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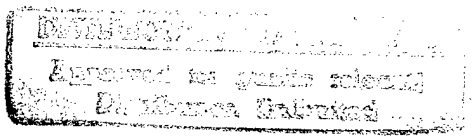

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Deutsche Airbus Tests Composites for Wings

92WS0510A Duesseldorf HANDELSBLATT in German 22 Apr 92 p 26

["Carbon-Fiber Composite Wing Tested for New Regional Aircraft"]

[Text]

Deutsche Airbus/Advantages of Carbon-Fiber Reinforced Plastic Over Aluminum

The success of a new passenger aircraft is based on the sum of all first-class technologies used for this aircraft. Besides advanced wing developments, these technologies include rational and intelligent functional design of all systems, advanced cockpit and cabin design, economical and ecological power plants, and primarily the use of new materials. These materials make a substantial contribution to reducing operating expenses due to their low weight.

Deutsche Airbus GmbH has 23,000 employees in 10 factories. While looking for a new type of material for airframe construction, they bet on a material consisting of carbon-fiber reinforced plastic. Research and use of this material for manufacturing aircraft have shown in the meantime that carbon-fiber composite material has proven its value over conventional aluminum.

The clear advantages of carbon-fiber reinforced plastic are low weight, no corrosion and a longer life. Carbon-fiber reinforced plastic is a material consisting of the two components, resin and fibers. A number of carbon fibers are embedded in a resin matrix. Carbon fibers are pyrolized plastic threads "baked" with the resin to form a hard, high-strength material. Curing takes place in an autoclave. This is an oven that operates under pressure at temperatures from 125 to 180°C with a curing time of 60 to 120 minutes.

An experimental wing has been created in the Stade factory, the plastics center for Deutsche Airbus. Only the moving parts such as the landing flaps, rudder, spoiler or brakes are still missing. The advantages of a carbon-fiber reinforced plastic wing over an aluminum wing fall into three areas. The weight of the wing is about 20 percent less, the plastic structure is absolutely impervious to corrosion, and the wing behaves in a manner far superior to any metal with regard to repetitive loads.

The wing frame has already successfully passed the first static tests. The characteristic data determined during these tests agree with the calculated prognoses of the engineers. The knowledge obtained to date forms the basis for deciding whether a wing frame will start series production in the future. This knowledge particularly includes the detailed tests of expected manufacturing costs. The carbon-fiber reinforced plastic wing frame could then be used for a new regional aircraft and for larger transport aircraft.

Introduction of ISDN to Eastern Germany

92WS0510B Berlin ING DIGEST in German Apr 92 p 31

[Article by Ingo Paszkowsky: "No Interference and Ten Times as Fast"]

[Text]

ISDN Digital Network

The Integrated Services Digital Network (ISDN) of the German Federal Post Office company Telekom is gaining acceptance. Companies are no longer holding back and are ordering connections. Telekom is promoting innovative, commercially realistic and conceivably self-supporting projects, both financially and personally.

Expanding ISDN to 100 percent coverage will be achieved in the old laender by the end of 1993. This is possible by the auxiliary activation of connections in conventional local telephone areas to local telephone areas already capable of ISDN. According to Telekom, "almost total coverage" was provided in the old laender at the end of the previous year. Eighty percent of all business customers can use ISDN.

From Rostock to Zwickau in 1992

It will be possible to provide 100 percent coverage in the new laender by 1994-95. Economic areas with a high population density have priority. The first connections will be established in 1992 in Rostock, Magdeburg, Leipzig, Dresden, Erfurt, Chemnitz, Neuruppin, Eisenach, and Zwickau. At this time, the number of connections is increasing rapidly. More than 50,000 base terminals and about 5,000 primary multiplexing terminals have already been sold.

The base terminal is attached by way of the conventional copper line. It has two base channels and one signaling channel. A maximum of eight terminals, including four telephones, may be connected to up to 12 ISDN jacks. As two channels are available, two terminals may be operated at the same time. In addition, it is possible to switch services. A telephone conversation may be interrupted to send a fax without disconnecting the line.

Small to medium-sized digital communications systems are connected to the ISDN by way of one or more base terminals. Larger systems require one or more primary multiplexing terminals. This type has 30 base channels and one signaling channel.

The private user, usually a telephone customer, would gain nothing from ISDN except higher costs. At this time, ISDN telephones are very expensive. However, for companies, even for smaller companies and professionals, the new technology is interesting for at least two reasons:

- Digital transmission of information decidedly increases the transmission quality. Faulty faxes are a thing of the past.
- The transmission speed, at 64 kbits/s is higher than in the analog network. Telefax, BTX, Teletex and data transmission are much faster. In the analog network, data are usually transmitted only at speeds between

2.4 and 9.6 kbits/s. With ISDN, one BTX page reaches the recipient in 0.2 s. On the analog network, this takes 10 s.

The high degree of acceptance of the network results finally from the connection of ISDN and the PC. The personal computer has become a multifunctional terminal. With ISDN, additional circuit boards (cards) inserted into the PC, and appropriate software, all services are available at the workplace. Faxes and files can be transmitted directly from a PC at company A to a PC at company Z. At almost the same time, both employees can converse on the telephone and make any changes necessary.

The Proper Interface Must Be Available

When acquiring an ISDN telecommunications system, care must be taken that it also provides the S0 (S Index Null) interface on the private branch exchange side. This is the interface on the base terminal. With it, non-voice terminals can be operated in the system without trouble. A company ISDN telecommunications system is advisable precisely in the new laender because the copper lines of the telephone system present in older buildings can be used. The PC and telephone can be connected to the same jack. No expensive special cable is needed to network the computers.

Many factors play a role in deciding whether the connection to ISDN works out for a company. One obstacle is the prices, some of which are horrendous, for the terminals. A telephone capable of using ISDN costs 1000 German marks [DM] and the fax unit necessary for Group 4 costs DM10,000. For this money, it can transmit a fax at 64 kbits/s. However, as a rule, a Group 4 fax can only communicate with a device from the same group. Adapters can make the terminals used up to now connect to ISDN.

However, that should only be a temporary solution because almost all the advantages of ISDN are lost. The connection fees for dial connections depend on the duration and distance but are independent of the service used. For all connections, 23 pfennigs per time unit are billed. In this way, the data throughput can be increased tremendously without higher fees.

Germany: Laboratory for Space, Low Gravity Research

92WS0551B Duesseldorf HANDELSBLATT in German 7 May 92 p 24

[Article by Silvia von der Weiden]

[Text] With a view to long-term international space projects which are on the agenda, bioscientists and engineers in the Federal Republic of Germany are working on the development of a closed life support system which can be used in space. The researchers have in view not only the self-sufficient maintenance of astronauts, but also completely terrestrial questions, such as the explanation of still unknown mechanisms in the complex interaction of biological and ecological cycles.

The goal was to create a laboratory which would make it possible to carry out in space experiments with aquatic organisms, either plant or animal, explained Professor Volker Bloum, biologist at the Ruhr University of Bochum (RUB) and coordinator of the Cebas-Aquarack Project of the German Space Agency (DARA). The Cebas-Aquarack space aquarium consists of a zoological and botanical component and is the German contribution to the Columbus Space Station. The intended starting date for the space venture, which is under American direction, is at the turn of the century.

At the present time the Cebas-Aquarack system is still only partially closed, which means that food for the animals and power for operation must be fed in from the outside. "Together with Russian colleagues we have a concrete plan to close the system completely. By so doing we will construct a food chain which reaches from microalgae to tiny radiolarians and crustaceans, and finally to fish," said the Bochum scientist, outlining the biological concept of the artificial ecosystem.

In the animal-model of their chief specimen—a viviparous tooth carp—the scientists wish to analyze representationally the behaviour of vertebrates under space conditions. The chief focus of interest is on questions concerning the influence of weightlessness and other altered environmental conditions in space on the hormone-controlled reproduction of animals. The biologists also wish to clarify whether and to what extent the high-energy particle fraction of cosmic rays causes damage to the genetic make-up of fish.

In addition to this the scientists wish to track down a well-known space problem. Even during relativley brief sojourns in space osteoporosis, a demineralization in the bones of the astronauts, occurs. This is a critical matter in terms of future long-term sojourns of humans, for example, on a lunar base.

The botanical component of the system constitutes the basis for a closed life support system in space, since oxygen, which all animals require for breathing, will be produced only by plants through photosynthesis. The experimenters at Aquarack decided on hornwort, an aquatic plant with high nitrate consumption. The plant absorbs not only the ammonia-containing excretions of the fish, and brings them back into the cycle, but also consumes the exhaled carbon dioxide, and in return furnishes vital oxygen.

Various filters remove the food remnants and dead animals and bacteria, and in interaction with a heat exchanger, a subordinate ultraviolet ray disinfector, and a circulation pump provide for healthy conditions and constant water quality in the 70-liter aquarium. A miniaturized version of the system has already been designed for the measurements of the insertion elements of the Space Lab.

In terms of control engineering a closed life support system puts forward enormous demands. "Our system must run for at least 12 months in supervised operation, and the experimental unit should react very flexibly in terms of its expansionability," said Diploma-Engineer Eckhard

Becker, the technical scientist in charge of the project (RUB), summarizing the crucial points of the idea.

Many indispensable systems were designed in duplicate for reasons of safety. In the nature of things, however, in space projects the availibility of space is limited; weight restrictions and cost calculations also play a decisive role.

The repertory of measured quantities is impressive. Temperature, oxygen content, and pH value furnish the experts with direct reports as to how well the quality range will be maintained in which the aquatic organisms can remain healthy. Ammonium and nitrate concentrations on the other hand indicate the pollution of the water with poisonous animal metabolic products. At every moment an efficient central computer is recording the abundance of data and information, and maintains the balance of the environmental conditions inside the Aquarack within a very narrow range of equilibrium.

Until now the only successful artificial ecosystem in the world has been the Russian Bios-3 Project, which for a long time was secret, and consequently barely noticed. Soviet scientists were able to keep an artificial ecosystem in operation for two years, although "only" on the basis of a plant food chain. The Bochum scientists now wish to progress to the optimization of the Cebas-Aquarack system for the purpose of producing animal protein, in cooperation with the researchers who once took part in the Bios-3 Project.

ESA Meets on Long-Term Strategic Plan

92WS0596A Paris AFP SCIENCES in French
6 May 92 p 3

[Unattributed article: "ESA Member Countries Consensus on a Staggered Strategic Program"]

[Text] Paris—According to a reliable source, a veritable consensus was reached on 30 April at a council meeting of the European Space Agency (ESA) which considered a long-term "strategic plan" that might be staggered over three, five, or 10 years, in accordance with the decisions made at the Munich space conference of 18-20 November 1991.

"A true debate took place among the delegations of the 13 member countries on the internal document called 'Strategy-3' and its several scenarios" concerning the agency's large programs: Hermes, Columbus, etc., an ESA spokesman indicated. "After this 'dynamic start,' the delegations agreed to meet again on 25-26 May in Bruges. The proposals made concerning the Strategy-3 plan do not include estimates. For the time being, this is an ESA internal document."

The delegations also acknowledged the need for all-out "international cooperation" in the space sector, a wish that was also expressed at the recent minister-level European space conference. The organization of this new council meeting in May also reflects the need to act fast, the spokesman indicated, especially considering that there are only seven months left before the next minister-level conference, scheduled for November in Spain.

The May meeting will serve to advance the dossiers in preparation for the agency's council meeting of 24-25 June. A last meeting, on 14-15 October, should finalize the documents to be submitted to the ministers in November. The ESA general director, Mr. Jean-Marie Luton, could therefore already take advantage of this mandate during the discussions he will have at the Space Agencies Forum organized in connection with the International Space Year (SAFISY), on 6-7 May, in Pasadena (California).

ESA Reactivates Giotto Space Probe

92WS0597B Paris AFP SCIENCES in French
14 May 92 p 14

[Unattributed article: "Giotto Probe Reactivated After 2 Years of Sleep"]

[Text] Paris—The Giotto space probe, which is now 219 million kilometers from the earth, was reactivated 7 May after two years of sleep to continue its mission towards the comet Grigg-Skjellerup, announces ESA [European Space Agency].

Giotto, which was placed "in hibernation" in July 1990, was "awakened" by the specialists of the European Space Operations Center (ESOC) at Darmstadt, Germany. Operations began on 4 May and the engineers had to make use of the 70 meter antenna of NASA's far space network, installed near Madrid, as well as its 95 kW transmitter to send commands to the probe.

"At such a distance," an ESA spokesman stresses "it takes about 24 minutes for a command to reach the probe and for its response to reach us." The first signal transmitted by Giotto arrived at Madrid on 4 May at 1614 UT, approximately 75 minutes after the beginning of operations (1455 TU), "indicating that the satellite was still in operating condition after spending seven years in space." It was also determined that Giotto was rotating around its axis at a rate of 14.93 rpm.

Giotto's adventure began on 2 July 1985 at Kourou in French Guiana, under the nose cone of the Ariane rocket, and, in March 1986, the probe brushed past Halley's Comet, and observed its nucleus and took remarkable pictures of it. After this exploit, Giotto is now setting out on a new phase of its mission of exploration of the solar system: It has a rendezvous on 10 July with the comet Grigg-Skjellerup, at 214 million kilometers from the earth.

DLR Acquires Eastern German Research Center

92WS0603B Berlin ING DIGEST in German
Jun 92 pp 66-67

[Article by: Rainer Althaus: "DLR Research Center Returns to its Roots"]

[Text] In Berlin, where 80 years ago the German Experimental Facility for Aviation [DVL] was founded, its successor organization has now established its sixth national branch. The newest work section of the German Research Facility for Aviation and Space e.V. [DLR] is now part of the nine new branch offices of major western German research establishments.

A chapter of German aviation history took place in the district of Adlershof. It was there that in 1913 the first wind tunnel with a performance capability of 50 m/s was built. In 1916, with the events of World War I, the DVL test center for army-support aircraft was established, and in 1922 normal activities were again resumed. Between 1930 and 1939, the facilities were substantially expanded. Later, in the aftermath of the World War II, DVL discontinued all activities in Berlin. When the GDR Academy of Sciences undertook space studies, there was again work in Adlershof, culminating in the establishment of the Institute for Space Research.

Now the DLR has incorporated that inconspicuous facility on Rudower Chaussee in southeastern Berlin. With respect to employees, including also the satellite ground station in Neustrelitz, the new branch office represents scarcely 10 percent of the engineering and scientific capability of the major research establishment—the DLR. But, perhaps, this inconspicuous piece of property may turn out to be a choice cut. The business director, Dr. Wolfgang Keydel, an experienced DLR manager, is appalled at "the condition of the building, considering its age," and, mindful of the piles of junk and galvanized bathtubs slopping over, reproaches what he sees as "at best the indifference and poorly developed aesthetic sense" of the otherwise "strongly motivated, competent workers." Keydel has high praise for the scientific work that was carried out in this facility. With respect to the level of its research, he pulls no punches when he says that "as a West German, I feel like a Yankee who visits the southern states, and sees how slowly everything seems to move."

Keydel has now been in Berlin Adlershof over a year, and comments frankly that "in my whole life, I have never learned so much as I have here in the passing months." The physicist Keydel, who directed the DLR Institute for High-Frequency Technology in Munich-Pfaffenhofen, has had many talks with his new colleagues, in the course of which he could assess their qualifications, but also "learn about the incredible events of recent history." Even before the Scientific Council, within the framework of its scientific evaluation of former GDR facilities, passed judgment on the Institute for Space Research, the DLR's research section communications technology evaluation program had been in contact with Adlershof and had come to its own evaluation. Keydel, who is also in charge of the aforementioned DLR research section, respectfully reported "outstanding results."

Shortly after this, the Scientific Council proposed that this former institute of the GDR Academy of Sciences be incorporated in the DLR. Because the Adlershof activities fit into DLR's field of specialty, Dr. Wolfgang Keydel was sent to Berlin to direct the build-up of a worthy research center. "Work is being carried out on the design of a wide-angle camera, with considerable intelligence, for the Mars mission in 1994. We in Oberpfaffenhofen were developing a camera with very high resolution for that purpose. The two projects now complement each other beautifully; they have been converged into a single project." The people in Munich were astounded that such sophisticated space hardware was being built in eastern Germany. Commenting on this, Keydel said: "It is truly remarkable that that could have been done here."

Other research activities in Adlershof are directed to the development of sensors to be used on earth-reconnaissance satellites, or more specifically to sensors designed for the intelligent acquisition of information concerning processes or conditions on the earth's surface, the lowest possible data rates in transmitting to earth, and sensors that can withstand space hazards and sometimes harmful radiations. Keydel, the temporary director, listed some practical capabilities he hopes will be developed for the future: "We want to be able to transmit data in clear text to the user, in the form they need it. Warnings to drug enforcement officials when poppy seed fields are ripe for harvest, critical data on tanker disasters to the shipping lines and environmental protection agencies, alerts to all potential victims of rapid glacial melting."

New Heads Sought

In future, the DLR research center in Berlin-Adlershof—aside from the Oberpfaffenhofen facility near Munich, and others in Braunschweig, Goettingen, Cologne-Porz, and Stuttgart—will have two institutes, one for planetary studies and the other for space sensor technology. Directors, one for the Freie University and the other for the Technical University in Berlin, are now being sought by advertising the positions. Keydel can leave when they are appointed. "I want to do something for the reunification. I don't want to talk about myself here. I've been spoken about enough. I'm doing this for the people. If only 50 of the 450 who were here previously can be satisfied, then much will have been achieved." Of course, one can also accomplish something in the professional field. Space sensor technology is said to be his idea. "You don't have the opportunity to set up an institute every day."

The people, whom, to be sure, he criticizes for lack of decisiveness and willingness to assume responsibility, are very close to Keydel's heart. "The job positions are the main concern, not so much the research," he exaggerates somewhat. But really no one actually knew before 20 December 1991 just how many positions would be available. Many individuals could not bear the uncertainty, and went over to DARA (the German Space Agency), to private industry, or to other DLR institutes. But "most of the people we wanted, remained." Now there are approximately 300 job positions, of which, one must admit, "80 are very shaky ABM (job-creation program) positions, but also about 80 permanent positions in the scientific field. The German Federal Ministry for Research and Technology is satisfied: "The DLR center in Berlin-Adlershof is a good example of the promising developments in the research community in the new federal states," parliamentary state secretary Bernd Neumann announced in early February.

On an Equal Footing With Other Fields

Dr. Wolfgang Keydel, who is in love with his scientific specialty, now sees "space science on an equal footing with

all other research fields." The research budget in Germany, from which the DLR draws about two-thirds of its operating funds, is "not excessively high, and space research has no special priority." The coolness toward this discipline is therefore believed to be no different from that shown to new technologies throughout history. "An industrial country like Germany has to pursue such research," Keydel asserts. "Man is building hotels beneath the water, why not one on the moon? Man will do whatever can be done. All blank spots in our knowledge will be filled. Who else can do all of this except the developed countries?"

Satellite-based operational applications like communications, navigation, weather forecasting, and environmental and climatic observations confirm this view. "Otherwise the ozone hole would never even have been detected!" Of course, problems and profitability balance the scales. "A certain tribute must be paid to technology." But the expenditures for absolutely senseless armaments or industrial subsidies far exceed those for space research. Continued cooperation with the CIS is part of this. In this regard, everything is proceeding in its normal way in Russia. Our cooperation has been good and without any friction. There are aid programs and there are paid contracts. These countries must be helped to get up and stand on their own feet."

Airbus A340 Maiden Flight, Test Program Discussed

92WS0621C Paris LA LETTRE HEBDOMADAIRE DU GIFAS in English 16 Apr 92 p 1

[Article: "Maiden Flight of the "A340-200"]

[Text] The smaller but extended range version of the Airbus A340 flew for the first time on 1 April 1992, for five hours and 15 minutes. The aircraft reached maximum speed of Mach 0.83 and a maximum altitude of 39,500 feet. During most of the flight, reactions were analysed and performance measured. Certain speeds, as low as stall level were analysed (the production version will be stall-proof). Bernard Ziegler, manager of the Engineering Division, assisted by the copilot Karl Nagel (test pilot) while the crew consisted of test flight engineers Jean-Pierre Petit, Fernando Alonso and Bernard Kamps. The A340-200 is the third Airbus A340 to be used in this flight test program. The first A340-300 made its maiden flight on 25 October 1991 and the second on 3 February. Approximately 21 metric tons of test equipment was on board to probe some 20,000 parameters. All three of these 4-jet A340s are powered by CFM 56-5C2 turbojets made by CFM International (SNECMA & General Electric). To date, these aircraft have logged 375 hours and 20 minutes' operation in 86 flights. The full test program will involve six Airbus A340s which will fly around 2,000 hours to complete the program which should result in simultaneous certification of the A340-200 and 300 next December by the European certification authorities JAA [Joint Airworthiness Authorities], followed one month later by FAA [Federal Aviation Administration] certification for America. The first Airbus A340-200 will be delivered to Lufthansa in January 1993 and UTA (Air France Group) will receive its first A340-300 one month later.

A2 - Airbus Industrie - 16 - 4 - 1992 - Contact: Mrs. B. Kracht - Phone: (33) 61 93 33 87

SNECMA Building Test Bed for GE-90 Engine

92WS0631F Paris LA LETTRE HEBDOMADAIRE DU GIFAS in English 14 May 92 p 1

[Text] SNECMA's new test bed for the GE90 engine is now taking form. It is located at the SNECMA Villaroche premises and will accommodate the biggest civil turbojet ever made until now. The engine is designed for wide-body aircraft of the coming generation (B777, MD12, A330ST). The test room where the bed is located is 12 meters across and approximately 100 meters long and designed for engines delivering thrusts of up to 100,000 pounds. It will be equipped with high technology measuring instruments capable of probing up to 3,000 parameters. SNECMA has also built a special bench-integrated system for testing and operating the GE90 which will have thrusts of 70,000 to 100,000 pounds. The system will be able to X-ray the engine while in operation. The test bed will be ready by the end of this year and ready to probe the exceptional reliability, fuel-saving (9 percent less than engines powering today's wide-body carriers) features and environmental improvements (substantial noise and chemical exhaust reduction) as of January 1993. SNECMA has a 25 percent stake in this program. The other partners, besides SNECMA's long-standing one, General Electric, are Italian and Japanese: FIAT-AVIO and Ishikawajima-Harima-Heavy (IHI). SNECMA is responsible for designing and building the high pressure compressor of the GE90 and participates in the low pressure compressor, the composite blower fan and various engine accessories.

AUTOMOTIVE INDUSTRY

Peugeot Applies Transputers to Computerized Car Navigation Systems

92BR0356 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 16 Apr 92 p 34

[Article signed P.A.: "Transputers May Make Their Way Into Automobiles"]

[Text] Utilization of transputers may reduce by a factor of 16 the time needed to look up an itinerary in computer-aided car navigation systems. PSA [Peugeot] and Aptor have proved it.

Will transputers actually make their way into cars in time? The Grenoble company Aptor has actually just proved how interesting the Inmos processor is in computer-aided navigation systems. Practically, the computing time in searching for an itinerary has been reduced from 16 seconds to one second precisely due to the utilization of transputers. This initial research result permits the development of a system providing a virturally real-time response to variations in road conditions!

Navigation assistance is now a burning subject that is actively studied within several European projects. Carminat, which aimed to develop a complete information, management, and navigation system for cars, has resulted

in the implementation of prototype navigation assistance systems, especially at SAGEM and Philips. The research by Aptor, conducted under the aegis of the automobile manufacturer PSA, is done within the framework of Prometheus. (Prometheus is a EUREKA program that covers four major subjects: information to the driver, active assistance, cooperative driving, and traffic management. This fourth subject covers research conducted under Carminat.) The PSA-Renault GIE [economic interest group] is particularly involved in Prometheus. This group is at the origin of the Vehicle Area Network (VAN), with the first components at the manufacturing stage. The PSA-Renault group is also closely interested in problems linked to "electronic copilots." In this context, PSA studies and research department has requested Aptor to analyze the potential of transputers in onboard data systems. Navigational assistance is the field chosen for the demonstration. In fact PSA had already been working on the project, but it encountered a problem when the application under development needed up to 16 seconds, watch in hand, on a 486-type personal computer to find the correct itinerary.

