions have been held only once every two or three years. If Miyamoto fails to retire during the forthcoming convention, he may not be able to do so until the next convention.

No JCP official supports the rumor about Miyamoto's possible retirement. Kaneko himself says that the JCP does not plan to reshuffle the party's top leaders at the next convention.

"Some people say that the party needs a change of image, but I don't think so because the party has been able to increase its numerical strength and the circulation of the party organ," he said.

Some people say that Miyamoto is of an advanced age. Kaneko says, but he

points out that Prime Minister Suzuki is now 71.

Both Seicho Matsumoto, a noted fiction writer, and Koreya Senda, a stage producer, who are said to be close to the JCP, deny the rumor.

Will Miyamoto's retirement really be suddenly and dramatically announced during the summer convention?

A Yomiuri Shimbun reporter asked him directly about the rumored retirement, and Miyamoto replied, "I don't know. Unlike other parties, Communist Party officials do not maneuver behind the scenes ahead of a party convention regarding party executives' posts."

"There will naturally be an election during the coming convention, but its results will not be known until after that election," he remarked.

Isn't it necessary to rejuvenate the party? he was asked.

Miyamoto replied, "Of course. Reform is one of the things the party can be proud of and efforts to rejuvenate the party have continued, especially at conventions. Senior officials are properly deployed and younger staff are promoted."

Born in Hikari, Yamaguchi-ken, Miyamoto graduated from the Department of Political Economics of Tokyo University in 1933 and joined the JCP the same year. He became secretary-general of the party in 1958 and a member of the Diet in 1977 when he was elected a upper house member from the national constituency.



CSO: 4120/335

POLITICAL AND SOCIOLOGICAL

## JCP INTERNATIONAL THEORETICAL SYMPOSIUM OPENS

OW071210 Tokyo JPS in English 0906 GMT 7 Jul 82

[Text] Tokyo, 7 Jul (JPS)--The International Theoretical Symposium to commemorate the 60th anniversary of founding the Japanese Communist Party opened at JCP headquarters on 7 July. The theme of the 3-day symposium is "on the struggle and task for world peace, defense of the right of nations to self-determination, and social progress."

In the symposium 12 representatives of the 11 parties of capitalist countries take part. They are representatives of the Communist Party of Great Britain, Italian Communist Party, Communist Party of Australia, Communist Party of the Netherlands, Swiss Labor Party, Left Party-Communists of Sweden, Communist Party of Spain, French Communist Party, Communist Party of Belgium, Socialist Unity Party of Mexico and the Japanese Communist Party.

At the beginning of the symposium, JCP Secretariat Chief Tetsuzo Fuwa gave an opening speech. In his speech Fuwa said, "This symposium is held in serious international situation--deepening historical crisis of world capitalism in political, economic and social fields; problems of present stage of development of socialist system and its policies; nuclear arms race and increasing threat of nuclear war; world-wide upsurge of novement against nuclear weapons and for peace; increasing international role of the nonaligned countries and tasks of developing countries; and struggle to defend the right of nations to self-determination...there are not a few problems to be studied and solved in creative ways with the revolutionary and scientific spirit of scientific socialism."

In the sumposium, neither keynote report is delivered to give a specific direction to the discussion, nor joint decision or conclusion will be made. With equal right, every delegate freely expresses one's viewpoints, and exchanges experiences and viewpoints with other parties through candid discussions.

CSO: 4120/341

POLITICAL AND SOCIOLOGICAL

## UEDA'S ADDRESS AT JCP THEORETICAL SYMPOSIUM

OW071222 Tokyo JPS in English 0911 GMT 7 Jul 82

[Text] Tokyo, 7 Jul (JPS)--In the first-day session of the International Theoretical Symposium held on 7 July, Koichiro Ueda, presidium vice chairman and Policy Commission chairman of the Japanese Communist Party, gave a speech, excerpts of which follow:

"The greatest problem for international peace today is the real and increasing threat of nuclear war, which could mean the end of human civilization.

"Why has the danger of nuclear war become the central issue of international politics in these early 1980 years?

"The material base for this is the terrible accumulation and technological development of nuclear weapons, a product of the arms race between two opposing military blocs, one centering around the USA, and the other around the USSR.

"The continuing development and accumulation of strategic and tactical nuclear weapons have even produced two devilish new concepts in military strategy: The strategy of a 'counterforce first strike,' and 'theatre' nuclear war, both based on the assumption that a war with nuclear weapons can be won.

"The Japanese Communist Party places special emphasis on two problems which lie at the root of these critical developments and involve the present status of the imperialist and socialist system.

"The first problem is the ever-deepening structural and historical crisis of contemporary capitalism, on which discussions focused during the last symposium here in 1979.

"The second problem is that a trend of big-powerism is gaining momentum within the socialist countries, which should by nature be forces for peace and socialism, and that this error, deriving from the doctrine of 'sphere of influence,' which is contrary to the cause of scientific socialism, is becoming more fixed.

"These things show that it is becoming more likely that the 1980's will develop into a dangerous 'nuclear age.'

"At the same time in historical terms it is very significant that a dramatic uprising of international movements is taking place, demanding that nuclear weapons be eliminated.

"In the 1930's, the 7th Congress of the Comintern called for international solidarity for the struggle against fascism and imperialism, but failed to prevent World War II.

"But relationship among the different world forces have since then undergone fundamental changes, and both objective and subjective conditions now exist that can indeed prevent nuclear war.

"Movements in each country are pursuing objectives in accordance with respective conditions: The Japanese Communist Party is proposing that a total ban on nuclear weapons must be placed at the center of our common international tasks.

"Why do we assert that a total ban is the core of urgent international tasks? First, this was the very starting point of the movement against nuclear weapons. We have also learned from the experience of recent history that partial measures adopted in the past, by-passing this aim, have had the effect of promoting the arms race.

"Secondly, the danger and bankruptcy of the doctrines of nuclear deterrence and equilibrium of military strength have become fully clear.

"The only conclusion, drawn from the experiences of the past 37 years since the first tragedies of nuclear war struck Hiroshima and Nagasaki, is that the basic task of totally banning the use, production, storage, testing and deployment of nuclear weapons must be undertaken unitedly at this very time if humanity is to survive and the nuclear arms race is to end.

"To make a total ban on nuclear weapons our urgent task never means that partial measures are valueless, nor does it ignore the need for a phased process based on parity once the total ban is agreed on.

"The Japanese Communist Party gives priority to three tasks as partial measures: A ban on the use of nuclear weapons, the creation of nuclear weapon-free zones and a comprehensive ban on nuclear tests, which all form part of a total ban on nuclear weapons. The conclusion of a treaty banning the use of nuclear weapons is extremely urgent.

"But the conclusion of an agreement banning the use of nuclear weapons would not in itself be enough to rid the world of the threat of nuclear war...our central task now is to strive for an international agreement banning all nuclear weapons and abolishing them.

"The Japanese Communist Party has declared that central to domestic tasks for prevention of nuclear war is opposition to and rejection of the Reagan administration's plan for limited nuclear war, which would turn Japan and Asia into a nuclear battlefield, and the impeachment of the LDP government for approving and collaborating in the plan.

"The policy of the LDP Suzuki cabinet is anti-people, and could lead Japan into nuclear war. In replying to parliamentary interpellations, Prime Minister Suzuki even tried to justify the Reagan statement about the possibility of conducting a limited nuclear war, by saying that this 'shows the posture of deterrence of nuclear war.'

"The JCP considers this a critical problem that affects the whole future of the Japanese people, and strongly calls on the people to reject the Reagan concept of limited nuclear war, and oppose the LDP government's complicity in it.

"It is necessary for anti-nuclear movements in developed capitalist countries to put up independent and specific demands appropriate to each respective domestic situation, and to intensify the exposure of the contradictions of the anti-people character of the nuclear policy of their respective governments. Only when this is done can there be progress in international solidarity for the prohibition of nuclear weapons.

"Our analysis is that the national demand to abolish nuclear weapons, coming from the majority of the people of A-bombed Japan, involves factors that lead inevitably to a demand for a nonaligned, neutral Japan.

"Unless the Japan-U.S. security pact is abrogated, it will not be possible for Japan to become a nuclear-free zone and to extend the zone to include the Asian-Pacific region.

"In dealing with the prospect of banning nuclear weapons in the cause of peace, we cannot of course fail to see the relationship of this with the world-historic victory of the cause of socialism. But I believe that the major emphasis should be on its inseparable relation with the national liberation movement I have referred to, and therefore the self-determination of nations in this perspective will be closely linked with the task of averting nuclear war, although the two issues should not be regarded as identical. The reason for this is that lasting peace does not mean simply the status without a hot war, but a situation in which all people live on equal terms, and with the established right to self-determination, and in which there is no oppression or aggression against other peoples.

"It is for this reason that the problem of military blocs becomes a focal issue, related closely to the defense of world peace, against nuclear war, and to the establishment of the right of nations to self-determination.

"The reason for this is, first of all, that the present vicious circle of the nuclear arms race derives from the distorted structure of international politics, in which the confrontation of military blocs, led respectively

by the United States and the Soviet Union, is central. Without the struggle for dissolution of the military alliances, it would be hard to end and reverse the nuclear arms build-up, and the prohibition of nuclear weapons will be hard to achieve.

"Secondly, the bringing in of nuclear weapons and the deployment of new theater nuclear missiles in Western Europe and Japan are based on the treaties of military alliances, viz., the North Atlantic Treaty Organization (NATO) and the Japan-U.S. Security Treaty.

