JPRS-EST-92-012
21 APRIL 1992

JPRS Report

Science & Technology

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JPRS-EST-92-012

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EC Internal Study Proposes Aerospace Industry Measures

92P60178 Duesseldorf HANDELSBLATT in German 31 Mar 92 p 22

[Text] Brussels—The European aerospace industry should receive EC funds in the amount of about DM1.42 billion by 1997 to put it in a better position compared to its American competition and to protect it more effectively against fluctuations in the dollar exchange rate. This is the plea of a 30-page internal study from the department of EC Commissioner Martin Bangemann; however, this study is still controversial within the Brussels body.

Like other branches of industry, aerospace will be confronted with structural problems of adaptation in the near future, according to the working paper, which was recently presented to the EC ministers of industry at their meeting in Lisbon and met with reservations, according to diplomats. The Gulf War in 1991 led to a drop in air traffic and thus a two-thirds reduction in the number of contracts; in addition, it is clear today that the dynamics of demand in civil aviation will not be sufficient to compensate in the 1990s for the burdens from the conversion of the defense industry, according to the study.

Europeans will only be able to improve their competitive position, which is structurally weaker than that of their U.S. rivals, if they rely upon a "dynamic, innovative concept." Besides a streamlining of production and programs, the decisive factor will be "economizing effects" on several levels. Suppliers must meet the specific wishes of their customers, such as maintenance service and guarantees, and work toward a "far-reaching standardization of their airplane configuration." Moreover, research and development must already take into account the foreseeable stricter demands for environmental compatibility, safety, and energy efficiency.

As was already done in a previous study (HANDELSBLATT of 5 Dec 91), the Commission listed the disadvantages of the European aerospace industry compared with the U.S. competition. However, Europeans can improve their position in the medium term by their own efforts, despite lasting advantages of U.S. manufacturers from tax privileges and funds from the Pentagon and the U.S. space agency NASA, according to the study.

In this context, the study recommends abandoning the previous system of public subsidies which is characterized by pronounced fragmentation and which emphasizes "national strategic considerations" too much. The multifarious research infrastructure (there are seven centers, some working in parallel) alone produces a loss of efficiency in the EC funds of at least 20 percent of the entire budget. The same is true for the flight control systems, which more than ever need to be harmonized.

Moreover, the study recommends that in the future, enterprises should fill their permanent need for engineers from those in the Commonwealth of Independent States, where today thousands of top personnel are unemployed.

The study, which is supposed to be handled before Easter, will probably provide controversial material in the European Commission with its statements on company mergers. Unlike the competent commissioner for competition, Leon Brittan, the Bangemann paper advocates that one examine not the European but the world market as a standard for a possible predominant position when dealing with proposed mergers in the aircraft industry. There are also reservations from the member states: London does not recognize the EC's authority in this matter in general, Bonn received the study "very reservedly," according to diplomats.

The EC should supply the branches with about DM1.42 billion for research and development between 1993 and 1997 and the member states should furnish the same amount. However, the sum must be adjusted in light of the discussion on the new EC finance program (Delors II), according to the paper.

German Satellite-Borne Optoelectronic Scanner Described

92MI0317 Bonn WISSENSCHAFT WIRTSCHAFT POLITIK in German 19 Feb 92 p 3

[Text] The modular optoelectronic multispectral scanner, MOMS-02, is an experimental instrument for taking digital optical photographs of the earth's surface from space and is to be used on the second German Spacelab mission, D2, planned for January 1993. MOMS-02 operates with advanced optoelectronic line detectors instead of the conventional mechanical scanning systems.

In all, the systems have five lenses, three for stereoscopic and two for multispectral work. The central lens has a focal length of 660 millimeters and is the core piece of the camera. It is capable of taking high-resolution images with a ground pixel size of four and a half meters square. MOMS-02's predecessor, MOMS-01, which served on the D1 mission, had to make do with 20-meter square pixel from an orbit height of 300 kilometers. (Pixel is the name of the rectangular section of ground that is given a number corresponding to the radiant intensity of the relevant area of terrain).

The two other lenses, which have shorter focal lengths and also point slightly outwards, work in conjunction with the central lens. This creates a three-fold stereoscopic image and makes it possible to photograph a point on the earth's surface at three different times from three different angles.

Because of the high data rate of the "photograph," due to the high three-dimensional resolution and flight speed, and the number of channels, there is only a limited time for taking pictures and only between 6 and 10 million square kilometers of the earth's surface can be covered.

Integrata Project Assessed

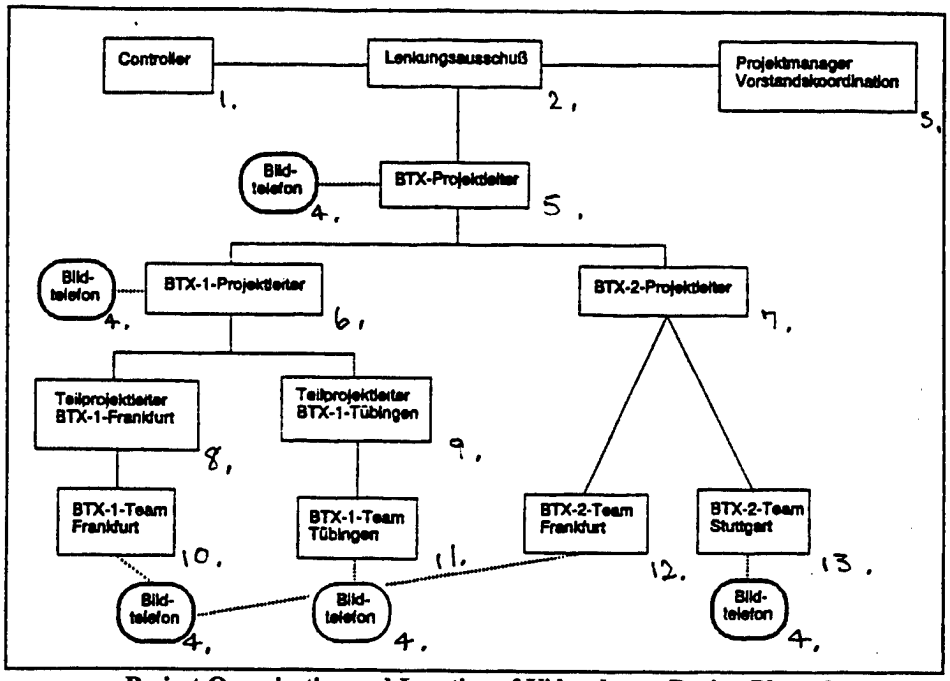
92WS0380B Heidelberg NET—NACHRICHTEN ELEKTRONIK + TELEMATIK in German Jan-Feb 92 pp 13-17

[Article by Dr. Gilbert Anderer (Project Director, Integrata AG): "Practical Test Passed"]

[Text] **ISDN videophones can now be bought commercially. The ISDN network has been expanded to cover almost the entire field, and the end products have become technically sophisticated. For what purposes does the new technology best lend itself? What will the price tags look like? What kind of organizational effects will videophone service have? How are the users relating to the new medium? The report below discusses a one-year pilot project and an accompanying study in which these questions have been systematically examined.**

In the pilot project, which was conducted by Integrata AG, five Philips Communications Industry working models were employed. They consisted of Standard ISDN Telephone Televiev, by means of which the selection processes and picture control was managed, and a video module, upon whose monitor the personal camera was mounted. A special document camera was used to transmit documents. This modular design proved especially flexible in practice, since in switching from the personal to the document camera no refocusing was required. The zoom document camera is capable of transmitting up to a half DIN A4-page machine- or handwritten text. Switching between the two cameras as well as the selection between the other party's and one's own picture (the positioning and sector controls are particularly important for the latter) is effected via the ISDN telephone. A so-called Codec (coder-decoder), which digitalizes and compresses the incoming video signals before transmission (in other words, prepares the signals for the monitor screen), is essential to transmit the video picture. Polished data compression techniques are also essential in order to reduce the required data sets from 216 Mbit/s to the 2 x 64 kbit/s possible under ISDN for the transmission of conventional TV images. To achieve this, the following procedures are used:

- Reduction of the number of lines to be transmitted from 576 to 288 and picture elements from 720 to 360;
- Transmission of only 8.33 images, which are interpolated, in order to present 50 images on the monitor;
- Transmission of only the moving image parts, which are added to the stored images at the receiver end and then completely combined again;
- Reduction of picture sharpness, brightness, and color variety sufficient for the resolution capability of the human eye.



Project Organization and Location of Videophones During Phase 2

Key: 1. controller; 2. steering committee; 3. project manager, board coordination; 4. video telephone; 5. BTX project leader; 6. BTX-1 project leader; 7. BTX-2 projectr leader; 8. section project leader BTX-1 Frankfurt; 9. section project leader BTX-1 Tuebingen; 10. BTX-1 team Frankfurt; 11. BTX-1 team Tuebingen; 12. BTX-2 team Frankfurt; 13. BTX-2 team Stuttgart.

The Right Communication Structures

The pilot test program took place within the framework of a large, decentralized software project that Integrata conducted for IBM. In the first phase there were sets in Integrata's Btx team parks in Tuebingen, Stuttgart, and Frankfurt. Another set was set up in the IBM facilities in Frankfurt. The fifth videophone was installed in the private office of a project director in Bonn.

Commencing in March 1990, the 40 coworkers in the Btx teams were able to improve their communications via ISDN videophone. The overall project broke down into two Btx projects, which worked relatively independently of each other. Each of the projects had its own leader. Moreover, until September 1990, owing to their size, the Btx teams in Frankfurt and Tuebingen were coordinated by their own section leaders. Furthermore, leadership functions for the overall project were assumed by a project director in Bonn, who could use the videophone right from the beginning.

The structures of communication and consequently the demands put on the projection direction were, because of the singular, innovative nature of the project, extremely complex and costly. Information streams had to flow project-internally, e.g., from programmer to programmer, as well as project-externally, e.g., from job submitter to project leader.

To manage the high communications and information demands, formal meetings within and between the individual teams were established on a regular basis. Direct, informal communication, both between the individual coworkers as well as between coworkers and project managers, was the dominant way of resolving problems.

Reservations of the Coworkers

Just as when any new communications medium is being introduced, the coworkers in the Btx teams were kept informed and briefed about the pilot project right from the beginning. Setting up the equipment and making the required organizational changes were worked out and implemented together with the coworkers. In this way, acceptance and proper usage, which were considerable in very high usage times after the introductory phase and the accompanying training measures, could be ensured.

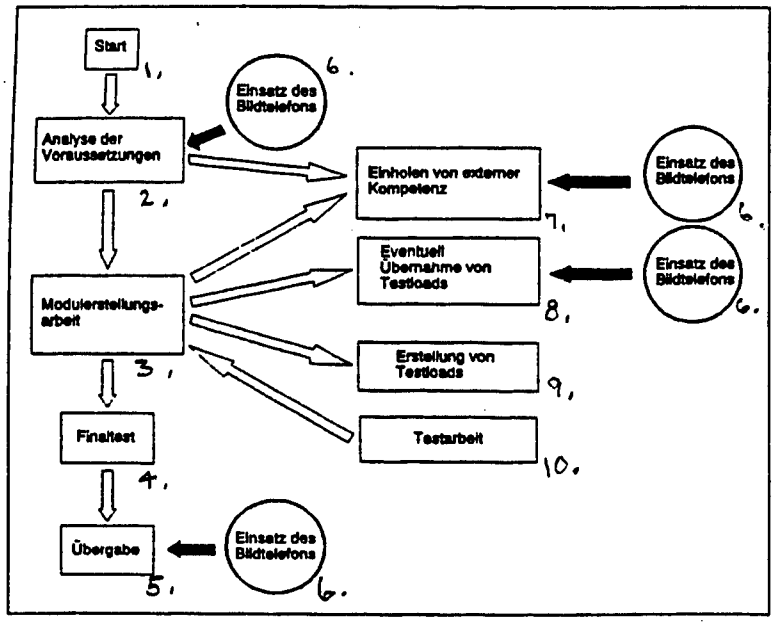
Nonetheless, initially there was considerably widespread skepticism as to the use and operational suitability of the equipment. A questionnaire and individual interviews revealed numerous reservations vis-a-vis the technical and communications aspects. The poorer picture quality of the ISDN videophone, as compared with that of a commercial television picture, was much criticized, and because of that the very use of such a picture for communications questioned.

In many cases, however, repeated daily use quickly resulted in changes of opinion. In most cases, the coworkers soon found the use of the videophone a pleasant experience, justified, and, above all, helpful in daily communications. That many simply enjoyed the entire experience of being among the first to use a new medium goes without saying.

New Usages Targeted

A decisive prerequisite for the successful integration of the videophones in the project structure was an intensive examination of the prevailing organizational conditions. The communications and informational structure was examined in a systematic study, which investigated the critical procedures in communications weak spots. It turned out that it was not so much the coworkers who were not using the sets to communicate with each other, but rather it was chiefly the project leaders who had a communications deficit that could be remedied by more use of the videophone. The multitude of adjustment, coordination, and control tasks in a decentralized project required a high degree of mobility that could only be managed at the expense of actual leadership participation.

After a thorough check of all options (additional project leaders, relocation of the team parks), a solution was finally found: A workplace was established in the private home of the Btx-1 Tuebingen section project leader, in which the least used videophone (IBM's set) was installed. His work plan was adapted to the new communications possibilities, and the number of his business trips was systematically reduced. Of course, not all the trips could be eliminated, but when the Frankfurt section project leader was called away on other assignments, for example, his responsibilities could be transferred to the Karlsruhe project leader without the overall project suffering in any way. The function of the section project leader could therefore be eliminated, and the hierarchy flattened somewhat. This project reorganization was introduced in September 1990.



Process Chain Analysis: The Videophoe Was Chiefly Used in Critical Phases of the Project

Key: 1. start; 2. analysis of prerequisites; 3. modular placement work; 4. final testing; 5. turnover; 6. use of videophone; 7. bringing in outside skills; 8. takeover of test load; 9. preparing test load; 10. testing work.

The videophones were used within the framework of program development, especially to improve communications in the critical project phases. Among other things in this regard, a process chain analysis, which is reproduced above in simplified form, was prepared. The critical phases occurred chiefly during the conceptual activity at the beginning of a project module and at the end when the completed module is turned over for use. Between these two times, external consultants have to be brought in repeatedly and section modules have to be given over to the other teams. In all these cases, direct and intensive communication is indispensable, otherwise the planned meetings could not be held. It must be mentioned however that a greater number of videophone sets would have considerably expanded the overall opportunities for use. Other examples for the use of picture communication may be briefly outlined:

- Groups within a team, which had higher communications requirements during specific phases of the project, established a fixed day on which further approaches might be resolved through videophone.
- The project manager used the more personal and direct communications via the new medium to hold even "critical" talks, (e.g., disciplinary actions).