During the first year of the project in 1990, Aptor's task consisted of training the PSA team in the transputer development tools. "This is a field in which we are very competent because our company took part in the first ESPRIT [European Strategic Program for R&D in Information Technologies] Supernode (I and II) projects for developing parallel computers precisely on the basis of Inmos processors," noted Yves Ansade, chief of the research department at Aptor.

Onboard Prototype by Late 1992

At the end of last year, the PSA application was redesigned using a parallel architecture and transferred to a transputer. The prototype of the navigation system is based on a PC (which is equipped with a card containing three transputers) and on a digitized geographic map of Paris. Its performance characteristics are: Itinerary search in less than one second meeting several conditions, such as shortest itinerary with regard to distance, time, or number of crossings. The two partners unabatedly continue their work, however. The goal for 1992 is the development of a computer-aided navigation system integrated on a PC miniboard (sized 10 x 10 cm and supplied by the U.S. company Ampro) on which transputer-based daughter boards are stacked. The aim is to produce an onboard prototype by late 1992. "This is a first step. Since the transputer has multitasking facilities, it might as well be assigned other functions, such as administration of a VAN network," concludes Yves Ansade.

Siemens Automotive Opens Fully Automated Plant

92WS0599A Paris L'USINE NOUVELLE in French 14 May 92 p 78

[Article by Marina Angel: "Foix, Siemens Automotive Pilot Site: Some 100 Million French Francs Invested in Ariege"; first paragraph is L'USINE NOUVELLE introduction]

[Text] The new fully automated production line at Foix is to serve as a test for a modernization and investment program.

Fifty engineers and technicians mobilized for two years, 100 million French francs [Fr] invested: Siemens Automotive has chosen to make its Foix unit in Ariege, equipped with a new fully automated production line, a pilot site for a modernization program undertaken at the group level. The number three company in the world in automotive electronics (Fr6.7 billion in sales, 14,000 employees) is attempting to integrate new fabrication line methods with its development strategy.

"We chose," explains Jean Fayet, CEO of the French affiliate, "to throw ourselves into a total battle covering all automotive electronics, in contrast to certain competitors who prefer to specialize and to become the leader in a single niche." The next few years will thus see Siemens Automotive integrate new product lines into its plants to pursue electronics development throughout the automobile with increased volumes and schedule requirements.

Doubled Capacity

The line placed in service at Foix unites volume capacity, flexibility, and tight scheduling. Result: Production capacity was doubled (5,000 parts per day in three shifts)—but with the same size staff of 130 persons. The production line is designed to fabricate six families of electronic calculators (200 references); and, lastly, cycle length was reduced from five to 1.2 days.

At Foix, all personnel were retained; however, the odds risk being quite different when this experiment is expanded to the larger units at Regensburg in Bavaria or at Toulouse-Le Mirail.

Germany: MBB Develops Optical Infrared Laser

92WS0631B Munich NEW-TECH NEWS in English No 1, 1992 pp 30-32

[Article: "Infrared Lasers Prevent Crashes: The Anti-Collision Fog System Makes for Safer Driving"]

[Text] The development of the anti-collision fog system has basically focused on two different approaches which will compete with one another on future markets: Objects are detected (1) with radar devices or (2) with infrared semiconductor lasers.

The plant in Schrobenhausen, which is responsible for the MBB fog system and which also initiated the development of the airbag in 1972, started working on a radar device some 10 years ago. However, experts soon realized that preparing such a product for subsequent series production would be extremely cost-intensive. It was, for example, an excessively complex matter to teach the device how to differentiate between a car and a can of Coke lying on the street, since both have similar backscatter.

As a result, since 1986 MBB research has focused on developing an optical infrared laser. The advantages of this type of system are obvious. Unlike radar devices, optical sensors are immune to jamming signals. Protecting the

radar devices from such signals would be an extremely cost-intensive task. And not enough research has been conducted to tell us what would happen if a large number of automobiles were to drive around with radar systems. Nobody knows how the systems would reciprocally influence each other.

As for overall cost including series-production prognoses, total expenses for an optical system would be approximately half of what a radar system with the same state of development would require. Although it is true that an infrared laser can't penetrate fog as well as radar does, it can indicate driver-visibility limitations, which is something the other system can't do.

Visibility as such is not a fixed parameter—it depends on various factors. Normal human vision can optically resolve and identify an object 6 mm in diameter at a distance of 300 m. The prerequisite for this, however, is a 100 percent contrast; the poorer the light conditions, the poorer visibility becomes. The human eye can also optically resolve objects with a 2 percent contrast. Or, in more simple terms: humans can still identify differences in tone comprising a 2 percent contrast on black and white photos.

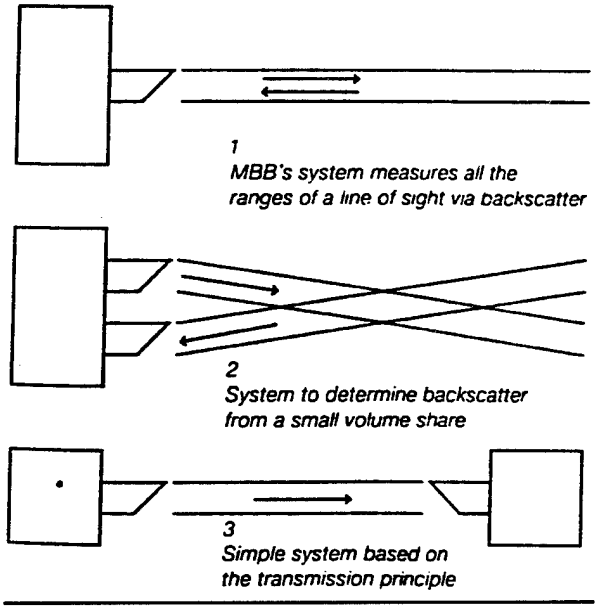
Fog scatters and attenuates light, which in turn reduces visibility. And visibility also depends on contrast: A white car in a snow-covered landscape is more difficult to spot than a red one. In addition to this, the faster a car drives the stronger the contrast must be for the eye to resolve the landscape it is observing. When measuring distance, MBB's infrared system directly ascertains the backscatter of the fog and subsequently calculates the visibility range. This is an advantage over all other competing developments, even over those based on optics.

Initial MBB testing was conducted using infrared devices with only one channel. As it turned out, however, the ideal solution was to have three to eight channels next to one another measuring a much larger surface. This is the only way the system can also pick up and register pedestrians or cyclists near the edge of a road.

Each measuring channel sends out a short laser pulse lasting approximately 10 nanoseconds (ns). A photoreceiver records the laser light which the obstacles in the beam's path have backscattered. The received signal is picked up at 6.6-ns intervals (corresponding to 1 m light travel time in both directions). The curve ascertained by this procedure is evaluated by a processor system, which consequently permits a range resolution of 0.5 m.

The multichannel measuring system operates according to this pulse-travel-time principle. It contains adaptive signal processing to detect very minimal backscattered light outputs and guarantee safety to the eyes—something MBB has seen to since the beginning (a laser with light outputs that are too strong is harmful to the eyes). Noncorresponding targets, that is, targets without reflectors or backscattering film, are detected even in reduced visibility conditions. Furthermore, the reflector signal produced through the fog is evaluated to determine visibility range loss.

Various visual-range measuring methods.
1
Combined distance and visual-range measurement according to Patent No. DE3640449.
2
Normal visual-range measurement via backscatter.
3
Transmission measurement with dislocated setup.



1
MBB's system measures all the ranges of a line of sight via backscatter

2
System to determine backscatter from a small volume share

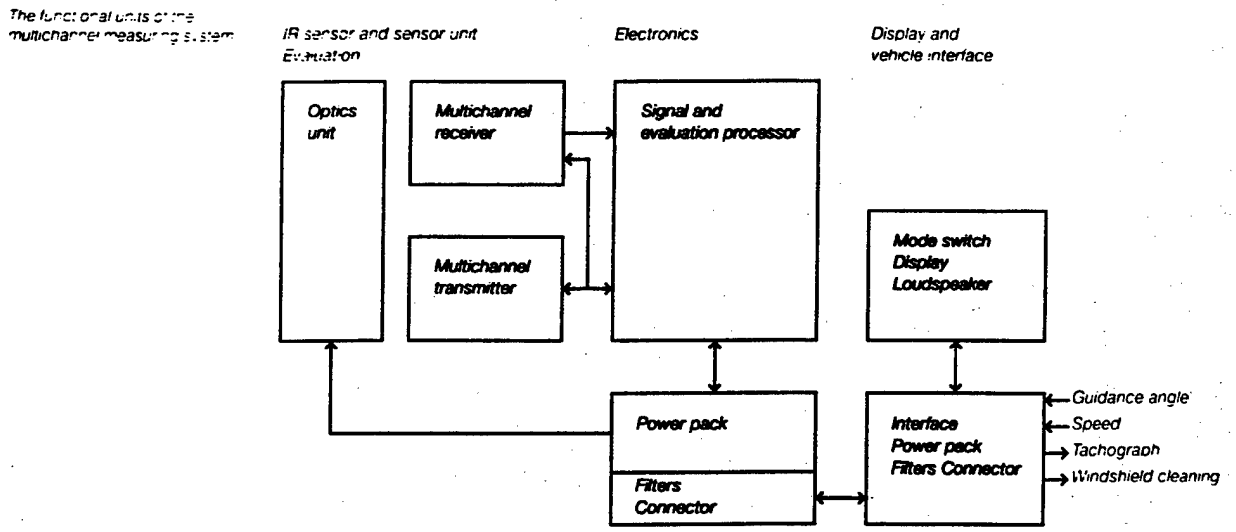
3
Simple system based on the transmission principle

The anti-collision fog system is installed on the car either in the bumper or behind the windshield in the automobile interior. One prerequisite for reliable measurement is that the optical system's field of vision is clean. This is taken care of by the device's own wiper, or if the system is inside the car, by a normal windshield wiper.

The driver receives the measurement results in real time. He is shown the distance between him and the object as well as the visibility range. This information is used to additionally calculate and automatically recommend the appropriate speed for the vehicle. Exactly how the driver will receive all this information will be up to the various automobile manufacturers who choose to equip their automobiles with the anti-collision fog systems.

MBB has worked out several baseline proposals which can be used in parallel.

One possibility would be a signal display located next to the dashboard which would warn the driver via colored lights. If the road is free for an area measuring 100 m in length and 20 m in width, the display shows "green." If the car approaches an obstacle at 50 m, the display gives a "yellow" or "red" warning. The same warning could be used to tell the driver when he is driving too fast in visibility conditions of only 50 m.



Another proposal is to superimpose the measured data on the windshield by means of a head-up display. This solution takes advantage of the fact that windshields possess certain backscattering qualities. A projector is mounted in the surface of the dashboard and the recorded data is projected on the windshield. The data is thus displayed in the driver's immediate field of vision. This solution seems highly favorable in view of the fact that, in cases of heavy fog, an automobile driver almost always has his eyes on the road and not so much on the dashboard.

For such a system to be truly ergonomic the signal which is sent out must be free of certain problems. Independent vehicle movement (zigzag skidding and lurching when braking), for example, must be calculated and predicted by the system. Effects of this kind should not prevent the optical system from correctly assessing objects which are otherwise easy to perceive. One way to eliminate such disturbances would be for the device to know the vehicle's horizontal axis and its steering angle. The software could consequently "reckon with" a target temporarily disappearing from the field of vision.

Driving around extreme curves places similar requirements on the infrared laser software. The device has to keep an eye—or rather an optic—on its target: It must also "take the curve."

When the vehicle is in operation, the range-finding system is ready for duty at all times—it doesn't have to be specially activated. As soon as the key turns in the ignition, the device conducts a selftest and displays its functionality via a light. In this respect it is comparable to an airbag or an anti-blocking system for brakes, which are also automatically activated as soon as the engine is ignited.

These three systems are also comparable in their reliability. In general one can say that the service life of these systems should be calculated to last as long as the car itself. However, unlike the other two sensor systems, it is also conceivable for infrared lasers in vehicles to be upgraded.

MBB's anti-collision fog system will be ready for utilization in the series production of cars in mid-1994. The automobile industry has already expressed considerable interest in this optical system, which will make yet another contribution to increased safety on the roads.

BIOTECHNOLOGY

French Biotechnology Firm Developing Hybrid Corn for Worldwide Market

92WS0555A Paris BIO: LA LETTRE DES BIOTECHNOLOGIES in French 5 Apr 92 pp 2-3

[Article entitled: "Orsan Pulls Out of Market for Major-Crop Seeds"] [Note: "Corn" in this article means the seeds of any of the cereal grasses used for food.]

[Text] Lafarge Coppee's biotechnology subsidiary Orsan completed its pullout from the market for major-crop seeds in mid-March, when it sold its French research activities on maize and autogamous cereal grasses to Rhone Poulenc. It also ceded its 66 percent stake in Belloy (sales of 98 million French francs [Fr]) to the same company. Orsan paid a high price for its foray into the seed market. Says the group's president, Michel Rose: "It explains all by itself our 1991 losses, which were Fr211 million, on sales that were down slightly to Fr1.95 billion. (The company lost Fr129 million in 1990.) In addition to operating losses, Orsan laid out Fr96 million in extraordinary expenditures. If it hadn't been for major-crop seeds, the company would have shown pre-tax profits of Fr26 million: the result of biochemistry's improved profitability (two-thirds of the company's sales and tripled earnings) and a renewed balance in the profit and loss sheet for

flower and vegetable seeds." The group's sale of its major-crop seed branch will enable it to show a profit again this year. But Michel Rose declines to make any earnings forecasts.

Orsan decided to withdraw from the market over a year ago, when it reckoned that it lacked the critical size to pull through. That, however, was just when the situation in the agricultural industry was unfavorable to a wholesale transfer, hence the decision to sell off the business in parts. Michel Rose admits that the company's withdrawal was "slower and more difficult than expected, and the exit cost high." Ten years after its initial move to diversify into biotechnology to avoid depending exclusively on construction markets, Lafarge Coppee's experience has been mixed. In biochemistry (amino acids for human and animal foodstuffs), the group has done well despite the fact that its results are still highly sensitive to fluctuations in the dollar and in raw material prices. Glutamate, for instance, will benefit from the new price recovery in Europe and from a drop in costs. The company also plans to expand to Eastern Europe, consolidate its position in Vietnam, and continue leading the world in lysine sales. Orsan is developing new molecules, while expanding the market for cyclodextrines. Aside from major crops, its association with Rhone Poulenc for vegetable and flower seeds (Clause, Harris Moran) is still profitable. But the shift in focus to the leading varieties should allow the company to pursue its recovery. Orsan's program to develop hybrid corn is continuing as planned through experiments conducted in France and internationally (notably China). The company aims to market its hybrids for the first time in 1994-95 and is expected to announce a partnership agreement in the coming weeks. "The potential market for hybrid corns is huge," stresses Jean Keller, the group's general secretary. "Since hybrids are ultimately expected to replace autogamous seeds, it is equal to the entire market for corn seeds, that is, China, the former USSR, the U.S., the EC, and Canada." The European market alone represents Fr5 billion annually, and the seed industry estimates the market for corn hybrids at three times that. The American company Monsanto is also actively working on the development of hybrid corn.

Industry's Participation in EC BRIDGE Program Discussed

92WS0574C Duesseldorf VDI NACHRICHTEN in German 17 Apr 92 p 18

[Article by Rudiger Steiner: "Europe Wants to Catch Up in Biotechnology Now"]

[Text]

The EC Research Program Biotech Is About To Be Passed

German Companies Have Been Cool To Date

German industry had a tired reaction to the EC biotechnology support program BRIDGE. Only four companies are participating. The initiators are hoping for more response in the follow-on project Biotech that is to be passed in April.

Michael Fritzen is the department head in the Ministry of Science for North Rhine-Westphalia. He praises the "industrial bent of the European research support." German companies would discover the colleges as partners for research and development to an increasing degree.

This estimation stands in contrast to the actual participation of German companies in the EC support program BRIDGE [Biotechnology Research for Innovation, Development and Growth in Europe]. This program runs from 1990 to 1993. Besides the more than 80 colleges and research facilities in the Federal Republic, only four companies are making use of the funds for biotechnology research from Brussels. In Great Britain, France or the Netherlands, three to five times as many companies are taking part. Volker Hempel is the director of the Technology Transfer Agency in the area of biotechnology for North Rhine-Westphalia. He holds a still existing lack of information, the laborious application process and limited exploitation rights responsible for this state. The strict German legislation for the industrial utilization of biotechnology and genetic technology may be another cause for the lack of industrial participation. For the approximately 1,000 approved research laboratories, there are only three approved production plants in the area of genetic technology. The chemical company Henkel of Duesseldorf is one of the four industrial participants in the BRIDGE program. Even so, this company has expanded its biotechnology research directly in the U.S. since 1985.

In spite of this, additional companies in Germany are profiting indirectly from the EC research program. The Degussa conglomerate of Frankfurt is using its own funds, for example, for a project for the industrial production of amino acids. These acids are used as feed additives in hog breeding. In this way, the company is securing access to biotechnology know-how. "With this plan, the market dominance of the Americans and Japanese in this area could be broken," says genetics professor Alfred Puehler, stating his opinion. He is from the University of Bielefeld, which is working on the project with other research institutes and companies from France, Spain and Ireland.

While the monies for the BRIDGE program have already been distributed, the follow-on support program Biotech is to be passed shortly in the EC Executive Council. This program is to run from 1992 to 1996. It is expected to have a budget of approximately the same size, about 340 million German marks [DM]. Research projects in the "precompetitive area" that cannot be implemented within a national framework are to be supported. At least two EC countries must participate in each project. The funds will be used to initiate new research projects, to support the transnational cooperation of existing national measures (e.g., through the use of workshops and travel) and for awarding stipends.

On the wish list of the EC, for example, is the genetic analysis of yeast cells. Some of the chromosomes of these cells have already been subjected to precise investigation. With the knowledge obtained from such analysis, the European breweries could still further reduce the time taken by the fermentation process in beer. The breeding of

useful plants having low nitrogen requirements and the genetic mapping of cattle are to be supported. This mapping is a prerequisite for genetic manipulation. Cell cultures in reagent glasses and genetically manipulated animals are seen as test systems for environmental toxins or medications. Finally, new and more cost-effective immunization materials, e.g., against allergies, are to be developed with the help of biotechnology.

The Biotech program is the subject of political debate. The EC Commission has had a draft version for two years that was improved in a few items at the behest of the European Parliament. The ethical and social repercussions of biotechnology research and public information should be given stronger consideration now. Kay Beese is a technical advisor in the EC Commission in Brussels. He is certain that the Executive Council will approve the support program in April. "Then, the major portion of the projects can be put out for bids as early as spring and the contracts let by the end of the year."

Finland: Genetic Research in Yeasts, Fungi

92WS0586A Helsinki HELSINGIN SANOMAT MONTHLY SUPPLEMENT in Finnish 16 May 92 p 39

[Unattributed article: "Genes Don't Make Decisions for People"]

[Text] The State Technical Research Center (VTT) is also studying genes; it has been studying them since 1980. Forty scientists doing research on genes are employed at the Biotechnology Laboratory in Otaniemi. Results have been produced, especially in the different fields of biotechnology involving the use of yeasts and mold fungi.

In one of the center's many projects they are in different ways trying to improve the characteristics of yeasts used in brewing beer. *Saccharomyces cerevisiae*, VTT-X-1021.7, is one of the new yeast strains that have seen the light of day in Otaniemi. As a result of genetic engineering, it can turn the wort into a full-bodied beer in a week. It takes at least a month to do so with the yeasts currently used by breweries. This yeast has aroused international interest, including Japan and the United States. It is not yet used by breweries, but tests conducted in the Biotechnology Laboratory pilot brewery show that beer can be produced with it.

What does it taste like?

"A very good beer indeed," university lecturer Merja Penttila of Helsinki said. She is one of the new-style microbiologists, chemists, and genetic engineers who served as midwives for the beer yeast.

By education and training, Merja Penttila is a biologist and geneticist who found her way to the university to study, specifically the microcosm of cells. She found her own field of research later in yeasts and mold fungi. Anyone who has baked bread or made home-made beer is familiar with yeast. Not many people think of mold as a useful creature, except perhaps in cheese.

"Research on yeasts is not just industrial biotechnology. Yeasts are also especially very important in understanding how human cells function and through that in cancer research too, among other areas, since humans and yeasts are basically similar," Merja Penttila said.

"We have isolated genes from mold fungi that produce enzymes degraded from lignin that are important for the paper industry. This is part of the work that enabled us to develop paper-bleaching techniques that spare the environment."

Like many research scientists, Merja Penttila puts in long days without counting hours. Her thirst for knowledge is great and ahead of her lies an endless number of things to study. The possibilities in her field are many now that chromosomes have been opened up. Will genetic engineering also open the doors to Europe?

"Science has always been an international affair," said Penttila, at whose workplace English, the language of science, is spoken with many different accents, among them German and Skane [southern Swedish dialect].

"Researchers may partially open those doors. Genetic engineering and biotechnology are typical high-tech fields in which Finland too can compete on world markets. Here we can also develop yeasts that produce xylitol or a yeast that effectively produces alcohol from energy plants, for fuel for a car, for example."

In genetic engineering the application of knowledge represents, in her opinion, the same kind of problem as in any technology whatsoever. Any knowledge can be applied in a right way or a wrong way.

"Ordinary genetic research is very safe. There is nothing mystical or dangerous about genes per se. They are around us everywhere."

Penttila did not admit to having a favorite gene. The researcher is interested in any gene that can tell her something about life. She has often pondered on the essential nature of genes. A gene itself is just a bundle of atoms, nothing more remarkable than that.

"If this were the year 2500, I might go ahead and look for a human value gene. But maybe the choices a person makes don't depend on genes. Of course, a person has to in any case make his own decisions, regardless of them."

COMPUTERS

High-Level Cooperative Dutch Research Projects Noted

92BR0343 Rijswijk POLYTECHNISCH WEEKBLAD in Dutch Apr 92 pp 8-9

[Article by Eng. W.F.K. van den Eijnde: "Science and Technology Behind Electrotechnology"]

[Text] Without a coordinated approach to scientific research there are certain things that now seem almost impossible to achieve. No wonder; all the simple things such as the safety pin and the thumb tack have already been invented. And if, per chance, a creative brain does

come up with a simple solution to an existing problem, then it usually falls into the category of "unexplored possibilities." Innovation-oriented research nowadays (certainly in electronics) means much intensive work and sophisticated, expensive equipment. It is therefore a good thing that governments and scientific organizations put their heads together in many different ways. Organizations such as SPIN [Stimulation Project Team for Information Technology Research], STiPT [Organization for the Implementation of Technology Policy], JESSI [Joint European Submicron Silicon Initiative], NWO [Dutch Organization for Scientific Research], and FOM [Institute for Basic Materials Research] are forging ahead in fields out of reach of individual organizations.

The increasing power of computers is grist for the mill for many organizations that try to piece together the bits of scientific research in an efficient way. SPIN is such an organization for whom using this computer power is very important. Two technologies play an important part here: parallel processors and neural networks. The latter also receives attention from SPIN in a program led by Prof. Dr. C. Gielen of the Catholic University of Nijmegen.

Neural Networks

The Neural Network program has two main aims. In the first place there is the fundamental theoretical research into characteristics of neural networks for specific applications and for the implementation of software and hardware. The second aim is the exchange and transfer of knowledge between universities and industry.

The research takes place by means of cooperation with five other institutes, each of which makes a specific contribution. The University of Utrecht does theoretical research into the storage and retrieval capacity of neural networks. Attention is focused particularly on three-dimensional object recognition and the analysis of visual information from the surrounding area for navigational purposes. At the University of Nijmegen, research is being carried out on jointly operating sensors and movement coordination. Both institutes are also working together on two projects in ESPRIT II [European Strategic Program for Research and Development in Information Technology]. Research is being undertaken at the University of Leiden into the relationship between learning algorithms, architecture, and functionality of neural networks. Finally, the University of Amsterdam will concentrate on implementing artificial intelligence systems, particularly in robots.

There are possibilities for commercial application of the research results in pattern recognition and self-navigating systems, image processing, and industrial factory automation. The research results are particularly important in areas in which information systems up to now have been used with varying success. In addition to the existing research, a number of new projects will be started such as recognition of handwriting, recognition and classification of signatures, and integration of artificial intelligence methods and neural networks.