"Thirdly, all military alliances are essentially accompanied by national oppression and unjust intervention, as with NATO, the Japan-U.S. Security Treaty and ANZUS are used as an instrument to force various countries into subordination to U.S. imperialism; which the Warsaw Treaty Organization has also done, although it was formed as a military alliance out of the necessity for self-defense, but now has taken on the aspect of an instrument of intervention and oppression, over-riding the right of nations to self-determination, as demonstrated by the Czechoslovak and Polish events.

"Related to the demands for peace, the basic demand for self-determination of nations by extension necessarily leads to the demand for dissolution of all military alliances regardless of where they are: East, West, North or South.

"If the solidarity of the movement of nonalignment in the Third World and the movement against nuclear weapons and for nonalignment in Western Europe, Japan, Australia and other parts of the world, is consolidated: If this solidarity is combined with the movement in the United States against nuclear weapons and with the people's movement on the move in socialist countries, and with socialist countries standing firm in defense of scientific socialism: And if this solidarity develops into a world-wide movement for the defense of peace and the self-determination of nations, it will be possible to block nuclear war plans and achieve a total ban on nuclear weapons, and achieve a world-historic transformation from the 'nuclear age' to an 'anti-nuclear age,' a non-nuclear, nonalignment age.

"Today, when conditions for blocking nuclear war plans are being enhanced by the significant advances made by the people's struggle, the increasingly important task is to build true solidarity between the three main revolutionary forces, vix., socialist countries, the revolutionary movement in capitalist countries, and the national liberation movement. In carrying out the most pressing task of today, vix., the defense of world peace, I would like to reiterate the need for the three-main revolutionary forces to overcome all forms of big-powerism and hegemonism, put an end to all obstacles to the right of nations to self-determination, and take active initiatives for a total ban on nuclear weapons and the dissolution of military blocs, i.e. for non-nuclear nonalignment."

CSO: 4120/341

POLITICAL AND SOCIOLOGICAL

## JCP STATEMENT CRITICIZES PRAGUE PUBLISHERS

OW101009 Tokyo AKAHATA in Japanese 8 Jul 82 p 1

[Text] A.P. Sachkov, director of the Peace and Socialism Publishing Company [PSPC] in Prague, turned down on 5 July the JCP request that INFORMATION BULLETIN, an international publication of the PSPC, carry a JCP rebuttal to its article attacking the JCP. In this connection, Tomio Nishizawa, chairman of the JCP International Relations Commission, issued the following statement on 6 July:

A.P. Sachkov, director of the PSPC in Prague, on 5 July rejected our party's request that a JCP rebuttal of an article attacking the JCP which was carried by the PSPC's INTERNATIONAL JOURNAL INFORMATION BULLETIN be printed in the same journal. The JCP resolutely protests this negative attitude of the PSPC leadership because it is an extremely untenable act which outrightly infringes upon the universally recognized principle that each party has equal rights.

In an unsigned AKAHATA article on 25 May, the JCP had already pointed out that INFORMATION BULLETIN shares with the jou nal problems of peace and socialism a role in launching blatant attacks on independent-minded communist parties. It also disclosed that the PSPC is playing a role as a center of hegemonism by having some representatives of foreign parties attached to the PSPC editorial board publicize the supremacy of the CPSU through these two journals, namely PROBLEMS OF PEACE AND SOCIALISM and INFORMATION BULLETIN. The PSPC director's refusal to print a JCP rebuttal once again proves that these claims by our party are well founded.

The JCP reiterates the urgent necessity of dissolving the PSPC's editorial board and the publishing house itsllf, both of which have played a no less harmful role than the defunct Cominform and which have greatly undermined the world communist movement's foundations of solidarity. The JCP will continue its positive activities to realize this dissolution.

CSO: 4120/341

SCIENCE AND TECHNOLOGY

## DEVELOPMENT OF NEC RADIOWAVE ABSORBENT FERRITE DISCUSSED

Tokyo NIHON KOGYO SHIMBUN in Japanese 7 Jun 82 p 8

[Interview with Toshiro Tsuji, Resources and Environmental Technology Research Institute, NEC, by reporter T. Mino; date and place not given]

[Text] Target--Commercialization at Yearend

Question: First, what is the objective of the development of ferrite microwave absorbers?

Tsuji: In the field of radar and microwave communications, radiowaves in various frequency bands are being used. Consequently, where various radiowaves intersect, such as aboard ships, at a radar base, or at a communications base, radiowave interference, such as false images on radar, occur, causing problems. There is an international movement to enforce, at the time of importation of electronics equipment, some sort of regulations for equipment that generates unnecessary radiowaves. I hear that, in the United States, the FCC (Federal Communications Commission) is studying specific regulatory measures.

Under such circumstances, it has become desirable to develop new types of microwave absorbers that operate in as wide a frequency band as possible. We have been advancing our work toward that goal, but we had a feeling that it might have been too late.

Question: But it is said that microwave absorbers that operate in such a wide frequency band are already in practical application.

Tsuji: To be sure, there are some good products for television, etc., that use low frequency bands. And it is not that there are no microwave absorbers at all that can absorb in a high-frequency band of 1-20 gigahertz. However, in the high-frequency band of 1-20 gigahertz, microwave absorption characteristics have been demonstrated only at a specific frequency. In view of such problems, these absorbers have not been for general use.

Also, among the absorbers used in microwave darkrooms, there are some that can work over a wide band, but they are only for indoor use. Since they cannot be used outdoors, their usage is limited.

Question: How did you advance the development?

Tsuji: There is a way of developing by modifying existing microwave absorbers. However, we began with a fundamental elucidation of the mechanism of radiowave absorption. By what mechanism does microwave absorption occur, and what structures and materials are required to meet the needs? In other words, we decided to tackle the problem head-on. Such an attack was the first ever tried in the world. T. Inui, chief investigator (Doctor of Engineering) of this laboratory, who has been working on the relationship between microwaves and substances for 20 years, and a research staff member, K. Hatakeyama, who has been conducting research on the subject for 4 or 5 years, decided to undertake the project. As a result, they have managed to build a theoretical basis concerning microwave absorption. This, I believe, may be called a discovery of worldwide importance. Then, based upon detailed studies of microwave propagation characteristics in materials, simulations were produced using a computer, and the construction of absorbers and materials analyses were undertaken. In that sense, research is greatly dependent upon individual efforts.

Composites Advanced

Question: In that case, are you saying that, as a result of the simulations, a new absorber will be surfacing?

Tsuji: There are various research processes to go through yet, but stating the conclusion, that is correct. Then [it was decided] a few years ago to take the direction of working with composites.

Question: What sorts of things are the composites?

Tsuji: This composite is comprised of an "absorption layer," where ferrite (particle-size distribution of 0.1-10 micrometers), short metal fibers (brass, etc.), and an organic, high-molecular-weight resin (epoxy, etc.), in a weight ratio of approximately 7:2:3, were uniformely dispersed; and a "metamorphic layer," where the same kind of ferrite and organic, high-molecular-weight resin in a weight ratio of approximately 2:3 were uniformly dispersed. It was discovered that formation of such a two-layer structure will allow the ready entrance of wide-frequency radiowaves when drastic changes in electrical characteristics are effected between the two layers; moreover, microwaves of a wide range can also be absorbed. Naturally, the two kinds of ferrite composite materials most suited for the two respective layers were also developed, using our own technology. However, as we are an electrical manufacturer, we had our share of difficulties with regard to where we should [go to] procure the most suitable chemical substances.

Question: I would like to hear what sort of effect the invention of ferrite microwave absorbers has.

Tsuji: The 1-20 gigahertz frequency bands used for radar and microwave communications can all be covered using only five kinds of absorbers with different operational ranges, and radiowave interference can be prevented. Moreover, absorbency is greater than 99 percent, and the absorbable frequency bandwidth can be 7-10 times greater than that of the previous types.

Promising Use for Honshu-Shikoku Cross-link

Question: What is the outlook for future commercialization?

Tsuji: I believe we can go into commercialization by the end of the year. Wide application is possible, such as in preventing false radar images from buildings, steel bridges, steel towers, ships' masts, etc.; in improving communications quality through use in the office housing the communication base, parabolic antennae, etc.; in preventing oscillation-scattering of unnecessary radiowaves by providing shield cases for microwave darkrooms; and so forth. For the present, however, a promising prospect probably is the Honshu-Shikoku cross-link bridge. Demands are estimated to be high, and so a mass-production effect can be demonstrated. It currently costs 150,000-200,000 yen per square meter, but we believe it can be sufficiently profitable even at 100,000 yen.

(Background note): The biggest feature of the ferrite microwave absorber which was developed as the first in the world by Nippon Electric Co. [NEC] is that it is applicable to a wide-frequency bandwidth. For example, in the vicinity of 9 gigahertz, the absorption bandwidth includes 2-2.5 gigahertz frequency both before and after the 9-gigahertz band. Conventional microwave absorbers are able to absorb microwaves over only a limited range. It may be said that the new product is epochal in comparison to previous ones, in that it can absorb high-frequency waves with great efficiency. By changing the thickness of the absorber or the mixing ratio of the composite material, absorbers applicable to different central frequencies can easily be made. Products in the form of "paint," "rubber sheets," and "plastics" have been developed as required in applied fields.