Overall, a concentration of videophone communications was noted in matters dealing with management talks that required a degree of intimacy and direct personal contact.

When Will Videophone Service Become Generally Available?

With respect to costs, the use of ISDN-based videophones is relatively favorable. To telephone without the video picture attachment costs the usual fee of DM0.23 per unit for a long-distance call. When the video picture is used, the same amount is added for use of the second channel. To this, however, must be added the basic monthly charge of DM73 for the ISDN terminal, as well as the equipment rental which currently runs at several hundred marks—this is without doubt the greatest obstacle in the way of any rapid expansion into a mass market.

Because of this, the new medium will at first be of greatest interest to large companies desirous of improving communications between various business sites. It will obviously be of prime interest to businesses with branches in several European countries. International videophone service is already available for the most important European countries. It is precisely in a multilingual milieu that the picture assumes an important function as another means of expression.

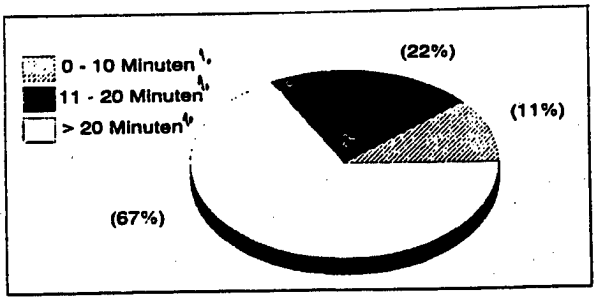
The system's cost-effectiveness has been examined at several levels in the Integrata project. If a narrow view, oriented solely to monetary considerations, is taken, then the aforementioned costs—to which, of course, organizational and maintenance costs must be added—must be balanced against the savings realized through the elimination of unnecessary business trips (travel costs, work time). A monthly evaluation of the videophone costs, examination of work logs and numerous interviews yield a differentiated judgment. The videophone service soon paid for itself, particularly when used by management. The average monthly savings were greater than the costs, despite the fact that the videophone conversations were generally twice a long as regular telephone talks. Sixty-seven percent

of the conversations took more than 20 minutes. These figures, which clearly show that videophone contacts are more personal, resulted from the evaluation of the telephone records that had to be filled out after each phone contact. In the case of strictly "coworker" videophone calls, such as were held especially during the first phase of the project, the costs were admittedly higher than the savings realized, since in these instances obviously fewer business trips, which would have increased the savings, were involved.

These results are further relativized when one considers the savings factors that cannot easily be quantified:

- The probability of misunderstandings is clearly reduced when videophone service, rather than conventional telephone service, is used.
- Videophone contacts were equally positively assessed with respect to the enhanced direct, personal nature of the communications.
- The videophone provided better control over results for management.
- Generally greater credibility was attributed to conversations conducted by videophone.

Additional cost factors that must be mentioned are the greater stress involved by those using the system for the first time, as well as the increased organizational maintenance and training expenses incurred through the use of a new medium.



Average Duration of Call When Using Videophones.

Key: 1. minutes

It's a Matter of the Right Strategy of Introducing the System

Costs and uses are therefore carefully weighed against each other. What is decisive is a strategy to introduce the system that at least takes the following factors into account:

- The organizational preparation should consider all opinions on the communications and information needs of the enterprise where the system is to be used;
- it should also hear all proposals on organizational optimization of work procedures when the ISDN videophones are used. The effects on the company organization (what, for example, would be the consequences of establishing a remote work place), should also be included in these considerations.
- The users ought to be involved in the introduction of the system. They should participate in the solutions to problems. Information alone rarely succeeds in breaking down acceptance barriers.
- Telephoning which involves the use of pictorial information puts special demands on the parties engaged in the talks. An introductory training course should discuss procedures to be followed in this type of communication and the technical aspects of its use.

Other possible fields of application for videophone service in other branches of the economy were not an object of this study. Nevertheless, numerous suggestions were made in conversations and as the result of the year-long examination of the system on other economically attractive fields of application.

For example, video telephone could in the short term become a standard service in conference and communications centers, hotels, congress halls, airports and train stations. Unlike conference centers with television coverage, the videophones could be offered at lesser cost and little fuss. Videophone service is to a certain degree the little brother of the television conference hall.

In the transition from design to production numerous small technical problems arise which must be resolved swiftly. Videophones could illustrate existing problems to development engineers on the spot, e.g., right on the production line, as it were, and accelerate solutions. It is precisely when large production enterprises are increasingly spreading out and moving to other countries that the communications structures between the component business areas ought to be strengthened by means of the right media.

By virtue of the expansion of videophones around the document camera, this service is just about predestined for use in the graphics and advertising industries. Layout and graphic presentations, which are so difficult to coordinate without errors by means of conventional telephone, become substantially more precise and therefore quicker to coordinate through the use of the videophone.

From a Luxury Item to a Mass-Produced Product

How will the demand for videophones develop? Will there be a sufficient number of parties owning a videophone to make the service feasible in the near future? It is, of course, very difficult to forecast. The study made by the Inforama marketing research company entitled "Video Market in Germany" forecasts a market of 90,000 sets by the end of the decade. Should the prices develop like those of PCs and camcorders—and there are indications that that will be the case—then the transition to mass production will come sooner than expected.

DASA, Aerospatiale Merge Helicopter R&D Efforts

92WS0387A Stuttgart FLUG REVUE in German Mar 92 p 30

[Article by K. Schwarz: "Eurocopter Takes Off"]

[Text]

Foundation Confirmed

DASA and Aerospatiale have now completely integrated their helicopter efforts. This makes Eurocopter the largest manufacturer of the branch after Sikorsky.

Since the beginning of the year, Eurocopter SA is "genuinely a complete, autonomous company with a joint kitty," says Jean-Francois Bigay. With Heinz Pluckthun, Bigay runs the business of the largest helicopter manufacturer in the world after Sikorsky. The merger of the helicopter efforts of MBB (DASA) and Aerospatiale is, Bigay believes, the grandest example to date of European cooperation in aerospace.

Under no circumstances was it a simple matter to join the two very different parts. An evaluation of the activities in La Courneuve and Marignane versus Ottobrunn and Donauworth showed a clear superiority for the French. This was even after MBB provided 200 million German marks [DM] in additional capital. Eurocopter Holding SA was included to document the targeted ratio of 60 to 40 percent in spite of this. This firm has 75 percent of the actual management company Eurocopter SA while Aerospatiale retains the remaining 25 percent directly. Eurocopter France, Eurocopter Deutschland, and Eurocopter International as the marketing company, are then wholly owned subsidiaries of Eurocopter SA.

This complicated structure will scarcely affect the everyday business as the active persons are the same to a large extent. The management cannot afford internal frictional losses because, just as the founding has been completed, the helicopter market is flying into heavy turbulence. A considerable drop in orders is evident for 1991. While Aerospatiale sold 289 helicopters in 1990, last year's level only reached 256 machines. This figure includes the MBB products, the BO 105 (34) and the BK 117 (10).

The collapse of the military market, which has not done so poorly since 1960, was one factor responsible for the adverse result. Other causes were the recession in important consumer countries, and a dramatic slump in Japan, where tax credits expired. Despite these, Eurocopter was able to maintain its position as the world's largest exporter. The market share is 45 percent (not including a few inaccessible military contracts).

The Germans Take Over Management of the Small Models

Dramatic improvement is not in view in the near future. Consequently, sales expectations drop for 1992. Plans call for a reduction in production rates to stretch unfilled orders. In this way, it is hoped the company will weather, with little damage, the dry spell until the recovery expected in three to four years.

The internal consolidation should be finished by that time. Eurocopter Deutschland will be responsible in the future for the models to 3.5 metric tons. Eurocopter France will see to the heavier models. Priorities of capital also will be set in the technological area. However, retaining the ability to design a complete helicopter in both countries will be one of these priorities. Few changes are expected in the models already in production. However, the syndicate management for the P 120L, which Aerospatiale started with CATIC (China) and Singapore Aerospace, will be transferred to Ottobrunn.

In addition, important future programs are the BO 108, the NH 90, and the PAH-2 Tiger. For this last model, austerity measures in the German defense budget will result in a reduction of the quantity. Besides this, discussions are now underway with the Russian design office Kamow regarding the joint development of a light helicopter with a take-off weight of about 1500 kg.

Global joint ventures are becoming more important. Although there is no concrete interest now, Eurocopter does not exclude the incorporation of Agusta or Westland into the company. A prerequisite, however, is that Eurocopter gain strength through new partners, be it through increased impact on the market, or in the financial area. As no money is expected from the parent companies, sufficient profit must be generated to be able to cover the high investment sums needed for future products. Only in this way can the company maintain its front-runner position in the branch over the long term.

On-site Production of Ariane 5 Booster Components Planned at Kourou

92WS0387C Stuttgart FLUG REVUE in German Mar 92 pp 80-81

[Article by Men J. Schmidt: "Fuel Cocktail"]

[Text]

Components for Ariane 5 Manufactured at Launch Facility

Having the equator in the immediate vicinity continues to be attractive. The third generation of long facilities for the European booster rocket is being created now in the French foreign department of Guyana. Construction work is proceeding smoothly. However, parts for the Ariane 5 are also being manufactured on the grounds in Kourou.

For the first time in European space travel, part of a rocket booster is being assembled in South America. The individual components of the Ariane 4 currently being used are transported from Europe to Kourou in French Guyana and made ready for launch there. For the new Ariane 5, an important component will even be produced in Guyana. This is the two rocket boosters attached to the sides of the central stage.

These solid-rocket boosters have a diameter of 3.05 m each. They comprise three individual pieces. When assembled, a booster is 30.52 m long and weighs 265 t at launch. In the initial ascent phase, each booster develops a thrust of 600 t.

The top segment of the booster designated the P 230, however, is manufactured in Italy. This segment contains complicated components such as the parachute system for recovering the burned-out rocket boosters, the ignition system, and the on-board avionics. This part is delivered to Kourou as a finished unit. On the other hand, the two

lower segments arrive as empty steel casings provided by MAN Technologie AG from the Federal Republic. These are then filled at the launch pad. First, they are transported to the fuel production center UPG [Usine Propergols Solides Guyana] in a special building. A distinctive feature of the building is the two towers. The arriving sections are first cleaned and impregnated. This prepares them to be filled with solid fuel. The building is ready for use now. It is designated the BPS [Batement Preparation Structures Propulsion].

At a safe distance, the fuel is produced in giant containers in another building. Here, it is mixed using a multi-blade oversized swinging broom. This facility is named Malaxage. As the Ariane 5 is equipped with two boosters, all systems are duplicated. The containers holding the fuel mixture are transported to the filling building after the mixing process is finished. In the filling building, the chocolate-colored viscous fuel is poured into the segments. After the curing process, the conic cores are removed from the segments.

The finished segments and the top segment are then transported to the BIP [Batement Integration Propulseurs], the integration building for the solid-rocket boosters. In this building, the boosters are assembled and equipped with the remaining components. This includes anchoring them to the central stage, the moving exhaust jets and all electrical connections. The entire integration process for the boosters is done in a vertical position. For this purpose, the boosters are permanently mounted on a platform equipped with train wheels. In this way, it is possible to transport the finished boosters directly from the integration building to the main transport platform. Then, the entire combination can be transported further by rail.

The first finished boosters are moved to a test stand, the BEAP [Banc d'Essais de l'Etage d'Acceleration a Poudre]. In the second quarter of this year, the first ignition test using a solid-rocket booster will be run. For the first time in the history of space travel, the booster will be tested as a complete unit in a vertical position (the exhaust jets pointed downward). During this test, the P 230 solid-fuel engine burns for precisely 120 seconds. The booster is filled with about 235 t of solid fuel. Of this amount, the top segment contains 23 metric tons while the two lower segments each hold more than 100 t.

The dimensions of the ignition test stand are massive. The tower for anchoring the booster is 50 m in height. Beneath this is a concrete, pyramid-shaped, flame diversion channel. To deflect the powerful exhaust tail, a channel 60 m deep, 35 m wide and 200 m long was blasted into granite.

Ten ignition tests are planned to qualify the solid-rocket boosters. The boosters are cooled using a special system so that they do not suffer any damage during the ignition tests.

The Launch Platform as a Transport Platform

Once the boosters have been assembled and integrated, they are moved onto a transport platform. This platform moves them to the rocket integration building BIL (Batement Integration Lanceur). The dimensions here are mighty also: 126 m long and 58 m high. The central stage of the Ariane 5 is joined to the two solid-rocket boosters in this tract. At the top comes the second L-7 stage, filled with fuel that can be stored, and the control unit. Only the payload top containing the cargo is left. The unit, once checked out, continues the trip vertically on the launch platform by rail. The launch platform itself weighs 900 t.

A rectangular column at the edge of the launch platform contains all necessary 'umbilical cords'. These are the electrical connections to the pressure measuring instruments in the tanks, to the temperature sensors, and for providing power to the on-board systems. These connections are necessary between the rocket and the launch control center. Once the rocket reaches the BAF [Batement d'Assamblage Final], the preparation center for launching, the satellites are installed as the payload. Then come the outer shell and the top section of the service column.

The first portion of the launching schedule, including fueling of the second stage, is completed in this building. Finally, eight hours before launch, the launch platform, which with the rocket weighs 1700 t, is rolled to the launch zone that is 2.8 km further north.

Even this area of ELA-3 is revolutionary in appearance. There is no service tower here, only three giant flame diversion channels and a gaping rectangular hole are visible. This hole will be covered later by the launch platform carrying the rocket. In addition, there is a small bunker that protects the electrical supply lines and the fuel lines for the cryogenic fuels, hydrogen and oxygen. The tanks are at a safe distance. To protect the launch platform and to reduce the noise during launch, the launch site is sprayed with water from a nearby tower reservoir for the first 20 seconds of launch.

Compared to other launch sites, the rocket booster is there for only a short time, about six hours. During this time, the central stage is fueled with hydrogen and oxygen. During this process, the cryogenic fuels are pumped from below into the rocket stage. The facilities in the launch site are already finished to a large extent. The water tower is finished and its operation has already been tested. The final concrete is now being applied to the exhaust shafts beneath the launch platform. The ELA-3 launch site will see use for the first time at the end of 1992. Then, ignition tests using the cryogenic central stage and its HM-60 Vulcain engine will be run.