More Knowledge Needed About Electromechanics

Mechanics and electrical engineering are coming closer and closer together. This is borne out by the development of the electronic watch, the intelligent camera, modern copying machines, the CD player, the optical and magnetic memory disks and many other examples in which electronics is taking an ever greater part in the design stage. A recent example of cooperation in this field is the Platform Foundation for Electromechanics set up by FME in cooperation with Innovation Centers, technical universities, the Center for Microelectronics, and, last but not least, the Ministry of Economic Affairs. There are also a number of industrial companies involved.

The reason for this cooperation being set up was a study ordered by the Ministry of Economic Affairs, which showed that Dutch firms do not fully realize what this combination of mechanical engineering, precision mechanics, electronics, optics and information technology could mean to the industry. The platform wants to change this situation by promoting knowledge transfers from the universities and other scientific institutions to industry by means of symposia, training, education, a handbook, and demonstration projects.

Atomic Layers for Superconductors

It is unfeasible to make electronic circuits with superconducting components if one does not have a reproducible technology to create multilayer structures. To optimize the quality of these layers, it is necessary to study these very thin layers at an atomic level. This can be done with the help of a high-resolution electron microscope. Such a study is taking place at the National Center for High-Resolution Electron Microscopy in Delft, together with the Dutch Organization for Scientific Research (NWO) and the Ukrainian expert Dr. V.L. Svetchinikov from Kiev, who has extensive experience in the field of microscopic section preparation. Through this research into high-temperature superconductors, it is hoped to keep up with developments in this field. Yet one may ask if this should not be done within an even larger-scale cooperation. The United States and Japan spend 400 and 320 million guilders a year respectively on research into superconductors. The research budget for the Netherlands is much more limited, namely 10 million guilders.

European 60 Tesla Magnet

Close cooperation between FOM and the University of Amsterdam will, in a few years, mean that the European research on highly magnetic fields will have access to a 60-tesla magnet. How high this is can be seen in a comparison of the earth's magnetic field (0.00005 tesla), or if one takes into account that the strongest permanent magnets can produce a field of about 0.7 tesla. Creating stronger magnetic field strengths is possible using electromagnets with coils through which thousands of amperes flow. Because such a current can beat a very cold coil to a temperature of 100°C in 1 second, and because it then takes hours before the coil has cooled off, it is essential with the aid of advanced measuring equipment to measure all important data in a fraction of a second and store it in

a computer. A second problem is the extremely high Lorentz force produced by the high current in the coil winding, occasionally causing them to explode. The coils must therefore be made of a superstrong metal alloy. The installation will be used for fundamental scientific research into various materials. Up to now the only way to bring change to an atom or electron structure of a solid material has been with a magnetic field, all other means of measurement cause too much change and destroy the structure to be examined.

The physical measurements include magnetization of ferromagnetic or other materials and alloys at the temperature of liquid helium. In addition, a study is being made into the changes in certain materials' electrical resistance subjected to a strong magnetic field. Other areas being studied are the quantum-Hall effect and the De Haas-van-Alphen effect. In the future it will be possible with this magnet to reach a temperature of 1 degree above absolute zero.

Fault-Resistant Computers

Improvement in the reliability of electronic circuits is no longer a satisfactory way to increase the reliability of computers. An electronics engineer has recently obtained his doctorate at the University of Twente with a thesis for PTT research [Posts, Telegraph and Telecommunications Authority] in which he discovered that, by tackling the software in the correct way, computer systems can still function despite a number of faults in the hardware. This is very important in cases in which computers must not fail, such as in aviation, space flights, and in nuclear reactor safety and operation. The method relies on program replicas that are carried out by various processor units. Naturally their output must be exactly identical. The result of this operation determines whether a part of the system should be made non-active. The suggested method is applied to transputer-based networks and programs written in Occam, the programming language for parallel computers.

Italy: Factory Automation Training Center Established

92MI0475 Turin MEDIA DUEMILA in Italian Apr 92 pp 76-77

[Article by Riccardo Panigada: "Technological Center for Automation"]

[Excerpt] [Passage omitted] Many foreigners come to Italy to buy machine tools since Italian companies now rank fourth in the machine tool sector after Japan, Germany, and CIS. Italian companies have even recently outclassed the United States in this sector and export 60 percent of their production.

Given that 50-60 percent of Italian industrial automation is concentrated in the Piacenza area, a decision was made to establish a reference point for industries from outside Piacenza that are located in the provinces of Milan, Cremona, Parma, Alessandria, and Pavia. The first project consists in the construction of a training center called "Leonardia," based in Piacenza.

"The primary goal," observed Dr. Filippo Impellizzeri, director of central planning and computer systems at the Mandelli Group, "is to set up three-year courses to train highly specialized professionals. We have seen that training programs based on having new employees work alongside expert personnel are inefficient in terms of time and production. Even if the apprentice is a high school or college graduate, it is difficult to learn the elements needed to carry out the tasks assigned and simultaneously be productive. The problems involved range from simply learning the technical jargon to a knowledge of highly specific structural analysis procedures that are certainly not taught during scholastic or university courses. An automated factory is not a restoration studio and it does not make any sense to apply the same teaching method for such highly different situations. Wherever research is done, knowledge has to travel fast and involve the largest number of people possible. For this reason even the physical proximity of people dealing with a specific problem has become indispensable."

Why the decision to set up Leonardia? "We have to respond now more than ever to the competition of Japanese industries. Their products have been arriving in Europe for several years and now they are starting to set up real 'transplants' (transplants of industrial departments with a specific line of products) in Europe after having carefully studied the most thriving market niches."

Competition is now even faster than technological development. Until now development in Italy was based on imitation, giving rise to so-called "research without innovation." It is now no longer possible to rely on the opportunities offered by mechanical developments that have been cheap and basically rewarding when the ideas proved to be good ones. But in this way, as a product is perfected it follows an asymptotic path with respect to the axis representing the maximum level of perfection that can be attained through the technology used. There is only one way of going beyond this: changing technology, and changing technology means having a good research activity.

This means changing our previous attitude based on imitation enriched by small ideas," said Impellizzeri, "to a more committed attitude based on the interdisciplinary research of new technologies. Of course, this way the costs increase greatly and eliminating losses becomes indispensable."

The first loss consists in hiring personnel who learn "by osmosis" and who often gladly emigrate to the industrial plants of competing companies once their training period is over. However, since the number of European companies working in the automation sector is bound to decline drastically over the next 10 years (where the only companies to survive will be those capable of offering adequate solutions, from selling a lathe to making adjustments, from supplying work centers to transport) and the establishment of joint research activities between the most highly specialized professionals within these same surviving companies will become indispensable. Hence, the availability of a

highly skilled work force within the country must be immediately considered a common good.

"Our program even makes provision for the incubation of these technicians over an entire three-year period. If for any reason after their period of employment in a company, they decide to set up their own company, they will be rented the facilities needed to set up their business in proportion to the area and use. This is better than losing people along with the chance to benefit at least indirectly, from the application of the knowledge acquired at the technical center. There are already cases in which some highly specialized professionals are becoming absolutely indispensable. For example, when a client sends projects on tape, if the technician responsible for reading them is not able to gain access to the projects to work on them afterwards with ease, we run the risk of losing the client. Furthermore as already mentioned, except for two large companies (Comau and Mandelli), the sector in Italy appears fragmented into many small to medium-sized companies, each with its own speciality."

"The project of a technological center like the one in Piacenza," said Impellizzeri, "with the goal of capturing and distributing the existing potential through a network of contacts between companies must be dual-purpose: it must promote local entrepreneurship through the physical proximity of industrial researchers, and also create market opportunities through the establishment of a permanent reference point where clients see the quality and diversification offered."

Germany: Firm Develops Fuzzy Logic Applications

92WS0559A Munich TOP-BUSINESS in German Apr 92 pp 124-128

[Article by Guenter Schaefer: "The Silent Revolution: Fuzzy Logic"; first paragraph is TOP BUSINESS introduction]

[Text] In the new software technology of fuzzy logic, the Japanese are certainly ahead by a nose. However, their German colleagues are slowly gaining on them. The best example: Inform GmbH of Aachen.

Adrian Weiler no longer ventures out of his office without a "walkie-talkie." No matter where he is in the company's building, the 36-year-old manager of Inform GmbH of Aachen wants to be accessible at all times.

And he has to be. Because, since the realization broke through in German industry that Weiler's small software shop has already been experimenting for several years with a technology which has currently unleashed a revolution in the electronics sector in Japan, the industrial engineer "can hardly escape from inquiries."

What has so disturbed domestic developers through all sectors and triggered a regular stream of pilgrims to Aachen is the sensational success which Japanese manufacturers of electronic devices are achieving in their domestic market with so-called "fuzzy logic." What this means is a process based on fuzzy logic, with which software for computer systems and electronic controls can be programmed faster, more cost-effectively, and above all "closer to reality."

Whereas conventional computers reach categorical decisions such as yes or no, true or false, according to exactly predefined samples, the mathematical operations in the fuzzy software lead to results which encompass the full spectrum of possible evaluations including "half true" or "almost true." It is precisely such ambiguities which provide the prerequisites for specialists such as Inform manager Weiler "to simulate the human decisionmaking process through software such that products with artificial intelligence are created."

Recently, Japan's developers have impressively demonstrated how this works in practice. In Japanese subways, fuzzy controls from Hitachi are already regulating driving conditions so sensitively that no one has to hold on anymore during acceleration or braking. And anyone who runs Epson's new hand scanner over a page of printed English text can almost simultaneously read the Japanese translation on an LCD display. The showstopper: In the West comparable devices with conventional technology cost approximately $10,000—however Epson is not even asking $200 for its fuzzy-based system currently available only in Tokyo.

It is not only in most Japanese high-tech devices from robots to stock analysis systems that the electronics are currently performing fuzzy calculations. In virtually every electronic product, above all in household devices, the new software, often stored on a chip, is providing improved functions and more service: Shower heads deliver consistently warm water, vacuum cleaners increase their suction depending on the characteristics and soil on the floor, and new microwave ovens present perfectly heated meals.

Matsushita, for example, is selling its Aisaigo washing machine at the rate of 100,000 a month not the least because even children can use it from day one—after it is turned on, all by itself a fuzzy computer checks the type of laundry and the level of soil and specifies the appropriate wash cycle.

Meanwhile, the new technology has advanced to the knockout criteria with even the average Japanese consumer—electronic devices which do not expressly refer to fuzzy workings no longer have any chance on the market.

In Germany only a few companies like Aachen's Inform are calmly awaiting the anticipated onslaught of Far Eastern suppliers on the European market. Its founder, Hans Juergen Zimmermann, professor for Operations Research at the Technical University of Aachen, and co-owner along with Adrian Weiler of the software company Inform, came across the work of Iran-born Lofti Zadeh 17 years ago.

Meteorically Increasing Demand

Zadeh, currently a professor at the famous University of California at Berkeley, had already developed the mathematical foundations of fuzzy logic in 1965. But, like Zadeh in the U.S., Zimmermann remained a lone voice in the wilderness.

"Even when I became manager at Inform in 1986," Weiler recalls, "no one in Germany wanted to hear about fuzzy, on the contrary: Our clients were irritated when we talked about it."

That has changed completely. The demand for intelligent systems for the materials industry, logistics, and production has virtually exploded in the last two years. At the textile machinery manufacturer Barmag, the production control program "Felis" takes care of trouble-free operation of highly complex production. Inform's transport control system "Tess" coordinates the buses at the Frankfurt airport so skillfully that 25 percent more air travellers can currently be brought to the terminal with 5 percent more vehicles.

In the Erlangen medical technology area of Siemens AG, Manfred Hasel, head of the materials department, praises the Tess system: "Despite increasing transport trips we were able to reduce the number of trucks and the loading and unloading time from one to two days down to a few hours."

Industry Bets on Fuzzy

Companies like Audi, Bosch, Mercedes-Benz, Thyssen, and Hoechst are currently on Weiler's list of customers or are working on joint projects with the Aachen pioneers.

A development tool called "Fuzzy Tech" is the focus of interest. With this menu-driven program for personal computers, relatively simple fuzzy-based software for process control and automation can be generated. Once the user has defined all the significant parameters, for example, for the smooth, jerk-free control of an elevator, Fuzzy Tech creates the necessary fuzzy rules and algorithms.

The fuzzy boom now also in Germany has blessed Weiler's company with meteoric growth. Whereas as late as 1986, four employees made up the Inform team, 70 specialists now work in the company's own building on Pascal Street in Aachen. The time has passed when computer experts had to attract attention to themselves at trade shows and events with spectacular gags such as a fuzzy-controlled toy cars.

Currently, the Inform partners are also on the march in terms of PR. In February, Zimmermann assumed chairmanship of the NRW Fuzzy Initiative founded by him, which is intended to give small and medium-sized companies in North Rhine-Westphalia a better understanding of the unconventional software methods.

This is first an enlightenment project. Because Weiler knows only too well what technical lay persons associate with the term "Fuzzy": "Most of them think of the bumbling Western character from the American film series."

Denmark: Work on Neural Network Applications

92WS0565B Copenhagen BERLINGSKE TIDENDE in Danish 5 May 92 Sec 5 p 22

[Article by Jens J. Kjaergaard: "Computer Sees Hidden Connections"—first paragraph is BERLINGSKE TIDENDE introduction]

[Text] Denmark must set its sights on being in the front row in the neural network field, according to director Mogens Aalund.

"If Danish firms are to remain competitive, it is important for Denmark to be one of the front runners in the application of the new information technologies," said Mogens Aalund, Ph.D., physicist and administrative director of the NEuroTech corporation.

The small but expanding firm, which is the country's only total supplier of products within the artificial neural network area for the professional market, is now moving into the new Symbion building on Fruebjergvej in Copenhagen after a brief and cramped stay on Haraldsgade where a building of 300 m^2 was quickly filled to the bursting point with research and development projects from the university and the business sector.

NEuroTech's think tank fits the surroundings perfectly. One of the hottest buzzwords of our day is neural networks, in layman's terms computers whose capability constantly improves through a form of self-education.

"We now know so much about the possibilities involved in the mechanical interpretation of data that we are justified in talking about a branch of engineering," Aalund said.

It may be a little too exaggerated to talk about artificial intelligence but the machines are modeled on the human brain, the genuine neural network, and they can clearly learn from experience.

The machines observe and register processes and actions, most of them junk, but as time goes by they are able to strip away the superfluous material—and what is left is a number of pieces of information that provide a usable basis for making decisions. In other words an expert knowledge that we would call intuition in human beings.

"At Hvidovre Hospital NEuroTech has assisted doctors in evaluating patients' chances of surviving a transplant operation. At Odense County Hospital we are working with the classification of spectra. SAS Data is getting help with developing a system that can predict the need for backup personnel—this project is being carried out in cooperation with AmbraSoft. At Louis Poulsen the machines are handling inventory control. Kommunedata uses neural networks for classification—and KTAS is getting good advice that will help prevent overloading and 'traffic jams' in the future broad-band network. This project, which is subsidized by the EC, is called NEUFODI."

Internationally recognized experts are included in NEuroTech's scientific advisory panel and management; among the cofounders are Associate Professor Benny Lautrup of

the Niels Bohr Institute and research grant recipient Soren Brunak of DTH [Denmark's Technical College].

Lautrup heads CONNECT, the Danish informatics center that was set up at the Niels Bohr Institute with money from the State Research Council. It is designed to actively expand, mediate and support cooperation among Danish researchers working on the theory and application of massive parallel hardware for artificial neural networks.

"The research field will be increasingly important to industry," Aalund predicted.

"This useful tool helps the consumer think in terms of constructive alternatives, also in areas where the problems are so complex that it is impossible to provide rules of thumb."

On the international level 10,000 scientists and engineers are working on developing neural networks—according to FORTUNE magazine. And the European Community provides a total of 350 million kroner to support projects of this kind.

"Electric power plants in the United States and Japan, and French waterworks already use neural networks for supervision and management in order to insure optimum operation. In the financial sector the ingenious technology is useful in evaluating portfolios, predicting exchange rates—and bankruptcies, securities trading, etc.

"We already have computer programs that react to buy and sell signals, but if everyone has purchased the same system they all act concurrently. This affects the market and then no one makes money. Neural networks are more flexible, users put in their own knowledge and are rewarded with a system that becomes better and better at reading the signals," said Aalund.

Computers can also learn to uncover cheating and fraud involving charge cards. This is sure to catch on here too. The Danish police, customs service and tax authorities already use knowledge-based systems in handling their work.

The machines sort mink pelts. They can judge bacon pigs, and can see if marmalade comes from South America or Spain. They can also grade wine and provide information about the vineyard and cru classification.

"Neural networks are not magic," Aalund said.

"The point is that they can work with statistics without a model and figure out the connections and produce a set of rules based on the bewildering total picture. Human beings will not become superfluous—but perhaps we can economize a little on scarce resources. Information engineers are a rare breed, therefore they are expensive.

"They call us connectionists because we are able to find otherwise hidden connections."

Germany: Competing With US, Japan in Fuzzy Logic Developments

Fuzzy-Petri-Net Tested

92WS0573A Duesseldorf VDI NACHRICHTEN in German 17 Apr 92 p 8

[Unattributed article: "Controlling Processes More Certainly With Fuzzy Logic: From the Pulpwood Plant to the Glass Industry to the Steel Mill: RWTH and Hoesch-Stahl Test Fuzzy-Petri-Net"; first paragraph is VDI NACHRICHTEN introduction]

[Text] Aachen, 17 Apr (VDI-N)—In order to discern the contents of a scanner image, the human squints and thus reduces the flood of information. Thanks to fuzzy technology, computer processes can also learn this coarsening of structures. In the following, Karl Lieven, manager of MIT [Management Intelligenter Technologien GmbH] in Aachen, describes how and where this occurs.

Within the framework of the NRW Fuzzy Initiative, MIT was founded in Aachen at the end of 1991. One focus of MIT's work consists in the development of application-ready fuzzy methods which support the decisionmaking process in the control of production processes.

In contrast to most fuzzy applications, in which expert linguistic knowledge is used to complete incomplete process knowledge, here, fuzzy concepts are used which enable efficient decisions under the real-time constraints of the production cycle through model coarsening. The restriction to the essential process data permits rough selection and evaluation of productive control procedures which are firmed up, if necessary, in a defuzzification phase.

With this use of fuzzy technologies, the developers at Aachen have made a decision process often observed in humans usable for industrial applications. In the observation of a scanner image or a picture puzzle, the human instinctively squints in order to identify the contents of the image more quickly. By this means, the observer reduces the flood of information received and uses his brain to support discernment of the structure of the image. Squinting results in a coarsening of the structures of the image (pixels, lines, contours, etc.) so that the contents of the image can be more readily identified by the brain.

Rough models are also used at the decisionmaking level in manufacturing. The compromise between model expense and accuracy of decisions results in the lack of sharpness inherent in the effective decisionmaking process. The violation of this necessity creates an obstacle to situation-based decisions. The person involved thus documents his inability to be able to base his decisions on essential determining characteristics.

To assure a more certain and stable production cycle, many partial processes operating simultaneously and asynchronously must be harmonized in a tight sequence over a short period of time.

A process control system in which the MIT employees in Aachen are using a fuzzy process model based on the fuzzy-Petri-net serves this purpose. With this automation

concept, the gap between dispositive and process-based decision is closed, so that revisions in processing at the time of disruptions or short-term adaptations for products are averted through the use of the residual flexibility in the process.

After two years of university research, the fuzzy concept has already been used in the following areas:

- As a control system for six discontinuously operating wood pulp digesters,
- As a process control system for production in a pulp wood plant, and
- As a fuzzy coordinator for five closely linked regulating circuits in the control of an automatic press for diffusing lenses in the glass industry.

Currently, the MIT employees in Aachen are testing the fuzzy-Petri-net concept along with experts from Hoesch Stahl AG in the control of ladles in the steel working process. Along with the mechanical engineers of the RWTH [Rhine-Westphalia Technical University], term considerations which occur in operational problem management in the area of flexible production and assembly are being investigated in a time-evaluated fuzzy-Petri-net concept.

University's Fuzzy Initiative Discussed

92WS0573B Duesseldorf VDI NACHRICHTEN in German 17 Apr 92 p 8

[Unattributed article: "North Rhine-Westphalia in the Forefront in Fuzzy: Initiative Bundles Innovative Forces"]

[Text] Duesseldorf, 17 Apr (VDI-N)—North Rhine-Westphalia intends to become number two in fuzzy products behind Japan. The NRW Fuzzy Initiative has set itself this lofty goal. It was announced to the public in mid-February by the Minister of Economy Guenther Einert. "If it does not succeed in bringing equal- or higher-valued fuzzy products to the market in time, irretrievable fields of technology which are now still in the hands of domestic firms will be lost," stressed Einert at that time with an eye toward Japan and the U.S. The NRW state government and the project partners are supporting the initiative over the next three years with a total of 11 million German marks [DM].

The objective of the initiative is to bundle the internationally available fuzzy know-how, to prepare it for use in small and medium-sized companies in NRW, and to make it economically available to interested firms through coordinated technology marketing and technology transfer measures.

At the cooperating partners of the NRW Fuzzy Initiative, and particularly at the demonstration center in Dortmund as well as at the consulting center in Aachen, additional application-oriented fuzzy components, which will be available in the future at favorable prices as core modules for fuzzy developments by small and medium-sized firms in NRW, are being developed. The experts of the cooperating partners are available for detailed analysis of problems, selection of available suitable software tools, and their adaptation to the development project.

The spokesman for the initiative is Prof. Dr. Zimmermann of the Aachen Technical University. The Chambers of Industry and Commerce of the state of North Rhine-Westphalia are involved through the head of their joint chambers Crone-Erdmann as a member of the board of the Fuzzy Initiative.

The Fuzzy Club, also just established, serves for the exchange of ideas between the representatives of the state's small and medium-sized firms. A scientific and a technical advisory council are also being formed. The role of the scientific advisory council—on which the best-known international fuzzy experts will serve—is to make internationally existing fuzzy know-how available. In the technical advisory council, primarily domestically known experts are serving. Its role is to support the Fuzzy Initiative in the performance of its current emphases. For Einert it is clear: "It is necessary to increase the innovative treasure."

Cooperating Partners in the NRW Fuzzy Initiative

- Scientific Advisory Council: International Discussion Forum for Scientists
- Ministry for Economy, Small and Medium-Sized Industry, and Technology of the State of North Rhine-Westphalia
- Fuzzy: Demonstration Center Dortmund
- ESR: Chair for Electrical Control and Regulation, University of Dortmund
- NRW Fuzzy-Club: Network of contacts for users and suppliers
- MIT: MIT-Management Intelligenter Technologien GmbH, Aachen
- Technical Advisory Council: Advisory council of domestic fuzzy experts
- IHK: Chambers of Commerce and Industry
- ZeTec: ZeTec GmbH Center for Fuzzy Information Technology, Dortmund.

With the foundation of the Fuzzy Initiative the state of North Rhine-Westphalia is emphasizing its drive to assume a leading position in fuzzy technology research and applications.

Researchers Optimistic About Future

92WS0573C Duesseldorf VDI NACHRICHTEN in German 17 Apr 92 p 1

[Article by Jens D. Billerbeck and Regine Boensch: "Fuzzy Products First Conquer Process Control Technology: Fuzzy Logic, Out of the Lab Into Factories"; first paragraph is VDI NACHRICHTEN introduction]

[Text] Duesseldorf, 17 Apr (VDI-N)—Developers are seeking dialogue with potential users.

Ten years from now fuzzy logic will be involved in the solution of about 20 percent of all control engineering problems. In process automation alone, the German

market for fuzzy products will increase to approximately DM100 million in 1995. That is the finding of a study to be released this summer by the Basel market research firm Prognos. By the year 2000, this amount should have quintupled.

However process automation is only one area which fuzzy logic will soon enrich with new innovative solutions. This is occurring even though the underlying theory is already quite old: In the 1960s, Berkeley Professor Lotfi A. Zadeh developed mathematical rules to calculate exactly with fuzzy terms and values. Thanks to so-called "fuzzy set theory," it is now possible for a computer to understand and process the following statement: "When the temperature is a little too high, close the regulator slightly."