7722
CSO: 4106/135

SCIENCE AND TECHNOLOGY

## U.S. - JAPANESE COMPUTER COMPANIES JOINT VENTURE REPORTED

### IBM - Tokyo Press Kogyo

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 28 May 82 p 1

[Text] The Tokyo Press Kogyo, (President Kyohei Ishii), a major automobile body metal pressing company, is currently conducting comprehensive business cooperation negotiations with IBM of the U.S. concerning computer peripheral equipment. These talks center on furnishing IBM the manufacturing technology of an independently developed computer relay keyboard and the establishment of a joint manufacturing and sales company in order to embark on a diversified mutual enterprise. Although this venture is in an area completely alien to their sphere of expertese, by moving into the high growth field of "mechatronics," they hope to rid themselves of the stigma of being tied exclusively to the deteriorating automobile industry.

In order to further these talks, Masahide Furukawa, Senior Managing Director, and Yasuhiko Ishii, Managing Director and Director of Planning and Development, will visit the United States for about two weeks beginning in mid-June to conduct full scale negotiations. On this trip they will also contact Keytro Co., the biggest American keyboard maker, in order to conduct talks for secondary level cooperation tied to the anticipated IBM cooperation arrangement. On the other hand, they are prepared to even consider negotiations for a completely separate cooperative agreement.

The keyboard developed by Tokyo Press Kogyo is firstly ultra thin (under 20mm) and by utilization of contactless switches, has a good response capability and is said to have a useful life more than three times that of other similar switches (it can function several tens of millions of times).

The company had projected development of this product as the most promising non-auto related item and had thus established a project team some three years ago. This effort finally bore fruit in the beginning of this year when it was determined that the product could be commercialized.

There is a brisk exchange nowadays over boundaries by auto parts and other auto related manufacturers with electronics manufacturers, as in the case of Aisin Seiki Co, Ltd, and Fujitsu Limited in the field of auto electronics.

The case of Tokyo Press Kogyo-IBM is characterized by the fact that it would be more accurate to describe it as an entry into the pure electronics field totally removed from the auto industry and not a auto-electronics venture. This is a move responding to the policies of auto manufacturers who by themselves have begun to increase the rate of production of auto parts in the face of greater worldwide small car competition.



## Hitachi - Burroughs

Tokyo NIHON KEIZAI SHIMBUN 30 May 82 p 1

[Text] It became apparent on the 29th that the world's second largest computer maker Burroughs (Chairman, Michael Blumenthal) and Hitachi, Ltd, had entered into talks aimed at cooperation in the fields of computers and communications. Burroughs' present objectives are to obtain Hitachi's optical fiber communication network system and small computer technology for worldwide distribution. Because Hitachi is showing a positive stance, the possibility of this being realized is high and there is some indication that this can be expanded into a cooperative arrangement of much greater amplitude. This cooperation, coming at a time when the likes of IBM and Fujitsu and other manufacturers are engaged in cutthroad competition in the field of computers and communications, as well as being one of the causes of the trade friction between Japan and the U.S., is likely to cause world-wide ripples.

In the field of mainframe computers, Burroughs ranks next to IBM but is on a downward trend in the computer market place because of its heavy reliance on the large-size computer in a world that is rapidly being taken over by miniature and micro computers and terminals of office automation.

As one effort to shore up the company, Burroughs last year acquired the Memorex company which manufacturers peripheral equipment compatible with IBM software in order to make inroads into the terminals and peripheral equipment area. However, this alone cannot satisfy the multitude of needs of the marketplace of today so they have come to Hitachi, one of our country's top class computer and communications makers, for talks on cooperation.

Burroughs Vice-Chairman J. Jacobson recently visited Katsushige Mita, President of Hitachi, Ltd, and explored the subject of cooperation with him. In response to this overture, President Mita expressed the view that in areas other than large mainframe computers, Hitachi could help Burroughs in many ways. Thus a major forward movement for cooperation between these firms has begun to take place.

According to officials of both companies, the reason it would be difficult for cooperation in the area of large mainframe computers is that Hitachi, as a basic business strategy, is building its software based on the same design theory as IBM, whereas Burroughs is manufacturing under a different design theory. As far as Burroughs is concerned, they are strongly interested in cooperation not in the field of mainframe computers but in the field of small computers, data terminals and communications systems in

the context of technology and marketing. Therefore, the Burroughs' interest agreed with Hitachi's position that "Cooperation between the two firms should be in areas without conflict or competition."

Because of this, the products most likely to be provided by Hitachi to Burroughs are communication network system technology and data terminal equipment which utilize optical fibers for increased efficiency to be used in establishing office automation systems. Also on the list of possible items for provision to Burroughs are printers using semiconductor lasers and small computers.

Furthermore, Burroughs is planning to manufacture Kanji character printers and data terminals in Japan starting this year. They have already obtained a manufacturing facility site, and there is some indication that Hitachi is prepared to provide some technical assistance to Burroughs in this endeavor. Because of this, the possibility of expanding cooperation between these two companies in the future into a wider range of products is probable.

Japan is more advanced in optical fiber technology.

Optical fiber communication network. This is a communications technology that supports a more efficient intra-company information network system. In this system, optical fiber cables that can transmit a massive volume of data are set up in offices and factories within a company interconnecting computers and terminals.

Office Automation has been getting popular in recent times and there is a trend for personal computers and facsimile devices heretofore introduced in a random fashion without regard to uniformity or compatibility to now be integrated into networks. In order to do so, a special communications network is necessary to make these diverse pieces of equipment all communicable when interconnected. When optical fibers are used for such a network, the transmission loss due to radio wave interference is reduced, and it is possible to transmit a great volume of data more accurately and at higher speeds. It is said that the optical fiber network technology of our country's computer and communications makers is more advanced than that of the United States.



Mitsubishi Electric - Sperry

Tokyo NIHON KEIZAI SHIMBUN in Japanese 8 June 82 p 8

[Text] Mitsubishi Electric Corporation and the American computer maker Sperry Co. (Head Office- New York; G. G. Probst, Chairman) announced on the 7th that they had signed an agreement that day to cooperate in the development, production and marketing of computers. Both companies will develop close ties through the mutual exchange of technology involving mainframe computers of Sperry and the medium and small computers of Mitsubishi and this will involve joint development and research in these areas. Mitsubishi will provide semiconductors and peripheral and data terminal equipment technology to Sperry for production and marketing.

Through this exchange, Mitsubishi Electric Corporation will strengthen its foothold in the world market while Sperry will increase its foothold in Japan. Thus, Japanese and U.S. computer makers have started to cooperate in an anti-IBM stragegy as well as office automation market strategies.

Agreement on "Anti IBM" Strategy

Nihachiro Katayama, President of Mitsubishi Electric Corporation, and Probst, Chairman of Sperry, revealed at their news conference that the contract they had signed that day was a basic agreement for mutual cooperation valid for five years. If there are no objections from either company at the end of five years, the agreement will automatically be extended for an additional five years. Both firms will establish working groups, respectively, to work out details of specific joint and cooperative work.

As a result of this agreement, Mitsubishi looks forward to (1) increasing its sales through the provision of semiconductors and data terminal equipment to Sperry and (2) strengthen its technological development capabilities through the use of Sperry technology. On the other hand, Sperry is counting on (1) obtaining Mitsubishi cooperation in the development of new products centering on data terminals and medium and small computers and (2) gaining Mitsubishi cooperation in the sales of products from its own computer division, Sperry UNIVAC, in Japan.

Sperry already has a distribution company operating under the name Nippon UNIVAC established in Japan under a joint capitalization arrangement with Mitsubishi Electric Corporation, Mitsui Bussan and Oki Electric Industries, Inc. (Sperry - 34.68%, Mitsubishi Electric - 1.58%), as well as a Japanese production facility called Oki UNIVAC (Sperry - 45.08%, Mitsubishi Electric - 8%). Additionally, Sperry has been purchasing conductors from Mitsubishi and, according to Chairman Probst, "We have had very close relations with Mitsubishi Electric for the past ten years." This agreement was proposed last fall by Sperry with the intent of making the relationship even stronger and more comprehensive.

It can be assumed that in the future Sperry and Mitsubishi will jointly develop peripheral equipment and smaller computers needed by Sperry to round out its product line and that Mitsubishi will undertake their production. The positions of Nippon UNIVAC and Oki UNIVAC are not expected to change in the future, but in order to further assist in the sales of Sperry - UNIVAC computers in Japan, "Mitsubishi will increase its holdings of Nippon UNIVAC stock," according to President Katayama.

Because Sperry in the past stressed large mainframe computers, it is now in critical need of smaller computers and peripheral equipment in its product lines. Mitsubishi arrived at its decision that it is advantageous to form a joint strategy front with Sperry by reinforcing each other because although they are strong in the field of small computers and peripheral equipment, they have been slow in getting into the field of medium and large computers.



9980
CSO: 4106/120

SCIENCE AND TECHNOLOGY

## AGENCY TO SET UP TECHNOLOGICAL DEVELOPMENT GUIDELINES

Tokyo NIHON KOGYO SHIMBUN in Japanese 26 May 82 p 14

[Article: "Establish New System Next Year; 'Practical Use Within 5 Years' Is Goal"]

[Text] Responding to recent demands for the technological buildup of Japan, the Industrial Science and Technology Agency has decided to create a new industry-government-university cooperation system called the "Technological Development System To Revitalize Industry" (temporary title). The purpose of the system will be to increase competitiveness in coping with structural recessions, regional development lag or decline, inadequate development in common areas, etc., which existing systems are unable to cover, and to achieve a general technological buildup of the nation. The step was taken in response to a proposal to "establish economic national security" that was submitted in late April by the special subcommittee on economic security problems under the general subcouncil of the Industrial Structure Council. Goals in FY 83 will be boiled down to about 15 themes, and research and development will be promoted while granting subsidies to participating enterprises. However, unlike the already started energy projects and systems for the establishment of next-generation industries, they will be limited to themes which can be brought to practical use within 3 to 5 years.