The ELA-3 also has its own control center known as the CDL [Centre de Lancement] for performing its launches. This center has two control rooms so that two launches can be performed in parallel. In terms of construction, the CDL is virtually finished. Only installation of the control rooms remains. CDL-3 will see use for the first time to control the qualification tests using the central stage on ELA-3.

CNES, the French space agency, gave MAN Gutehoffnungshutte AG in Oberhausen the job as general contractor for planning and constructing the new rocket

launch facility in 1988. It was possible to complete part of the first phase of construction as early as 1991. By that point, about 4000 t of steel construction and facilities for the booster test stand, rocket assembly hall, launch platform, booster wagon, palettes, and exhaust control system for the launch site were in place. The second phase of construction is targeted for completion before the end of 1994. The final assembly hall, which will be about 100 m high, will be built there.

The UPG fuel factory was already turned over to the European Space Agency, ESA, on 25 October 1991. The first test had to be recently postponed by six months because of curing problems in the first mixture for the booster segments. It is still unclear whether this time can be made up and the first launch take place as planned in April 1995.

CNES Subsidiary To Promote French, CIS Space Industry Relations

92WS0397B Paris AFP SCIENCES in French 20 Feb 92 p 14

[Article entitled: "The CNES Creates an Organization to Expand Industrial Exchanges with the CIS"]

[Text] Paris—The National Center for Space Studies (CNES) announced 13 February that it was creating a special organization to expand space industry exchanges with the CIS.

The Expansion of International Space Industry Relations (DERSI) will be a 99 percent owned CNES subsidiary. Its goal, the CNES stressed when it announced the news, is to promote and facilitate industrial relations between the two countries. It will do that by putting to work the experience and knowledge of former USSR space circles that the CNES gained during more than 25 years of unbroken collaboration.

DERSI will disseminate and exchange information, and arrange manufacturer contacts, visits, seminars, and commercial exhibitions.

DERSI will have an office in Moscow and a seat in the CNES's offices in Paris beginning in March. Mrs. Helene Bourlakoff, who is presently in charge of space collaboration with the CIS in the CNES's international affairs division, will manage the organization. After a two-year probationary period, the National Center for Space Studies will reassess DERSI, to decide what adjustments it will need to continue its work.

Airbus Seeks Japanese Partner for Super Jumbo

92WS0401B Paris AFP SCIENCES in French 27 Feb 92 p 23

[Article entitled: "Plans for a Plane Seating Over 600: Airbus Says There Will Be a Market In 2000"]

[Text] Toulouse—Airbus Industrie's general manager Heribert Flosdorf said on 24 February in Toulouse that there would be a market for a super jumbo able to carry over 600 passengers beyond the year 2000.

That, explained Mr. Flosdorf, is the conclusion of a study Airbus conducted among airlines and potential customers to confirm the existence of a market for Ultra High Capacity Aircraft (UHCA). "The UHCA will have an entirely new geometry, whether in length, span, or mass. And it may raise unforeseen technical problems." To give some idea of the difficulties involved, he pointed out that a plane that size would have landing gear weighing over 30 metric tons.

"Airbus is discussing possible new alliances to make a plane that has not yet been designed," explained Mr. Flosdorf, who indicated that a new aeronautical world is taking shape. "We may be able to forge new alliances that are impossible within existing programs. Perhaps with the Japanese, or the Russians, why not?" concluded Airbus Industrie's number-two man.

The new "superjumbo," said the director of Airbus programs Adam Brown, is meant to counter the American monopoly on jumbo jet sales to Japan and to respond to the boom in air transportation in the Asia-Pacific zone.

The European consortium is already negotiating a partnership plan with the three principal Japanese aeronautics firms, Mitsubishi Heavy Industries, Kawasaki Heavy Industries, and Fuji Heavy Industries. The superjumbo would carry 600 to 800 passengers, or about 50 percent more than Boeing's biggest 747s, and should be put into service in 2002, say the project's promoters.

Mr. Brown acknowledged that Airbus's proposal did carry some risk for the Japanese companies, which already have agreements with Boeing. "It is a strategic choice for the Japanese. They are at a crossroads: Either they become full partners of the Europeans, or subcontractors for the Americans."

Aeronautic sources point out that Japanese industry currently has a 22 percent stake in the development of the new Boeing 777 jumbo jet (coming out in 1995), after supplying parts for the Boeing 767. Airbus's schema for the 600-800 seater is similar in type to the Boeing 777's. And the European consortium assures us that "the Japanese will have more than just sheet metal work to do."

ESA Awards SILEX Optical Link System Contract

92WS0444L Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 24 Feb 92 p 3

[Article: "ESA Awards SILEX Contract"]

[Text] Matra Marconi Space has signed a contract worth Fr600 million with the European Space Agency (ESA) for the further development of the SILEX optical link communications satellite system.

Under development since 1985, in close cooperation between the ESA, CNES and Matra Marconi Space, the prime contractor, SILEX will enable high-speed digital laser beam-based transmissions between two satellites. One of the terminals will be placed on the SPOT 4 observation satellite, 800 km above the earth, which will

be launched in 1994. The other terminal will be installed on the ESA ARTEMIS satellite, a geostationary satellite to be launched in 1995, relaying the images from the SPOT 4 cameras to earth in real time.

The SILEX programme brings together 20 subcontractors from nine European countries.

AUTOMOTIVE INDUSTRY

Developments in Electric Autos, Batteries

FRG's El Sport

92WS0370A Duesseldorf HANDELSBLATT in German 14 Feb 92 pp 90- 93

[Text]

High Energy Batteries: Competition for the ABB Group

Pure Plastic Car

In the El Sport electric auto, current comes from the car floor, which also serves as the storage battery.

For months, the futuristic car made its rounds unnoticed through the dark Hotzenforst. Then Thomas Albiez moved the mystery vehicle out into the light. With the El Sport, the director of Hotzenblitz-Mobile GmbH from Ibach in the Black Forest presented the public with the first electric auto built systematically around the battery.

In extensive trials, the bright red lightweight—it tips the scales at 600 kilograms—has passed its first test.

The central element of the 2.7-meter-long electric car is a high-capacity battery which was developed in Austria. Since 1983, experts of the Development Group for Energy Storage Batteries and Drive Systems (Studiengesellschaft fuer Energiespeicher und Antriebssysteme) [SEA], a wholly owned subsidiary of the Elin electrical engineering group in Muerzzuschlag, have been working on their zinc-bromine design. Except for a few wires, screws, and pump components, the battery is composed entirely of plastic, as are large portions of the car body. The El Sport is a pure plastic car; even the electrodes, contributed by the medium-size compounder Zipperling from Ahrensburg near Hamburg, are made of plastic. The material, immune to corrosion for decades, consists of polyethylene made electrically conductive by the addition of carbon black particles. "At present, it is the most conductive plastic available commercially in the world," says Gerd Tomazic, director of SEA, enthusiastically.

In contrast to other high-energy batteries with the electrically active combinations of sodium-sulfur or sodium-nickel chloride, which require operating temperatures between 250° and 370°C, the zinc-bromine variant achieves 2.5 to 3 times the energy density of the conventional lead storage battery at ambient temperatures. While somewhat less than other storage batteries, it is sufficient for a range of 200 kilometers, even if a top speed of 110 and the ability to climb hills easily are demanded. The energy content of the zinc-bromine battery is totally available for the motor, while the competition uses a small part of its juice even when standing still in order to maintain the battery at operating temperature.

"Our biggest advantage is the design flexibility," says Tomazic enthusiastically. The Hotzenblitz crew of designers, model builders and engineers has made full use of that. The battery was designed like a hip flask and placed under the seats and between the wheels. "For us the zinc-bromine battery was the most reasonable solution because it could be integrated in a space-saving fashion," acknowledges Albiez. In 1993 the Austrians want to begin mass production. During the initial phase, about 10,000 batteries with a capacity of 15 kilowatt-hours each are to roll off the assembly line annually.

If the Austrians keep to their schedule, they will encounter their powerful competitor ABB in the market. "Our product is ready for the market ecologically as well as economically," declares Manfred Mack, director of the ABB Hochenergiebatterie GmbH in Heidelberg. The development costs amounted to about 220 million German marks [DM], one third of which was paid for by the Federal Ministry for Research and Technology (Bundesministerium fuer Forschung und Technologie). In comparison to the lead storage battery, the ABB product has almost five times greater energy density and a working life of at least three years. "It is just far too expensive," admits Mack self-critically. At present, with a small lot assembled mostly by hand, a kilowatt-hour (kWh) still costs DM1700. To change this, ABB wants to construct an industrial plant. This year a decision is to be made on the site. Because of generous investment aid, the new German states are considered to be the favorites.

A capacity of 600 megawatt-hours is planned even in the new production facility's start-up phase in 1994—that corresponds to 40,000 batteries with 15 kilowatt-hours each. At present, ABB's annual capacity is 10 megawatts. The price is also supposed to sink drastically: to DM800 per kilowatt-hour. In 1997 the plant should be running at maximum capacity with 2500 megawatt-hours annually. The sales personnel in Heidelberg believe a 15-kilowatt-hour battery will then be available for DM5000. Optimists even consider DM3300.

At present, the sodium-sulfur battery is favored by large-scale users like BMW or Volkswagen AG, which, in co-production with Swiss watch king Nicolas Hayek, wants to develop an economical Swatchauto. RWE AG also hopes to get into the business. Its British affiliate Chloride-RWE in Clifton near Manchester is working on the development of high energy storage batteries based on sulfur-sodium. "Our direct competition in this area, ABB, has a good year's head start in the manufacturing technology," admits Horst Hoffmann, head of the research and development division of RWE AG. "But our pilot plant production is ready to go." Both manufacturers are hoping for the signal effect of the far-reaching air pollution control regulations which the state of California adopted in its Clean Air Act. "That means no less than a legislatively-backed demand for the introduction of mass-produced electric autos," rejoices Manfred Mack.

AEG, which is entering the future electric auto market with its sodium-nickel chloride battery, is also betting on this trend. It was possible to increase the performance of the AEG high energy variant by 20 percent in recent years. "This will make ranges of far greater than 200 kilometers possible," promises Frank Dieter Maier, member of the board of AEG. But the potential has not yet been exhausted.

However, that may not be of critical importance. A recently published study by the Basel firm Prognos AG states: "The market share of electric vehicles will be determined ultimately by the general legal framework and not by restrictions regarding their efficiency." Manfred Mack is confident "that from now on, the Federal Republic, states, and communities will follow the example of California."

"A market is opening up whose outlines are still sketchy," says AEG director Maier, already rubbing his hands in anticipation of future business. "In any case, billions are at stake."

Developments in Electric Autos, Batteries

Batteries Compared

92WS0370B Duesseldorf HANDELSBLATT in German 14 Feb 92 p 91

[Text]

Systems Compared: Cold Instead Of Hot

The **zinc-bromine battery** is composed of a series of cells with two plastic electrodes and an interposed separator. Liquid electrolyte, which in the simplest case consists of an aqueous zinc-bromine solution and an organic bromine-complexing component, is supplied to each cell from a reservoir by two pumps. During charging, zinc is deposited at the cathode. The bromine generated at the anode is bound by the complexing agent and stored. During discharging, the bromine is reduced electrochemically at the anode while at the same time the zinc film goes into solution at the cathode. This cycle of deposition and dissolution can be repeated approximately 2000 times before the battery gives up the ghost.

An ion-conducting ceramic as the solid electrolyte and **sodium-sulfur** as the electrodes form the basic elements of the high-energy batteries from ABB and the RWE affiliate Chloride-RWE. The two reactants, sodium and sulfur, are enclosed in liquid form in sealed cells. Many of these cells can be connected in parallel for high capacity. With a theoretical energy density of 80 kilowatt-hours per kilogram, the sodium-sulfur battery surpasses conventional lead batteries by more than a factor of four. The battery is insulated very effectively using the thermos bottle principle in order to maintain the required operating temperature of about 300°C without too high an energy output. With this battery, mid-sized cars attain a cruising range of about 200 kilometers at a maximum speed of 130 kilometers per hour. Of the materials employed, 97.5 percent can be reused.

AEG's **sodium-nickel chloride battery** is also constructed from single cells. In the charged state, each individual cell contains sodium as the negative electrode and nickel chloride as the positive electrode. During discharging, sodium reacts with nickel chloride to form sodium chloride (table salt) and nickel. During the charging process, the reverse occurs. The key component of the cell is a special sodium ion-conducting aluminum oxide ceramic which becomes electrically functional only at higher temperatures. Current flows upon heating to 250° to 370°C. In energy density, the sodium-nickel chloride battery surpasses the lead battery by about a factor of four. In durability tests, 2500 charging cycles have already been attained.

Germany: Electric Vehicle Propulsion System Variants Discussed

92WS0409A Stuttgart ELEKTRONIK INFORMATIONEN in German 4 Feb 92 pp 12-14

[Article by Axel Krause: "Engine Electronics: Alternating Current Versus Direct Current Motor; Electric Car Calls For Special Propulsion Concepts"]

[Text] Unlike gasoline or diesel-fueled cars, the energy supply carried in an electric car is very small since 100 kg of lead batteries contain the mechanically usable energy of only 1 liter of gasoline. So it is all the more important that as little loss of energy as possible occurs during the conversion of electrical into mechanical energy. The whole drive train—electronic controls, motor, gears—must attain a very high degree of efficiency (80 percent).

As a rule, during the operation of an electric vehicle maximal engine performance is required only when starting or climbing; thus the drive system runs under partial load most of the time. And it is precisely in this area that a higher degree of efficiency is needed, one that can be in part further improved through the application of recovery. To achieve this, the drive motor is employed as a generator in order to reconvert the kinetic energy of the vehicle into electrical energy. Particularly on hilly or mountainous stretches, the range can clearly be extended in this way, but during downhill driving up to 30 percent of the energy spent in climbing can be recovered.

Drives With Constantly Generating Engines

As can be seen in Figure 1, with constantly generating engines maximal performance is delivered within a very narrow range. Through a combination of a constantly generating engine and a manual transmission, development of the performance curve required to propel the vehicle can, as in Figure 2, be realized.

It is also possible to build a drive mechanism without a manual transmission by limiting performance at higher revolutions per minute through electronic circuit control. To do this, the drive mechanism, including the electronic controls, must be oversized, in this case for peak performance, which is equivalent to about five times the rated performance. High magnetic-field strengths can be obtained through the use of high-grade magnetic materials

and in this way also engines with high torque as well as high efficiency. These engines are already being used in competition vehicles.