It is true that fuzzy set theory was developed in the U.S., however, in Europe university scientists have been conducting intensive research in this area for several years. But it was the Japanese who first made the consumer familiar with fuzzy techniques. Here it emerges in a host of consumer products from washing machines to camcorders and rice cookers.

However, in Europe as well, fuzzy advocates have discovered increasingly more applications in industry and implemented them as pilot projects, for example, in cement production, in steel mills, and chemical installations. One of the first was Prof. Hans Juergen Zimmermann of the RWTH in Aachen. He is also the spokesman of the North Rhine-Westphalia Fuzzy Initiative which came into being at the beginning of this year. It has set itself the goal of making the new technology usable even for small and medium-sized companies.

The large companies already recognized the advantages of fuzzy logic a long time ago. According to Joerg Thietke of Prognos: "Over half of all large German companies are already working on implementation of actual projects or have at least planned them." However, as always with the introduction of new technologies, there have also been negative experiences—failures which could have been avoided through more accurate analysis of problems.

Fuzzy pioneer Zimmermann also warns against exaggerated expectations: "The idea that fuzzy is always simple, fast, and cheap is widespread. But unfortunately it is not true." Consequently, a dialogue between users and developers is absolutely essential. VDI NACHRICHTEN will respond to the need for information with a telephone campaign on 28 April: Fuzzy experts will answer the questions of interested parties.

The field of possible fuzzy applications is extensive and reaches far beyond process engineering. Just a few weeks ago, a fuzzy convention was held in the U.S. which promoted the use of fuzzy methods in neural networks as an important future market. New applications can be found for fuzzy logic even in the analysis of complex data.

Constantin von Altrock, leader of the fuzzy technology activity at Aachen's Inform GmbH, predicts new products in multisensor systems. There, it is not a question of measuring individual values especially accurately but of obtaining an overall picture of a process through skillful linking of many individual measurements. "A good physician bases his diagnosis on many individual observations and not on the fact that he measures a fever accurately to eight decimal places."

But, there is no more time to waste because, not only in Japan, but in the U.S., the starting gun for fuzzy products has already sounded. According to Prognos expert Thietke: "Experience shows that the Americans do not delay as long as the Europeans in implementation of products."

Daimler-Benz To Become Integrated Technological Firm

92WS0588A Duesseldorf HANDELSBLATT in German 12 May 92 p 13

[Article by Georg Heller: "Integration Into a Technological Conglomerate Must Begin in the Workers' Minds: Daimler-Benz/How the Whole Is To Become More Than the Sum of the Parts"]

[Text] 11 May, HANDELSBLATT—Edzard Reuter calmly accepts the accusation that a bit of hypocrisy was built into the Daimler-Benz administrative city in Stuttgart-Moehringen. Such critics feel, as the chairman of the group notes with ironic distance, that it would have been more honest to express the power of Germany's largest private conglomerate with a mighty skyscraper.

But is there not something else that can give the visitor to this corporate headquarters designed like a city the feeling that something is wrong here? This Daimler administration, in which roughly 3,000 people work, looks like the housing for a commune. However, such corporate management is no democratic community in which the citizens deal with each other on the basis of equal rights. The strict hierarchical structure of this large company would be more honestly reflected in a skyscraper on whose top floor corporate management is installed above everyone else.

However, Reuter asserts that architecture itself affects people. He would like more communication; hierarchies should be dismantled. The structure of this group of buildings is an offer to the people who work here. In Moehringen communication areas are made available to Daimler employees. The type of building here should be interpreted as a "conscious influencing factor," says the chairman of the board.

Restructuring All Along the Line

The "Piazza" is larger than the market square in Stuttgart and calls to mind the piazzas of the former upper Italian city states. Reuter concedes that the square around which the buildings are grouped is not yet being used as a meeting place; but the "street cafe" on the little pond in the landscaped area bustles with life in the summer, and in the casino there is communication across departmental boundaries.

Edzard Reuter is so preoccupied with the condition of the people in the group that he publicly spoke of their "emotional life." "Everywhere there is inquisitive searching, even insecurity, and in some cases bruises on the soul,"

Reuter said in his most recent balance-sheet press conference concerning the revolution in this conglomerate, which is supposed to grow into an "integrated technological group."

It is obvious that structural changes are not only the occasion for building such a conglomerate, but are also the result of mergers. Both automotive sections—private autos and commercial vehicles—will have to be made more productive through virtually total restructuring of management, development, and production. Production must be internationalized, placed on site in developing countries, and made more independent of the fluctuations of the dollar. The Dornier and MBB acquisitions are being reorganized; aircraft construction is being combined with Deutsche Airbus. AEG must be reorganized; the useful sections must be sorted out. The newly founded Debis combines services to all companies in the group and is supposed to grow into the market. After all, everything should be based on profit.

Creativity Must Be Given a Chance

In view of such radical changes, what Reuter said about the emotional life of those involved is rather restrained. What does the reduced investment in AEG or the regrouping and concentration of the extremely varied companies in Deutsche Aerospace mean for the people working there? The managers cannot merely reorient themselves; hundreds of employees on the management floors are simply "superfluous." Inevitably that leaves its mark even on those who remain. And part of that is that they must identify with this new image which thus far exists only as a vision of an "integrated technological conglomerate" and has yet to develop its own "corporate culture."

"This is the cardinal issue for the group," said Reuter in a conversation with HANDELSBLATT. Whether the technology group gets off the ground will not depend on the success of AEG, DASA, or Debis. It must succeed in tearing down the "mental hierarchies"; that is the group's major problem. "We will not make any more progress in competition if the creativity of the younger people is not given a chance. And that can only happen if the hierarchy is breached."

All this is playing out against the backdrop of a critical situation worldwide in the auto industry, which has already brought the American groups billion dollar losses. But even from that good reasons can be drawn to justify the expansion of Daimler-Benz into a technological group. Will "pure" automakers survive the turn of the century? The globalization of the world economy also justifies the restructuring of the group. At Daimler, management is reacting with the expansion of the international production group, with the "multi-domestic concept," with "global sourcing," and "strategic alliances."

With its acquisitions Daimler-Benz acquired the problem of conversion from defense to civilian manufacturing to a larger extent than had ever been the case in the group. The "Jaeger 90" complex, for example, has added to the host of problems which the company is suddenly facing in this phase of building the group. However, it is possible that the problems of conversion can be solved only within an integrated technological conglomerate; at any rate, Reuter is convinced of that.

A prerequisite for success is that expectations are fulfilled in so-called "synergy effects," which should result from integration. Reuter prefers to discuss "networking" of activities within the group. As a prime example of this, he mentions the separation of microelectronics from DASA and AEG into an independent company. The founding of "Charterway" among Mercedes-Benz, DASA, and Debis (Contract Hire) and of "Intertraffic" between Mercedes and DASA (traffic guidance system) demonstrate that the group's management intends to fully exploit the group's potential.

The possibilities for networking activities already existing in the group to new areas of business "offer unique international" market opportunities, according to corporate planning manager Dr. Rolf Hanssen. As an example, he mentions the existing capability to solve environmental problems; the areas of auto recycling and munitions disposal result from the bundling of such potentials. The "ecological compatibility" of commerce has a high value for chairman Reuter as "one of the greatest challenges" which the group has to meet. Participation in the Metallgesellschaft is part of this strategy.

New Opportunities in New Areas of Business

Mercedes chairman Werner Niefer says on the subject of group potential: "The future of the automobile and of automaking will no doubt be played out in the area of high technology. And fundamental and cross-sectional technologies of the future will be called into play to cope with the problem of keeping the automobile mobile and linking it with other transportation systems. But Deutsche Aerospace, MBB, Dornier, MTU, and even AEG are right at home there."

Deutsche Aerospace, in which the air and space activities of the group including German Airbus production have been combined, is in the middle of the "restructuring of the German aviation industry," where Reuter and the then chairman of the board of the Deutsche Bank, Alfred Herrhausen, were when the decision was made to expand the company into a technological conglomerate. In light of global markets, the restructuring could not be limited to Germany; it long ago assumed the character of a European industrial order; strategic alliances with America and the Far East are being formed.

Ambitious Goals for Debis

In an extremely short time, DASA chairman Juergen Schrempp brought the activities of the group in the aircraft and engine construction to a scale which qualified it for system leadership. The German-French "Eurocopter" alliance, the combination of European aircraft manufacturers for the "Regioliner" as well as the German-American strategic alliance of the engine builders MTU and Pratt & Whitney are the reasons for this. There is no doubt that around the turn of the century this branch of the company will be as significant within the group as the private auto section.

In Debis, which bundles services within the group and also offers them to the outside, former "cost centers" will become new "profit centers." But the idea is even more far-reaching. Debis is entering the market with an "outsourcing" offer for third parties. Debis' creators plan an internationally leading role for it in information technology.

The service company supports the sales of the groups products in many ways—from aircraft leasing to contract hire for commercial vehicles, through barter transactions in Eastern trade, through the integration of individual products into system offers, from goods to customized solutions to problems. Debis is opening "business relationships which would have been inconceivable a short time ago," according to Reuter. The company has begun expansion with tremendous enthusiasm under the leadership of Dr. Manfred Gentz and has taken on an international role with the purchase of Cap Gemini. Soon one-fourth of the Daimler group's balance sheet will cover Debis businesses and the sales of this area of the company will equal those of the former AEG.

Emerging as core activities from AEG will be at least railroad technology, locomotive and railcar manufacture, a business which is booming throughout Europe, as well as the closely associated areas of electrical systems and automation technology. To the question of whether Daimler-Benz would buy the company whose purchase and restructuring has already cost the group's coffers millions, many Daimler managers respond with eloquent silence. Reuter rejects the question of whether there will still be an AEG by the turn of the century as absurd.

Huge Fat-Cutting Process Darkens the Mood

In the most advanced integration project, i.e., DASA, the subordinate companies are transferred to a "homogeneous business sector organization." The direction of the concentration now being undertaken is the disappearance of the level of individual companies. After the dissolution of MBB and TST, 400 managers will no longer have a function. This is having a catastrophic effect on the mood in the company. It can also hardly be assumed that the reduced investment in AEG rigorously managed by Ernst Georg Stoeckl will take place without wounds to management there. And it is hardly conceivable that the 20,000 persons "too many on board" in Mercedes private car production can be interpreted to mean only simple sailors.

Automakers have been placed in a special situation; and that is the crux of the problem which they have been studying. The "strategic adaptation requirements" are, according to an internal paper, "linked to the experience in Mercedes-Benz AG, no longer being the whole company, but rather part of a comprehensive unit whose demands are represented by a holding company, which must first rework its entire content." Whereas the managers of the auto sector must learn that they are managing only one sector along with three others, the managers of the three other sectors must acknowledge the leadership function of a holding administration which is still dominated by automobile personnel.

As the group's leadership sees it, the holding company must fulfill "its management mandate to significantly increase the value of the group according to the dictates of necessity." This means furnishing the proof that the sum is greater than its parts. Currently, this holding company consists primarily of managers from the former auto group, but in fact "automobile thinking" no longer fits the modern technological conglomerate.

"It is my most important job in the next few years to push in this direction," says Reuter; and his contract has been extended, in no small measure because of this. Younger managers, more women among them, Reuter says explicitly, must come into positions "where they can continue to press forward in this direction." Reuter has "model insular solutions" in mind because this is not a "self-propelling process." Far too many people who are bound to the old mentality have tried to block such development.

Managers With the Old Mentality Create Obstacles

The story is in house that in the old structure at Mercedes, the developmental engineer was a cut above the production engineer who was in turn above the customer service engineer. In the auto development area, "clear functionality and strong hierarchy prevail, the manager is the bottleneck." Consequently, it is acknowledged, under no circumstances should the mistake be made in the holding company of making "Mercedes structure the measure of all things." Thus, today people who have come in through the back door, and who are already shaking up the old thinking, can be seen in many positions where the company is dealing with the outside—in public relations work and in the branches.

Reuter's vision is a group in which autos are as much at home as aerospace and rail technology, plus the service sector, and everything should be integrated so that it can never be torn apart. Microelectronics plays a crucial role in this. "We are working on combining rail, air, and the automobile into a transportation system," says Reuter. This results in "networking effects." But the group, which will already have sales of more than 100 billion German marks [DM] in 1993, can be successful over the long term only if it simultaneously succeeds in decentralizing itself and motivating people.

The "integrated technology conglomerate" is taking shape, its form is becoming recognizable. It is much more difficult to comprehend what is referred to by this new group as "company culture." Planning manager Hanssen stresses that "corporate culture" must not in any event remain a buzzword, but rather must be defined as an objective and "measures taken" to achieve it.

In the new areas of DASA and Debis, there is, according to Reuter, already completely different behavior, different ways of thinking. There is a much stronger orientation toward the individual there than toward the departmental hierarchy. Teamwork prevails there without worry about hierarchies. This structure, conventional in research, is also typical of large areas of DASA. At Debis—because of the nature of this responsive service organization—no

market-oriented units operate with their own decision-making power. Gentz sees one of the most significant tasks of the next few years as "organizing the company so that it is composed of the least possible independent units with high creativity." Reuter has in mind that over time group managers who have gotten their education not only in the headquarters, but also in the various areas of the company will develop; thus, they will be able to "represent" the areas in the holding company.

Teamwork Instead of Departmental Hierarchy

An automaker such as Mercedes is structured hierarchically and functionally. And what has brought the auto industry success throughout the world for 100 years must now be replaced by cooperative partnership behavior and holistic thinking. Internal analysis consistently acknowledges that, in addition to the objective problems of restructuring, managers are also "confronted with emotional resistance which is difficult to comprehend." This results from the fact "that the new requirements for cooperation are on a collision course with deep-seated behaviors, without the possibility of such conflict being adequately and quickly overcome by individual actions." The authors of the analysis call this a "cultural behavior dilemma."

This applies particularly to the "old auto boys" in the conglomerate who base their opinion of themselves on a mixture of formal hierarchical status and personal drive. "Such a power dominated structure trains one to avoid failures and to suppress conflicts. Anyone who admits having problems or tries to do what is necessary without complete protection risks disadvantages and sanctions in company-internal competition instead of encouragement if he relies on his argumentative strength instead of power."

Anyone who understands that must certainly be afraid of how he can expand a group which can meet the global challenge with such a management culture.

The vision of the technological conglomerate goes beyond that formerly referred to as diversification; it is expressed by the term integration. The varied activities which must be united within the group must complement and reinforce each other; networking must yield a whole which is more than the sum of its parts. This increases the complexity of the creation so that manageability is jeopardized. The company has become too complex for a few individuals to be able to comprehend and control everything.

Manageability Despite Great Complexity

On the production level, Taylorism is already dead. Total functionalization (including the people involved in production) and excessive automation have made production rigid and susceptible to disruption. More than two decades ago, the projects in the framework of "humanization of work" revealed that job enrichment and job rotation did not increase the cost of the production process because they made it more flexible. With it, the Japanese managed to achieve an enormous cost advantage compared to fully automated, hierarchically controlled production.

Today it is called "lean production" when large-scale industrial production is restructured so that people work responsibly there in manageable areas and can thus identify with their work. Niefer wants to covert more than 50 percent of the jobs at Mercedes into the form of teamwork. People work more creatively and more efficiently if they are considered as whole personalities and not reduced to one single function. Productivity rises. There is no doubt that this also applies to the employees behind the desks in management.

The human being has been rediscovered in the company—more precisely: his power when he is not dependent, but can act autonomously. Many businessmen and managers nevertheless believe that it is impossible to operate without a hierarchical management structure. They absurdly believe, even now in light of the breakdown in the East, that it is possible to retain comfortable top-down operation in their business. They are looking for a hierarchy which permits creativity such as can only result from a democratic structure in which people fit without subordinating their thoughts. How can a hierarchical structure achieve that?

"Flat" Hierarchies Must Develop

In the management of Daimler-Benz the awareness is strong that the holding company must not become a "bureaucratic nightmare." There is the conviction that there should be fewer management functions and more technical functions, more project teams, which work across departmental boundaries and whose members are not bound to the directives of their departmental managers, should be used (something which is obviously extremely difficult in practice). "Communications lines" must become larger, reporting structures shorter. The shape of this new "flattened" hierarchy is not yet clear. In any case, this hierarchy will not be so uniform as it formerly was: It must respond differently to different challenges, according to the group's planner. A legal department must, for example, be organized differently from development.

Reuter himself considers it out of the question to completely reject any hierarchy. Automobiles are products of large industry which are manufactured in highly integrated processes. It could not be left up to the individual responsibility of the worker how and when a complex product like the automobile reaches the consumer. That must be handled by an organization which provides the workers with the "corset stays for action." Nevertheless, as much responsibility as possible must be delegated. In the factories, there must be more "self-sufficient islands." Thanks to his fellow board member Werner Niefer smaller manageable units will be created wherever possible in the auto sector. In project management, various functions are not merely to be coordinated, but combined into profit centers wherever possible under responsible company leadership. Fan production in Bad Homburg, which is also to supply the market, is mentioned as an example.

Power Bureaucracy Should Abolish Itself

Manageable units which can operate independently are a possible solution for the incompatibility of the need for hierarchy with the call for creativity which can only thrive in independence. With smaller operational units, it is obvious that more people will assume responsibility than in larger systems. Hanssen is considering which other administrative functions besides data processing can be "cut loose" and made independent, and he does not even spare the legal department (mentally). In development, project teams which integrate design, production, and market demands from the outset should operate.

Niefer is "studying organizational models and cycles tried and tested for decades" and is not afraid of "slaughtering some sacred cows" in the process. According to Niefer, "We are thus currently rethinking our entire management organization with the objective of strengthening individual responsibility and supporting entrepreneurs in the company. There is no question in my mind that we can become significantly leaner here."

For this a power bureaucracy must take aim at itself and abolish itself wherever possible, because this process certainly does not operate from the bottom up. Discussions with managers of Daimler and Mercedes give a split image of the way it actually operates. According to it, this group seems to be a world consisting of nothing except a top and a bottom. There is no sentence which is spoken, no chart which reflects an organizational structure which is not determined by this dimension. It is always a question of management structures in which superiors deal with subordinates. Project teams are only bulges in the communication line, which still runs principally from top to bottom. In corporate seminars and in corporate education a small number of managers—compared to the "overall population" of the Daimler group—is being trained to think more about the whole (instead of merely the function), more about leadership based on competence (instead of power). How can they change this?

Rethinking Even at the "Very Bottom"

In corporate seminars, young people from the management levels are having the opportunity of contributing to the analysis and restructuring of the company. "Released from all management structures," they can report directly to the board. And when they are allowed to "lecture the board directly—that is the absolute high point of the corporate seminar." They have the opportunity "to make themselves known at the very top," which is useful "when decisions are made about their continued professional career." On the other hand, everyone "all the way up to the board" must learn to listen and to change.

Although it is acknowledged that not everything can be done "top down," but that structures should also be provided so that something can come "bottom up," the problem always remains of how some of the new insights and structures can be disseminated "top down." The restructuring in the thought process must be "repeated in parallel throughout the entire group at the way down." "How do we manage that at the bottom?" is the problem which obviously arises from the fact that nothing is questioned from there. Whatever "upper management"—and that does not always reach from the central department managers to the department managers—has devised must be delivered to the "lower levels." For this, programs must also be worked out for the "lower hierarchies," which then "multiply downward" themselves.

Is it possible to actually convey the idea to those at the bottom in this way that the point is to abolish hierarchies?

ENERGY, ENVIRONMENT

Experts Discuss Future of Alternative Energies in Germany

92MI0514 Bonn DIE WELT in German 7 May 92 p 23

[Article by Silvia von der Weiden: "Upward Trend for Alternative Energies"]

[Text] Solar, wind, hydroelectric, and biogas-fired electricity generation in Germany will continue to grow, and a rate of up to 10 percent is forecast, though technical problems with connection to the national grid are becoming increasingly apparent. Last week over 400 engineers and scientists from Germany and abroad met to discuss the practicalities of these issues at a conference in Dortmund organized by the Association of German Electrical Engineers.

"Our long-term aim must be to integrate renewable energies," said Professor Ralf Gretsch of the University of Erlangen-Nuernberg. "It has emerged that the fluctuating annual and daily output of renewable energies poses problems in terms of grid requirements." At present, less than 1 percent of Germany's electricity is generated from solar energy, though private rooftop solar cell units are becoming one of the most widespread means of exploiting solar energy. More and more of these small-scale facilities are also being connected to the public electricity grid, into which they are able to feed power generated in excess of requirements in return for payment. The direct current produced by solar cells is converted by inverters into the conventional 50-Hz alternating current. The experts complained that inverters intended for small-scale consumers differed widely in efficiency, thus leading to significant switching losses and parasitic currents in the grid. They also criticized the haphazard, and frequently dubious, implementation of the prescribed safety measures when these systems were installed.

The electricity corporations' main source of concern regarding wind energy, which currently accounts for 0.1 percent of the electricity generated in Germany, is the fluctuations in supply. "If we wish to use renewable energies, which we cannot control over time, then efficient storage facilities are indispensable," said Gretsch. The increase in state grants have triggered a boom in windfarms, especially on the German North Sea coast, where some areas are generating more electricity than they consume. This has suddenly required substantial investment by the electricity corporations to enable them to use this excess supply elsewhere.

During the conference, the experts also questioned the economic viability of a large number of decentralized plants. The amount of energy actually converted by conventional solar cells is at the most 14 percent, so sustained technological efforts are required to help renewable energies toward a major breakthrough.

France's Rhone-Poulenc Presents Waste Reduction Plan

92WS0597C Paris AFP SCIENCES in French 14 May 92 p 43

[Unattributed article: "Rhone-Poulenc Presents an 'Environment Plan'"]

[Text] Paris—The French chemical group Rhone-Poulenc presented an "environment plan" on 12 May targeted at reducing all its effluents and wastes throughout the world by 50 percent by 1995 and by 65 percent by the year 2000, explained its general manager Mr. Jean-Marc Bruel. This plan also has the goal of improving safety and taking the "environmental" dimension into account in all stages of product development.

The group has implemented three indexes measuring discharges in water, air, and solid wastes from its plants throughout the world, whose evolution will be published each year. Mr. Bruel estimated the total environment budget of the group at 2 billion French francs [Fr] in 1991—including Fr1.45 billion for the plants in France—a total expected to remain about the same through 1995.

Measured against these indexes, water pollution has already been reduced by 26 percent since 1989. Air pollution has dropped 7 percent and pollution from solid wastes 19 percent since 1990, according to Rhone-Poulenc. The group also presented its progress achieved in materials oxidizable in water, reduced by 25 percent since 1984, and in atmospheric discharges of sulfur dioxide, reduced by 34 percent over the same period.

France: Petroleum Industry Targets Hydrocarbons

92WS0597D Paris AFP SCIENCES in French 14 May 92 p 46

[Unattributed article: "Petroleum Industry Intends To Attack Hydrocarbon Emissions]

[Text] Paris—The petroleum industry has decided to attack hydrocarbon emissions in the atmosphere, released at the time of the loading and transport of petroleum, according to an announcement to the press on 11 May by representatives of the French Association of Petroleum Technicians.

According to a manager of the petroleum company Total, Mr. Jean-Philippe Caruette, these emissions would represent discharges of "a little over 100,000 metric tons" of hydrocarbons into the atmosphere per year. The petroleum profession intends to reach a first level in its fight against these emissions by performing loading and unloading of fuels "in closed circuit" and by recovering gasoline vapors released to reprocess them in the depots, managers explained.

The cost of such an operation is estimated at 12.5 billion French francs [Fr] by petroleum companies: Fr4.5 billion for service station equipment, Fr1.5 billion for modification of tanker trucks, Fr5 billion to adapt the installations at depots, and Fr1.5 billion for loading facilities in refineries and gasoline vapor recovery units.

Emissions from petroleum distribution represent approximately 10 percent of the total discharge of about 3 million metric tons of hydrocarbons into the atmosphere as a result of human activities, according to the Agency for the Environment and the Control of Energy (ADEME). An ADEME spokesman specified that the other sources were the transport sector (75 percent), basically private automobiles, and industries using solvent.

According to Mr. Gilbert Portal, general secretary of Europia, a pressure group formed two years ago to defend the interests of the European petroleum industry with the EEC, the directives currently under preparation at the Commission will not set new targets in terms of emissions but will impose constraints on the technologies to be used by the profession to effectively combat this form of atmospheric pollution.