The proposal for the "establishment of an economic security system" drafted by the Industrial Structure Council focuses on the fact that, in clarifying the future outlook, present conditions point to an increase in factors such as oil shocks, public nuisances, and trade friction which weaken economic activity and obstruct sound development of the economy. It is a report on countermeasures that have been considered. Of course, great expectations are placed on technological development, and in paragraph 3 of the report, where it refers to the plan for the technological buildup of the nation, with emphasis on international contributions, it proposes the promotion of technological development to revitalize the industries.

In the FY 83 budget, the Industrial Science and Technology Agency is taking a cue from such ideas to revive industries which have fallen into structural recession, to raise the general level of technological development areas which are low, and to activate industries in the regions which lag behind modern progress. With these as pillars, it has outlined a "policy for the revival of industries through technology."

The first targets for the revival plan are expected to be petrochemical, synthetic fibers, paper pulp, nonferrous metals, ceramics, precision processing, and casting and forging; themes will be selected from them which meet the required conditions.

Research and development are scheduled for themes other than industrial categories--for example, sensors and materials which fall under common element technology. The present plan calls for the selection of about 15 themes from various prospective areas of technology such as catalysis technology, heat-resistant enzymes technology and small-lot synthetic fiber technology which can be put into practical use within 3 to 5 years, and projects under joint research by industry, government, and academia.

As for subsidies, this will depend on future budget negotiations, but they will be larger than the present maximum subsidy (50 percent).

Technological Development Themes Selected by the Industrial Structure Council for Review To Activate Materials Industries (Examples)

| Category | Theme | Breakthrough Goals |
|---|---|---|
| Steel | Continuous cold rolling process technology | 1) Develop a compact removal facility for surface oxide film<br>2) Develop an automatic scanning system for scars on cold rolling surface |
| | Direct link technology for continuous casting and hot rolling process | 1) Develop a high-precision rolling technology<br>2) Develop a technique for manufacture of unblemished slab<br>3) Develop manufacturing technology for high purity steel |
| Petrochemical | Technology for making petrified products using bioreactors | 1) Extract high-efficiency microbes<br>2) Develop heat-resistant enzymes |
| | Develop new process with new catalysts | 1) Clarify functions of new catalysts<br>2) Establish engineering technology |
| Synthetic fibers | Superspeed, multiple thread type manufacturing process technology for new fibers | 1) Develop control technology for highly reliable operation at super speeds<br>2) Develop process technology for uniform fiber structure |

| Category | Theme | Breakthrough Goals |
|---|---|---|
| Synthetic fibers (cont'd) | Development of technology for fibers with revolutionary uses | 1) Develop technology for high strength, modular and tough fibers<br>2) Develop fibers with new physical and chemical qualities |
| | Manufacturing technology for various types of small-lot synthetic fibers | 1) Develop technology for automatic switching of spinning thread cap<br>2) Develop automatic threading technology<br>3) Develop automatic thread-cutting technology |
| Paper pulp | Hydrogen dissolving method for pulpmaking | 1) Search for catalysts<br>2) Develop control technology for reaction of solids/gases |
| | Pulp technology by microbe processing | 1) Cultivation of microbes<br>2) Control microbe reaction |
| | Fast cultivation technology of pulp materials and direct conversion to pulp | 1) Separate and cultivate protoplasts<br>2) Separate and cultivate plasmids |
| Aluminum refining | Blast furnace refining technology for aluminum | 1) Develop ultrahigh heat-resistant materials for blast furnaces<br>2) Establish control technology for balance between heat and materials under ultrahigh heat |
| Chlorine | Soda manufacturing technology by solid electrolytic method | 1) Develop long-life, high electric current, efficient ion exchange membrane<br>2) Develop electric battery and electrode resistant to high electric current operation |



5884
CSO: 4106/132

SCIENCE AND TECHNOLOGY

## R&D ACTIVITIES IN BIOTECHNOLOGY REPORTED

LDP Committee on Bioscience

Tokyo NIHON KOGYO SHIMBUN in Japanese 13 May 82 p 19

[Text] The Liberal Democratic Party (LDP) Diet Committee on Bioscience was formally inaugurated at a general meeting on 11 May, for the purpose of providing full support on policy matters pertaining to the promotion of research and development of bioscience, which is considered the "star industry" of the next generation. Former minister of agriculture and fisheries and present Lower House member Takao Kameoka, who was appointed chief organizer, stated: "Research and development in bioscience in Japan lags 10 years behind Europe and America. If things are left to their present course, we may win the economic contest with them, but we will be completely defeated in this field." Of special urgency is the study of biomasses as a new source of energy substituting for oil, and the LDP is planning speedy measures ranging from the drafting of policies to establishing new biomass curriculums in the various universities.

Among the oil-substitute energy sources contemplated are: nuclear power generation, nuclear fusion, solar heat, and biomass. It is felt that biomasses involving extraction of energy from flora may become the leading substitute energy source in the future.

Countries in Europe and America have therefore stressed early research and development in this field, but in Japan the Ministry of Agriculture and Fisheries has appropriated only 226 million yen for "biomass development expenditures" in the FY 82 budget, and it has yet to embark on any specific research and development.

Moreover, there are absolutely no universities which presently conduct biomass courses or, much less, regard even botany with any importance.

As an example, Mr Kameoka said: "You know, among the graduates of Tokyo University in 1981, there were only 10 who majored in botany, and there were fewer than 300 throughout Japan. In addition, there are no biomass researchers; this is a hopeless situation."

On the other hand, not only are there biomass curriculums in the universities in Europe and America, but countries there are also devoting full efforts toward nurturing researchers. Mr Kameoka emphasized: "In order to further develop the study of biomasses, the United States has already embarked on the protection of genes. The principal countries of Europe are also helping to protect biomasses, secure seeds, and improve seed cultivation in Africa."

In Japan and the other Asian countries, however, there continues to be a lack of any research in such areas. In fact, biomasses are being sacrificed because of the irresponsible development of farmland with the increase in population.

Mr Kameoka laments: "To tell the truth, for more than 10 years I have desperately tried to persuade the bureaucrats of the Ministry of Agriculture and Fisheries to utilize biomass as an energy source, but no one has showed any concern. The reason is that botany in Japan has been regarded as a hobby of the aristocracy."

Despite such realities, an LDP Diet Committee on Bioscience has been formed. The Diet members supporting chief organizer Kameoka include such illustrious personalities as Taro Nakayama, former secretary general of the prime minister's office and a present Upper House member; Tasaburo Kumagai, former director of the Science and Technology Agency and also a present Upper House member; and others.

With the forming of the Diet committee as a backdrop, Mr Kameoka is already applying pressure on the government as he continues: "In any case, at the present rate we will be at the mercy of the Western nations concerning not only oil but substitute energy as well. Before the government talks about the need to secure energy, it must exert full efforts toward maintaining a biomass research and development system and toward securing biomass resources."

Furthermore, facing the drafting of the budget for the coming fiscal year, he is bullish as he declares: "I will try to persuade the government to actively promote the maintenance of testing and research facilities, as well as to cultivate researchers."



Industrial Sector

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 19 May 82 p 1

[Text] According to related sources, on 18 May five companies affiliated with the Industrial Bank of Japan (IBJ)--Toyo Soda Manufacturing (Tozo Morishima, president), Nippon Soda (Yoshio Morisawa, president), Nissan Chemical Industries (Misao Kusano, president), Central Glass (Saburo Ito, president) and Hodogaya Chemicals (Toshio Morimoti, president)--will begin interdisciplinary research and development in cooperation with the

similarly IBJ-affiliated research organization for high technology, the Sagami Central Chemical Research Institute (4-4-1 Nishi-Onuma, Sagamihara City, Kanagawa Prefecture; Zenki Ninomiya, board chairman). As part of the project, joint research will be conducted especially in such biotechnological fields as genetic engineering, which is the center of attention as the next-generation technology. The chemical industry, which is now in a structural recession, has recently been increasing its efforts toward technological development, and it is to be noted that this is the first case in which a group of enterprises from the same capitalist interests are getting together for research and development in next-generation technology.

The cooperation in joint research and development by the five IBJ affiliates is based on the perception that the pursuit of biophysiology is indispensable to the future direction of the chemical enterprises.

The five IBJ affiliates are therefore participating in the Welfare Ministry's research task force on development projects involving extraction, analysis, and synthesis techniques for dioxyribonucleic acid (DNA), which is necessary for the rearrangement of genes. Cooperative research is being conducted by the Toyo Soda Manufacturing Company, which has accumulated analysis techniques in high-speed liquid chromotography; Nippon Soda, which boasts stockpiling techniques for agricultural and medical chemicals; Nissan Chemical Industries; Hodogaya Chemicals; and Central Glass, which specializes increasingly in fine chemicals.

The five companies have been joined by the Sagami Central Chemical Research Institute, which is participating in the Science and Technology Agency's life science project involving basic research in organic synthesis, synthesis technology based on enzymes, and research on bioreactors. They will conduct research and development in so-called interdisciplinary areas, which are border areas between physics and chemistry, between chemistry and biology, etc. They intend especially to focus on biotechnology, which includes techniques for genes rearrangement and bioreactors.