Current-Generating Engines

In this version the magnetic field has to be generated while energy is being expended. With it the degree of efficiency turns out to be lower in comparison with constantly generating engines. In exchange for this, field B can be varied by weakening the field, which simultaneously increases the number of revolutions per minute and decreases the torque. There are many ways of building this kind of engine. Two versions in particular are frequently used for the drive mechanisms of electric vehicles.

- With a direct-current series drive the field-generating winding is connected in series with the rotor, which contains the torque-generating winding. Since field and motor current are the same, the performance curve shows the following characteristics (Figure 3).

Limited by heavy brush losses, the degree of efficiency of this version is not especially high, even under partial load (75 to 85 percent). Since losses increase at a particularly rapid rate at a high number of revolutions per minute, the motor is operated at no more than 6,000 revolutions per minute. Vehicles with this drive attain a top speed of 60 km/h at the outside when steadily gearing down at the same time.

If, on the other hand, a manual transmission is built into the vehicle, even higher speeds—90 km/h, for example, with the Penguin Tavaria—can be attained.

- With an asynchronous alternating-current drive, the field-generating and the torque-developing currents flow through the same motor winding. Unlike the way a series motor works, with this drive the relative strengths of the two currents can be varied within certain limits—through variation of the slip frequency. Because of this, the performance curve is flatter in the upper revolutions-per-minute range than it is with a series motor (Figure 4). Because there is no brush friction and because of the option of adapting the field, the degree of efficiency at high revolutions per minute as well as under partial load is very high (85 to 93 percent). In addition, with this motor the number of revolutions per minute can be increased to 15,000.

Because of the enormous performance range, the asynchronous motor is destined for drives without manual transmissions. Starting from a dead stop on a 20 percent grade and top speeds of up to about 120 km/h on flat stretches are perfectly attainable (with the Horlacher "Carbon" model, for example). The rate of acceleration from zero km/h can be increased by 70 percent with star-triangle shifting for especially steep grades. Shifting into forward or reverse and recovery are also possible without any additional expenditure of energy.

As with all alternating-current motors, the asynchronous drive cannot be operated directly from the battery. Instead, an electronic converter for the conversion of battery direct current into alternating current is necessary. Since about 3 percent of the performance expended in this controlled shifting is lost, the overall efficiency of the motor and the electronics lies between 82 and 90 percent. This drive electronics is costly and expensive. Not least of all, this factor has led to the fact that the asynchronous motor has not yet gained widespread acceptance as a vehicle-drive system.

[Box, p 12; by Alfred Goldbacher]

"For reasons of safety," said Volkswagen head Ulrich Seiffert, "an electric car in particular should also be at least 3.20 meters long." Only in this way can passive safety devices be effectively installed in the vehicle. Swiss automobile and aircraft manufacturer Max Horlacher wants to prove that shorter cars can be safe too with the features he is developing. The whole chassis is made of plastic honeycomb that weighs much less than those made of steel, yet is impressive because of its great strength. The front and sides of the vehicle are specially reinforced as further protection and, in addition, the seats are constructively mounted over the battery pack. The seat backs have been connected to the roof so that the forces resulting from an impact can be effectively diverted in a circular motion.

The first crash tests on this "City" model (frontal impact at 32 km/h) turned out to be very positive. The University of Zurich Forensic Medicine Institute noted the following: The windshield remained in its frame and the driver—in the test a plastic dummy with many measuring instruments—would undoubtedly have been unhurt.

Road Tests With "City"

Exactly 2 meters long, the car weighs about 280 kg without batteries. If lead batteries for supplying power are used, another approximately 250 kg of ballast have to be added to this. There is ample room in the interior for two people (let's say 1.80 meters tall weighing 75 kg) and in addition two cases of beer in the back.

If the outside temperature clearly drops to under the 20°C limit, as with a diesel engine, the battery has to be prewarmed in order not to further reduce its already limited charging capacity. But it is not done with the well-known "minute of silence" by means of glow plugs. Rather, simultaneous with the charging process the battery has to be warmed with heating mats and the operating temperature of the energy source maintained as long as possible through effective insulation.

The starting procedure itself goes off in an unspectacular manner: no rumbling, no shaking; the driver depresses the power pedal and the "City" purrs away. While top brands advertise how quietly their "flagships" run, manufacturers of cars that operate with electric motors waste no words on this. The only sounds that are apparent during operation of the car are largely produced by the resistance of the tires running over the road.

Under heavy load, the "City's" motor generates about 14 kW of power, sufficient to accelerate the vehicle to 50 km/h in a few seconds and further to 80 km/h in the same amount

of time. The roadability of this 2-meter-long car can no doubt be compared with that of a go-cart, and without having to sacrifice any riding comfort either. No rustling, no creaking can be heard in the "City's" interior. For those conscious of energy conservation, next to the "regular" brake pedal another one has been installed which activates the recycling of the braking action energy. The braking action actually turns out to be fairly moderate, but it supports the way it is anticipated that people drive. That is, every time one rolls up to a turnoff or an intersection the recovery of electrical energy can be sensibly applied.

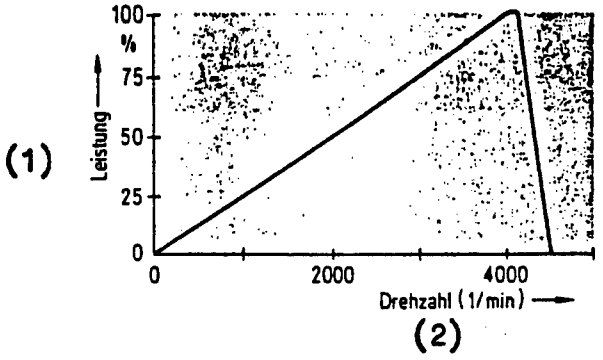


Figure 1. Drives with constantly generating engines deliver maximal performance within a very narrow range.

Key: 10. 1. Performance 2. Revolutions per minute (1/minute)

The limited range that is the biggest drawback readily attributed to electric vehicles only holds true to a limited extent for the "City" model. Test runs with sodium-sulphur batteries were recently conducted by ABB [Asea Brown Boveri]. The results were amazing since the built-in batteries provided enough power without being recharged to drive from Basel to Frankfurt am Main without any problems. They already have enough power today for a run of 380 km on the freeway at a speed of 80 km/h!

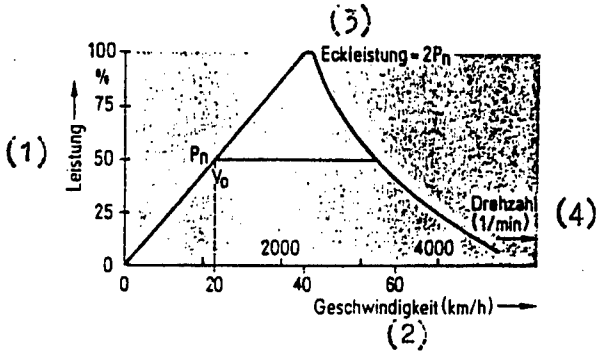


Figure 3. Performance curve of a direct-current series drive. In the first part of the curve the motor is operated with constant current and thus also with a constant field. As the number of revolutions per minute increases, the operating voltage must be increased until the maximal figure, the battery voltage, is attained.

Key: 10. 1. Performance 2. Speed (km/h) 3. Peak performance = $2P_n$ 4. Revolutions per minute (1/minute)

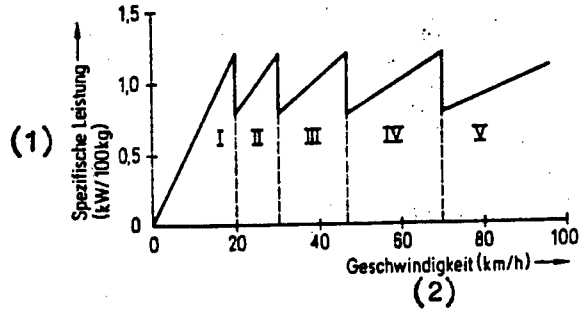


Figure 2. Through a combination of a constantly generating engine and a manual transmission, development of the performance curverequired to propel the vehicle can be realized.

Key: 10. 1. Specific performance (kW/100 kg) 2. Speed (km/h)

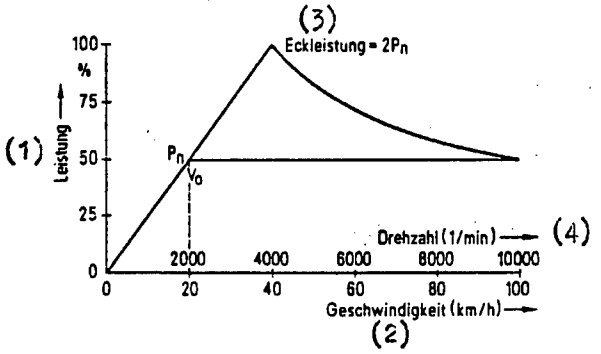


Figure 4. With an asynchronous motor the relative strengths of the field-generating and torque-developing currents can be varied within certain limits. Therefore, the performance curve is flatter in the upper revolutions-per-minute range than it is with a series motor.

Key: 10. 1. Performance 2. Speed (km/h) 3. Peak performance = $2P_n$ 4. Revolutions per minute (1/minute)

VW, German Research Institute's Simulation Software Decreases Vehicle Production Time

92WS0414D Duesseldorf VDI NACHRICHTEN in German 21 Feb 92 p 26

[Article by N.B.: "More Production in EC Countries; Japanese Reduce Exports of Memory Chips to Europe"]

[Text] VDI-N, Duesseldorf, 21 Feb 92—Now the Japanese have been "caught off balance" too—that is, the Koreans are doing with memory chips what the Japanese did to the Americans six years ago: They are threatening to put Japan's manufacturers out of the running with ruinous prices. Thus, NEC [Nippon Electric Company] has announced that exports of 4-Mbit-DRAM's from Japan to Europe would be discontinued as of Fall 1992—actually because they can no longer compete with the Korean prices (dumping).

Nevertheless, NEC wants to get rid of half a million of these chips a month in Europe. Part of this figure is supposed to come off the Scottish production line and the rest from the United States—more specifically, from California where NEC operates a production plant in Roseville.

Other Japanese chip manufacturers also appear to be employing similar strategies, especially through them to expand their European production—which may well happen in connection with the common European market in 1993. With these strategies, they want to increase their local share of the market in Europe in order to obtain tariff advantages.

The European semiconductor industry will be observing this with attentiveness and mixed feelings. Only Mitsubishi has come to Germany (Aachen) and will have to take a good look there at the high cost of fringe benefits as well as the restrictions on rules governing working hours: In the other European countries working conditions are clearly more favorable from the employer's point of view.

Volvo, BMW, Mercedes Introduce Laser Welding Processes

92WS0440A Landsberg PRODUKTION in German 23 Jan 92 p 3

["A Beginning Has Been Made: 1991 Marked the Introduction of Laser Welding in the Series Production of Automobiles"]

[Text] Landsberg —**BMW had been the pioneer in the field of automobile body laser welding. In the eighth and third Touring, the roof had been joined to the side wall by means of laser. Other automobile manufacturers were also able to demonstrate some laser welding applications last year. While the initial applications may have differed, all had one thing in common, namely, the laser is now in place in the production lines and large-scale applications are envisaged.**

Each of the laser applications put into operation last year by the various automobile manufacturers is a kind of harbinger of things to come. In the production of its S-class body, Mercedes Benz for the first time used cold wire laser welding. A second laser application joined the roof to the side wall. Volvo is doing the same thing in the production of its new 850s. The Swedes are the pioneers in developing the clamping technique and the length of the weld (almost 1.5 meters). Both applications eliminate the need for a conventional bypass.

Those responsible at Audi and Opel will not use laser welding without a backup system. Nonetheless, each of these automobile producers is also a pioneer. Audi is welding the chassis auxiliary spar of its Quattro model with full 14-kilowatt laser power to a depth of six millimeters. Over at Opel, the cross struts of the Astra and Calibra engine hoods are being joined by laser. Opel leads in other applications in a decisive point. In Bochum, large-scale operations are underway: 1,400 laser-welded hood assemblies leave the hood production line daily.

The reasons for using lasers are many. In the case of Mercedes Benz, styling was the decisive factor in favor of using laser welding on the new S-class. The company did not want the joining of the roof and C-columns to be covered over, as it is with most automobiles, with an orifice plate. If laser welding were not used, then only TIG welding and subsequent body-flush smoothing would be used, as it was in all previous models. The refinishing, smoothing work was a rather expensive procedure that could be drastically minimized by means of the laser. Because it introduces very little heat, the laser has the positive properties of creating only slight warpage and a slightly elevated weld seam. Production specialists at Mercedes Benz early demonstrated that, just for that reason alone, would have to be considered.

Powerful laser light beams also helped the workers at Sindelfingen to achieve the accuracy required for laser butt welding. After clamping, the laser cutting head cuts off the excess sheet metal on each side. Then the welding head is brought into position. The cold wire welding technique, used for the first time, takes care of the minimized but very desirable weld mound. The unit and laser beam source was supplied by the Trumpf concern.

Trumpf, located in Ditzingen, also supplied the laser for the second Mercedes installation for welding the roof to the side wall. A special feature of the welding line, in which the unit made by the Held systems specialists of Heusenstamm is integrated, is that up to four different models can be produced in any sequence.

Volvo has also announced another world premiere. About 100 Volvo 850 bodies are now passing through the laser welding station in the Ghent plant, where an MBB-multiaxial portal operates in conjunction with a 6-kW Rofin-Sinar unit. Weld seams, 1,370 millimeters in length, join the roof on both sides to the body. Unlike other known solutions, the clamping technique used by the Swedes is at first glance a surprisingly simple operation—but at the same time a very effective one. A telescopic fork, on which the press wheel sits, is secured right on the laser head. The principle very much resembles the telescopic fork of a motorcycle. The press wheel locks the roof sheet metal into place with respect to the body. This system reliably aligns the position to be welded. Unlike the conventional clamping

technique, the pressure force can be reduced by a factor of 10, thereby avoiding greater stresses in the sheet metal.

The Swedish automobile producer's well known safety philosophy permeated the introduction of laser welding. Crash tests, particularly side impacts involving energy removal and diversion, were the decisive factor for using lasers in the roof seams.