French Cars Lag Behind in Antipollution Measures

92WS0600A Paris L'USINE NOUVELLE in French 14 May 92 pp 28-29

[Article by Alain-Gabriel Verdevoye: "Eight Months Before European Standards Come Into Force: The Large Bill for Automobile Pollution Control"—first paragraph is L'USINE NOUVELLE introduction]

[Text] Renault and Peugeot lag behind their European competitors. And the application of antipollution standards is expensive, for them and for equipment manufacturers.

The automobile industry is preparing for action. The countdown has started. A gnawing anxiety has seized the production and marketing departments of French car and equipment manufacturers. Only eight months remain before the European antipollution standards for gasoline-powered vehicles come into force. On 1 January 1993, all cars sold in the EEC will have to be equipped with catalytic converters and electronic fuel injection systems.

To meet the challenge, Renault and Peugeot must reconvert one half of their production. That is nearly impossible! In fact, their German competitors already have a full length lead. Under the pressure of German tax incentives, Opel and Volkswagen are now shipping only "antipollution" vehicles on their domestic market. And they are beginning to do the same in France. Since last March, all Opel cars sold in France meet the forthcoming pollution-control regulations. The same will be true of Volkswagen by next July. Both manufacturers, as well as BMW and Mercedez-Benz have now nearly completed their production and marketing mutations.

French manufacturers are far from it. For production and marketing reasons, they reserve their antipollution models

for export (Germany, Swiss, Sweden, etc.). The cars they sell in France are practically all "dirty." Renault intensifies its efforts. All versions of the Safrane, its new high-end car, are already equipped with fuel injection and catalytic converters. And 50 percent of the recently redesigned R19 are now "clean."

Additional Cost: 6,000 Francs [Fr]

But it is only a tentative start. Peugeot and Renault know that they cannot pass along to customers the full additional cost of antipollution devices, estimated at Fr6,000 per vehicle. "In a first stage, that will cost us money," people at Renault point out. Therefore, why would French manufacturers lose money on their own market, which takes up 45 percent of their production, before the legislation comes into force?

The trouble is that French manufacturers have postponed their conversion for so long that they now must do it in a hurry. With a triple handicap. Neither Peugeot nor Renault benefits from the experience that German companies have accumulated over large series. They have not yet achieved the required economies of scale. They will have to take up the excess cost all at once, whereas Volkswagen staggered them over several years.

Anyhow, a large part of the automobile industry had to mobilize itself quickly in order to meet the new ecological standards. Equipment manufacturers were among the first. Thus, the German company Bosch invested Fr450 million at its Onet-le-Chateau factory, near Rodez, to supply electronic fuel injection systems, to Peugeot and Renault among others. Besides, Bosch is expected to double its sales to Peugeot in this sector. In Caen, it has also started producing electronic fuel-injection control units. That required an additional investment of Fr650 million. The Italian Magneti Marelli also expects to spend Fr700 million in France between 1990 to 1994, in particular for electronics, the prerequisite to offering the sophisticated engine fuel-supply systems made compulsory by antipollution standards. The Italian group's Argentan (Orne) carburetor plant alone will receive Fr250 million to shift progressively to the production of injection units. As for the French electronics manufacturer SAGEM [Company for General Applications of Electricity and Mechanics], it, too, intends to join the injection fray—at considerable cost. It might start its first shipments to Peugeot in 1992.

Catalytic converter manufacturers also have had to invest. The U.S. company Allied Signal wants to double the capacity of its Florange (Moselle) factory. This unit specializes in the impregnation of the monolithic precious-metal ceramic components that form the very core of catalytic converters. ACG (General Motors Group) has spent Fr40 million to start its catalytic converter production in Gennevilliers (Hauts-de-Seine). One of the U.S. group's goals is to eventually supply not just Opel, but also Renault, perhaps even Peugeot. For its part, ECIA, the Peugeot subsidiary, had to completely overhaul its production program, to sell two million of ad hoc exhaust lines next year. This has required industrial investments worth Fr30 million.

Redesigned Vehicles

If the forthcoming regulations of 1993 have cost equipment manufacturers a lot, car manufacturers, for their part, have had to redesign their vehicles. No less! For instance, Peugeot has spent Fr600 million per year since 1985, just for research and development. At Peugeot as well as at Renault, one half of the engine designers are working on antipollution problems. Industrialization expenditures, too, are considerable, even though manufacturers decline to quote figures.

Yet, the European, and more particularly the French, automobile industry's troubles are not over yet. Already, new and still more severe standards are looming on the horizon. Scheduled for 1996, they might become applicable in some European countries by 1994, through tax incentives.

Needless to say, manufacturers do not mince their words in private, blaming it all on ecological escalation. In fact, to adapt to the 1996 regulations, Peugeot alone will have to spend from Fr40 million to Fr100 million for each engine type. And the company with the lion logo lists 25 different engines in its catalog!

France: New Radioactive Waste Disposal System

92WS0600B Paris L'USINE NOUVELLE in French
14 May 92 pp 68-69

[Article by Jean-Michel Meyer: "The Aube Center Has Received Its First 'Parcels'; Radioactive Waste: New-Look Storage"—first paragraph is L'USINE NOUVELLE introduction]

[Text] The Koreans, the Japanese, and the Americans are interested in a new way to store short-lived radioactive waste above ground. In 300 years, it will be harmless.

Poured concrete slowly covers the radioactive waste "parcels" arranged at the bottom of the casing. An operator, standing on a movable bridge some 20 meters above the structure, controls the pump with a remote-control device. When the parcels have completely disappeared under the magma, the concrete surface will be smoothed and made perfectly horizontal, and a new layer of parcels will be placed on top.

The new concept of above-ground storage of short-lived slightly radioactive waste built by the ANDRA [National Agency for Radioactive Waste Management] has been operational since April. Here, at Soulaines-Dhuys, in a corner of southern Champagne, one million cubic meters of waste materials, walled up in reinforced concrete structures, will progressively lose their radioactivity. They will be harmless after three centuries. In fact, contrary to many toxic materials, a radioactive substance will self-destruct and turn into stable products. The only problem is that it takes 300 years for short-lived radioactive waste to become harmless to man. The first drums, from the EDF [French Power Company] power plant of Le Bugey (Ain), were shipped to Soulaines-Dhuys, some 50 km from Troyes, late in January; the first storage and concrete-pouring operations started around mid-April.

The Aube center, scheduled to remain in operation until 2030-2040, will progressively take over from the Manche center, near La Hague, which will go out of operation at the end of 1994. Four hundred and twenty four concrete structures, 24 of which are already built, will receive 22,000 to 23,000 cubic meters of waste per year. This waste consists of filters, water-processing resins, tools, gloves, overalls, etc., which have been contaminated by radioactive materials. They represent 90 percent of the waste volume generated by the nuclear industry. The storage center also accepts all waste from research laboratories, the Pasteur Institute, private hospitals, and the pharmaceutical, agrifood, and building industries.

Three successive safety barriers have been provided: the packaging materials of the parcels (or drums), the concrete structures, and the geology of the site. The parcels are shipped to Soulaines-Dhuys by truck from the production centers or, in three quarters of the cases, after going through the Brienne-le-Chateau railroad terminal. Road transport will reach its maximum capacity in 1995, with about 12 vehicles per day. When a convoy arrives, the wagons and semi-trailers, the (transcontainer) handling equipment, and the parcels are subject to a radioactivity and non-contamination check.

Waste Individual Identification and Monitoring

Individual identification of the parcels and waste monitoring are the center's major innovations. Using a laser to read the bar-code label affixed to each drum, the ANDRA gets all the information concerning their characteristics (nature of the waste, radioactivity level, etc.). Any container that does not meet acceptance criteria is rejected by the computer. Computers will also make it possible to keep very accurate records of the containers and their contents, and to "know their location inside the structures," people at the ANDRA assured us. For this, they will use detailed maps of each storage structure.

After their acceptance, parcels from the nuclear industry (EDF, CEA [Atomic Energy Commission], etc.), whose containers are prepared for storage without any intermediate operation, are sent to the storage areas. However, waste from the hospital, pharmaceutical, and similar sectors will first be compacted by a 1,000-ton press, to be set into service by next summer. After that, they will be mixed with a coating material (concrete, mortar, resin, asphalt) and packaged into concrete or steel 200- or 400-liter parcels. Each parcel will contain 85 percent of coating materials and only 15 percent of waste.

When the parcels are loaded, a movable frame covers the 25 x 25-meter, 8-meter high concrete structures. Each structure can receive 696 parcels of 400 liters each, arranged in six layers. They are loaded from a movable bridge at the rate of 40 parcels per day. It takes about three months to fill one casing. Storage stabilization is performed in two days, with two concrete-pouring stages: first, a filling operation lasting six hours, during which 200 cubic meters of concrete are poured to fill the spaces between parcels up to a height of 80 cm; second, a smoothing operation, which takes seven to eight hours and consists in spreading 100 cubic meters of concrete up to 10 cm above the containers. This is a delicate operation that determines the stability of the next parcel layer.

To ensure that the concrete is perfectly even and horizontal, the ANDRA uses motor-operated theodolites supplied by the Swiss company Leica. Operating on the same principle as radar, these instruments measure automatically and without contact the altimetric characteristics of a surface, based on a mesh topology the parameters of which can be defined, and at the rate of about one point every sixth second. The precision achieved ranges from 0.5 to 10 mm. The system regularly produces listings which the pump operator uses to immediately rework any area that is out of tolerance. "This ensures that the entire layer is even, and saves us from having to pour a third 3- to 4-cm thick layer of a very liquid mortar to achieve the same result," Fabrice Ceola, in charge of the center operation, explained. When the storage structures are all full, they will be covered with a concrete slab and hermetically closed by a 2- to 3-mm thick polyurethane coating that will make it water-tight. The spaces will be progressively filled with soil. And in 40 years the final cover, consisting of a clayey layer, an asphalt membrane, drainage layers, and seeded topsoil, will conceal the site. Then, everything will take place underground. A network of galleries laid out by laser with a 1 percent slope—800 meters of which have already been completed—will make it possible to check that the facility is working properly. It will also collect runoff and seep water to prevent any radioactivity.

Eventually, in 300 years, the site will be returned to the Champenois great-great-grandchildren, who may want to settle there.

FACTORY AUTOMATION, ROBOTICS

German Firms Copy Japanese Work Organization Techniques

92WS0550A Munich TOP-BUSINESS in German Apr 92 pp 110-124

[Article by Brigitte Vogel: "Production Organization: Against the Japanese as a Team"—first paragraph is TOP-BUSINESS introduction]

[Text] A revolutionary development is taking place in German factories: Japanese-style teamwork is supposed to take the place of the strict division of labor based on Taylor's principles. Ahead of all the others, automobile manufacturers have hopes of greater productivity through teamwork.

Helmut Binder does not mince words. "You can't make Japanese out of Europeans by fiat," the electronic data processing buyer for Robert Bosch, Ltd., criticized the introduction of Far-Eastern management methods. "Now, at the end of the 20th century, there are no more crises to be dealt with as concerns concepts that have been around for decades."

The ideas with which the Stuttgart strategists at present want to lower costs and increase productivity are not really

brand new. Since, behind the CIP [continuous improvement process] mobilization program concealed nothing more than the Japanese improvement philosophy, kaizen. And what is regarded as the ideal solution at Bosch today has been applied for more than 30 years now in Japan.

Ideas imported from the Far East are currently popular not only with the Stuttgart electronics company, but also on other management floors. Compete by copying? That's what it looks like.

Since the Japanese have been on their economic victory train all over the world, the creative power of German company managers do not appear to have been up to much. Whether it be MITI [(Japanese) Ministry of Trade and Industry] style industrial policy, just-in-time, or kamban—faithful like the Bhagwan's young followers, they parrot Toyota's success formulas.

Until recently, without any lasting effect. Since in their analysis of Japanese economic power for years they had overlooked something fundamental. Not better production systems, not clever robots, not lower wages—as was erroneously assumed—are alone decisive. The Far-Eastern competition's lead in productivity hinges on organization.

The great rethinking has already begun on German management floors: The watchword is to look on workers, machines, materials, and production process as a whole. The goal is to bring planning and execution personnel together; the solution is teamwork.

However, the consequences of this neo-German industrial philosophy can scarcely be estimated. "It will have consequences for workers and companies, for labor unions and employers comparable to those the introduction of the assembly line once produced," prophesied Louis Hughes, chairman of the board of Adam Opel, Inc., in Ruesselsheim.

The fact that the blue-collar worker, his expertise, and his flexibility in German plants is moving back into the focal point of strategic considerations has a scientific background. After investigating 90 auto plants and hundreds of suppliers, Massachusetts Institute of Technology (MIT) researchers came up with alarming figures:

- Auto manufacturers in Japan require 16.8 hours on average to assemble a vehicle, whereas European producers need 45.5 hours.
- In Japan there is an average of 60 assembly errors per 100 cars, as against 97 for European manufacturers.
- Nearly 70 percent of all workers in Japanese plants work in teams; in Europe just 0.6 percent of them do.
- On average 5 percent of the workers are absent in Japanese auto plants; the corresponding figure in European auto plants is 12.1 percent.

A concrete example makes it clear that the cost differential is systematic.

What the MIT researchers brought to light at the Mercedes-Benz plant in Sindelfingen speaks volumes: There, "more effort went into solving those problems that arose specifically due to assembly-line operations than was necessary at the competing Japanese plant in order to put together a nearly perfect auto at the first attempt."

Speaking on behalf of the industry, Opel production chief Peter Endele also self-critically admitted: "We've concentrated too much on the technological renovation of our plants."

Auto Industry Plays Role of Forerunner

The Japanese took an entirely different path. Their production system, "lean production" in the jargon of the trade, efficiently combines the advantages of the assembly line with the flexibility and quality of hand-crafted production. The core element in this system are independent teams, in which each individual contributes to a productivity-promoting process of continuous improvement (called kaizen).

This or something similar is also the way things will soon be in many German workshops. Whether it be Bosch, BMW, Mercedes-Benz, VW, the automobile supplier Loehr & Bromkamp, or the Augsburg computer producer NCR—cutting straight across all branches of the industry, pilot projects are being launched or workshop workers are being prepared for what experts are already describing as "innovative self-organization of the plant."

In the process, Germany's second-largest automobile producer, Opel, has assumed the role of a forerunner. By way of example, in production shed K40 of the parent plant in Ruesselsheim, where the assembly moves "Omega" and "Senator" model auto bodies through the plant at a constant rate, teams of eight to 15 workers were formed on the line composed of nothing but individual workers.

Motivation Through Self-Determination

This form of teamwork plays havoc with the principles of the traditional division of labor:

- Each team is fully responsibile for a specific part of the assembly operation.
- Suggestions for improving the process and increasing product quality come from team members and are no longer ordered from above.
- In keeping with the motto: "Everyone helps everyone else," they strive for as much flexibility as possible.
- Previously separate departments, quality control and supplies and equipment are now part of each team's area of responsibility.
- Elected spokesman for the team for one year, one of the team members, who also serves as moderator during regular team discussions in which operations, training arrangements, vacation plans, or other proposals are discussed, assumes responsibility for coordination.

This kind of self-determination creates motivation. "All of a sudden, workers are more interested than ever," teamwork promoter Peter Enderle sees his expectations confirmed, "in how they can do their jobs faster and better."

But explosive material also lies hidden in the redistribution of responsibility. "The tenacity of snipers at all levels

is not to be underestimated," as Uwe Loos, business manager responsible for production at Offenbach automobile suppler Loehr & Bromkamp, has had to learn. Since, with this sytem, many people will have to say goodbye to prestige and thinking in terms of status.

At the production level, it is especially the foremen, up to now the absolute rulers of the assembly line, who are being forced to rethink things. Their new function will not be to give orders any more, but to give advice. They are supposed to support the team on technical questions and get team members to agree on concrete goals, the attainment of which, they are, of course, responsible for.

At Opel some of them felt themselves duped by the new organization of the work. Their reactions ranged from obvious defensiveness, "Just leave me alone, you and your newfangled system," to the question: "Do you mean to say that anarchy prevails now?"

At Mercedes too, a former quality controller complained about his new assignment: "Before, I could still wear the green smock [of an inspector]; now I have to drive a fork-lift truck."

It is obvious that there will be grinding of teeth and screaming when command structures are turned inside out. Yet, according to Opel manager Enderle, tackling assignments and challenges as a team has, on the whole, proven to be very successful. "Of course, this doesn't happen just by pressing buttons, but we have no other option if we want to continue to be permanently able to compete."

For the company, the step toward more democracy in the plant has already paid off. Motivation and productivity are increasing and the number of hours lost through illness has dropped. Fewer costly jobs that have to be done over again and repairs, which reduce committee quotas, are incurred and machines are better utilized.

First Successes Chalked Up

To be sure, they will not be able to measure the actual results in marks and pfennigs for one or two years yet—but the two-figure amount in millions by which the cost of wages has risen since the introduction of teamwork at the German General Motors subsidiary should flow back into the company coffers several times over.

The internal calculations of another German company make it clear that an immense potential for efficiency is inherent in team organization. On the basis of 100 pilot projects that have already been launched, it was ascertained that there would be a possible total of about DM5 million in reductions of costs for personnel. It would result in a reduction in material inventory of over DM3 million.

The savings from improvement proposals alone produced DM1.4 million last year for the drive-shaft manufacturer, Loehr & Bromkamp (200 employees, sales in 1991: DM530 million). But prophet Loos expects much more continuous improvement of the new process. His goal: By next year at the latest, every worker should hand in at least two proposals.

Naturally, this has its price. There is, on the other hand, the expense of training and training courses. Loos calculates that about 1 percent of sales volume will annually be invested in "the maintenance of team workers." "In an industry-wide comparison, we come out absolutely ahead [of the other companies] with 2.7 days of training per employee per year," says Loos.

But even the best trained and motivated worker will be fighting a losing battle if bureaucratic obstacles are not eliminated, areas of competence are not redistributed, and areas of responsibility are not efficiently structured in future.

This is why Bosch manager Guenter Bensinger categorically demands: "Every single worker's assignment and role must be fundamentally changed." Juergen Hubbert, passenger-car foreman at Mercedes-Benz, where an eight-level hierarchy is not suitable for the plant, thinks along the same lines. At the latest with the introduction of interdisciplinary project teams, Hubbert said, "Will the power of the department princes be practically challenged?"

Old Power Structures Disappear

As early as two years ago, Loos initiated a radical change in the organization structure at Loehr & Bromkamp in order to bring the planners closer to the net product. The four leading departments (planning, quality, the Offenbach plant, and the Waldhof plant) were eliminated and seven product-related units were newly created, to each of which planning and quality control are now assigned.

Loos regards the elimination of an entire hierarchy level as a good basis for further advancing development of the company, which "is now oriented toward the worker." He is convinced that "a main department head is not really more important than the man at the machine."

More independence and checking on themselves instead of monotony in the workplace—demands that the workers, factory committees, and labor unions have long, almost in vain, been making—are today getting the men off the management floor and into the operation of the company.

Between the labor unions and company strategists—purely theoretical, at least—agreement prevails on the fact that the new productivity-raising work models are the right response to the Japanese challenge.

"However, it would be stupid," Franz Steinkuehler, the president of the IG Metall Company, warned, for them to overlook the negative consequences for the workers. They involve, "for example, qualification, which means the danger of overworking oneself—but not being paid for it—instead of self-determination in teamwork."

Richard Heller, the chairman of the Opel general factory committee, could not help raising the question as to whether teamwork will not after all be classified by the managers "as a simple efficiency instrument" and whether they are not going about it in the wrong way, namely "where the productivity reserves are already exhausted."

Pressure of Time and Hectic Pace Increasing

It is true that the response of workers who are already working on teams is, without exception, positive. But a survey conducted by the Dortmund Social Research Center after the first pilot tests at Opel shows that the pressure of time and the hectic pace have considerably increased. Conflicts and competition within the team are perceived as being especially burdensome. In the sociocultural environment of Japan, where hierarchies graded by age and group interests stifle every shred of individualism, teamwork may function outstandingly as a disciplining instrument to increase productivity. But in Europe culture and style are shaped more by every individual's originality of behavior.

Nevertheless, the way German managers at present dictate application of the new production concept in the company, they seem to overly orient themselves along the lines of the Japanese model. "It's not enough," according to Munich business consultant Roland Berger, "to put on a kimono and copy Far-Eastern management tricks."

Our own ideas, appropriate to the situation in German companies, are in demand. Otherwise, Bosch's man, Binder, is right in suspecting that the Swabian firm will only be enthusiastic over the kaizen philosophy because it is "cheap."

[Box, p 113]

Fit for Teamwork

Holger Karsten of the Wiesbanden consulting firm Arthur D. Little's Automotive Practice has developed 10 rules for introducing teamwork:

1. Top management commitment: Without integration and a serious commitment on the part of the top management team, absolutely nothing will work. If they do not want to visibly support the activities of the teams, they would do better to stay away from team models.

2. Integration of teams into organization structure: To see to it that the kaizen work teams are not "left hanging in mid-air," channels for reporting and committees that make decisions on their team activities must be organized.

3. Sponsor from the management floor: Acceptance of the teams must be gained quickly right from the start. This can be efficiently accomplished by a committed sponsor from the board of directors or the management who can convince the upper echelons too.

4. Intensive information: Before the teamwork system is initiated, all of those involved (managers, workers, factory committee) must be thoroughly informed about the purpose of the teams. Especially middle managers must be relieved of the fear that they will lose too much responsibility.

5. Inclusion of factory committee: Unless the factory committee is informed and convinced early on, any improvement program will be doomed to failure. An internal agreement is probably inevitable.

6. Training of moderators: Moderators must (especially in the beginning) be carefully chosen and prepared for their leadership role in, for example, methodology, communication, and conflict management. If economies are made concerning this point, later failure will be programmed into the system.

7. Training in methods for all participants: Once the team is formed and the moderator designated, everyone must familiarize himself with dealing with the appropriate methods, be it with the fishbone program, Pareto analysis, or the "five-why-question method."

8. Establishing ability to deal with conflicts: The success of the teams lies in changing the business processes. Since it will not be achieved with the existing company organization without conflicts, those involved outside the teams must also be prepared for these conflicts.

9. Impressive visualizing: From the start, who is working on what aspect of the project and what progress has already been made must be graphically and convincingly "publicly" depicted. Large flipcharts, for example, are one way of doing this.

10. Creating a changeable environment: Accompanying the "tangible analytic and organizational apparatus, an open management culture capable of learning must be established which regards mistakes as an opportunity to learn and offers incentives for participating in teamwork."

Mercedes-Benz Adopts Group Work Organization

92WS0551C Duesseldorf HANDELSBLATT in German, 5 May 92 p 12

[Text] In the opinion of Personnel Director Heiner Tropitzsch the group work model which Mercedes-Benz AG is testing is distinctly different from the Swedish and Japanese models. "We are opposed to copying the Japanese here in Germany," the company president Karl Feuerstein also stressed at a press interview. The company accord, which has been in effect since March, is valid for three years. After that a comprehensive agreement is to be concluded.

At present at Mercedes-Benz there are 150 projects for group work, which 10,000 employees are included in. The new factory in Rastatt is acting as the forerunner. Here group work is to be in effect for 80 percent to 90 percent of the employees involved in production. The management of Mercedes-Benz is attempting to include 50 percent of employees involved in production into group work by the mid-90s, and by 1990 to realize the latter throughout their entire production.

Tropitzsch as well as Feuerstein stressed that both the Swedish and the Japanese group work models were too one-sided. While the Swedish model almost exclusively pursues the humanistic approach of work enhancement for the employees, Japanese team work is aimed only at advances in productivity. By comparison the company agreement on group work at Mercedes-Benz establishes

that the company goal of achieving improved economy, and the employees' goal of improving their work situation are of equal importance.

The groups consist of eight to 12 members. In the staffing of the groups already existing personnel structures are not supposed to be dissolved, in order that older employees, for example, will not be forced out. The group members may thus possess widely varied qualifications. "Every man need not know how to do everything," Feuerstein stressed. Pay is oriented according to what qualifications the individual possesses. At the same time it is not crucial whether the qualifications are constantly being called for.

For the time being however no new pay system will be introduced along with the group work. "This is not urgently required," Tropitzsch said. On the other hand Feuerstein pleads for a new system with altered pay scale criteria. The firms should pay for getting at "the gold in the workers' heads," he said.