The five companies will send their researchers to the Sagami Research Institute. In preparation, the institute formed a research task force on biotechnology in May. It plans to send its researchers to the U.S. National Institutes of Health (NIH) and to the Tokyo University Medical Research Institute. It also plans to build research facilities for biotechnology within the compound of the institute, and to formalize the task force as a unit of the institute as early as mid-October.

Interdisciplinary research and development of genetic engineering-related technology constitute new areas which start from basic research and, since there is great risk in individual companies' attempting to cope with such research and development, it was decided that the five IBJ affiliates would participate in a joint system. The view is that future research and development will be conducted under joint efforts by the universities and national and public research organizations, and through a search for qualified researchers.

## MITI's Plans

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 2 Jun 82 p 1

[Text] As a link in the development of advanced industries, the Ministry of International Trade and Industry (MITI) is going all out to cultivate and promote the bioindustry. Concretely, it plans to establish a "Bioindustry Promotion Committee (temporary title)" under joint government-private sector efforts in July. For the time being, it plans to review problems with which the committee will deal, draft medium-range and long-range blueprints for the bioindustry, and work on necessary government measures and proper environmental conditions. The MITI intends to open a bioindustry office within the Basic Industries Bureau as of 1 July as a core agency for the active promotion of its policy measures, to continue research and development on biomass technology which it has promoted in the past, and to nurture the bioindustry through new policies as a major pillar for the revival of the basic industries.

### Formulation of Medium-Range and Long-Range Visions

The bioindustry is an advanced industry which seeks to bring about a technological revolution in broad areas such as the field of chemistry, medical care, food production, agriculture, and energy. It is an industry which has the potential, through the effective industrial utilization of the functions of organisms and cells, to achieve mass production, drastically reduce the manufacturing processes, and economize on energy for goods that in the past have been difficult to manufacture.

Representative activities of the bioindustry are: rearrangement of genes in the medical and pharmaceutical fields, mass cultivation of cells, and production of biomass energy (oil-substitute energy) by utilizing alcoholic crops, animal wastes, and rice straw. These are all necessary and indispensable to Japan in terms of the effective use of its resources and the progress of its industries. The nurture and promotion of the industry are crucial to the revival of its chemical industry and its clearly declining basic industries.

The MITI has decided to begin substantive efforts to nurture the bioindustry from such a point of view. Especially regarding biomass technology, which is basic to the industry, the MITI (Basic Industries Bureau) has already taken concrete steps such as establishing a biomass policy office which is actively promoting measures. Also, the Industrial Science and Technology Agency is considering biotechnology as a key theme for this fiscal year, in connection with its research and development system for the next-generation industrial base, and much progress has been made concerning research in the basic fields.

Having achieved such progress thus far, the MITI plans further expansion and development in these projects to nurture and promote the bioindustry. The main thrust of future efforts will focus on continuous promotion of basic research in the previous projects and their support through

administrative policies. Establishment of the Bioindustry Promotion Committee is a link in such efforts. The committee will formulate medium-range and long-range plans for the bioindustry and promote government policies and environmental conditions accordingly.

Also, the bioindustry office established on 1 July is an expanded version of the previous biomass policy office. It is a "directive office" established by directive, and on 1 October it will be elevated to an "ordinance office" established by ministerial ordinance.



5884
CSO: 4106/128

SCIENCE & TECHNOLOGY

## LIGHTER, STRONGER MATERIALS FOR AUTOS OF FUTURE REPORTED

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 12-14, 18-21, 25-26 May 82
May 82

[12 May 82 p 10]

[Text] Effective Reduction of Fuel Consumption

Automobile companies are now grappling with numerous technological issues in order to gain a victory in the world automotive wars of the 1980's. These tasks involve reducing fuel consumption, improving drivability, safety and durability, and reducing weight. The technological approaches include increased engine fuel efficiency, the use of electronics, and design changes, but the most effective approach will be the use of alternative materials.

"Reduction of fuel consumption involves a number of technological tasks. Now that it is no longer possible to achieve major reductions in fuel consumption through individual technological advances, we will have to adopt the strategy of improving fuel consumption as a cumulative total of small technical advances. But the use of alternative materials will have the advantage of being more effective and simpler than the difficult and expensive development of new technologies." (Director Kiyoshi Matsumoto, chief product design engineer of Toyota Motor Co) Considering that the automobile is a very complex product that requires precision technology, it may not be proper to label the switch to alternative materials as "technological development." But it is an important topic for development that can produce better results than the development of advanced technology.

Moreover, these materials are "often not advanced technology materials like ceramics and carbon fiber, but rather popular materials like aluminum and magnesium." (Director Shoichiro Irimajiri of Honda Motor Co) That is, the switch to alternative materials will usually mean improving existing technology rather than developing eye-opening new technology. And that is just where Japanese technology excels.

The Toyota Mark II shows the past direction of materials development by a Japanese automobile manufacturer. To start with, the steel which constitutes 60 percent of the total weight increased from 612 kg in the 1900GL (1900-cc displacement) in 1968 to 725 kg in the 2600 Grandee (2600 cc) of 1978.

At the same time, castings went from 138 to 140 kg, plastics from 36 to 55 kg, glass from 30 to 27 kg, aluminum from 30 to 43 kg, rubber from 50 to 63 kg, and cloth and leather from 74 to 39 kg, while copper and zinc remained unchanged at 30 kg.

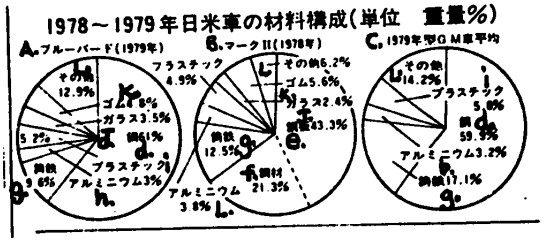
The percentage changes for various materials were +53 percent for plastics, +43 percent for aluminum and +26 percent for rubber, but -47 percent for cloth and leather and -10 percent for glass. Total vehicle weight went up from 1 ton to 1.2 tons, but because of the increase in engine displacement, this can essentially be considered a weight reduction. In other words, by using large quantities of plastics and aluminum, it was possible to hold down the increase in weight.

When the Nissan Laurel underwent a full model change in 1980, total vehicle weight dropped 85 kg below that of the old model. This included reductions of 10 kg from the chassis, 55 kg from the body, and 30 kg elsewhere, for a total reduction of 105 kg. However, there were increases of 20 kg to improve comfort, reduce noise, and increase safety, so the net decrease in weight was 85 kg. Needless to say, the use of alternative materials played a large part in achieving this decrease.

Since automobiles fill many needs, steps to reduce wieght are countered by factors that tend to increase weight, such as the desire for comfort. This trend is seen in lightweight cars, as in the Mark II and the Bluebird. Fuji Heavy Industries' small Rex, which went through a full model change last September, became more than 10 kg heavier because of 30 percent more window glass and a heavier fuel tank. This was balanced by the use of plastics and high-tension steel sheeting, so the total weight stayed about the same even though the car grew larger. These results could not have been achieved without the use of new materials.

Even though popular materials are used, the switch to alternative materials certainly cannot be made overnight. That is because there are pressing problems of cost, processing technology, and safety to be overcome. The extent to which these problems can be overcome will be a major topic of research and development by automobile makers.

(See table on next page)




Proportion of Materials (by weight) Used in 1978-79 Japanese and American Cars

| | | | |
|---|---|---|---|
| (a) | Bluebird (1979) | (b) | Mark II (1978) |
| (c) | GM average (1979) | (d) | Steel |
| (e) | Sheet steel | (f) | Other steel |
| (g) | Cast iron | (h) | Aluminum |
| (i) | Plastics | (j) | Glass |
| (k) | Rubber | (1) | Other |

[13 May 82 p 11]

[Text] Jump in Use of High-Tension Sheet Steel

As a part of the switch to alternative materials, the use of high-tension steel has made rapid progress in recent years. High-tension steel is stronger than ordinary steel sheets and can thus be made 0.1 to 0.05 mm thinner. Thus the weight of the steel sheets used can be reduced by about 10 percent.

The price of high-tension steel is higher than that of ordinary steel sheets, of course; according to a comparison of 1981 manufacturers' invoice prices. the cost is about 10 percent higher. But because the amount used is just 10 percent lower, there is no change in the automobile manufacturer's production costs. In short, the adoption of high-tension steel conserves resources to the extent that the volume of steel used is reduced, and this is a major factor in the automobile manufacturers' efforts to reduce weight and fuel consumption.

Nevertheless, it was rarely used in automobiles until the mid-1970's. That is because difficulties in forming high-tension steel made it useful only in very simple parts such as bumpers, doorguard bars, and seatbelt buckles.

Accordin ; to Japan Automobile Manufacturers Association statistics for 1963 through 1980, in the 4 years ending in 1976 the amount of high-tension steel used was only 0.2 kg per car, but the figure rose to 5.4 kg in 1977 and 6.4 kg in 1980. These are strictly average values; the amounts have jumped sharply for the new models after recent full model changes.

For example, the Nissan Bluebird, which had a full model change in November 1979, uses 40 kg of high-tension steel. That was followed by a sharp growth

in its use, with 70 kg in the Leopard (1980), 55 kg in the Laurel (1980), 80 kg in the Violet Revelta (1981), and 55 kg in the Skyline (1981).