Since Volvo, like Mercedes, decided against a backup system, process safety was carefully observed in introducing the laser system in the daily routine. Much time was spent in finding the ideal parameters for the daily production routine. The pilot plant in Goeteborg performed the necessary preparatory work in this regard over a period of two years.

Places and products: Audi's production engineers did not think first about the body. In Ingolstadt, components of the chassis were laser-welded to depths of six millimeters. Nothing in world production matched it. Laser engineering and performance were now in demand. United Technologies supplied the 14-kW unit, the portal came from Held, and the clamping technology was developed domestically.

All auxiliary spars in the Audi 80 Quattro are already being laser-welded. Despite this, Audi is careful not to speak of large-scale applications. Because the Ingolstadt workers still use the system for developmental tasks, no bypass with inert gas welding is used. This implies that other chassis components as well, even of other models, will in future be moving down this welding line.

To be specific, the Ingolstadt workers join the lower shell of the auxiliary spar to the upper shell. Each of the sheet metal components are 2.25 millimeters thick; through-welding is desired. Both the welding depths as well as the weld seam length may be world records. The laser weld is 4.2 meters long. In the final stage of the operation, a stroke time of about a minute is required for the welding. Laser welding speed, which is about five to seven times faster, is a distinct advantage over inert gas welding.

The greatest possible auxiliary spar rigidity, combined with the greatest possible internal free mass, was the designer's requirement which led to the use of lasers. Of course, the laser operations are cost-effective, even when the development engineers keep some system capacities free.

Finally, an example of what is meant by the expression "on a large scale." In the Opel plant in Bochum, it is simply a matter of a true piece count, namely, 1,400 Astra engine hoods, produced by lasers, leave the plant every work shift. In the Opel plant the laser, owing to its positive features including its ability to dispense with all finishing work, has displaced spot welding. In the forward section of the engine hood, the outer skin metal sheet is joined to the cross-struts. The Robomatix system performs four welding operations on each hood. Thus, one welding cell suffices to produce all the Astra hoods. So far it has not been necessary to use the planned bypass. At the present state of knowledge, those making the decisions at Opel will continue not using the bypass. The reliability of the hoods to date has convinced them.

The laser is almost ideally suited for use on the sheet metals used for flange welds since the sheets rest securely one on the other. Because of this, the clamping technique is held within limits. When the laser is used, there is absolutely no need for the refinishing work which is necessary after spot welding. Thanks to the laser's favorable heat properties, not even a surface run can be detected. Warpage is virtually excluded.

The Opel application is a good example of how even short-term laser use is possible. The required component tolerances would also have been necessary for spot welding, which is to say that the Astra hoods were not designed in advance for laser use. By the time the decision to use the laser was made, the design of the new model had already progressed too far. Despite all of that, precisely this application is the best example of the economical use of lasers in series production.

The aforementioned examples of applications in the automobile industry impressively demonstrate some laser capabilities. Nonetheless, these uses may still be considered somewhat exotic. They merely document a few initial attempts at its use. One will have to wait a few years to see further progress in the large-scale use of lasers in body and chassis fabrication. Even for these applications, there will always be competing processes that could make life difficult for the laser for some time. We need think just of adhesives.

BIOTECHNOLOGY

German Environmental Biotechnology Program Launched

92MI0329 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German 18 Feb 92 pp 2-4

[Text] Microorganisms make it possible to develop new, environment-friendly materials, destroy ecologically harmful substances, and detect ecological damage. Environmental biotechnology has nowhere near reached its full development capacity. Following intensive consultations with experts from science and industry, therefore, the Federal Minister of Research and Technology (BMFT) has decided to allocate 50 million German marks [DM] over the next five years for environmental biotechnology research and development projects under the "Biotechnology 2000" program.

It is intended to allocate the funding through two invitations to bid. Project outlines and applications may be submitted immediately. The projects eligible for funding will have the following objectives:

- developing new biologically degradable materials, so as to prevent waste from even occurring;
- improving control over the composting of organic substances so that refuse compost can be extensively recycled and new microbial processes for soil and waste water purification can be developed;
- improving microbiological test methods.

In line with these objectives, the capacity for microbial decontamination and reclamation of the environment must be enhanced in three specific areas:

1. Development of Environment-Friendly Materials

Biology can help to create environment-friendly substances such as biologically degradable materials. New products of bacterial metabolism with properties similar to those of plastics are being sought, i.e., biopolymers (such as new polyhydroxybutyric acids), which help prevent dumps from building up. The main objective as far as refuse composting is concerned is to improve process control so as to restore organic substances and macro- and micronutrients to the natural ecocycle, for instance as soil conditioners.

Biopolymers are thermoplastically moldable substances created by bacteria, which are comparable with synthetic plastics but have the advantage of being biologically degradable. These substances have a wide range of potential applications, including packaging materials, such as cosmetic bottles, shoppers, disposable goods (e.g. party cutlery), and office materials (e.g. sheeting). Biopolymers could be used in medicine for developing implants (for stabilizing bone fractures, for example) that would dissolve in the body without side-effects once they have served their purpose, thus obviating the need for a further operation. Though production costs for such biopolymers are currently still too high, their prospects will increase as new microorganisms are developed or existing ones are improved, and as disposal costs for conventional packaging materials continue to rise.

2. Degradation of Waste Substances

Biology can also assist in the destruction of pollutants. Biological degrading processes exploit the metabolic properties and capacities of specialized microorganisms such as bacteria and fungi to achieve extensive degradation of pollutants without their polluting the environment in a different form, for example as exhaust gases (in the case of thermal processes). A positive ecobalance can be established in this way. Microorganisms may also make it possible to "crack open" the chlorinated aromatics found in waste water from paint shops and printing works.

There has been little research to date into the potential of suitable microorganisms. In many cases they still degrade too slowly: With biological soil decontamination, such as oil or dioxin degradation, it can take up to two years to degrade all pollutants. As it takes too long to bring concentrations down to below the official limits, the cost benefits over other, nonbiological, purification and reclamation processes and waste dumping cannot actually be achieved. The new environmental biotechnology projects in this area will thus address the following: As regards effluent, soil, and exhaust air purification and the reclamation of derelict sites, the attempt will be made to extend the potential of microbes by discovering new microorganisms or mixed cultures, and understanding and enhancing their capacities. The prime objective is to use biotechnology to develop representative technical solutions for the degradation of highly toxic and hazardous substances (such as chlorofluorocarbons and dioxins) and heavy metals (such as cadmium and lead) for use as models. Research is also required into the removal of particularly malodorous substances from exhaust air.

3. Biological Testing Methods

Biology also assists in identifying environmental pollution. However, there is still a lack of microbiological test methods that provide information on, for example, whether viable microorganisms are present in contaminated soil, what degrading potential they have, and what marginal conditions have to be met for optimum pollutant degradation, e.g., addition of oxygen or nutrients. New test methods may be based on genetic probes, which provide information on the kinds of microorganisms present. The development of biosensors, which identify biochemical oxygen requirements or specific pollutants for water quality assessments, for instance, also holds out excellent prospects. The advantage of these biosensors is that they provide very rapid information on effluent quality, without the need for detailed laboratory analysis or tests on fish, so that the appropriate decisions can be taken.

Research projects on developing and standardizing new microbiological test methods will therefore also be funded, so as to promote the monitoring and assessment of the damage caused by pollutants, their degradation, and the efficacy of biological processes.

Information and Consultancy

In view of the large number of small and medium-sized enterprises working on biological purification and reclamation processes, a pilot scheme will be launched under which temporary technology transfer centers for biological processes remedying environmental damage will be installed at research institutes. The purpose is both to encourage the introduction and dissemination of known environment-oriented biotechnological methods and to provide impartial advice, information, and training with a view to overcoming uncertainty on the part of local authorities and enterprises, which, when faced with cases of pollution, often have to decide whether to use biological degrading processes.

Joint projects, in which enterprises work together with research facilities, have the advantage of pooling scarce resources, achieving technology transfer and synergy at an early stage, and having little influence on the competitive situation. They therefore have the highest funding priority; preference is also given to R&D projects or proposals for technology transfer centers involving institutes in the new laender and in eastern Berlin.

The BMFT intends to collaborate closely in environmental biotechnology with American institutes and organizations, such as the environment protection agency. It is planned to coordinate research and development activities, so as to pool knowledge and to acquire complementary experience.

Proposals for projects involving collaboration with American agencies will therefore receive preferential funding.

The rate of funding complies with the EC's guidelines for state subsidies and differs according to the level of research: Industrial basic research projects will be eligible for a maximum of 50 percent, and applied research projects for a maximum of 25 percent. A 10 percent bonus is granted to small and medium-sized enterprises (defined by the EC as enterprises with fewer than 250 employees and revenue below ECU20 million), and to applicants from the new laender. The funds will be allocated through two invitations to bid. The deadline for the receipt of draft projects for the first round is 30 April 1992, and for the second round, 30 April 1993.

Further information is available from the project manager: the Biology, Energy, and Ecology [BEO] Division at the Juelich KFA, P.O. Box 19 13, 5170 Juelich.

COMPUTERS

German Report Analyzes European Computer Industry Shortcomings

92WS0385B Duesseldorf WIRTSCHAFTSWOCHE in German 28 Feb 92 pp 58-63

[Article by Hans-Peter Canibol, Michael Charlier and Herbert Fuchs in "Special High-Tech" section under the rubric, "Office Technology and Applied Computer Science": "Computer Industry: Europe Being Sidetracked. Merciless Analysis"; first paragraph is an introduction]

[Text] BDI [Federation of German Industry] is complaining about its own members. They are not causing researchers' top achievements to be converted into products.

The hearts of experts at the Federation of German Industry (BDI) in Cologne sank into their boots. Several chief executive officers of important companies were complaining indignantly about a paper that they really did not at all have to be familiar with. It had been classified as confidential by BDI—for good reason—the federation experts had not found a good word to say about their own members in the study on industrial policy in the high-technology field, especially in applied computer science. Frightened, BDI withdrew from circulation the document in which the reasons for the continued rise of the Japanese were mercilessly analyzed. The federation was dead right with its assessment in this case. "German competitiveness, standing in the way of international cooperation, was used very often as a pretext for strategic mental laziness," the federation says with indignation. A little later the federation complains, "Basic research in Germany is holding its own at the top of the world. Only there is a hitch somewhere with the linkage with applied research and the applications industry."

Consistently, BDI tidied up the industry with the usual set phrases that are to excuse its lagging behind. The reasons for Europe's weak position are, they say, simply "homemade problems." The experts caution against the mistaken view that "a copy of Japanese management and leadership techniques" could bring well-being. On the other hand they commend the "Japanese willingness to take risks" and come to the conclusion that "Japanese companies are now reaping the profit for their vision."

Europe has little to offer commercially in the field of computers and computer technology. The old continent has been blotted out by the establishment of norms and standards. The operating system with the greatest growth—UNIX and everything pertaining to it—is as American as apple pie. Hardware and software innovations are coming from the U.S.—often only in a roundabout way through Japan.

Every attempt to correct the course here has up to now been denied far-reaching success. The reason cannot be money: About 10 billion German marks [DM] in public funds are being allocated to European high-tech companies under the pompous name the "Eureka Initiative." But BDI's sobering statement is: "The gap between Germany and Europe and Japan appears to be growing. The erosion of the industrial base, especially in the field of applied computer science and microelectronics, is continuing."

This is a polite paraphrase for a disgraceful trend. Japanese and Americans are buying up Europe's last still self-determined companies. Only Nixdorf's takeover by Siemens falls outside this category. For instance, Fujitsu ICL and Nokia and Digital Equipment Corp. (DEC) swallowed up Mannesmann Kienzle and Philips' Information Systems division. The proud French are also paying their tribute. NEC and IBM are nibbling at Bull. Only a participating interest of both giants could rescue the national company constantly on the edge of bankruptcy, the strategists in Paris believed. IBM only after long hesitation declared itself prepared to take over a 5.7 percent share of Bull, which is reporting as a loss one-sixth of its annual sales of DM12 billion. This means a contribution of over DM100 million per year for the ailing IBM concern. The technological arguments like better laptops for IBM and better mainframes for Bull are only a pretext. What is more, the French Government has bound IBM to prove that the Americans are taking it seriously with their empty phrase "we are a European company."

However, new proof would not have been necessary. It is clear when IBM and Siemens are already working closely together within the framework of a Eureka project in chip development that the big concern from the U.S. developed long ago into the coordinator of European chip and computer activities.

BDI, which apart from that prefers to stand up for the technological strength of its own members, did not once raise any objection to this. On the contrary: The federation's superiors expressly recommend pointing oneself more strongly in the direction of North America when looking for partners. The reasoning behind this is that only close cooperation across the Atlantic promises a slight chance of being able to stand up to the Japanese plans for conquest.

Europe's industry can obviously build no counterposition on its own strength. Siemens has enough to do to digest the

integration of Nixdorf. Resignation is spreading at Philips, Thomson and Olivetti. Daimler-Benz has settled the downfall of office equipment manufacturer AEG-Olympia. But the Swabians nevertheless are making an attempt to somewhat rescue microelectronics in Europe. Within the next week company president Edzard Reuter will announce in Berlin the founding of a microelectronics company in which all relevant activities of the group will be integrated. It will comprise 22 subsidiaries that belong today at home and abroad to AEG in Frankfurt or to DASA in Munich. Both major Daimler subsidiaries have each a 50 percent share in the new company.

The new Daimler offspring will be subdivided into four units and employ 20,000 people. The most important branch is the motor vehicle electronics branch with Telefunken Electronic from Heilbronn as its core. Daimler wants to build up its strength here in order, above all, to do business better with Ford and Opel.

Telefunken, Eurosil, Matra and Siliconix are dominant in the semiconductor field. The third division, microsystems engineering, is developing and building components and assemblies. Telefunken in Nuremberg and MBB as well as Dornier from Munich form the core companies. The activities of the AEG subsidiary in Ulm are gathered together in the new special engineering unit that is to appear not before the first of the year in 1993. Daimler states that the reason for concentrating these activities is the necessity of strengthening its exports. However, on a worldwide scale—even Daimler in-house—the style is rather grand: DM2 billion worth of business.

Such a commitment, even if it is still so modest, has rarity value in Europe. Companies foreign to the trade that are incorporating microelectronic components and computers into their products, like motor vehicle, machine and plant builders, are not once rearing up. It seems to be all the same to them whether they are dependent on European or Japanese manufacturers. A concerted action by a lot of sectors to rescue the European electronics industry is hardly imaginable. By comparison, in Japan there is no excessive fear of contact between companies of the same or other sectors.