Thus there are differences of opinion between management and factory committee over the pay of the group spokesman. The company agreement at the present time provides that the demonstrated qualification for carrying out this job will not be remunerated. Only the group spokesman who is currently active will receive a supplement to his pay. The group spokesman moreover will be elected by the group members. According to the company agreement, however, it must be guaranteed that the spokesman will be accepted both by his superior and his co-workers.

The group spokesman has the job of organizing, together with the members, the assignment of work within the group, of acting as moderator at the weekly approximately 30-minute-long work discussions, and of acting as speaker for the group in external matters. Increased management duties fall on those foremen who have a large number of groups under their charge. Since the group organizes its own work and vacation planning, the foreman should then have more time for managment tasks. The tasks of qualifying the group members should also devolve on the foreman. Similarly the group can make its own extensive recommendations on qualification, which can make it possible for an individual to perform additional activities within the group.

It is important that the qualification programs be drawn up in cooperation with the factory committee, and that they should require its approval. Codetermination also applies to the choice of the project, agreement as to the goals, in the question of aborting the project, and in the solution of problems of overriding importance, which might come to light in the course of the project. In addition to this every project is accompanied by a project team, which is made up of members both of the sectors concerned and of the factory committee.

German Field-Bus System Competes for Position as Universal Standard

92WS0574D Duesseldorf VDI NACHRICHTEN in German 17 Apr 92 p 21

[Article by Gerd Krause: "Trench Warfare of Field-Bus Systems"]

[Text]

The First Devices For the German Standard Profibus Have Hit the Market But an International Bus Standard Has Not Yet Been Specified

After five years of preliminary work, the Profibus field-bus organization is now hoping for a breakthrough. The initial field devices have been on the market for a short time. However, critics doubt the potential of success for this universal bus system that should solve all industrial communications problems. Other field buses have been established for a long time in the automation technology marketplace.

Karl-Peter Simon can only shake his head. "Finally, the Germans have the only standard field bus worldwide and still we are about to misplay a giant chance by arguing about bits and bytes," warns the field-bus expert from the drive specialty company Danfoss.

The basis for his complaint is the numerous German field-bus vendors who, besides the Profibus Universal Bus, recommend their special bus systems. Simon's company Danfoss is a member of the Profibus User's Organization. This is the association of large and medium-sized companies that was able to present field devices for the first time such as electric drives and flowmeters as well as applications for the standard field-bus system. This was in Hannover after five years of preliminary work.

The goal was clearly defined as early as 1987 when the predecessor organization of Profibus was brought to life, primarily at the behest of Siemens. This goal was a universal, manufacturer-independent field bus for industrial communications. It was to have uniform interface definitions extending from simple sensors and actuators at the field level up to primary networks for process control. "With Profibus," exudes Karl-Peter Simon, "the German industry, which is dependent on exports, now has a standard system as demanded by the market, even internationally."

There is doubt about this, though. "In Europe, Profibus does not have a chance," says Dr. Robert Patzke from the board of directors of Messtechnik und Fertigungstechnologie (Measurement Engineering and Manufacturing Technology) of Wunstorf. In the area of sensors and actuators, the French field bus FIP [Flux Information Process] is superior to Profibus. The European development appears to confirm Patzke's prognosis. Besides France, Italy and Great Britain recently decided in favor of the French FIP as the field-bus standard.

However, Profibus is relying on the unique universal system, on the standard interconnection from the lowest sensors and actuators up to the process-control level. Dr. Manfred Patz is the managing director of Softing, the systems house and Profibus member from Munich. He says, "Not even the Japanese have a comparable concept." However, the critic Patzke doubts even this saying, "The Japanese will come with their cellular bus FAIS for MAP. Their bus is already internationally recognized."

Even the Profibus champions see the problem that foreign vendors of field-bus systems are knocking on the door. "We must decide in favor of one system quickly," demands Karl-Peter Simon. The cost pressures on medium-sized businesses from foreign manufacturers are becoming greater and greater. "Whoever is developing field devices for several bus systems has enormous expenses for software development and data documentation. This is because every interface requires the expensive development of ASICs, application-specific chips."

However, the medium-sized businesses are still looking at Profibus with skepticism. It took too long for the innovative niche-market vendors to convert the Profibus concept to practical use. "While the people at Profibus go on a coffee break," sneers Markus Kuner, "we have already developed another interface." Kuner is a drive developer for Pabst Motoren, an automation company from the Black Forest. Pabst, along with more than 80 other companies, feels very comfortable in the Interbus S Club of the field-bus developer Phoenix Contact. In the meantime, the promoters of the Interbus S can point to the most applications.

Such complaints had to force Profibus into action. Indeed, Siemens, the dominant Profibus partner, surprised the engineering world at the Hannover Fair with a minor sensation. The electro giant opened its long-held secret, the DP [decentralized peripheral] protocol to all Profibus members. DP is seen as the "magic bullet" against Interbus S. With the DP protocol, applications can be implemented in the area of sensors and actuators that were previously the domain of the fast Interbus S. Even as late as a few months ago, branch insiders doubted that Siemens would play this trump card. However, the automation giant now wants to sell every manufacturer of Profibus field equipment, this means their own competitors, ASICs for this application. The competition champion Patzke has an amazingly simple explanation for this sudden courtship. "Until now, the Minster for Research has put about 18 million German marks into the development of Profibus. If it flops, that would be the last major project for Siemens helped with tax money."

The new DP protocol could eliminate another reason for the coexistence of many bus systems, namely their differing suitability for various applications. "No field bus can do everything," emphasizes Robert Patzke unwaveringly. He points to the success of the DIN Measurement bus that he supports in the area of test and measurement technology. To specify one universal bus would also restrict the user too much and inhibit technical development. According to Patzke, "The users should decide which bus they want." The decisions of the users are eagerly awaited. For example, the automobile manufacturers Mercedes Benz and BMW will decide shortly whether they will specify Interbus S or Profibus.

Germany: New Generation of Machining Centers Developed

92WS0592A Coburg MASCHINE & WERKZEUG in German Apr 92 No 8 pp 36-41

[Article by WRF: "Flexible Production: 'Forward Orientation' Despite Declining Economic Situation; Machining Centers in 'New Generation'"—first paragraph is MASCHINE & WERKZEUG introduction]

[Text] Against the background of increasingly stiffening competition and a recession, the end of which is not yet in sight, the Maho Company is moving forward with "full steam ahead." Already at the approaches to Metav, it has presented its high-performance machining centers as a "family in a completely new generation." It is obvious that the sluggish economy has also left its mark on the industry's model company in Pfronten. Maho board member Hans-Joachim Holstein used the presentation of the new family generation of high-performance machining centers to shed light in a detailed way on the situation in the industry and in his firm in particular: "There is nothing left of the euphoria of reunification that prevailed two years ago. We too have invested too quickly and too much." He said that the collapse of the Eastern markets was especially painful, "to the extent of a couple of million."

And that sales in the United States and in neighboring European countries have practically crumbled—even in Switzerland, where up to now they have always had good sales potential. It looks exactly the same in France, where a "lack of policy orientation" has prevailed for years now. Only in Italy does Holstein see light at the end of the tunnel: He said that sales had been noticeably picking up again since October.

Recession Has Not Yet Hit Bottom

In Germany, however, he said that the bottom has not yet been reached and that an improvement of the situation is not in sight before the end of the year. The Japanese too have not come out of this unscathed, with a loss of sales of about 40 percent—although chiefly in their own domestic market. He said that this is why an increasingly more bitter price war is to be anticipated, especially in Europe.

Consequently, Holstein said, European manufacturers must adapt to the altered market structures and thus, for example, "make production leaner," concentrate on crucial sectors, and further develop the range of products. This calls for improving quality or "integrating" direct supply into production through subcontractors. He said, for example, that this is how lead production at Maho was completely phased out. "Despite a difficult situation," Holstein said, "we are nevertheless forward oriented." A perfect indication of this is the new Maho plant in Kempten, which is scheduled to go into its trial run by September of this year. This "production plant, which will be unique not only in Europe," is expected to consume an investment of DM160 million before construction is completed—they plan to go into full operation by 1993.

With the production methods applied there, current production runs, which take from 20 to 25 days, will be reduced to two to five days. Hans-Joachim Holstein said: "One thing for certain: No one else in Europe is going to build a plant of this size as quickly as this one was built." But he also knows that, if they cannot "operate the new plant round the clock, it won't pay off."

Transfer of Production Is Strategic Move

As expected, board member Holstein was also critical of the location of [the company's] production in Germany. Because of the currently unresolved wage demands, there is a great danger that they "will offer us a chance to obtain labor-intensive parts abroad." As an example, Holstein cited the already completed transfer of production from Maho's subsidiary plant in Emstal to Hungary.

He said that the transfer of production is a strategic move, which is why the location of production in Emstal inevitably had to be abandoned. The currently 200 workers will in part be absorbed in Seebach and Pfronten, and only sales and service will be retained in Emstal. The Maho manager sees no alternative at the present time to taking this step since "the basic conditions in Germany are no longer right!"

Machining Centers "in a New Generation"

In return, however, the idea of a high-performance machining center within a "family in a completely new generation" that has been introduced appears to be the right one. "These centers," they said in Pfronten, "with their variable module design offer substantial room for further development and advantages over familiar models." Thus, the machine performs all linear movements. Because of this, an optimal usable work area 800 mm x 600 mm x 600 mm (X, Y, Z) in size was created. The essential components, like bed with slide rest, rack, tool replacer, and compartment with control box, are the same. Variable operational programs result in different four or five-axis horizontal machining centers. New operational focal points are derived from this:

- maximal productivity in the production of the most complicated workpieces,
- complete production of the most complex workpiece geometries through execution employing five axes that meets maximal requirements for accuracy.

Variable spindlestock programs result in "horizontal machining center" or "universal machining center with swivel-head unit" versions. Three machining methods on one machine are possible: horizontal machining only, vertical machining only, and genuine automated five-side machining in a jig.

The double rack positions at an exceptionally fast rate of 30 m/min in all linear axes. The NC table provides a B axis of rotation which is rigidly connected to the drive and is capable of heavy loads in the standard version as a high-quality fourth NC axis with a maximum capacity of 1,000 kg.

As a double-suspended NC swivel roundtable, the A axis in the stable execution of the fifth NC axis permits swiveling movements of up to 93° toward the machine and 33° away from it (maximum load: 650 kg).

When the fifth NC axis is used, 70 percent of the large work area occupied by the machine in the four-axis NC version with unlimited milling capacity is conserved. All versions of the machine have a rotation-range adjuster for a maximal workpiece diameter of 950 mm at a Z distance of 350 mm. The new type roller guides ensure rapid and highly accurate positioning.

Shavings Fall Freely and Installation Is Simple

Unimpeded, free fall of shavings is produced by means of the stationary, optimally rigid designed and secured NC roundtable or NC swivel roundtable, that is, a minimal supporting surface for shavings through a shavings drain. The double *rack* is attached to a steel housing that seals off the backside of the entire work area.

The [downward] sloping surface of the steel housing ensures the free fall of shavings at all spindle settings. In conjunction with the new type of machine configuration, the inherently rigid machine bed in addition provides the advantage of installation without any special foundation work because of the stable three-point support. All in all, a very promising idea—but then the new machining center is designed to be the central component for flexible production.

MBB Develops Image Processing System for Precision Machining

92WS0631D Munich NEW-TECH NEWS in English No 1, 1992 pp 17-19

[Excerpt] [Passage omitted] SCOUT, the seam-follower sensor, was developed by MBB to be a member in the product family of "beam-delivery and beam-positioning systems for high-power lasers."

SCOUT is an image-processing system for three-dimensional seam following and consists of a sensor system and an evaluation unit. An illumination apparatus and an industrial camera are integrated in the sensor system, which is mounted directly on the robot's hand. SCOUT illuminates the seam with light bars, and the resultant "pattern" is recorded at an angle by the integrated camera. When the machined material is a plane surface, the light bars take on the form of straight bars. However, if the field of view registers a difference in height, for instance a sheet cut, a "jump" can be seen in the bar.

The evaluation unit connected to the sensor system analyzes this jump and determines the distance and the lateral position of the seam in relation to the robot's hand. The core of the evaluation unit is the image-processing hardware. It has been specially tailored for this application and contains, besides the processor for monitoring and communication, signal processors in a parallel architecture. Various user-specific circuits ensure rapid data interchange within the system as well as smooth data takeover from the camera interface.

The seam data is supplied to the robot control via a parallel or high-speed serial interface. SCOUT is characterized particularly by its seam-following speed. Conventional systems use a laser beam to scan the surface and determine the distance on the basis of numerous single measuring points. This is a simple method, but an extremely slow one, as all the measurements are conducted sequentially.

In comparison, SCOUT processes a new frame every 20 milliseconds, whereby several points on the seam are determined from each frame. Thanks to the high computing capacity, it is possible to achieve welding velocities of up to 20 m/min.

SCOUT	
Accuracy in depth	0.1 mm
Lateral accuracy	0.1 mm
Accuracy of perpendicular	0.2°
Sensor weight	1.2 kg
Dimensions	150 x 90 x 60 mm
Illumination	class-1 laser
Frame update rate	20 ms

In addition to the position of the seam, which is determined absolutely accurately to within 0.1 mm in all three dimensions, the perpendicular on the workpiece and the seam direction are also calculated. Total seam following is the result.

To stay with the example of the auto industry, one possible application for SCOUT could be welding car-body folds, for instance on a trunk lid. The lid consists of an outer skin and an inner structure. Both sheet parts are deep-drawn and placed inside one another. The outer skin is then folded. Normally, a sealing strip is placed in this fold and spot-welded. However, in time cracks usually form in the sealing material and humidity may penetrate. Whoever has driven an older car knows that corrosion starts at these very folds (trunk lid, doors), and the result is rusty sheet metal.

This problem can be solved by a laser-welded seam. The parts are sealed perfectly; moreover, the strength of the bond is increased thanks to the homogeneous load distribution along the weld. The remaining obstacle is how to prepare the sheet cuts. A trunk lid made in this manner has seam-position tolerances of a few millimeters. This means that every seam would have to be programmed individually. This is of course impossible, as series production calls for a cycle time of one minute per part. SCOUT was developed for this very type of application.

To start off with, the seam parameters are supplied to SCOUT via a terminal. The shape of the seam is then represented on a graphic display. This is how SCOUT makes it possible to store innumerable seam geometries. On starting the machining process, the robot's hand is made to set down at a defined point. SCOUT identifies the seam and supplies its exact position to the robot control, which then guides the robot along the seam. To orientate itself, SCOUT also scans the robot's position. This closes the control loop, and consequently the variations in sheet cuts which are caused during production are offset.

Further problems inherent in laser machining are the increasing size of the facilities and the growing number of axes that are required. This complexity calls for ever greater precision. Likewise, the focus intensity varies, due to the possibility of changing the beam path length with large gantries. This downgrades both machining rate and weld quality.

Performance is enhanced substantially thanks to FOCON, an active beam-delivery system. FOCON consists of an adaptive mirror, a sensor and a processor-driven control unit.

FOCON	
Free aperture	55 mm
Optics	water-cooled mirror optics, focusing mirror optics (optional)
Nominal laser power	between 100 W and 25 kW
Variation of laser power	10% to 100% nominal power
Mode of operation	continuous-wave pulse (optional)
Accuracy of control	beam tilt relative to mechanical axes $\leq$ 50 µ rad, focal length error +/- 0.1 mm
Control range	tilt +/- 1.5 mrad, focal length +/- 3 mm (at f = 150 mm)
Frequency range	30-Hz tilt, 1-Hz focal length

The adaptive mirror is placed in the beam path as a bending mirror close to the laser source. It can be tilted in all directions perpendicularly to the beam axis in order to guide the laser beam. In addition, the mirror surface is spherically deformable.

The sensor is integrated into the final focusing optics. It outcouples a minute amount of the laser beam intensity by means of a hole grating mirror and simultaneously measures its angular deviation and divergence. The control unit accepts the sensor signals and drives the adaptive mirror.

This control loop serves to keep the focus position constant at all settings of the beam-delivery system. FOCON is a valuable aid in basic system adjustment, too. In series production, the control unit can be coupled with the overall system control. This makes it possible for the system to be switched off as soon as the laser beam leaves a tolerance zone, which has been defined in terms of laser power and focus position.

The third product from the beam-delivery family is the LASS laser-switching system, which enables laser beams from one or several CO_2 laser sources to be variably assigned to different machining stations. Consequently, LASS ensures that facilities are utilized to full capacity and redundancy increased.

LASS	
Free aperture	70 mm
Optics	coated and cooled copper mirrors
Expansion ratio	1.2 to 2.0
Angular stability	$\leq$ 10 µ rad
Switching time	2 s

This product family has aroused keen interest on the part of industry at trade fairs. SCOUT, FOCON and LASS are expected to be put on the market in early 1992.

MICROELECTRONICS

Eurochip Project To Train Microchip Designers

92WS0455A Duesseldorf HANDELSBLATT in German 1 Apr 92 p B4

[Article by Lutz Bloos: "Microelectronics—Eurochip Finances Training at 200 Universities and Institutes—In the Future, Chip Designers Will be a Rare Commodity in Europe"]

[Text] According to Augustin W. Kaesser, Eurochip Service Organization, the EC will need an additional 100,000 chip designers by the year 2000. At present, approximately 3,000 design specialists are being trained in the EC. To close this gap Eurochip was established in October 1989 as part of the European Esprit program. It started work immediately.

The reason for the rapidly increasing demand for VLSI-engineers, as the chip designers are called officially, is the increased use of microelectronics in all industries. More and more companies are using chips customized to their specific needs in manufacturing, process control, and monitoring. These chips recognize fingerprints in access control systems, process data from sensors of all kinds and control actuators. The applications are practically limitless.

However, the use of ASIC [application specific integrated circuit] also means an increased dependence on American and Japanese developers and manufacturers. In case of supply bottlenecks, this could slow down or paralyze individual companies or a whole industry. To prevent this from happening, Eurochip supports approximately 200 universities and institutes in the training of chip designers. At a cost of only DM30 million an additional 3,000 students of information sciences are to be trained and are expected to graduate each year.

Usually, information sciences students specialize in chip design towards the end of their studies. A chip goes through six design stages, from the initial concept to the production layout. As a first preparatory task students have to obtain or prepare specifications which define the chip functions in detail and describe the general conditions under which the chip will work.

Then, algorithms for the computing steps and formulas have to be developed. The third step, the register transfer level, divides the chip design into subassemblies such as memory, counter, oscillators, and multiplexers which convert analog readings into digital form or convert digital commands into analog signals for control purposes. During this phase, data and control flows are developed and specified. The designer has to decide whether to use available components or develop new components.

The fourth level involves developing the chip logic, the actual chip design. The subassemblies are divided into logic gates and are simulated. A gate consists of six transistors, which carry out different computing operations depending on their circuit connections. The result is a logic plan for the digital part and a transistor network for the analog part. In the fifth step, the gates are subdivided into transistors, capacitors, diodes and resistors.

Cost Reduction

The ultimate step is the development of a layout consisting of lines, rectangles and polygons which represent the individual elements and conductors. This layout resembles the finished chip under the microscope. Now, its functions can be tested on a computer.

To be able to check whether the chip actually works its hardware has to be tested, i.e. it has to be produced first. For a single unit, this is very expensive, easily costing DM50,000. To reduce the cost for the individual institutes, Eurochip collects designs all over Europe until there are enough for a wafer. Then, Eurochip contracts out the design implementation and sends the finished chips to the designers for testing to detect any errors that might have entered the chips.

However, not all ASIC are developed in a "vacuum" simply as a thesis without future application. Several thesis students develop a chip under contract with a company which will subsequently produce and use the chips. These designs are the company's property, and the company pays for them accordingly. Other thesis students offer their free design to companies.

In Germany, the Society for Mathematics and Data Processing (GMD) carries out the tasks of the Eurochip organization. A governing committee of well-known personalities from industry and academia is responsible for strategic decisions and general supervision. Support for the universities consists mainly of workstations and appropriate CAD software as well as test instruments. Since Eurochip acts as a large customer, manufacturers grant favorable prices. Coordination of chip production is equally important.

Of the 200 Eurochip users, 52 institutes are full members which receive all organization services free of charge. In addition, they are eligible for financial aid for a teaching position. The 60 associated institutions have free access to chip manufacturing and can purchase the software tools from Eurochip. The other institutions from EC and EFTA countries must pay for all Eurochip services, but have the advantage of being able to buy below market price.

Germany: Thin Layer Cadmium Telluride for Solar Cells

92WS0455B Duesseldorf HANDELSBLATT in German 1 Apr 92 p B5

[Article by Lutz Bloos: "Solar Energy/Will Solar Energy Become Competitive?—Batelle Institute Develops Thin Layer Cell Technology"]

[Text] A new technology using thin layer cadmium telluride cells could mean a breakthrough in photovoltaics and

a boom for solar cells in the coming years. A five-fold reduction in cost compared to cells made of amorphous silicon seems possible.

The Battelle Institute in Frankfurt is involved in the development and production process for CdTe-thin layer cells. The fact that cadmium telluride is suitable for photovoltaic applications has been known to Battelle and other research laboratories for 20 years. However, the technology could not be used until researchers had a better understanding of the basic processes and materials parameters.

"These efforts have been surprisingly successful," says Battelle staff member Dr. Dieter Bonnet, "we were able to demonstrate a particularly cost-effective separation process." With the so-called closed-space sublimation high-quality layers are separated at very high speeds and are applied to the carrier material. The process is carried out at temperatures below 700°C in a moderate vacuum of 0.1 mbar using protective gas.

For the production tests, simple window glass was used as a substrate; it was coated photovoltaically in one to two minutes. The resulting solar cells had an efficiency of 11 percent. This corresponds to the output of amorphous silicon cells whose yield, however, drops to approximately 6 percent within a few months.

At present, the Frankfurt institute is developing a concept for translating the method into a production technique. Bonnet assumes that the photovoltaic layer is separated onto moving carrier material, similar to the coating of photographic films. This could mean a throughput speed of six square meters or more per hour. This way, the developers in Frankfurt hope to create a competitive product quickly. With a production volume of 10,000 square meters per year Battelle estimates the price for ready-made modules to be less than DM200 to DM300 per square meter. This means that the cost is approximately 80 percent lower than the production cost for silicon cells.

Start of Commercial Production

Once the development has been completed and trial production has started on an institutional scale, Battelle plans to start commercial production in cooperation with industrial partners with whom they already had initial talks. Battelle hopes that this cooperation will lead to a particularly strong position in the growing world market for regenerative energy systems.

While silicon technology has made considerable progress in the past years, it still costs more than DM1 per kilowatt-hour produced. Still, countries with lots of sunshine seem to consider it a promising technology. The Iranian government, for instance, signed a contract with Telefunken Systemtechnik in January for the delivery of a complete factory for the production of solar cells and solar cell modules.

Subsidies for German Microchip Production Called Unnecessary

92WS0558A Hamburg DEUTSCHES ALLGEMEINES SONNTAGSBLATT in German 8 May 92 p 10

[Text]

Expensive Lesson

The European economy feels dependent on Japanese microchips. It demands heavy subsidies for its own semiconductor development. But the fear of East Asian high technology is unfounded.

Along with microchips in general and memory chips in particular, there are now also Eurochips; or more precisely, there should be. That, at least, is what a number of industrial representatives want who, in recent months, came forward with increasingly vocal calls for subsidies for European semiconductor production, forced up against the wall by Japanese and American competition. Under no circumstances, it is said, could an industrial nation of Germany's standing get along without access to chip production technology.

The most prominent representative of this demand is Heinrich von Pierer, future chairman of the board of Siemens AG. At the Hannover trade fair in April, he used strong words to take policy to task. "It is necessary to reconsider the principle of liberalism and free economy if the continued development of microelectronics in Germany is at stake." That means: Government should finance completely or at least in large part the construction of a factory for the next generation of memory chips. The cost would be at least one billion, perhaps even two. A supporting argument has already been found: The site for the new production plant should be Dresden.