The use of high-tension steel as a proportion of white metal body weight (weight of sheet steel for the body) has reached 15 percent for the Bluebird, 20 percent for the Leopard, Laurel and Skyline, and 33 percent for the Violet Revelta.

Large amounts of high-tension steel are used in Toyota cars as well. The first was the Cressida, with 56.2 kg in March 1980. That fall the Mark II had a model change which gave it 57 kg, and in 1981 the Carina and Celica increased to 70 kg and 90 kg, respectively. The Japanese passenger car that uses the most high-tension steel is the Soarer, newly developed in 1981, which uses 133 kg. Before that, the world leader in the use of high-tension steel was the Ford Escort, but the Soarer uses far more.

Toyota and Nissan cars are not alone; other cars which have undergone full model changes have added from 20 to 50 kg high-tension steel per vehicle. It is used in many parts, including hoods, front and rear bumpers, doors, and trunk lids. In Toyo Kogyo's popular Familia, for example, high-tension steel is used at 61 points in 32 parts, including the front frame, the front P-liner, the roof header, and hinge reinforcements. The total weight is 52 kg. And in the Soarer, which uses even more high-tension steel, it is found in major components like the steering column and engine brackets.

Last year Nissan made a survey of the use of high-tension steel and found that only 1,000 tons were used in the first half of 1979, but this figure rose quickly to 7,300 tons in the second half, to 7,600 tons in the first half of 1980, to 11,000 tons in the second half of 1980, and to 30,000 tons in the first half of 1981. It heads the list of high-growth materials.

The reason high-tension steel has become so widely used is that just when automobile manufacturers want lighter cars, they and the steelmakers have developed a technology to facilitate the shaping of the material; this had been an obstacle to its widespread use. Rapid advances are made when technology eliminates an obstacle. The widespread use of high-tension steel is proof of this quality of technology. In that sense there is no question that "high-tension steel will be used for 40 to 50 percent of white metal body weight in the near future." (Nissan Vice President Hiroshi Takahashi)

[14 May 82 p 11]

[Text] Full Use of Plastics Still in Future

The use of plastics in automobiles has been increasing at a pace as rapid as that of high-tension steel. There is nothing new, however, about the association of plastics with automobiles.

In 1941 Henry Ford, the automobile king, developed a "plastic car" using body panels of laminated phenol. And in 1953, America's General Motors (GM) developed its Corvette, which can be called the first real "plastic car" and was surprisingly popular.

Thus the use of plastics in automobiles began in the Unites States some 40 years ago, and practical applications are quite advanced. But this use had declined because plastics were inferior to other materials like steel in terms of workability and shock resistance; plastics did not return to the spotlight until the first oil shock of the early 1970's.

For example, consumption of plastics in automobiles in the United States in 1970 was 416,000 tons, but in 1977 it reached 815,000 tons. Now consumption is expected to be around 1 million tons per year. As can be seen from the use of about 100 kg of plastic in each of the "K" cars that Chrysler introduced into the market last year as a final move to overcome its management crisis, the use of plastics in different automobile parts is certainly spreading.

Plastics have a short history in Japan, and annual usage cannot be determined with accuracy. It is thought that usage has been similar to that in the United States.

In the case of Toyo Kogyo's small passenger car Cosmo, which went through a full model change last year, plastics are used in 18 parts: shock-absorbent bumpers, headlight housings, front grill, radiator tank, air cleaner, turn signals, battery case, outside mirrors, cowl grill, instrument panel, steering wheel, protective molding, seat trim, interior light, rear bumper, and hubcaps.

The Cosmo is not alone; recently, plastic shock-absorbent bumpers have become the most common application of plastics in small Japanese passenger cars. Metal bumpers are expected to disappear completely from Japanese passenger cars in the near future, and some manufacturers of metal bumpers have already been forced to close down or convert their operations.

The next most common application is for interiors. Cowl grills and panels are all being made of plastic, as are many P-rocker bars, seat covers, trim items, consoles, and angle wings.

Plastics have also come to be used extensively under the hood. Uses include windshield washer pumps, timing gear covers, transmission underpans, torque converter covers, and actuator housings. The Japanese automobile industry has lagged behind the United States in the use of plastics, but is undeniably switching materials rapidly.

However, many in the industry point out that "full-scale use of plastics is still a thing of the future." (Toyo Kogyo Director Takashi Mitsunari) According to estimates by the Japan Automotive Institute, the use of plastics is expected to show more growth in the 6 years from 1985 to 1990 than in the 6 years from 1980 to 1985. (see chart on next page)

The reason is that present plastics are not used in large-volumn applications. Quantities used will jump sharply, once plastics are used for hoods, fenders, doors, trunk lids, and soft facings. At present these parts are quickly being converted from ordinary steel sheets to high-tension steel, but it is possible they will be converted again from high-tension steel to plastics.

It cannot be said that moving parts now are being made of plastic. It is true, however, that all car manufacturers are conducting extensive research and development in regard to such applications. According to those in the industry, the parts in question include the drive shaft, transmission mount members, outer handles, rock regulator mechanism, rocker cover, timing sprocket, gas tank, seat frames, cab body, timing belt cover, and bumper beams.

Replacement of glass with plastic may be another topic of study. From the perspective of reducing the weight of a vehicle, a given area of glass weight even more than sheet steel. But because comfort is sought in passenger cars now, the glass area has been expanded, and this naturally results in heavier vehicles. Replacement of glass with plastic will be one of the automobile industry's most important technological topics.

Estimated Use of Plastics in Passenger Cars
(Source: Japan Automotive Institute Survey)

| Polymer | Growth Rate 1980-1985 | 1985-1990 | Major Parts |
|---|---|---|---|
| Polyurethane/RIM | 13.7% | 17.6% | RRIM fenders, doors |
| Polypropylene (PP) | 1.6 | 10.3 | bumpers, air-conditioner housing |
| Unsaturated polyester (FRP) | 26.6 | 26.0 | hood, wheels, doorseals |
| ABS (styrene) | -42.1 | -12.7 | |
| Polyethylene (PE) | 40.1 | 44.8 | gas tank, seat backs |
| PVC | -9.5 | -6.1 | |
| Nylon | 10.4 | -1.2 | oil pan |
| Synthetic textiles | -16.0 | -6.3 | |
| Phenol | -3.5 | -0.8 | |
| Polycarbonate (PC) | 62.5 | 17.9 | glass substitute, bumpers |
| Acryl | 3.3 | -6.5 | |
| Noryl (PPO) | 116.6 | 18.2 | instrument panel, exterior trim |
| Ployacetal | 27.3 | 0 | window hardware |
| Thermoplastic polyester (PBT/BET) | 13.6 | -24.0 | |
| All polymers (Annual Growth | +2.5% 0.5% | +10.1% 2.0%) | |

[15 May 82 p 9]

[Text] Cost of Aluminum Is Problem

This year, Toyota finally concluded with GM Holden, the Australian arm of America's General Motor's, for the joint supply of aluminum cylinder heads. Each year GM Holden is to receive 12,000 aluminum cylinder heads produced by Toyota's Australian subsidiary TMA (Toyota Manufacturing Australia).

Aluminum shows promise as a lighter material, and fairly large quantities are used in Japan in connection with engines. It is particularly popular for cylinder heads.

Large quantities of aluminum are used in the United States for transaxle cases, bumpers, brake master cylinders, air cleaners, brackets etc. Ford used 91 kg of aluminum parts in the 1981 Lynx, much more than is used in Japanese cars. Japanese cars, however, are far ahead in the use of aluminum cylinder heads. Toyota makes aluminum cylinder heads in Australia; it is these that are to be supplied to GM Holden. Nissan and Mitsubishi also plan to make aluminum cylinder heads in Australia and import them into Japan.

Of course cylinder heads are not the only use for aluminum. In Toyo Kogyo's popular Familia, for example, it is used in 16 areas: battery body parts, rocker arms, intake manifold, cylinder head cover, cylinder head, pistons, timing gear case cover, gearshift case, clutch housing, oil pump housing, transmission case, fuel pump body, automatic transmission control body, room cover, steering gear cover, and wheels. Of existing cars, it is probably the one in which aluminum is most widely used.

Toyo Kogyo's Cosmo and Lucie went through full model changes last year, and the overall weight of each was reduced by 50 kg; 4.2 percent of that reduction was achieved by replacing steel with aluminum

Of course, "to reduce much weight by using aluminum, it is necessary to make aluminum cylinder blocks." (Director Yoshio Nakamura of Fuji Heavy Industries' Product Design Division 2) The engine in Fuji Heavy Industries' small passenger car Leone (1,300 to 1,800-cc displacement) is the only Japanese aluminum cylinder block. Because the cylinder block is the central portion of the engine, making it of aluminum takes us one step nearer to a real aluminum engine. Making the cylinder block of aluminum requires changing the engine production line itself, so relatively little progress has actually been made, even by the Japanese automobile industry, which has the use of aluminum as a goal.

Nevertheless, the number of small parts which have been converted to aluminum is gradually accumulating, and the metal has come to play a significant role in weight reduction. In the case of the Toyota Mark II passenger car, for example, comparison of the 1968 model 1900GL (1,900 cc) and the 1979 model 2600 Grandee (2,600 cc) shows an increase in aluminum from 30 kg in 1968 to 43 kg in 1979; this is a growth rate of 43 percent, second only to the 53 percent rate for plastics.