Otto Mueller of Hyperstone Electronic GmbH [Limited Liability Company] in Konstanz knows what Europe is suffering from. "The will to achieve something is lacking," is the engineer's analysis, on whose know-how entire computer families are based, like the early Nixdorf series 820 machines and the CTM computer. His wife Ilse, who is in charge of marketing, knows of still another reason for Europe's lacking innovation capability in questions of microelectronics: "In Germany aid money helps above all to support laziness and incompetence."

The Muellers have been fighting—without sucess—since 1989 for the use of the Hyperstone RISC processor that Otto Mueller developed. Three years ago Siemens deserted in the last minute and sat in the supposedly safe Mips pew, a U.S. company whose processors at that time were making a worldwide triumphant advance. Now the Siemens workstations in which the Mips processor is functioning are still only second choice. Because its competitor DEC recently introduced the many times more powerful Alpha processor (WIRTSCHAFTSWOCHE, June 92), whereupon the Mips user's frontage is quickly beginning to sway. "Siemens could have had a better processor as early as 1989 with the Hyperstone," Ilse Mueller lashes out. Besides it was able to be developed, she says. Her husband has developed it further since then. "It is the equal of the Alpha," Ilse Mueller asserts. In contrast to the Hyperstone E1, which is being produced by Zilog Corporation in the U.S. and by UMC in Taipei in Taiwan, the successor type is still in the drawer.

Above all the Muellers are plugging the fact that their processor can be manufactured with relatively simple production techniques, because it makes do with 85,000 transistors. Similarly powerful chips from U.S. manufacturers like Intel and Motorola on the other hand require high-tech conditions, because far more than a million transistors have to find room on a single silicon chip. While Otto Mueller gave up long ago, his wife has continued the fight—but probably not any longer. "We will sell our know-how in Japan," she threatened.

The head of the Fraunhofer Society for the Promotion of Applied Research in Munich, Professor Max Syrbe, is annoyed by Ilse Mueller's sweeping criticism of the promotion of research in Germany. He sees Europe and Japan as approximate equals, technologically, in microelectronics. However, what is lacking is conversion into marketable products: "The marketing has to be in tune. Take the example of X-ray lithography. A top place in the world will be secured with much commitment and a pile of money. And then we will get stuck on appropriation terms." Time slips by and the products come on the market too late.

Just the controversial JESSI [Joint European Submicron Silicon Initiative] should change this, Syrbe hopes. The original goal of finding the prerequisites for the production of 64-megabit chips was given up a long time ago here. Since then Siemens and IBM, who are still just six to 12 months behind the Japanese competition, have been taking care of this. JESSI was simply rededicated. The project financed by an outlay of DM8 billion, which several European countries are putting up, now is to bring about at least a quantum leap in the development of so-called ASICs, chips that are specially tailored for use in motor vehicles or in a specific machine tool.

Meanwhile many computer experts are criticizing the too strong orientation towards hardware. "At present the main development momentum is coming from software," sums up Peter Kirn, applications and architectures director at IBM Deutschland GmbH in Stuttgart. Already today clearly more money is being made through software and service than through hardware, but here too the Europeans are not really getting a word in. The software is coming almost entirely from the U.S. However, the Japanese are deploring a massive deficiency, so that the Tokyo Trade Ministry calculates that Japan even still in the year 2000 will be the most important net importer of software logic for computers.

It is difficult for the Europeans to gain a foothold in software development, because all the popular operating systems come from the U.S., and it is logical that the matching processor logic is also being invented there. Just as most application programs from Ami Pro (word processing from Lotus) to Xtree Gold come from the States. While the best hardware producers are in Japan, the creative people like Microsoft head Bill Gates live in the U.S. The Europeans, however, are in danger of being sidetracked.

DEFENSE R&D

Eurocopter Seeks UK Partner for Tiger Helicopter

92WS0401C Paris AFP SCIENCES in French 27 Feb 92 pp 25, 26

[Text] Singapore—Eurocopter Company President Jean-Francois Bigay announced 25 February that his firm had signed an accord with British Aerospace allowing it to offer its Tiger combat helicopter to the British Government as an alternative to the American Apache helicopter. Eurocopter is composed of Aerospatiale and MBB.

"The British Government wants real competition, and this agreement defines the conditions under which the Tiger might be proposed," added Mr. Bigay during an AFP interview at the Singapore Aeronautics Show. Eurocopter has been seeking a British manufacturer to join the Tiger program ever since Great Britain's Westland came out in favor of McDonnell Douglas's Apache.

The accord designates British Aerospace as the go-between in discussions with the British Defense Ministry about possible changes in the Tiger, Mr. Bigay adds. He pointed out that Great Britain was already participating in the program via the Trigat engine and missile.

The Franco-German group seems to have gotten assurances from Great Britain that its army would not request a craft whose specifications exactly matched those of the American helicopter, which is what happened when Westland teamed up with Eurocopter. The British will decide how many Tigers they need this year, but the number is estimated at 100 antitank copters, to be delivered starting in 1999.

For Mr. Bigay "the stakes are high, for Britain's choice of the Tiger would mean the European forces could purchase the same craft." The industrial phase of the program should begin in mid-1994. The announcement of such an agreement also seems to suggest that a solution could be found to the problem of funding the Trigat long-range antitank missile, which is the Tiger's main future weapon.

Aerospatiale, MBB, and British Aerospace, which teamed up in the Euromissile Dynamics Group consortium, each still had 1 billion French francs [Fr] to pay out to complete Trigat's development phase. (The latter will cost a total of Fr6 billion).

Budgetary restrictions make Britain reluctant to pursue the contract. Consequently, the French and Germans recently agreed to trim the second development phase to Fr2.5 billion, and thus ask only Fr500 million from Great Britain. Britain's final decision on the Trigat is expected sometime in March.

ENERGY, ENVIRONMENT

Germany: New Solar Cell Production Process Presented

92MI0303 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German 29 Jan 92 pp 10-11

[Text] Work on developing a technical precipitation process for cadmium telluride (CdTe) films at Battelle has led to a process for producing thin-film solar cells that makes for surprising material and time savings and is therefore also economical. The first test cells achieved 11 percent efficiency, thus also demonstrating a potential for significantly higher values. The next step is to achieve a rapid commercial application within a targeted development program, with industry playing a substantial role.

Thin-film solar cells hold out the best prospects for exploiting solar energy, as they convert sunlight directly into high-grade electric power and can be produced economically.

Only a very few known semiconductors are suitable for thin-film solar cells. Only four semiconductors have so far given promising results, i.e., efficiency of over 10 percent: amorphous and crystalline silicon, copper indium diselenide, and cadmium telluride.

As in the case of photographic film, the production process used decisively affects the cost of solar cells, as does their capacity (in this case, their degree of efficiency). The process must use as little material as possible and be fast, so that the high investment costs for equipment for producing high-quality semiconductor films can be justified by high productivity.

Although the known silicon solar cell, currently used in the federal government's "1,000 roofs" program, is a technically mature system, it is still too expensive, both for the present and for the near future, to compete with conventional energy sources. Only thin-film solar cells will be able to.

In the meantime, university and research institute work all over the world has provided a better understanding of the basic processes and material parameters, which is why a resumption of this work at Battelle in 1990 seemed justified. This has now resulted in a surprising success: a particularly cost-effective precipitation process called close-spaced sublimation. This process can be used to deposit particularly high-quality CdTe layers at very high speed. It consists in transsublimating the CdTe material at a temperature of 600 to 700°C from a plate-shaped blank to the slightly cooler (about 500°C) substrate placed close to it, on which good polycrystalline CdTe films grow. The precipitation process takes place in a moderate vacuum in a protective atmosphere, which makes for particularly cost-effective production. Cheap window glass is used as the substrate. Battelle in Frankfurt used films that can be

precipitated in one or two minutes by this method to produce initial solar cells with 11 percent efficiency.

Initial estimates point to production costs significantly lower than 200 to 300 German marks [DM] per square meter for finished modules at an output of 10,000 square meters per year. This means specific production costs of DM2,000 to DM3,000 for a one-KW yield, a performance feasible with direct sunlight.

This price could even mean that this method of electricity generation could compete with conventional power stations. Battelle's cost estimates are about 80 percent lower than current prices for silicon cells. This will open up a considerable market for CdTe thin-film solar cells, what will make industrial investment worthwhile.

German Survey Assesses Solar Power Station Potential

92MI0304 Bonn WISSENSCHAFT WIRTSCHAFT POLITIK in German 12 Feb 92 p 5

[Text] Solar power stations could make an immediate contribution to environment and climate protection. This is the main finding of a study of the potential for solar heat power stations in the Mediterranean area commissioned by the BMFT [Federal Ministry of Research and Technology] from the German Aerospace Research Institute (DLR) and the Solar Energy and Hydrogen Research Center (ZSW), both in Stuttgart, Interatom (now Siemens) in Bergisch Gladbach, and Schlaich, Bergermann & Partners (SBP), also in Stuttgart, and presented this week in Bonn.

According to the energy policy framework adopted, from 3,500 to 13,500 megawatts of solar energy could be produced cost-effectively by power stations in 16 Mediterranean basin countries by the year 2005. This would replace from 4 to 15 percent of the increase in oil and gas that the area would otherwise require. In the longer term (say by 2025), solar power stations could bring about a significant reduction in CO_2 emissions in this growing economic area. Each megawatt of solar energy replaces 2,000 tonnes of CO_2 emissions per year. A combination of more efficient fossil-fuel power stations and an additional expansion of solar power stations for a total of 23,000 megawatts by 2025 would at least make it possible to stabilize CO^2 emissions at current levels. A rapid build-up of solar power stations after the turn of the century to 33 percent (about 63,000 MW) of the expected 190,000-MW market potential for new power stations up to the year 2025 would make it possible to cut current CO_2 emissions of about 380 million tonnes a year by up to 35 percent.

The expansion of solar power stations involves a market worth 15 billion to 60 billion German marks [DM] by the year 2005 and DM90 billion to 220 billion over the period from 2005 to 2025.

The conclusion to be drawn is that work should start straight away if the contribution that solar power stations can make to energy supplies and environment protection in the Mediterranean basin is to be achieved by the year 2025, said the scientists presenting the study. Favorable framework conditions will have to be established at the political, i.e., government level, as solar heat power stations would not represent a viable alternative in terms of energy policy as long as the oil price structure does not have to take account of the cost of environmental impact.

The immediate start required could make use of the farm power stations (over 300 MW) with parabolic trough concentrators in combination with oil or gas firing, as tested in California. In addition, all the systems studied show considerable scope for development, including solar towers with central radiation receivers and parabolic concentrators with Stirling motors.

Solar heat power stations ranging from 50 kW to 100 MW could be ready for commercial use within 10 years. However, the creation of the requisite industrial production facilities can only be justified in economic terms if projects are first carried out, and that also means financed, immediately in the Mediterranean basin.

Germany: Recyclable Plastic for Auto Radiator Grilles Tested

92MI0307 Wuerzburg UMWELTMAGAZIN in German No 1-2 Feb 92 p 20

[Text] As part of a joint development project, Bayer AG and Volkswagen AG have carried out strict tests on the recyclability of Novodur, a technical thermoplastic by Bayer based on ABS [acrylonitrile-butadine-styrene] resin.

Volkswagen AG's pilot automobile processing plant in Leer, East Frisia, already dismantles large numbers of scrapped Volkswagen and Audi cars for research purposes in preparation for future auto recycling. Large quantities of radiator grilles made in Novodur thermoplastic accumulate when five- to 10-year-old cars are dismantled. These old components are cut up, cleaned, and reprocessed to make new radiator grilles.

The surface quality of these new radiator grilles made with recycled Novodur is surprisingly good. To the naked eye, they are indistinguishable from radiator grilles made with new material. As the paintability of Novodur is not affected by recycling, Volkswagen can paint the recycled material the same color as the new car.

Extensive trials with Novodur scrap have also demonstrated that many years' outdoor use in the harshest of atmospheric conditions hardly damages the material at all. The mechanical properties of the recycled material come very close to the high level of Novodur. If new material is added, the resulting quality also satisfies the current requirements set for automobile construction materials.

The results achieved so far in the project make it clear that reprocessed plastics do not necessarily have to be channeled into down-market uses. If they are collected by type and properly reprocessed, old components can also yield high-quality materials for long-term high-performance applications.

The results achieved encourage both firms to work closely together on further joint projects on recycling plastics from automobile scrap.

Swiss Company Develops Soluble, Recyclable Plastics

92MI0308 Wuerzburg UMWELTMAGAZIN in German No 1-2, Feb 92

[Text] It has long been well known that recycling's biggest headache is plastics, especially when different types are mixed and they are heavily soiled. A new Swiss firm looks like filling a gap in the market here. Hubertus Bahlsen, who works in development management at Belland AG says: "Because our plastics are designed to be water-soluble, the solution to the packing problem is a solution in the truest sense of the word."

He confidently presents the process, which has taken more than 10 years to develop, as "the only technology currently available anywhere in the world that solves the technical and economic problems of recycling plastic packaging materials from household and trade refuse." No small claim! The core of this innovative technology is the "Belland separator module," which can be integrated into existing recycling plants and replaces time-consuming and costly manual sorting of plastics with a simple automatic filtration process.

In detail, the process works as follows: the Swiss manufacturer's special plastics are not soluble in water, but in water plus alkali they can be broken down into their various polymer chains. But the really special feature is that the liquefied plastic can now be separated from all other plastics and other composites in mixed post-consumer waste by means of conventional filters. Next the plastic is cleaned using expensive but conventional water cleaning processes such as sterilization and fine filtration down to the individual polymer chains.

Roland Belz, Belland AG's founder, promises: "In this way, the clinging residues not normally removed by superficial cleaning and the aromatics and sanitary contaminants that have migrated into the plastic can now be removed to an extent unknown in the past. This means that the plastics processed and then precipitated again in this way do not have the unpleasant smell that is sometimes given off by conventional plastics recycled from mixed household waste." If mixed with appropriate amounts of new material, Belz explains, they can even be used for high-grade applications and particular specifications. Another point in favor of the process is that the process water circulates in a closed cycle throughout the entire dissolving and cleaning procedure. The salts produced during recycling are also reprocessed in a specially designed system and reused.

Large-Scale Industrial Production

So much for the technology, which has already produced satisfactory results in a pilot scheme.