Advocates of the Eurochip do not accept the objection that the Japanese and Americans will be certain to put these memory components on the market faster and more economically. Some warn that the Japanese will take advantage of their market-controlling position in order to get a stranglehold on their European clients and competitors. Others fear that by awarding production of application-specific integrated circuits (ASICs) to Japan, clients' valuable systems information contained in these circuits could also flow to East Asia—with possibly disastrous consequences for the position of German industry in the international market.

The validity of these arguments is contested. After all, Japan's chip industry, which is now suffering from declining profits, also lives from the sale of its products—and not from the fact that it holds them back for strategic reasons. And a manufacturer of ASICs who abuses the systems knowledge entrusted to him by his clients could hardly remain for long in the market.

The research ministry in Bonn emphasizes another aspect. Chips are not just key components for many products: On the contrary, the technology necessary for manufacturing highly integrated circuits is itself a key technology, and it has a decisive influence on the capabilities of a highly developed economy. Whoever does not master them not

only abandons the manufacture of components, which can simply be purchased elsewhere on the world market; he also abandons the expansion of the accompanying infrastructure in qualification, research, development, and production—and with it access to the know-how which allows optimal utilization of these components.

What is the Nationality of a Silicon Chip?

Both lines of argument lead to the same conclusion. The safeguarding of an independent German, or at least European, chip production appears to be a task of the greatest importance for industrial policy. And because they also see it that way, European countries and the EC have already invested billions of marks in building up an independent potential for chip production in recent years. If industry now makes further demands in this direction, it seems reasonable to first examine critically the results of these industrial policy efforts achieved thus far. There is sufficient cause to do so.

Almost 10 years ago, Siemens of Germany and Philips of the Netherlands launched their so-called Megaproject, to the accompaniment of a great stir in the media; it was to lead to the production of the one megabit chip by 1987. Bonn and The Hague supported the project with half a billion marks, one third of the total volume. The first megachips "made in Germany" were not delivered in 1987, however, but with a one-year delay, and then the quicker Japanese had long had the market under their wings. Furthermore, the megachips, produced in Regensburg, were not nearly as European as the project's creators had promised. The Siemens researchers had had difficulties during preparation for production and were only able to begin manufacturing after they had purchased the basic technical processes from Japanese competitors.

The Munich team also introduced the four megabit chip considerably later than the Japanese, and that with such an unfavorable profit to loss ratio that rumor has it that production never advanced beyond the pilot stage. Frustrated, Philips finally announced that it would withdraw from cooperation. Things went no better with the 16 megabit chip. Last June Siemens threw in the towel and announced the conclusion of a cooperation agreement with IBM: Starting immediately, the 16 MB chip would be produced jointly with the Americans, and development work for the 64 MB chip would also proceed cooperatively.

Of course, the lovely word cooperation should mislead no one concerning the true nature of the agreement. With the 16 MB chip, Siemens completely abandoned the design which they had developed on their own and simply bought their way into IBM for a great deal of money. Incidentally, the Americans, with their multinational approach, produce the 16 MB chips for Siemens in a plant in France—it was most convenient to set up there.

Whether the plants for the new chip are located in the U.S., in France, in Dresden or in Sindelfingen, what goes on behind factory doors will have very little to do with German or European technology. The nationality of electronic components is a bit of a problem, anyway. To date, no one has clarified what is actually meant by "national" or "European" access to chip technology. Three years ago, when German Chancellor Helmut Kohl ceremoniously started up the production line of the state-of-the-art four megabit chip in IBM's Sindelfingen plant, he may have reached for a rather symbolic pushbutton switch, but the chips, which were baked in the Swabian plant, never made it to the German or any other national market; they were intended exclusively for company use. The processes by which the Sindelfingen chips are made belong neither to Germany nor to Europe, but rather to the internationally active IBM—and it, too, purchases in Japan what it cannot get elsewhere.

Siemens' purchase of IBM technology for the 16 MB and 64 MB chips meant recognition of the fact that the development of leading-edge technology is far easier with international cooperation than in a national framework. Logically, this decision also meant the end for the central part of the JESSI project, created with great hopes in 1989. The "Joint European Submicron Silicon Initiative" set itself the goal of bringing the 16 MB chip to production readiness by 1993 and the 64 MB chip by 1996 as products of independent European development.

Nothing has come of it. In the JESSI initiative's "new profile" presented at the end of last year, the superchip, formerly proclaimed as a leading-edge technology, was mentioned only in passing. With successful cooperation between Siemens and IBM in this area, "there is no longer a need for public support."

Incidentally, JESSI and research minister Heinz Riesenhuber (CDU) have gained the insight "that Europe cannot fully cover all the areas relevant for microelectronics on its own, but rather must seek international cooperation." With European governments and the EC having invested roughly 4 billion German marks in the project thus far, this was an expensive lesson.

SUPERCONDUCTIVITY

UK Semiconductor Industry Gets Boost From Computer Industry

92WS0621I Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 20 Apr 92 p 6

[Article: "Mobile Sector Holds Back Semiconductors"]

[Text] All the enthusiasm and optimistic forecasts that accompany the promised introduction of new telecommunications services in the UK and Europe, have yet to filter through the cash registers of hardware manufacturers. Last to benefit is the UK's semiconductor industry. According to statistics issued by the Electronic Components Industry Federation (ECIF) in London last week, demand for semiconductors for use in communications equipment declined by 9 percent in 1991.

But there is always next year. "In 1992, telecommunications manufacturers will concentrate on the new markets

of radiocommunications and fibre-optic wide area networks," says the ECIF's chief statistician, Malcolm House. He admits that was a view he held last year, too, but events turned out otherwise.

Major disappointments for ECIF members have been second generation cordless telephones (CT-2), GSM digital cellular telephones and personal communications network handsets. Between them these had been expected to generate a burgeoning market for complex digital signal processing chips and high-frequency radio transistors. But CT-2 failed to grab the imaginations of the British buying public, GSM has been delayed through lack of test instrumentation and the personal communications network operators have "re-phrased" their launch plans and "realigned their business allegiances." Some cynics say that the technology for all three has proven a little more difficult to implement than originally forecast.

Nevertheless, despite being let down by the telecommunications industry, House can claim that his forecasts have turned out to be more accurate than many industry analysts. A year ago, House forecast that the UK semiconductor market would grow by 1.9 percent. "In the event," he said, "actual growth was 1 percent to £1,228 million despite the general economic gloom."

In the end, it was the computer business that saved the day. The data-processing industry in the UK actually increased its consumption of microprocessors by no less than 45 percent by value, as it changed over to the newer 32-bit processors. That move in turn generated additional demand for memory chips, with total sales of dynamic random access memory (DRAM) chips increasing by 6 percent despite a general reduction in unit prices.

For the communications industry, this could be good news, since one of the main stimuli for adopting the more powerful processor is to cope with a rapidly growing need to interconnect powerful machines either by direct attachment to local area networks, indirectly to public networks by modem or ISDN, or by radio data links.

House predicts that in 1992, the data processing industry in the UK will spend 8 percent more on semiconductors than in 1991. "Memory chips will dominate, growing by 9 percent in 1992, for total sales of £322 million," House said.

The overall market for integrated circuits of all types will grow by 6 percent to reach a total market of £1,084 million, with discrete devices such as diodes, transistors and optoelectronic devices growing by 1 percent to £205 million. In the longer term, House sees purchases of semiconductors by the UK's computer-makers continuing to grow faster than all other sectors reaching £633 million in 1994. Added together with a growing dependence of other products in telecommunications and automobile electronics on microprocessors and memory chips, these two types of components alone will account for more than 50 percent of the £804 million British industry will spend on them in 1994.

UK Semiconductor Market Estimates and Forecasts

(£ million)

	Estimates			Forecasts			
	1989	1990	1991	1992	1993	1994	CAGR (%)
Discretes	223	221	203	205	209	219	-0.4
Growth (%)		-0.9	-8.1	1.0	2.0	4.8	
ICs	1,059	997	1,025	1.084	1,200	1,360	5.1
Growth (%)		-5.9	2.8	5.8	10.7	13.3	
Total	1,282	1,218	1,228	1,289	1,409	1,579	4.3
Growth (%)		-5.0	0.8	5.0	9.3	12.1	

Source: ECIF

TELECOMMUNICATIONS

France: CNET Develops Compact HDTV Codec

92BR0346 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 2 Apr 92 p 32

[Article signed F.G.: "CNET Advances in Integration of HD-MAC Encoders"]

[Text] The implementation of a hybrid video filtering and interpolation module at the Grenoble facility of the CNET [National Center for Telecommunications Research] opens the way to developing more compact codecs for the European high-definition television (HDTV) standard. CNET has just crossed an additional threshold in the integration of the HD-MAC coding function that is necessary for transmitting high-definition pictures. The French laboratory has indeed developed a hybrid video filtering and interpolation module with 8 x 16 coefficients, on which were mounted four filtering processors (Mulac) and eight video delay lines (LRV16K) using an original planar technology. These circuits were designed by the CNET based on a CCETT [Joint Center for Television and Telecommunications Studies] specification and manufactured by Matra MHS. Two modules can be arranged in cascade to improve the vertical opening of the filter or to process interframe. Due to this module, it was possible to stack all the prefilters of the HD-MAC codec that was installed in Albertville in January on four cards containing

a total of 14 video filtering and interpolation modules, whereas some 50 Mulacs and 100 delay lines were needed with the previous solutions.

Fourteen Billion Multiplications/Additions per Second

Video filtering and interpolation are two essential coding functions in the HD-MAC standard, which is itself a central element of the HDTV production, transmission, and reception chain. In this type of coding, the principle of throughput reduction implies in effect image sequence subsampling operations that require the utilization of prefilters to avoid the conventional spectral deflection problems.

In a typical HDTV transmission, the transmitted signal comprises a 625-line analog video signal (i.e., half the number of lines and number of pixels per line of the source picture) as well as digital assistance data that are embedded in the picture lines which are not processed by a conventional 625-line receiver. These data contain information on the space and time characteristics each segment of the source image (choice of coding system, motion vectors). This additional information (Digitally Assisted Television, or DATV) makes it possible to reproduce the original quality of the HDTV picture on a 1250-line receiver equipped with a HD-MAC decoder. The principle of throughput reduction consists in subsampling the incoming HD video sequence, based on the space and time characteristics of the image which is dissected into segments of 16 x 16 pixels. For instance, the time-based sampling rate of a fixed image block that is repeated unchanged during four successive frames (or 80 ms, since the interval between two frames is 20 ms in Europe) will be reduced by a factor of four (time subsampling) and pixel distribution of the HD block will be preserved for four consecutive frames, thereby reconstituting four blocks of conventional definition. A similar process is applied to moving blocks (only space subsampling so that the motion information is not lost) and slowly moving blocks (space/time subsampling with motion estimate). Thus, three different coding paths are used: the 20-, 40-, and 80-ms paths. The filters used in the subsampling operations are two-dimensional fine impulse response filters that can be programmed for up to 16 x 16 coefficients and that operate at the sampling frequency of the source picture, i.e., 54 MHz. These operations require computing power of 14 billion multiplications/additions per second. Moreover, 15 lines or more than 200 kbits have to be stored in the delay lines that also operate at 54 MHz. The computing power in the CNET hybrid module is supplied by the filtering processors (Mulac) which also handle the multiplication/addition operations and storage in the video delay lines (LVR16K).

EC's Pandolfi on Transatlantic Telecommunications Alliances

92BR0374 Paris ENTREPRISES & TELECOMMUNICATIONS in French Apr 92 pp 84-87

[Interview with Filippo Maria Pandolfi, EC Commission vice president, conducted by Herve Marchal: "Plea For a Holy Alliance"]

[Text] A pragmatist first and foremost, the EC Commission vice president in charge of telecommunications, technology, and science favors a huge Euro-American cooperative effort by major firms. He hopes, moreover, in the next three months to enter into an important agreement with several American electronics giants. And he is announcing a new research and development (R&D) policy concentrating on key technologies. The Bull-IBM agreement does not shock him; entirely to the contrary, since in his opinion it should serve as an example to Olivetti. Finally, he even intends to propose a major joint R&D project with the Japanese, which would lead to sales. Europe redeployed throughout the world: a realist's Utopia?

[Entreprises & Telecommunications (E&T)]: The dispute between the United States and the European Community regarding the opening of public telecommunications markets appears to be worse. How do you react to this, being a fervent defender of a Euro-American cooperation policy?

[Pandolfi]: It is rather complicated. There are two aspects to this question. There is a negative aspect, the dispute over the public procurement rules. The Community has for a long time held the Buy American Act [1] against the United States, as it discriminates against European products. And the United States reproaches Europe for its directive on government markets, which should come into force on 1 January 1993 [2]. Well, a tough battle is ahead. However, on the other hand the American decision means the end of the major dispute on European telecommunications.

[E&T]: You mean...

[Pandolfi]: Some provisions of the Trade Act[3] allow the American administration to draw up a so-called "priority" list. And who was at the head of this list for the first time in 1989? The Community. The Americans voiced their disagreement with the EC over the next two years. But this year it is over. There is no longer any dispute on the general matter of telecommunications. This is why I am pleased: They have abandoned their general accusation. However, at the same time a battle must be fought over Article 29, which relates to government markets and for which we have some good arguments.

[E&T]: How and when will you do battle?

[Pandolfi]: That is not my direct responsibility. We must consult with Martin Bangemann, my fellow Commissioner in charge of the internal market and industrial matters; this matter falls within his area of responsibility. But it is for us to choose the moment and the method.

[E&T]: What is your judgment of the access to the American market by European manufacturers in this sector?

[Pandolfi]: There are sectors where European market penetration is excellent, future technologies where the Europeans are in the lead. For example, all-digital high-definition television.[4] Here we have Thomson and Philips. There are other sectors where, traditionally, American policy has for a fact severely limited European market penetration. In my opinion we must, so to speak, define

the rules of the game while the match is being played. For example, if we increase the degree of strategic cooperation in the information technologies and communications sector between the major North American and European firms, I believe that the results will be balanced and symmetrical. The danger for Europe is an asymmetrical situation. A long-term view is therefore necessary for greater symmetry.

[E&T]: In which sectors do you feel Europe needs a contribution from America and where, in the intermediate term, can it expect positive results?

[Pandolfi]: Semiconductors, in other words memories and microprocessors. If we develop these technologies within a U.S.-European partnership, there will be reciprocal market opportunities. The risk is that we will not get past our historical antagonisms. And that we will thus remain in an asymmetrical situation. This is the case with Japan, for example. If we had major R&D projects with the Japanese, it would mean better penetration of the Japanese market. My view is that there is no possible "scorciatoia," or shortcut.

[E&T]: Have you had indications of good faith from American firms when cooperation is proposed to them?

[Pandolfi]: Yes, without any doubt. You know the American companies which wish to cooperate with us. There are IBM, Texas Instruments, and Hewlett-Packard. I have had a very favorable experience with the latter. They set up a factory in my hometown, Bergamo, to assemble laser printers. Mr. Young, the CEO, told me that productivity there was higher than can be found in Japan! There are also Motorola and Intel....

[E&T]: Are there concrete projects with these companies?

[Pandolfi]: I can say nothing for the moment as we are in a period of transition.... If you like, however, we could meet after spring.

[E&T]: So there will be important announcements at that time.

[Pandolfi]: I hope so, that is what I want.

[E&T]: Still in the area of U.S.-European cooperation?

[Pandolfi]: There is no *a priori* intention to exclude Japan, but we must use the golden rule of the *locus minoris resistentiae*, the path of least resistance. Moreover, cooperation with the United States began in the 1950s; we belong to the same industrial culture. However, this rapprochement can be seen from another angle. One can say that it is an effect of the recession. Because of this recession we have decided to modify our R&D policy and to base it, far more than in the past, on TPs or technological priorities.

[E&T]: Can you give details of this new policy?

[Pandolfi]: The Maastricht Summit defined three major Community policies: our external responsibilities with regard to accelerating history; our cohesion, allowing weaker countries to move more effectively towards economic convergence; and, thirdly, our competitiveness. Most specifically in industry. So at the center of this need for industrial competitiveness is a reoriented R&D policy concentrating on key technologies. It is the technologies, rather than the project itself, which must be targeted. All in all, this effort, which took ECU2.4 billion in 1992, will cost the Community ECU4.2 billion in constant money terms in 1997.

Of course our approach must also be modified; it would be stupid interventionism to imagine that political or bureaucratic bodies could define a project which belongs to industry. Consequently, we must examine in a transparent and intelligible manner a number of projects proposed by the industrial sector. Then it is up to us to choose. Keeping two criteria in mind: aims and resources.

We cannot sign a treaty at Maastricht without also making coherent decisions on resources. This is Jacques Delors' current problem: how to make this text work. Each member state has its problems. Germany has its eastern half; Spain has the problem of making its merge with Europe less difficult; Italy has its exceptionally high budget deficit; the United Kingdom the problem of combining political tradition with economic reality. As for France, it is in a period of fibrillation.

[E&T]: How are you going to create the necessary momentum? For the last year or so we have had the feeling that in the technology sector Europe is on remarkably slippery ground.

[Pandolfi]: This is in effect the critical point. My problem this year will be to convince the major firms to pool a certain part of their technological R&D activities.

[E&T]: A specific example is the cooperation between Philips and Thomson on high-definition television.

[Pandolfi]: That is a most typical case. Here are two firms applying themselves to the same activity, both based in Europe, both with important joint ventures outside European borders, for example in the United States, but who always have a problem developing a joint technological research project. They have reached agreement on the general strategy, but not yet or still not on research and technology. In addition, there are factors which complicate everybody's life. For example, Philips is simultaneously developing all-digital HDTV through its American subsidiary, D2-MAC and HD-MAC in Eindhoven, The Netherlands, and Pal Plus in Germany through its German subsidiary. It is not easy to manage to combine such riches.

And then I had to destroy an illusion last year. The illusion that public authorities could be the arbiters of the economic destiny of companies. Until then we rather had the feeling that, to determine the future, it was sufficient to establish a standard. My great task—which took more than 300 hours—was to bring broadcasters into the process. Five years ago, in 1986, the directive was drawn up using an exclusively technological approach. Hence mistakes such as saying that only high-power satellites could transmit television signals!

Now, the only solution is to unite all parties who are active on the market. Their destinies are linked. So the good thing

about that incredible episode last year—where all cards were reshuffled—is that a consensus was obtained on the subjects to be dealt with and, in particular, the principle was established for the first time of cooperation between equipment producers and broadcasters with the aim of developing the market.

My problem now is to arrive at a viewpoint which is common to all parties on the major, independent variable in this area: all-digital HDTV. For example, Mr. Rousselet, the chairman of Canal Plus, asked me, "Over what relevant period must I calculate the depreciation of my investments? If technological change brings the horizon closer, all my economic calculations become incorrect." We are thus in a delicate phase, and an essential one, as in signing a Memorandum of Understanding (MOU) which must be binding on all parties, we must have a clear view of this question.

[E&T]: What is your opinion on that basic and very controversial point, all-digital HDTV?

[Pandolfi]: It is true that in the middle of next year the Federal Communications Commission (FCC), which is in charge of these regulations in the United States, will make its decision, but they will be decisions on the standard to be adopted. Next it will be necessary to build a prototype receiver, and then it will take three years to come up with the first applications, and so on.... I have the feeling that the time factor is pretty much always the same. And in technology, there is the risk of imagining that when one has found the patent, everything is solved. On the contrary, it is the application phase that is terribly difficult. Look at the Japanese. They started work on high-definition television 20 years ago. They took the risk of being the pioneers. And they saw that we can get on the train at the next station. This gives us advantages. Maybe tomorrow the United States will find themselves in a comparable situation. I think that when all is said and done, all-digital technology will be the winning technology. There is no problem there.

[E&T]: Everybody is in agreement, but for the Europeans the big question is: How long?

[Pandolfi]: You are right. I have my own ideas about this, but I do not have the right to express them. You should add that, as the interesting experiments at the Winter Olympics have shown, it is also necessary to be able to make practical use of the instruments. In Albertville, there were 15 mobile stations, teams of cameramen of different nationalities.... A new technique requires a proper apprenticeship.

[E&T]: What is your assessment of the life-size experiments in European high definition at the Olympics?

[Pandolfi]: To be frank, there are still some technical problems, even with respect to the picture. However, I think that the outcome is positive. Even though the technical problems still exist, even though the reality is a bit different from the laboratory experiments, we did actually manage to carry out live experiments.

[E&T]: How are you going to make all those involved in the audiovisual industry accept common rules on high definition?

[Pandolfi]: The market will help us. The good thing about broadcasters is that they are closer to the market in some cases than television manufacturers. It is they, the broadcasters, who told me that the factor which is creating movement on the market is the 16:9 wide-screen format, much more than the standard. And then, to be completely frank, we must finally have televisions at affordable prices in the new format.

[E&T]: Programs will be needed for this format: What do the program producers say?

[Pandolfi]: At the moment they are being cautious. They are waiting. However, the impetus given by the Community, along with a major increase in promotional funding, could have an effect. I am expecting that in this area France will play a very special role. A good combination of Community action and an all-out commitment by France could make things move.

[E&T]: How much funding will you expect to offer?

[Pandolfi]: I have given a figure on the order of ECU1 billion over five years. Perhaps it will be ECU850 million. We will have to be patient until April to know, but the ballpark figure will not be changed. The major difficulty that we will have to face, besides the independent all-digital variable, is that it will be necessary to make simultaneous investment decisions in the four sectors concerned: technology, programs, satellites, broadcasters. Fortunately the difficulties are not of a theological nature. There are already the beginnings of cooperation.

[E&T]: In another field, we have just witnessed important events which, although primarily in France, are of concern to the whole European computer industry. I mean the purchase by IBM of stock in Bull. At the same time, in Italy, Olivetti is restructuring but does not seem to be looking for an alliance. Finally, IBM also has other, slightly older agreements with Siemens. Where is the European computer industry going?

[Pandolfi]: I hope that Olivetti will get a major international partner. After all, the problem is not on the domestic market. It is international. I hope that Olivetti's destiny will resemble the Bull-IBM joint venture.

[E&T]: Does the ever stronger presence of IBM in Europe bother you? Are you shocked as a European?

[Pandolfi]: Absolutely not! Absolutely not! Europe's strength lies in knowing how to go outside its borders. I think that this alliance is useful for both parties. It would be stupid to deny the advantages for IBM as that company also has its problems. But there are obviously advantages for Bull. Along with, perhaps, the feeling that their future is now better assured. Sharing difficulties is a lot better than tackling them in isolation. However, the problem is to go farther. This type of cooperation must be extended.

[E&T]: What do you have in mind, as an example?

[Pandolfi]: We have come back to the problem of the technological priority projects. I am thinking of automobile electronics. This is a key problem where there is a very wide gulf between Europe and the United States on the one side, and Japan on the other. At the moment the trend is negative. The times are against us. The course of events must be reversed. This is why my European feelings are reinforced by the recent major agreements.

[E&T]: The other major problem which is crucial to the future of European electronics is components, semiconductors. One European mainstay in this area is SGS-Thomson, a company which is equally Italian and French. In addition, there is Siemens, as well as Philips. On the international level, none of them has sufficient weight. And attempts at a rapprochement have so far come to nothing.

[Pandolfi]: First it is necessary that the companies involved find a reasonable solution to their own problems; this will then allow a technological priority project to be defined. It would be curious to ask the public authorities to substitute themselves for the companies. My task begins precisely at the minute following the moment when they define their project.

Having said this, I am not an unconcerned spectator. I am well aware of the question of the increase in capital needed by SGS-Thomson, I know the problems of the two parties, but also the technological ambitions of Pasquale Pistorio, the CEO of SGS-Thomson, and his staff. Above and beyond the problems or ambitions of an industry, the pressure of technological progress is inexorable. Sixty-four Mbit memories had only just gone into production when the prospect of 256 Mbits already was looming. Work is in progress on certain technologies derived from research being carried out at CERN [European Center for Nuclear Research] in Geneva on particle acceleration. For 256-Mbit memories, we need a lithographic line width of 0.1 micron. That is nearly 100 silicon atoms. Extraordinary!

[E&T]: Do you feel that Siemens or even Philips are making a move on these questions of alliances?

[Pandolfi]: In terms of the subjective climate, there is an improvement compared to last year. With a trend toward imitation. A year ago the idea of cooperation between Bull and IBM was the end of the world! And now we are starting to consider such events natural. That's progress.

[E&T]: Are you not in the end defending a sort of economic Yalta, a privileged U.S.-European partnership?