The problems with switching over to aluminum are that production costs are high, and also that the market price of aluminum ingots is not stable. To start with, the cost of electricity to refine the aluminum is unbelievably high. According to Japan Automotive Institute figures on energy consumption for materials used in automobiles, production of a ton of steel requires the energy equivalent of 0.45 kiloliters of petroleum, but aluminum requires 6.6 kiloliters. In other words, aluminum takes 10 times more energy. To cope with the high cost of aluminum produced in Japan, Toyota is considering

building an aluminum plant in Canada, where electricity is cheaper, and has begun an on-site feasibility study.

Thus there is some progress in conversion to aluminum. In fact, as Nakamura says, "Even though production costs are high, there are still advantages to using aluminum." The aluminum project research done by one auto manufacturer shows good results for many parts, including yokes, sprockets, shift cases, radiators, hoods, extension bars, roller arms, control rods, brake pedals, and master cylinders. The number is greater than for any of the other alternative materials for automobiles.

[19 May 82 p 9]

[Text] Ceramics Best Suited for Engines

The "news" at the beginning of this year about "the world's first car with a ceramic engine" provided a bright topic for living room conversation. As this was the dream engine which would greatly improve fuel economy, the news attracted attention when Tokyo's Kabutocho stock market reopened, and that day saw great advances for the stocks of Isuzu Motors and Tokyo Ceramics, the joint developers of the engine.

It is certain that the two companies have been working together on development of a ceramic engine. This research has been carried out with 200 million yen grant for research and development of important technology; the ceramic engine (three cylinders, 2800 cc) developed in Tokyo Ceramics' Kagoshima integrated laboratories was put in Isuzu's small Gemini passenger car and test driven on the Yogan highway near Sakurajima. Running at a top speed of 50 km/h, it achieved a fuel consumption 30 percent lower than existing diesel engines, in addition to running much quieter.

Ceramics first gained considerable attention as a material for automobile engines. The reason, as explained by Takeshi Nakatsuka, Isuzu director and development chief, is that "combustion chamber temperatures in present cast iron or aluminum alloy engines, whether water-cooled or air-cooled, have to be kept below 800° C to prevent sintering. But if ceramics with their superior heat resistance are used for cylinders and pistons, combustion chamber temperatures can go up to 1,100 or 1,200° C, which improves fuel efficiency and allows more power. Moreover, a cooling system becomes unnecessary, so there is no need for a radiator or fan. That means a reduction in engine weight."

A metallic engine loses 33 percent of fuel energy in exhaust gases and another 33 percent to the cooling system, so only the remaining 33 percent can actually be used for motive power. In a ceramic engine, on the other hand, the energy which would have been lost to cooling in a metal engine can be put to use, yielding a 33-percent savings in fuel. A car with a ceramic engine tested at Sakurajima did show theoretical fuel savings of 30 percent. That is the reason the ceramic engine is called the "dream engine."

This is not to say that the era of the ceramic engine is about to arrive. The reason is that ceramics are basically a brittle material. Because safety is a primary consideration in materials for automobiles, brittleness is a grave defect.

Another reason is that the difficulty of processing ceramics is a bottleneck in making ceramic engines practical. Uniform quality and the ability to be mass-produced are absolute prerequisites for automobile parts. In that sense, the true era of the ceramic engine is still well in the future.

Ceramic parts are, however, increasingly being used in automobiles. The "new ceramics glow plug" jointly developed last September by Isuzu and Tokyo Ceramics is the world's first. This ceramic glow plug, which has the brand name "Ultra QOS," succeeded in reducing the warmup time for diesel engines from the conventional 3.5 seconds to zero.

The temperature of the glow plug exposed to combustion in the combustion chamber of a diesel engine can reach 2,000° C. Conventional glow plugs made of magnesium oxide and alumina are not capable of high amperage heating and thus require a warmup period. The "new ceramic glow plug," on the other hand, has high thermal impulse resistance, and so the waiting period before starting is eliminated completely. This technology would not be possible without ceramics. Isuzu already uses it in the Gemini, and its use will spread to other cars as well.

Beyond Isuzu's glow plug, Japanese auto makers are now actively grappling with the use of ceramics for moving parts peripheral to the engine. Particularly promising candidates for conversion to ceramics are manifolds, liners, pistons, auxilliary combustion chambers, camshafts, tappets, and turbochargers; it appears ceramics will become practical for these major parts in the near future.

There was a time when the ceramics used in automobiles were limited to a very few items like window glass, headlights, and spark plug insulators, but now ceramics are becoming practical for important applications. Although Isuzu Motors says the use of ceramics for the engine itself is still in the future, the use of ceramics in automobiles is making steady progress. Japan has a long tradition of technical developments in ceramics in connection with china and porcelain; to that extent there is a great hope for future development.

[20 May 82 p 9]

[Text] Reduced Friction With Sintered Alloy

The new Laser 1S engine in Toyota's small Carina passenger car, which went through a full model change last July, uses a variety of new technologies. Notable features, in addition to the world's first electronic fuel-to-air ratio control system and the world's first vibration-proof air cleaner, are the hollow sinter alloy camshaft and the sinter forged connecting rods.

The hollow sinter alloy camshaft is the world's first practical version; the sinter forged connecting rod, although predated by that of Porsche, is also on the leading edge of international technology. The most highly praised feature of the Laser 1S is these sinter alloys being used where they are needed.

The use of sintered alloy for automobile parts became common at the beginning of the 1940's. While the use of high-tension steel, plastics, and aluminum has the goal of reducing fuel consumption by reducing weight, the goal of powder metallurgy is to reduce the cost and improve the quality of parts. It is not accurate to speak of new materials in this case, but the use of powder metallurgy is continuing to grow steadily. Cost competition in the battle of the 1980's for world automobile supremacy has become more intense in the past few years, and so the advantages of sintered alloy as a cost strategy have come to be reevaluated.

Automobile parts account for over 60 percent of Japan's sintered alloy products; each vehicle has 20 to 30 parts totaling about 3 kg.

These parts include valve seats, crankshaft bearings, torque converter clutch plates, distributor points, camshaft thrust plates, shock absorber plates, doorlock strikers, oil pump gears, timing pulleys, and transmission clutch hubs.

The most commonly used sinter alloy parts are valve seats. These were developed for use with unleaded gasoline, and are now used in most gasoline engines and some diesel engines.

Earlier valve seats were cast-forged products, and friction between the seat and the valve tended to be a problem. Sinter alloys, on the other hand, use elements with high heat-resistant, friction-resistant elements that are then impregnated with lead for enhanced lubrication. In other words, it is the use of unleaded gasoline that has made sintered alloy most suitable for valve seats.

Other parts to which sintered alloy is well suited include crankshaft bearings, torque converter clutch plates, and distributor points. Sintered alloy also makes possible lower costs for shock absorber parts, oil pump gears, door lock strikers, transmission clutch hubs, timing gears, etc. Sinter metals differ greatly from high-tension steel, aluminum and plastics, which have gained attention because of their goal of reducing engine weight.

There is a similarity, however, in that parts using sintered alloy have become more numerous, larger, and more complex. In Europe, for example, the crankshaft pulleys of the 2,300-cc Rover have the same weight, 2 kg, as those in 2,600-cc cars. This is the largest single sinter alloy automobile part in the world. The powder metallurgy camshaft pulley of the Volkswagen (VW) Golf, Passart and Audi weighs only 0.63 kg, but its diameter is a full 135 mm. The sinter alloy connecting rod in Toyota's Laser 1S engine comes right behind the VW product in deserving notice.

In Europe and the United States, aluminum-based sintered alloy products are beginning to be noticed in addition to ferrous sintered alloy. Ferrous parts have contributed to reductions in cost and improvements in quality for some time; those made with aluminum have added significance because, in addition to those merits, they respond to the demands of the era of lighter vehicles.

Italy's Fiat Co, for example, has built a rack-and-pinion pallet for steering boxes using aluminum powder metallurgy, and it intends to expand use of that part. In the past, the sintering of aluminum alloys has been considered a problem in terms of volume production because sintering was hindered by the film of surface oxidation on the powdered aluminum. But recently there have been improvements in production technology, including antifriction agents and regulation of the sintering atmosphere; facilitation of volume production has further encouraged the adoption of sintered alloy.

It has thus become quite possible that sinter alloys, both ferrous and aluminum-based, will come to be extensively used in automobiles.

[21 May 82 p 9]

[Text] Light and Plentiful Magnesium

"It seems not to be generally known, but if there is going to be any big switch in materials in the next few years, it will be to the use of magnesium. There is an unlimited supply of magnesium on earth, and the move to magnesium will spread quickly, once it begins." These are the words of the deputy director of Honda Laboratories (and a director of Honda Motor Co), Shoichiro Irimajiri, regarding the future of magnesium as material for automobiles.

Seawater has a magnesium content of about 0.1 percent. Considering the vastness of the oceans, this is an unlimited supply. To illustrate, Japan now uses 20,000 tons of magnesium per year--an amount equivalent to that contained in a cube of seawater measuring a mere 250 meters on an edge. Moreover, minerals like dolomite contain magnesium in the form of magnesium carbonate or magnesium oxide, produced in Japan in large quantities.

Magnesium has been noted as a material for automobiles because it has great mechanical strength and a specific gravity of 1.74, lighter than that of aluminum. It is one quarter the weight of iron or lead, and a third the weight of aluminum. The surprising thing is that the automobile industry, which has taken great pains to reduce vehicle weight, has not been using magnesium.