Encouraged by these results, the Solothurn-based company has for the last two years been concentrating its research and development work on expanding the process for large-scale industrial mass production. Back at the end of last year Roland Betz told a press conference that changing the production process to include the targeted use of mass-produced raw products had raised output capacity from 600-800 to 30,000-40,000 tonnes a year. At the same time, manufacturing costs had been brought down from 17.50-25 German marks [DM] per kg to a competitive selling price of DM5-6/kg. Cooperation with Mannesmann KG and other firms has obviously paid off.

It is therefore hardly surprising that, in this age of packaging regulations and obligations to take used packaging back, Belz sees brilliant market prospects in Europe, the United States, and Japan. Apart from the convincing recycling technology, there is an impressive range of applications for the special plastic, ranging from core solution [Loesekern] technology for injection molding to labeling systems, diapers and sanitary products, adhesives for telephone directories and catalogues, and temporary protective coatings. The innovative Swiss firm works with such international household names as Mitsubishi, Kimberly Clark, ITT-Japan, Nynex-USA, and the German firms Tengelmann and Schoeller and the laminated foil manufacturer Mildenberger & Willing.

In readiness for the upcoming "major offensive," the company is increasing its capital by 10 million Swiss francs in preparation for setting up a production facility in the new laender. "We are currently negotiationg for two alternative sites in Saxony-Anhalt," explains Belland PR spokesman Walter Thielemann. Since nothing had yet been settled at the time of going to press, Thielemann was unwilling to say any more.

There is no doubt, however, that, in addition to pressing ahead with preparations for large-scale industrial production, the Swiss are also seeking to market their know-how. In the future, too, Belland will therefore be offering interested plastics manufacturers all the technology required for production by way of licensing agreements.

Germany: CFC Substitutes Assessed

92MI0321 Bonn DIE WELT in German 26 Feb 92 p 23

[Article by Rolf H. Latusseck: "A Heavy Reckoning—CFC Substitutes Also Causing Problems"]

[Text] The ban on ozone-depleting chlorofluorocarbons (CFCs) by the beginning of 1995 has been decided at the political level not only in Germany, but throughout Europe. In addition, speaking at the international conference on "alternatives to chlorofluorocarbons and halons," which closes today in Berlin, Professor Franz Nader said that the [German] Chemical Industry Federation (VCI) "expects the transition to be completed in Germany during 1994."

How difficult, or how easy, will they be to give up? Jens Hasselbach of the University of Stuttgart uses a practical example to illustrate the problems. The freight compartment of a refrigerated truck is insulated with the usual polyurethane slabs of a specific thickness. Instead of expanding these slabs as previously with fully halogenated CFC foam, partially halogenated gases could be used.

Though slabs of this type would provide equally good heat insulation, using partially halogenated gases is only considered a stop-gap solution, as they still contain ozone-depleting chlorine, albeit in considerably lesser quantities, and moreover act as powerful greenhouse gases. They can therefore be expected to be banned in the foreseeable future, the desired option being a total ban on halogenated hydrocarbons.

Alternatives Such as Pentane Less Effective Insulators

Pentane is one of the most promising candidates in this connection. Its insulating properties, however, are between 5 and 10 percent lower, as the gases used both serve to expand the slabs during manufacturing and decisively affect their insulating properties, as they remain trapped in the small pores of the foam.

To compensate for the inferior heat insulation, the boards have to be thicker. With a refrigerated truck, this means either a wider vehicle (which would contravene traffic regulations) or less freight capacity. A narrower freight compartment means, however, that palettes that have been specifically designed and standardized for optimum space utilization would no longer fit. This difficulty could be resolved, albeit at considerable trouble and cost, by restandardizing.

Greenhouse Effect or Ozone Hole? A Difficult Choice

This would still not solve the problem, however. There would still be less useful space, reducing the amount of freight that could be carried. The result of this lower capacity would be to increase energy consumption and, consequently, the production of carbon dioxide, a greenhouse gas. The problem of refrigerated trucks is not a marginal one, but is typical of the whole dilemma, for all potential CFC substitutes have inferior insulating properties, with the exception of partially halogenated CFCs.

Now that these gases have largely vanished from aerosols, one of their major uses is in insulating materials. However, a house built with inferior insulating boards requires more intensive heating, burns more fuel, and produces more carbon dioxide. Federal Environment Minister Toepfer intends pentane, partially halogenated and similar substances to be used for these purposes.

Complete CFC substitutes simply do not exist yet. All the available substances either cause damage that runs counter to other environmental protection targets or are at a stage of development such that they will not be ready for use by 1995—if ever.

Germany: Groundwater Testing for Pesticides Urged

92MI0324 Bonn DIE WELT in German 28 Feb 92 p 19

[Article by Richard Scheibel: "How Much Poison Ends up in the Groundwater? Scientists Demand Regulations on Pesticide Residue Measurements"]

[Text] Experts involved in recording the agrochemical residues in the groundwater, now compulsory nationwide, face a difficult job. The systematic collection of data on this matter has only just begun, and even when figures are available, they are often not disclosed.

Water scientists attending the Utech Conference in Berlin have had heated discussions on the criteria for assessing existing data and how it should be handled. It also emerged that even the chemical analysis of water samples is a problem.

After a number of alarming cases of very high levels of agrochemical residues in some underground water reserves, the Federal Environment Agency in Berlin began systematically collecting data on pesticide levels in water samples. Since 1991 this has taken the form of a project closely coordinated with the approval procedure for agrochemicals.

As part of this mandatory approval procedure, the Federal Environment Agency must assess the product in terms of the residues that it leaves and their degradability. The agency wants to make its assessment more reliable by basing it on the long-term observation of series of measurements.

Data collection has posed considerable problems. Access to figures on pesticide levels in water samples, which are recorded on a regular basis by waterworks and the relevant departments in the laender, is not legally regulated. As a result, even the Federal Environment Agency is advised that it is supplied with data on a voluntary basis.

Since 1990, only 81 out of about 2,000 water corporations in the old federal laender have joined this initiative. They have given the Federal Environment Agency over 100,000 measurement results, which have shown that 10.3 percent of groundwater samples contained agrochemicals and their decomposition products, while 3.2 percent of the samples exceeded the 0.1 micrograms/liter threshold laid down in the drinking water regulation. Overall, 69 different substances were detected, with Atrazin, a pesticide now banned, at the head of the list. The compounds identified include ametryn, bentazon, 1.2-dichloropropane, lindane, isoproturan, and terbutylhylazine.

One of the major conclusions that experts have drawn from this data is that the agrochemical approval procedure, which also comprises laboratory tests on the stability and behavior of the chemicals, requires revision. Tests on many of the substances found had previously led to the assumption that these substances were rapidly degraded in the soil and in plants, and thus could not reach the groundwater at all.

The experts attending the Utech Conference also largely agreed that legal regulations setting out the measurement procedures are urgently required. Even the Federal Environment Agency's estimates were only published in the form of lists stating cumulative values for the whole country. Conference participants alleged that data protection had priority over the disclosure of individual findings at specific measuring points.

In addition to easier access to data, the experts also called for urgent improvements to analysis methods. Tests for

only 90 of the 290 or so known agrochemical compounds can currently be performed, as no analysis methods are available to date for the others.

However, even with compounds that can be analyzed in the minutest traces there are difficulties. The use of a large number of laboratories creates a wealth of opportunities for error. Standardized analysis methods and interlaboratory tests carried out under official supervision, thus obliging all the laboratories involved to demonstrate the accuracy of their tests, therefore constitute another important requirement.

Even in the light of findings to date, however the Federal Environment Agency calls for greater care in dealing with agrochemicals. The trend observed in the test data indicates that the number of cases detected will continue to rise.

According to the agency in Berlin, the approval procedure must be tightened up to ensure that adequate precautions are taken to prevent growing pollution of drinking water, although the threshold levels currently in force are not called into question.

Germany: Trials Confirm Incineration Destroys CFCs

92MI0330 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German 18 Feb 92 pp 6-7

[Text] Large-scale trials carried out at a German refuse-fired heating and power station have just confirmed the results obtained at the Tamara pilot waste incineration plant belonging to the Karlsruhe Nuclear Research Center [KfK] Isotope Laboratory. The chlorofluorocarbons (CFCs), known as "ozone killers," used for producing polyurethane foam were completely destroyed in normal industrial-scale waste incineration operating conditions as well. This means that the polyurethane foam with a high CFC content, large quantities of which are encountered in refrigerator disposal, can be destroyed in an environment-friendly manner in waste combustion plants. The trials also showed that, with conventional modern exhaust gas purification systems, the current legal limits on hydrogen fluoride emissions, which occur as by-products, can easily be complied with.

The large number of obsolete refrigerators poses a potential ecological problem owing to the CFCs contained in the refrigerating circuits and present as foaming agents in the polyurethane foams used for thermal insulation. The older type of refrigerator contains around 150 grams of CFC in the refrigerating circuit and around 500 grams in the insulating foam. Although it is possible to remove and store the CFCs contained in the circuits, there is over three times as much in the insulation material, and, when dumped, the gas can be exhaled, thus making a substantial contribution to the depletion of the ozone layer.

Initial trials at the KfK's Tamara pilot waste incineration plant, conducted under strictly controlled conditions, demonstrated that the CFCs were completely degraded without emission of any further harmful by-products.

Trials were conducted on the incineration of polyurethane foam containing the most frequently-used CFC, the trichlorofluormethane known as R11. It has now also been shown that these results can be reproduced in the real conditions of a large-scale commercial refuse-fired heating and power station. One stage of these trials involved the incineration of an additional 120 kg polyurethane from scrapped refrigerators in one of the two firing plants, which work in parallel, each with a throughput of 9 tonnes of refuse per hour. The exhaust gas from the plant was analyzed for CFC content, and particularly for possible reaction products such as hydrogen fluoride, dioxins, and short-chain hydrocarbons. The following concentrations were measured in the plant's exhaust gas:

- The CFC concentration was around 20 micrograms/m^3 i.e., the CFC's present in the polyurethane foam were more than 99.998-percent destroyed;
- The highest hydrogen fluoride concentration measured was around 0.1 milligrams/m^3 i.e., a factor of 10 below the emission limits of 1 milligram/m^3 currently in force for waste incineration plants;
- No other R11 decomposition products were detected.

The results obtained with Tamara were thus confirmed on a large-scale commercial basis, and a low-pollution disposal method for the insulating material from scrapped refrigerators was demonstrated. As was already the case with the destruction of dioxins and the recycling or immobilization of heavy metals in the flue-dust of waste incineration plants using the Karlsruhe 3-R process, these trials have again confirmed that waste incineration is a viable means of destroying pollutants if the appropriate techniques are used.

German Project Develops Promising Diesel Fuel From Rape Oil

92MI0333 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT INFORMATIONEN in German 18 Feb 92 pp 13-14

[Text] As part of the joint project on "fuel from rape," VEBA [United Electricity and Mining Corporation] Oil AG in Gelsenkirchen is developing a process whereby refined rape oil mixed with mineral oil components is processed in conventional "hydrotreaters" to obtain specification-standard diesel oil. The main part of the hydrocracking process consists in treating rape oil with hydrogen in a pressure vessel with the addition of a special catalyst. The fuel components thereby produced are paraffin and propane in liquid gas form. Both products can be used as a source of energy and no marketing problems are expected, even in the future. The carbon component of these products is derived wholly from the renewable raw material rape.

The basic knowledge available on this process suggests that it will be possible to use rape oil in existing oil processing plants without any further major modifications to the machinery. The products can be sold without restriction under the existing fuel distribution system.

Using a proportion of rape oil in existing plants will, in principle, make it possible to process it on an industrial scale without any extra investment. As a change in the proportion of rape oil used is not expected to cause technical production problems, plant operation will not be dependent on variations in the availability of rape oil on the market. The studies carried out under the joint project will verify these expectations and ascertain the optimum production conditions.

Although the Federal Minister of Research and Technology is optimistic about the technical prospects, the results of the tests are not yet available. Partial results from the technical tests in progress are expected during the second half of 1992 at the earliest. The overall aim of the joint project is to examine and assess the prospects for using rape oil as a raw material for the production of fuels.

The Federal Ministry of Research and Technology is providing about 2.6 million German marks for this joint project over the period from 1 July 1991 to 31 December 1993.

Latest European Ozone Research Results Show Negative Trend

92MI0334 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT INFORMATIONEN in German 18 Feb 92 pp 14-15

[Text] The latest results of the European EASOE [European Arctic Stratospheric Ozone Experiment] 91/92 ozone research campaign suggest that the ozone layer over Central and Northern Europe is unusually thin this winter and that the severe chemical disturbances in the atmosphere may cause ozone depletion during the coming weeks. Satellite measurements by American scientists have since confirmed this diagnosis.

Stratospheric ozone is being destroyed more rapidly than has previously been assumed. The latest analysis of ozone observations over several years show that the downward trend has virtually doubled within the last 10 years and that over this period up to 8 percent of the ozone was lost in the spring months in the northern hemisphere. It is particularly alarming to note that the intermediate latitudes, including the Federal Republic of Germany, are also being affected by these losses. It has been established that anthropogenic trace gases such as chlorofluorocarbons (CFCs) and halogens are causing this ozone depletion. The following detailed interim results of the EASOE campaign are now available:

- The ozone content of the stratosphere over the Arctic Circle and in the intermediate latitudes of Europe is unusually low this winter;
- The eruption of Mount Pinatubo in June 1991 has increased the stratospheric aerosol content virtually tenfold over previous years;
- The nitrogen dioxide (NO_2) concentration is very low. In the volcano aerosol region nitrogen oxide (NO) and NO_2, which normally limit the ozone-destroying effect of chlorine, have in fact been drastically reduced;
- Measurements of the chlorine compounds in the lower stratosphere above the Arctic Circle suggest that a large proportion of the chlorine originating from CFCs is present in a form that can destroy ozone directly;
- Calculations performed on models based on the chemical changes observed indicate that further ozone depletion can be expected;
- The eruption of Mount Pinatubo has severely disturbed the atmosphere of the northern hemisphere this winter.

Transport processes need to be taken into account as well as the chemical changes to explain the unusually low ozone concentrations. The respective contributions made by these two factors cannot, however, be assessed until the results available so far have been analyzed in detail.

The intention behind the EASOE campaign is to document more fully than ever before how the dynamic processes and the chemical composition of the arctic polar vortex have developed over time. The polar vortex is a meteorological phenomenon that occurs over the poles in winter, gives rise to very low temperatures (below -80°C), and contributes directly to the formation of the ozone hole over the South Pole. Although there is no ozone hole in the northern hemisphere (as yet), it is assumed that the observed ozone depletion is a direct consequence of the processes making up the arctic polar vortex. As far as we know at present, the key to understanding global ozone depletion lies not only in knowing precisely how ozone-damaging trace substances build up in the stratosphere, but also to a large extent in understanding the polar vortices.