[Pandolfi]: I could object slightly to the term "Yalta." However, I think that the time is not far off when the Japanese themselves will be forced to play a far greater role in the game. Now they are trying to get in under external pressure, through conventional political and diplomatic formulas such as in the case of certain agreements with the Americans. In my opinion, all that is outdated. They will be obliged to agree to reestablish symmetry. Having said that, the Americans and Europeans must behave differently. One cannot penetrate the Japanese markets without taking the question of language seriously. What rule obliges the Japanese to learn English?

Business

[E&T]: Do you think that you have positive contacts with the Japanese?

[Pandolfi]: I must admit that I have twice thought of going to Japan. However, I think that it is only after next summer that I could go there with any ideas. One cannot simply go there with just a politico-diplomatic attitude.

[E&T]: Then you would go there, but with what kind of idea?

[Pandolfi]: The idea is to do something jointly. The principle being that of mutual advantage. And with the curiosity of a pioneer. It is therefore necessary to go there with a proposal, an initiative. Something new where we would share the advantages, the risks, the creativity, and obviously the market. We cannot choose a sector which is too compromised. We would have to have an area where we could get involved together. However, there is mistrust, the shadow of the past, the constraints of the present. And we also have a tendency to perceive our internal rules as untouchable. This is a bit like competition rules, which are gospel to us, whereas in the United States and Japan people are occasionally less scrupulous.

[E&T]: In the matter of telecommunications, Europe is the relatively stronger party.

[Pandolfi]: I agree completely. And I am pleased to see that we have gotten over the major difficulties. Our reorganization is complete. I should remind you of the compromise reached on 7 December 1989, which was a crucial turning point. With Brittan, the commissioner for competition, and his liberalization directive on the one side and myself with my directive on open network provision (ONP) on the other. And in the center, Quiles, as we were under the French presidency at that moment. But let's say that the triangular arrangement worked.

[E&T]: How do you see the next 10 years, in this information and communications technology sector, for Europe?

[Pandolfi]: The 1980s were focused on the idea of progress; now we are going to concentrate on the idea of controlling progress. It is like what happened in economics. After the major crisis of the 1970s and the boom at the beginning of the 1980s, we must ensure controlled, stable growth. And I think that is the destiny of this whole decade.

Footnotes

1. The Buy American Act is a set of regulations which give preference to American products on the U.S. market.

2. This Community directive gives preference, where the prices are the same, to European companies for equipment contracts with public authorities.

3. The Trade Act is a 1988 law on commercial exchanges which requires the U.S. Government to draw up a list of countries where the United States has a problem opening markets.

4. All-digital means the complete encoding of information, for the whole of the image sequence, into binary series (0 and 1), as in computing.

Telecommunications Officials Interviewed on Privatization

Ricke Provides Justification

92WS0468 Duesseldorf VDI NACHRICHTEN in German 27 Mar 92 p 7

[Interview with Telekom Head Helmut Ricke, by R. Boensch and G. Krause, place not given, 27 Mar 92: "'We Need Money—We Don't Have Any Money to Give'—Telekom Head Helmut Ricke Frustrated by Civil Service and Budget Laws"]

[Text] Telekom needs reforms. Civil service laws restrict employees, the lack of capital becomes more and more noticeable.

[VDI-NACHRICHTEN]: You want to privatize Telekom. Are you hopeful that Article 87 of the Basic Law will be changed?

[Ricke]: Prospects are surprisingly good if you compare the present situation with that of only a year ago. If we only looked at it in objective, rational terms there should be more than enough votes for the two-thirds majority required in the Bundestag and Bundesrat for a change in the Basic Law.

[VDI-NACHRICHTEN]: Why do you want to incorporate Telekom, do you want to become a real entrepreneur again?

[Ricke]: I consider myself an entrepreneur even now although we are, strictly speaking, a federal agency.

[VDI-NACHRICHTEN]: Why then do you want to privatize Telekom?

[Ricke]: Our goals are clear: By the end of the decade we want to have sales of more than DM80 billion and we want to offer our customers maximum service at minimal cost.

Our efforts towards privatization will include taking care of social concerns. However, we must not forget that we have 20 percent more personnel than telecommunications operators in other parts of the world.

Another factor are capital expenditures which account for half of all costs at Telekom. We invest twice as much per DM of sales than the American network operators. To reach our goals we need better capital equipment; what we have today won't do. Our equity ratio is currently 23 percent, in comparison, at British Telecom it is over 60 percent, and internationally, this figure is usually 50 percent. It would be unrealistic for us to expect that we can reach such a figure, but even the meager DM16 billion which we urgently need to reach the legally required equity ratio can only be obtained by broad private investments in Telekom.

[VDI-NACHRICHTEN]: You lack money...

[Ricke]: ...which we need urgently to work internationally. During this decade.

[VDI-NACHRICHTEN]: Do you think you can keep up with the competition? What prevents you now from competing?

[Ricke]: The restrictions imposed by the civil service and budget laws. You cannot manage a company with procedures which are used in public administrations.

[VDI-NACHRICHTEN]: You want to prevent the Finance Minister from constantly demanding money from you?

[Ricke]: We need money, we don't have any to give, that should be recognized. Therefore privatization. The second restriction is the civil service code. The rigidity of our personnel and administrative structure prevents us from becoming competitive. We are not allowed to pay based on performance, we are losing good employees and there is no personnel turnover.

[VDI-NACHRICHTEN]: Is the freedom you won through the first reform enough for making changes?

[Ricke]: The opportunities provided by the first reform have not yet been exhausted. When we started to breathe life into the law concerning the postal service structure, we were faced with new tasks caused by the unification: merger with the postal service in the East and establishing an infrastructure. This has changed our priorities. However, I did underestimate the dynamics of the development around us, it has become much stronger due to the unification. Competition forces us to act much more quickly than is allowed by the first postal reform law. I could live with the fact that everybody says we are too expensive—rightly so. But what if our monopoly will be challenged by competition?

[VDI-NACHRICHTEN]: Does the obligation to provide an infrastructure which have by law kept you from becoming more competitive?

[Ricke]: No, our competitiveness has nothing to do with this: We simply have to lower our costs. This is very difficult with civil service procedures.

[VDI-NACHRICHTEN]: What are your obligations based on the infrastructure mission, which ones can you drop?

[Ricke]: Fulfilling an infrastructure mission does not mean that you can only fulfill it with civil servants. This mission can also be fulfilled without the Basic Law stipulating that telecommunications fall under the government's responsibility for the country's infrastructure. There are those who demand this. I could live with this, even if it is not the ideal constitution I am envisioning. My basic philosophy is: the more deregulation, the better. Whether the infrastructure mission is laid down in the constitution or in another law, or whether a government agency below the ministerial level acts as a watchdog as is the case with Oftel in England, does not matter to an incorporated Telekom.

[VDI-NACHRICHTEN]: How would you like Telekom to look in the year 2000?

[Ricke]: A corporation without any government participation which still takes care of the governmental regulatory tasks. The present conflict, namely owner and regulator in one person, must be resolved. However, the decision of how many networks to set up cannot be left to market forces alone, here government regulations are necessary. But this can also be done with a corporation.

Committee Chairman Discusses Risks

92WS0468 Duesseldorf VDI NACHRICHTEN in German 27 Mar 92 p 7

[Interview with Peter Paterna, SPD Postal Expert, by R. Boensch and G. Krause, place not given, 27 Mar 92: "'Privatization of Telekom Would be Risky'—Peter Paterna, SPD Postal Expert, Sees Infrastructure Mission in Danger"]"

[Text]

[VDI-NACHRICHTEN]: Is it necessary to privatize Telekom?

[Paterna]: No, this would be extremely risky. I would urgently advise the SPD not to change Article 87.

[VDI-NACHRICHTEN]: Mr. Ricke and others always quote the civil service laws as a bottleneck. Mr. Ricke wants a clear decision.

[Paterna]: So do I, because everybody is extremely confused. There is no job left where people know for sure that it will not be changed. A situation like that has never before happened in the Postal Service, you must not forget that. The promise of job security attracts people even today.

[VDI-NACHRICHTEN]: Would it not be possible to switch civil servants to a private employment contract?

[Paterna]: In that case we must be quite clear about the consequences. The Postal Service employs 670,000 people; of those 325,000 are civil servants. The status of our eastern German employees has not been decided yet. It would take a lot of money to get the civil servants to give up their status. And there is no pension fund for these civil servants. Have you considered the cost of changing their pensions to a private pension fund? That would ruin the enterprises.

[VDI-NACHRICHTEN]: Another reason quoted in favor of changing the civil service laws is the fact that personnel is bought by private industry and compensated based on performance.

[Paterna]: In addition to civil servants, civil service employees have rights, too: After 15 years they cannot be dismissed anymore. You can imagine how many new employees could be hired between now and the year 2000: It wouldn't be many.

[VDI-NACHRICHTEN]: However, the enterprises complain about the restrictions imposed by the civil service laws.

[Paterna]: If you consider the civil service laws as an urgent problem, then we should reform the civil service laws and not take the enterprises out of the civil service. This, however, affects Article 33 of the Basic Law, not Article 87.

[VDI-NACHRICHTEN]: Telekom wants to expand internationally, and for that it needs money which it does not have. It does not even reach the legally required equity ratio.

[Paterna]: Let's cross this bridge when we get there. A government-owned enterprise cannot go bankrupt, it has unlimited borrowing power. Moreover, there is no problem in obtaining the necessary funds on the capital market.

[VDI-NACHRICHTEN]: What do you think of a holding company owned by the government under whose roof the three postal enterprises, Telekom, Postal Service, and Postal Bank would operate with different private participation?

[Paterna]: We already have a board of directors as a parent organization; this has proved to be just a farce. At present, there is a discussion about the benefits derived from joint usage such as the postal service and postal bank both using the postal offices. Here, a board of directors would have to intervene, but it doesn't.

[VDI-NACHRICHTEN]: That is to say you are not completely happy with everything right now either.

[Paterna]: Indeed, there are even more problems. It is no longer acceptable for the Postal Minister to combine the functions of regulator, legal authority, owner and politician. He has no hesitation of mixing into the daily operation of the enterprises. A third problem is the fact that Mr. Waigl has direct access to the assets of the postal enterprises. However, this would also be the case if the majority of shares of a Telekom AG would be in government hands.

[VDI-NACHRICHTEN]: And what if the Minister of Economic Affairs were the owner?

[Paterna]: Since the constitution of the Federal Republic says that the Minister of Economic Affairs has to come from the SPD, regardless of the party in power, this would be asking for trouble.

[VDI-NACHRICHTEN]: If you could start a second postal reform phase, what would you change?

[Paterna]: The enterprises need money, no doubt about that. At the same time, the budgetary situation is so tight already that not much help can be expected here. Still, a few things could be changed: The Postal Service would have to be treated like in other EC countries, i.e. no taxes and fees which would mean an extra DM1.7 billion for the enterprise. The Postal Bank would have to pay an as-if tax based on the rates for regular credit institutions. That way, it would have to pay DM50 million instead of DM250 million. Telekom, too, should only be required to pay an as-if tax and should be rewarded with investment subsidies and write-offs for its commitment in the new federal states—just like regular companies. This would bring the postal enterprises over the critical threshold of 1997-98. After that, things will improve anyhow.

[VDI-NACHRICHTEN]: How do you solve the regulator role?

[Paterna]: I am in favor of monopoly rights, independent of the special task of uniting Germany. Monopoly rights make up for the disadvantage of being involved in special political missions which should be required from Telekom.

[VDI-NACHRICHTEN]: Such as?

[Paterna]: Guaranteeing basic services nationwide and nationwide modernization of the infrastructure—even where it does not make economic sense from a company standpoint. I do not think that a purely competitive situation would take care of this.

Germany: Digital Mobile Telephone To Enter Market

92WS0572B Duesseldorf HANDELSBLATT in German 4 May 92 p 16

[Text]

RWTUeV Awards First Mobile Telephone License

Licenses for the first mobile telephone D network equipment, eagerly awaited at the German network operator Mannesmann Mobilfunk GmbH and elsewhere, will be awarded at the end of May by the RWTUeV [Rheinisch-Westfaelischer Technischer Ueberwachungsverein, Rhine-Westphalian Technical Control Board], Essen. The telephones could thus be on the market throughout Europe by the beginning of June, explained Dr. Hans-Juergen Meckelburg, director of the RWTUeV Institute for Information Technology, at the opening of the new quality center. The equipment from four manufacturers will receive certificates after each device undergoes 400 hours of testing in accordance with the European guidelines for electromagnetic compatibility (EMC).

Altogether, there are six testing centers throughout Europe. In Germany, in addition to the RWTUeV, the state-owned BFZ in Saarbruecken has jurisdiction and unconditionally recognizes the results of the TUeV institute. In Essen, meanwhile, 80 percent of the digital mobile telephones developed to date are on the test bench in the absorber hall (photo with the prototypes of the Siemens equipment).

"All of the 15 to 20 manufacturers world-wide are our clients; only the Japanese, with the exception of Panasonic, have submitted nothing yet," says Meckelburg. He sees the reason for this in special services. Employees of each manufacturer are accommodated in the Essen institute; they can immediately pass along all suggestions to their development departments. The RWTUeV charges at least 500,000 German marks [DM] for one test. That is a small percentage of the development cost per telephone of DM20 to 40 million.

This innovative step was a gamble for the RWTUeV. The DM15 million information technology testing laboratory was the greatest single investment of the RWTUeV, which had a turnover of about DM420 million in 1991. Public funding is not available for the testing center. In three years only the DM6 million GSM systems simulator, which has now begun operation after a year's delay, will be amortized. For Meckelburg, however, this means that testing of the E1 network equipment must also be done at the RWTUeV.

The complexity of these new systems has always been underestimated, which, according to Meckelburg, accounts for the delays in the plans of the Federal Ministry of Post and Telecommunications. The Ministry planned for the network to begin operation by July 1991. This also applied to the simulator, which, in a cut-back interim solution, was working with fewer than 200 test programs. Therefore, the first licenses are also restricted until the end of the year. However, Meckelburg believes this period will have to be extended by a year.

France, Netherlands Connect Videotex Networks

92WS0621H Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 20 Apr 92 p 2

[Article: "France/Netherlands: Videotex Networks Interconnected"]

[Text] France Telecom and Videotex Nederland have interconnected their two videotex networks, enabling 150,000 users of the 560 service available on Viditel to access services on the Teletel network operated by Intelmatique, a France Telecom subsidiary.

The Dutch interconnection brings the number of videotex networks to which Teletel is connected worldwide to 27. Telematique and PTT Telecom Nederlands both hold equity interests in Videotex Nederland, whose Viditel network operates to the UK's Prestel standard but which has Teletel technology integrated into the network.

Belgian Company To Install Global Advanced Telecommunications Services System in Singapore

92WS0621M Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 4 May 92 p 14

[Article: "Singapore Telecom Orders Advanced Services System From Alcatel Bell"]

[Text] Alcatel Bell Telephone of Belgium has been awarded a $13 million turnkey contract by Singapore Telecom to supply, install, test and commission a Global Advanced Telecommunication Services System (GATES). The system, designed to enhance the range of international telecommunications services offered by Singapore Telecom, will be installed in two phases, the first of which is planned for completion at the end of March 1993.

GATES is an intelligent network providing services such as International Virtual Private Network (IVPN)—which Singapore Telecom markets as Corporate Switched Telecommunications Network Services or CSTN—Alternate Billing Services (ABS) and Advanced Freephone Services (AFS). The Singapore configuration will have a capacity of 1,000 international and 1,500 national trunks.

The contract also calls for Alcatel to train some 20 engineers and technicians of Singapore Telecom starting in May and running until November of this year.

This is the second contract which Alcatel Bell has received from Singapore Telecom. A year ago, the company was one of two companies selected to supply more than 500,000 lines of digital switching equipment. Singapore Telecom has the option to double these requirements (see ITI issue 292).

British Telecom's Expansion Plans Discussed

92WS0621N Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 4 May 92 pp 15-16

[Article: "BT Unveils Major GNS Investment Programme, Announces New Data Service"]

[Text] Under a multi-million pound investment programme, BT plans to expand its Global Network Services (GNS) coverage and implement a new, faster data service based on frame relay technology.

By 1994, it is planned to more than double the number of countries in which GNS is fully managed by BT, from 23 to more than 60.

The geographical expansion will cover all regions. In continental Europe, plans include the location of 100 new access nodes in 25 countries. Currently, BT provides direct access in 13 European countries. GNS expansions into the former Eastern Bloc countries will be via agreements with local third parties, and negotiations are progressing with Czechoslovakia, Hungary, Poland and the former Soviet Union.

A second key area of expansion is the Asian Pacific region, which represents one of the strongest growth markets for managed data services. GNS direct access and support is scheduled for an additional seven countries by the end of 1992, including Singapore, South Korea and Taiwan.

BT is also planning extensive expansion of GNS throughout South and Central America, targeting 10 countries, and providing access in the Middle East and Africa.

BT's new high-speed frame relay network will be based on StrataCom's FastPacket IPX networking switch which has just completed first phase interoperability testing and BT's existing Turbo Engine switches.

The FastPacket network will be interconnected, and will interoperate with BT's existing ExpressLANE frame relay service. The new high-speed frame relay connections will allow customers to transmit data at rates up to 2Mbit/s. The service will be tested in the third quarter of this year with the intention of providing a commercial service by the end of the year.

BT's frame relay customers will now select from a list of features which will determine whether their traffic is transported over BT's TurboEngine, StrataCom's IPX or a combination of the two platforms.

If a customer requires access speeds higher than 256Kbit/s, or requests permanent virtual circuits (PVCs) with a specific committed information rate (CIR), the StrataCom platform will be used. If a customer requires the lower 56 or 256Kbit/s service and wants switched virtual circuits (SVCs), the Turbo platform will be used. Value-added multiprotocol services such as frame relay to X.25 conversion will be available on both platforms. The two platforms will interoperate transparently to the user allowing for data traffic to enter via BT's Turbo Engine and exit via the IPX or vice versa.

Initial management of the StrataCom network will be performed through StrataCom's StrataView Plus network management system. StrataCom is developing an interface to BT's Concert Integrated Management System (IMS) in which IPX node and packet line status information will appear directly on the Concert IMS. Additionally, billing information will be gathered from StrataView Plus and integrated with BT's current system to provide customers with one single bill for all ExpressLANE services.

Within the next 12 months, BT plans to offer the frame relay services to 14 countries. The associated expansion of the backbone network will involve the deployment of Turbo and/or IPX nodes in new sites across the United States and Canada, including Boston, Atlanta, Seattle and Toronto, which will double local frame relay access to more than 350 cities. In Europe, the service will cover the United Kingdom, France, Germany, the Netherlands, Belgium, Spain, Switzerland and Sweden. Fractional T1 services will also be deployed in sites in Japan, Hong Kong, Singapore and Australia.

In addition to its current flat-rate bundled pricing scheme, BT will offer customers a new pricing structure based on feature sets (bundled PVC-based, CIRs etc.) and higher access speeds. The pricing plan will be made available to customers upon commercial release of the new high-speed service in the fourth quarter of this year.

This latest agreement broadens an existing agreement reached between the two companies in November last year under which BT became an international re-seller for StrataCom's IPX (see ITI issue 315).

BT already offers a 56/64 Kbit/s frame relay service.

BT Expands ISDN Service

BT is currently enhancing its international ISDN links with the U.S. and Japan to provide international Supplementary Services (I-SUP), according to international ISDN Marketing Manager, Ruth Stockdale. The UK telecommunications operator will also be able to offer interconnection with the U.S. via two additional carriers, MCI and Sprint, later in the year. In addition I-SUP trials with Switzerland and Australia are in progress.

Implementation of I-SUP provides facilities such as subaddressing and calling line identification across national boundaries, she explains.

She told ITI last week that BT now has ISDN interconnections with 16 countries, with another two to be added in

June. "We are now concentrating on upgrading international services to I-SUP signaling so we can start carrying supplementary services such as sub-addressing and calling-line identity on an international basis," she said. "We are currently testing upgrades to Japan and the U.S., and will start similar tests with Switzerland and Australia later in the year."

The rate at which new connections can be implemented and then be upgraded depends on the availability of suitable network capabilities in the destination countries. "We work to the CCITT 1988 'Blue Book' standards," Stockdale said. Others have not yet implemented those standards.

"In the U.S. the only international carrier we interconnect with at present is AT&T. We will be interconnecting with MCI in the summer and Sprint shortly after. Extending full basic rate access to US RBOC subscribers though will depend on the implementation of a true U.S.-wide standard. That is due by the Autumn of 1992, Stockdale believes. In the meantime, most U.S. subscribers have to be satisfied with a single switched 54Kbit/s circuit. And that requires the use of rate adaptation equipment in the UK. However, the U.S. is scheduled to define a national standard for ISDN that will allow full 2B+D basic rate access.

She said that BT is also beginning to see the emergence of a business in transit traffic where it can provide ISDN interconnection between two countries which are not directly connected, but where each has an ISDN link with the UK-Sweden and Australia for example.

The cost of an international ISDN connection is approximately two to 2.5 times higher than for a normal analogue connection, Stockdale admits, but explains that since most usage is for high speed data transfer, this still represents savings over the use of conventional data communications methods such as international packet-switched services or the use of high-speed modems on analogue lines. She adds that BT is producing a series of ISDN information sheets that set out in detail the rates and technical requirements for interconnection with different countries. The first four sheets cover France, Germany, Japan and the U.S.

Meantime, UK ISDN Marketing Manager Les Lowin claims that BT is ahead of customer demand in the provision of ISDN services in the UK. A year after the introduction of BT's ISDN-2 basic rate service, he claims that it is within reach of 86 percent of all business customers and 78 percent of residential subscribers. "Basic Rate service can now be provided from any BT digital exchange and from any electronic exchange that is co-located with a digital switch," he told ITI. The plan is to be able to offer service to all customers by the end of the year. He adds that an ISDN connection will be provided "in the same timeframe as for a normal telephone service—five to six days from it being requested."

A year ago, BT ordered multiplex equipment to allow ISDN BRA to be provided from existing local digital exchanges—System X and AXE-10. In all, sufficient equipment for provision of 90,000 lines was ordered. "All of that has been installed now," he said, "except for a pool reserved for rapid deployment at locations where a customer requests ISDN service from an exchange which was not originally scheduled for ISDN. So far, around 8,000 lines are in active service with around 1,800 customers signed for ISDN-2. These are mostly corporate users who are still evaluating how they can make full use of ISDN facilities. "We are now beginning to see signs of big orders about to come in as evaluation periods finish," he claims.

A crucial factor remains the availability of terminal equipment and software. Compared with the position 12 months ago, this situation has eased considerably, with many more vendors producing a variety of terminals. BT itself has added a number of items to its portfolio of branded terminals, including a Group 4 facsimile from Canon, and soon two new adapters—one to provide access for serial communications data terminals that use the RS-232 or V.24 interface, the second of the V.35 standard used for broadcast quality audio systems.

Lowin is also firm in his commitment to add a basic digital voice terminal to the catalogue during the next few months. Video telephones and conference equipment will be added later in the year, he adds.

Telecom Finland Orders ERMES Digital Paging System

92WS0631I Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 11 May 92 p 1

[Text] Espoo-based Tecnomen has been awarded a contract by Telecom Finland for the supply and construction of a digital pan-European paging system based on the ETSI standard for ERMES [European Radio Message System].

The new system will go into operation early next year when it will cover Finland's largest cities and the Nordic countries. In the future Europe-wide coverage is planned.

The ERMES paging system is a real-time, pocket mobile electronic message system, which also incorporates the present tone-only, number and text paging services offered by Telecom Finland Paging Services. The customer's pager can also be used as a personal pocket diary for recording written messages, from home or the office, wherever the user moves in Europe.

ERMES offers added value when combined with Telecom's NMT or GSM mobile networks. Calls to an inaccessible mobile phone can be diverted to Telecom Paging Services' Voice Mailbox service, allowing messages to be dictated and notification to be transferred to the called party's pocket or wristband pager.

Tecnomen's radio synchronisation technology is used in Telecom Finland's paging service, which has been operational since October 1985.

In January 1990, 18 national telecommunications operators signed a joint Memorandum of Understanding for the implementation of a pan-European paging system. A decision in principle has also been made to extend the service to the Gulf region.

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