Magnesium has been used in automobiles in Europe and the United States for over 50 years. VW's famous Beetle used over 20 kg in magnesium parts. These parts included the crankcase and the transmission housing, and it is said a total of 38,000 tons of magnesium had been used by the time production of the Beetle stopped in 1980. GM used it in fuel pumps for about 20 years, beginning in 1956.

This is not to say Japan has no experience in the use of magnesium. A good deal was used in the R360 Coupe that Toyo Kogyo developed around 1960, in such parts as the clutch housing, cooling fan, front cover, valve rocker cover, oilpan and transmission case.

Since that time, however, magnesium has come to be used only rarely in Europe and not at all in Japan and the United States. The reason is that it is more costly than aluminum.

Magnesium has come back into the spotlight because fuel costs have quickly increased the need for lighter automobiles. GM used magnesium in the rocker arm cover of its 1981 Chevrolet Corvette engine (5,700-cc V8), and Ford used it in Lincoln steering housings. Industry sources say that Ford will adopt two magnesium parts for its 1982 pickup trucks, and that GM will use magnesium engine assembly brackets in cars to be introduced soon. In addition, GM is going to use magnesium for EGR valve plates, and Ford for steering column lock housings; its use in moving parts is being considered quite actively.

But Japanese automobile manufacturers, who are said to produce cars that are the world's most advanced in terms of quality and capabilities, are behind Europe and the United States in the use of magnesium. Its share has gone to aluminum because (according to an aluminum manufacturer) "its cost is from 1.6 to 2.0 times that of aluminum."

Now that the cost of aluminum is increasing year after year, there is a very good chance for a rapid shift from aluminum to magnesium. The companies are all rapidly carrying out research and development regarding the practical use of magnesium.

According to technical personnel of one auto maker, parts which will one day be made of magnesium include clutch housings, torque converter housings, steering lock housings, alternator end plates, alternator brackets, steering gear boxes, cylinder head covers, oilpans, starter end plates, wind regulators, mission cases, mission support brackets, and disk wheels.

Irimajiri points out, "When you mention changing materials in automobiles, people think of new materials like ceramics and carbon fiber, but actually there is still a lot to be done in using more popular materials." Magnesium is truly an illustrative example of popular materials in that sense.

[21 May 82 p 9]

[Text] Design Changes for Efficient Use of Materials

The central theme at the Swiss automotive parts show SiTEV '82, held in Geneva from 11 to 14 May, was the switch in automobile materials. SiTEV is Europe's largest trade fair for automotive parts; this year about 1,700 producers from around the world took part and displayed numerous parts using new materials. The most noteworthy feature was the expanded use of plastics and aluminum.

The plastics exhibited by DuPont Corp, the largest manufacturer of plastics in the United States, were a good illustration of how much is possible in the use of plastics for automotive parts. DuPont guides proudly showed "all the parts that can be made of plastic," from bumpers to expected items like interior panels, and even body panels and engineering plastics in the engine compartment.

Active application of plastics in seats, gasoline tanks, and a unit combining the bumper and air skirt was shown. The same was true of aluminum. The most numerous items were those in connection with wheels and cylinder heads. Aluminum has been used for cylinder blocks and steering assemblies. It can be said that a worldwide tide of alternative materials for automotive parts could be seen.

Japanese auto and parts manufacturers have all been making practical use of plastics and aluminum for these parts. Japan has actually taken the lead in the use of aluminum for cylinder heads. Japan's auto makers could even make experimental plastic cars, like that of DuPont, without too much difficulty. That is the reason many of those from Japan's automobile industry who looked around at SiTEV '82 said there was almost nothing to learn there.

But is there really nothing to be learned? Managing Director Hiroshi Yamada of Chiyoda Seisakusho (in Ota, Gumma), which has a cooperative relationship with Fuji Heavy Industries, says emphatically, "It may be true that there is little to learn about alternative materials themselves. But there is a great deal to learn about planning and design changes to accompany alternative materials. Europe and the United States are still ahead on this point."

As Yamada says, the maximum effect of alternative materials cannot be developed by just substituting plastics or aluminum for sheet steel. A greater effect can be obtained by changing plans and designs. In a sense, there are times when the effect of the planning and design changes accompanying the use of alternative materials is greater than the contribution of the materials themselves. In other words, it is no exaggeration to say that without planning and design changes, the advantages of alternative materials are cut in half.

For example, the world's first hollow sinter alloy camshaft developed by Toyota last year for the Laser 1S engine, is epoch-making technology which added a design change to an alternative material. Standard camshafts are forged (and partially cast), but that for the Laser 1S is made of hollow steel. It is made by setting component parts like sinter alloy cam pieces and steel journals and gear pieces into the hollow shaft in order and bonding the assembly at high temperatures. In addition to allowing a reduction of 0.9 kg from the weight of standard camshafts, the hollow design has drawn out such advantages as (1) allowing use of the hollow portion as a route for oil pressure, and (2) enabling selection of the most suitable materials for components like cams and journals. This is truly a skillful meshing of alternative materials with design changes.

In general, many shafts are used in automotive parts. These shafts often need lubricating and lightening holes. It would be logical, therefore, to make these shafts of hollow pipe. In practice, however, pipe is hard to work, and it is hard to bond the related components to the pipe, and so only limited use is made of pipe. In the case of camshafts, especially, no other manufacturer had succeeded in using a hollow shaft.

Many planning and design changes to accompany alternative materials were found at SITEV. Although there was no technology of epochal significance, one can say future automotive technology was forecast by plans and designs which differed greatly from the present situation in Japan. Although the alternative materials technology of the Japanese automobile industry is advancing, it is still in the beginning stage in this regard. It will be necessary to step forward into the second stage.

[26 May 82 p 12]

[Text] Future Topics

The switch to alternative materials in automobiles has gone forward with unprecedented speed in the past few years. Societal demands for improved fuel consumption, comfort, drivability, economy, cost, and safety have provided the setting for technological development. These societal demands are going to increase, not slacken. If responding to these societal needs is to be the mission of the automobile industry, the use of alternative materials must continue to be an important topic of technological development.

It is certain, however, that there are many tasks involved in the use of alternative materials. One aspect of these is the technical task involved in conversion, including the problems of cost, forming and processing, and safety. Another aspect is the social effects accompanying conversion to alternative materials. Manufacturers of steel bumpers, primarily plating companies, have already been forced to abandon or change their line of business. It cannot be assumed that there will be no other industries which will have completed their role in society like this.

Aside from this second aspect, the technical tasks are not limited to the automobile manufacturers; makers and processors of materials will have to join in elaborate research projects. In addition to the joint research on ceramic engines by Isuzu and Tokyo Ceramics, other major manufacturers have been putting effort into joint research and development.

One particular problem in the case of ceramics is to increase workability and somehow overcome the problem of brittleness. As long as automobile parts must be produced in large quantities, materials which are hard to process will not be appropriate. First of all, poor workability means high costs, and costly parts cannot be adopted by the automobile industry, whose first premise is the ability to compete internationally.

This first point--high cost--has become a bottleneck for increased utilization of aluminum. When aluminum is refined in Japan, where power costs are high,

the cost of materials is nearly double that in foreign countries. To avoid this cost, Toyota, Nissan, and Mitsubishi Motors have decided to establish local subsidiaries in Australia and import aluminum parts into Japan; this may be one more approach to the increased use of alternative materials. Other technical tasks in regard to switching over to aluminum are improvement of surface processing methods and techniques for bonding aluminum to other metals.

Upgrading workability is as much a task for hollow pipe as it is for ceramics. It is necessary to make holes by drilling, and unless some radically new method with an impact on quality and cost can be found, it will be difficult to use hollow pipe in large quantities.

It is said that magnesium "could be used in large quantities if only it were cheaper." At present, magnesium costs from 1.6 to 2.0 times as much as aluminum. If this cost difference grows smaller and the need for lighter vehicles grows more urgent, "a complete switch to magnesium will become possible." (Honda Director Irimajiri)

The problem with plastics is the switch from one plastic to another: from PP (polypropylene) to PE (polyethylene), or from ABS (a styrene) to RFP (reinforced plastic). There may be little future change in plastics for interior and exterior trim, but there will be conversion from other plastics to engineering plastics when resistance to heat and vibration is needed.

One of the heaviest materials used in automobiles is glass. A larger area of glass results in a heavier car. There has been a tendency, nevertheless, to increase the glass area in recent cars in the pursuit of comfort. That is, there is movement in a direction opposite to the current need to reduce vehicle weight. Replacing this window glass with plastic would certainly mean a great reduction in weight. Toyota switched to plastic headlights in its small passenger car Carina, which went through a full model change last year. This is a modest change, but one of great significance for the current trend. But even Toyota says that "changing the windshield and everything to plastic would be difficult because of the problem of visibility." This may be the largest remaining point for use of alternative materials.

Toyo Kogyo Director Takashi Mitsunari says, "One thing we manufacturers have to pay more attention to is that in switching to alternative materials, we may start on the road to self-destruction by losing the leadership in developing and applying new materials ourselves." In other words, it is possible that the initiative in developing new materials, now held by the automobile manufacturers, will be snatched away by the manufacturers of new materials. Such a trend is already apparent in Europe, and it has weakened the development abilities of the car manufacturers. Will the leadership in use of alternative materials be held by the manufacturers of cars or of raw materials? This is the remaining big problem facing the automobile industry as it switches to alternative materials.



9601
CSO: 4106/124

END