The arctic polar vortex is a particularly complex meteorological phenomenon. Its circulation can be quite different from one winter to another, its center can occur at different locations, and rapid warming can also cause it to break up suddenly. For a campaign these are impossible to ponder and, by their very nature, cannot be planned.

The current winter, however, seems to be fulfilling the "hopes" placed in it: An unusually strong vortex had already formed before the end of 1991. Its air masses lay over the European arctic region for most of the time, sometimes extending as far as Central Europe. For several weeks, Kiruna was at the center of the vortex and thus proved the most convenient place at that time for carrying out the balloon and airborne measurement programme in particular.

Until the middle of March 1992, more than 200 scientists from 16 countries will be in Northern Europe studying the chemistry of the stratospheric ozone layer over Antarctica [as published].

FRG: Research Projects To Improve District Heating

92WS0369A Duesseldorf HANDELSBLATT in German 26 Feb 92 pp 30-31

[Article by Herbert Engelhardt, doctor of engineering and institute director, and Werner Manthey, graduate engineer, Hannover District Heating Research Institute e.V.

[Registered Association], Hannover, under the rubric "District Heating": "Research for Economical Heat Supply in the Federal Republic; Broad Spectrum of Research Projects Should Strengthen Competitiveness"; first paragraph is an introduction]

[Text] 25 Feb 92 (HANDELSBLATT-TL)—District heating in the federal republic is now as before in economically straightened circumstances. This applies both to the old and the new federal lands.

The comparatively high percentage of space heating of about 23 percent in the new versus 9 percent in the old lands should really be a good basis for availing oneself here of the energy, ecological and economical advantages associated with the increased use of combined electric power and heating. However neither the technical nor the organizational structures suffice for this purpose at present. Heat is being produced mostly at old raw lignite heating stations, and pipeline systems are to some extent in a deplorable state.

The further development of district and central heating in the old lands, or the safeguarding of market shares in the new lands, will essentially depend on whether one succeeds in lowering the cost of heat distribution to such an extent that economical operation will be possible even with low oil and gas prices. To make a financial contribution to this is the stated goal of an entire series of research projects that are being financed by district heating operators, the manufacturing industry and federal research ministry (BMFT) and Federal Ministry of Economics (BMWi).

The "New Kinds of Heat Distribution" joint research and development project is trying to lower the cost of laying pipeline systems directly in the ground by improved layout, the use of new materials and construction elements, and the use of new construction machines and new construction and laying processes. BMFT is supporting the project with 50 percent of the costs. A lot of utilities sector partners are taking part in the joint project. Nine individual projects are being worked on in close cooperation under the direction of the District Heating Consortium Registered Association (AGFW) affiliated with VDEW [German Electric Power Plant Association]. Here two projects will be considered in detail that are concerned with special problems of heating-system pipelines laid in the ground.

"In-service self-prestressing" is the subject of the Lower Rhine District heating utility. Temperature-conditioned straining of the pipe carrying the medium as a rule makes necessary the mechanical or thermal prestressing of pipelines to the stress limit. However, this requires that the pipeline ditch be kept open a long time until the completion of a pipeline section so that the section can then be prestressed and subsequently backfilled. If this is dispensed with and the pipeline ditch is backfilled in pace with the progress of construction, then so-called in-service self-prestressing, i.e., local plastic deformation, is achieved in service at corresponding temperatures of the medium. The controllability of such processes was able to be proven.

"East" Special Program for District Heating

The "investigation of frictional forces in heating pipelines laid in the ground" is at the center of interest at the District Heating Research Institute in Hannover Registered Association. Compound pipeline systems laid directly in the ground are restrained in their temperature-conditioned movement by frictional forces between the backfill material and the casing. This is desirable, because the movement of branches and elbows leads to high mechanical loads and costly disconnection measures. The processes in the pipeline/ground contact region are a great deal more complex than hitherto assumed.

The investigation of interaction between district heating pipelines and the bedding material is the newest project that will be begun in the near future under the direction of the Weimar Municipal Public Works Department. Extensive theoretical studies and technical school and field experiments are to contribute to the better mastery of stress and strain behavior in the area of elbows and fittings of heating pipelines laid in the ground.

A special program of the Consortium of Industrial Research Associations Registered Association (AiF), which is supporting the research activities of small and medium-sized industry under a mandate from and with the funds of BMWi, was created specially for research facilities in the new lands. The District Heating Research Institute in Hannover Registered Association has the assignment as a member association of AiF of coordinating the sector's joint research and of rendering organizational assistance.

The priorities of this program are:

- The development of a process for an integrated systematic analysis of the condition of district heating pipeline systems
- The rehabilitation and replacement of heating systems laid in ditches
- New materials and connectors for medium-carrying pipes in heating pipelines
- Open- and closed-system heat pumps with water as the heat carrier in industry
- The influence of halogen-free PUR-I [polyurethane injection] insulation on the longterm behavior of plastic casings
- The conversion of obsolete steam and condensate systems to hot water, and
- Lowering the working parameter in hot water systems

The project for determination of the long term behavior of fluorohydrocarbon-free foams in plastic casings is of major economic importance. The ban as of 1995 on halogen-containing foaming agents is placing narrow time constraints on covering the requirement-specific properties of fluorohydrocarbon-free plastic casings. Work toward this is being done in close cooperation with interested research institutes in all of Europe.

The topics of analysis of the condition and the rehabilitation of district heating pipelines laid in ditches are tuned especially to the problems in the new lands.

The pressure for economizing on materials and the limited selection of materials in the former GDR cause one to expect a considerable need for reconstruction. The cost of this and dependability depend on essentially to what extent one is successful in eliminating the weak points in the analysis of condition and suited measures.

Inlet temperatures of higher than 130°C and high operating pressures are also typical of district heating transport pipelines in the new lands. The use of cost-effective laying methods, using plastic casings, for example, is nearly impossible because of this. Reduction of the working parameter and the conversion of steam to hot water will be able to proceed along with reduction of the aimed-at heating requirement. The bases for this and model designs must be worked for in the projects.

A priority of future research work will be to form applicable ideas for rehabilitation and for the construction of economical structures not only for the large municipal district heating systems in the new lands, but also for the multitude of industrial heat producers with downstream systems for supplying the neighborhood.

These requirements show that technical optimization alone will not lead to economical district heating in the new federal lands. It is a problem of establishing the policy and basic requirements, that will be permitted by the companies and people involved working in an orderly manner together in accordance with the public interest. Above all, the district heating sector expects from the policy, in connection with future environmental laws, the inclusion of social costs in energy costs, which the good care of resources, and with that of the environment, of district heating based on combined heat and power will cope with.

Photo Captions

1. p. 31: The investment of billions is necessary in order to put on an economical and environmentally tolerable basis in the district heating systems in the new federal lands. A joint study by the Munich/Dresden Technomar GmbH [Limited Liability Company] study group and Professor Doctor Peter Loose of Berlin is to throw light on the actual state, sensible rehabilitation ideas, the plant and product requirement to be expected, and also future operator structures.

French Firms Increase Waste Management Research

92WS0399A Paris L'USINE NOUVELLE in French 27 Feb 92 p 20

[Article by Pierre Laperrousaz: "The Race to Treat Waste Is Off and Running"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Economical means of treating waste—recycling, neutralization, incineration—have to be found. France's large urban-service companies are in contention for the job.

Brice Lalonde has set a clear goal: France will have to have its waste problem resolved by the end of the century. The two industry leaders, the Lyon Water Company-Dumez and the General Water Company, have gotten the message.

Jerome Monod's group has announced it will spend 31.2 billion French francs [Fr] on waste research and development this year, compared to Fr13.7 million in 1991. Its competitor estimates it will spend Fr80 million to Fr100 million and plans to build a research center in Limay that will keep 20 people busy on a 1992 budget of Fr15 million. And both of them have just defined their strategy for waste treatment.

France's waste problem can be summed up simply enough: How does one convert the 20 million metric tons of household garbage and the 50 million metric tons of industrial waste produced each year into a trickle of "final" residues that are as harmless as possible? For the country's "technical burial centers"—which is what dumping grounds are now being called—will soon be saturated.

General Water and Lyon Water already possess expertise in different stages of the waste-treatment process, including collection, sorting, incineration, neutralization, and burial. But the knowledge is scattered among different subsidiaries, and some of the activities are much more technical than others. For example, explains Georges Valentis, the director of General Water's new research center in Limay, "We have mastered all the steps involved in treating industrial waste, in Sarp Industrie. But we are going to have to implement new collection techniques, such as those involving expert systems, to optimize selective collection."

The diversity of the technologies needed means that operations will have to be somewhat decentralized. And although the two groups have centers for their waste treatment activities—General Water's in Limay and Lyon Water's in Pecq—a large share of the research will be conducted in their subsidiaries. "The development of certain processes such as making waste sites impermeable or neutralizing (rendering harmless) the waste requires field work," explains Francois Fiessinger, who is the director of research at Sita, a subsidiary of Lyon Water Company.

Lyon Water has designated several "centers of excellence" for that purpose. They include Degremont and Novergie for biological recycling, Cofreth for incineration, and France Dechets for neutralization and burial sites.

Creating Shared Research Hubs

Some of the group's other companies, which ordinarily have nothing to do with waste, have also pitched in. For instance, Soletanche, which has considerable know-how in earth stablilization for public-works projects, has just teamed up with Sita to create a joint company, Inertec. Its purpose will be the development of neutralization processes. Lyon Water does lag behind its competitor in that area. Yet "over half the waste now deposited in dumps will have to be stabilized through neutralization a few years from now. That means we must find economical means of

doing so," remarks Francois Fiessinger. As for public-works companies such as Dumez, they could incorporate neutralized products into building foundations or embankments.

The diversity of the problems involved has spurred the two competitors to seek expertise from outside their companies: from universities, technical centers, and manufacturers. Sita, for instance, has just teamed up with Recymet, a Swiss company that owns a technology for recycling batteries and accumulators. It has also just created a joint venture with Rhone-Poulenc for the storage of final residues. Based in Vernon, the company will specialize in using membranes to make waste sites tight, treating water through drainage, and long-term monitoring.

Clearly, the two groups are aiming to develop a whole range of processes. "Selective collection is not necessarily the right answer everywhere," says Georges Valentis. Companies must be able to propose comprehensive solutions: "Customers, especially local communities, are increasingly demanding integrated, optimized lines." And it will take nothing less to stave off foreign competitors, such as the United States' Waste Management, which is insistently knocking at our door.

Germany's Position, Chances in Photovoltaics Assessed

92WS0402D Duesseldorf HANDELSBLATT in German 5 Mar 92 p 28

[Dipl.-Ing. Reinhold Wurster, Ludwig-Boelkow-Systemtechnik GmbH, Ottobrunn]

[Text]

Photovoltaics: Germany Gambles Away Chances: Implementation of Technologies for Electricity Production Necessary

The Market Penalizes Those Who Come Too Late

The longer the construction of large production plants for photovoltaics is delayed, the greater the danger that Japanese manufacturers, already leading in technology and pricing, will once again get the business. Germany, despite its very good technological position, will abandon or else not even enter another future market.

The most elegant method for converting inexhaustible renewable energy into electricity is photovoltaics (PV). For a quarter century, it has found commercial use in special applications like space flight. Although the market for photovoltaics has expanded in the last decade by over 20 percent per year on average and thus is one of the largest growth markets of all module technologies (monocrystalline, polycrystalline and thin-layer), no more than about 60 MW of PV module output are being sold annually world-wide. It is made in production facilities with different degrees of automation at greatly variable production costs.

As early as 1988, a Ludwig-Boelkow-Systemtechnik GmbH study commissioned by the BMFT [Bundesministerium fuer Forschung und Technologie, Federal Ministry for Research and Technology] showed how conventional PV technology, for example polycrystalline, can be made with optimized production designs at substantially reduced manufacturing costs, arriving at costs of about 7 German marks [DM] per Wp (Wp equals Watt peak, possible maximum output) for fully wired, grid-connected PV facilities under certain initial conditions. In Germany today, with the BMFT's 1000-roof program, these costs are about DM22-27/Wp. In Switzerland, however, grid-connected facilities are already being set up for 16 DM/Wp. This also explains why in contrast to Germany, where power supply companies always refer to PV electricity generation costs of DM2/kWh and higher, production costs of 1.30 to 1.40 Swiss francs/kWh are achieved in Switzerland, and in fact almost always with PV modules imported from Japan or the U.S., since Switzerland does not have its own PV manufacturing plants.

In Japan, the production costs for polycrystalline PV cells were about 500 yen/Wp (about DM4/Wp) in 1990 and thus less than half as high as in Germany. By the year 2000, they should even drop to about 100 to 200 yen/Wp. System costs without PV modules should then be about 160 yen/Wp for roof-integrated systems. With mass production, the turnkey roof-integrated PV system would then cost about 300 to 400 yen/Wp, or about DM3.50/Wp, which for Central European insolation conditions leads to electricity production costs of about DM0.35/kWh.

Those Who Want to Export Heavily Must Put Forth More Effort

A further difference between Germany and Japan and Switzerland is that Germany does not have a concrete objective with a target date for the use of PV for electricity production. The Japanese power supply companies have agreed to put at least 50 MW PV-output on line by the year 2000. About 200 MW from domestic producers are to be put on line by the year 2000, and about 4,500 MW may even be on line by 2010. The Sanyo company is assuming a PV world market of 10,000 MW for the year 2010 and can envision a world-wide share of 50 percent for PV electricity by the year 2030.

Based on these objectives, a successive expansion of the production capacities has already begun in Japan. Kobayashi of the Sunshine Project even talks about production plants with 100 MW annual production capacity for the second half of the 90s.

Germany is certainly among the technological leaders in PV technology and now, through the purchase of ArcoSolar, commands the largest PV producer in the world. No other country supports R&D activities with more federal funding than Germany; at present it is about DM100 million annually.

The frequently heard argument that Germany has the highest federal R&D expenditures for photovoltaics worldwide, both in terms of percentage as well as absolute value, is no justification for the neglect of more lasting support by the nation or industry. For no other industrialized country of Germany's stature exports nearly as much of its gross

national product (Germany: over 30 percent; Japan: about 20 percent; U.S.: 7 to 8 percent).

If one relates total R&D expenditures by the German Government and industry to this export production value, then Germany is even behind the U.S. and clearly behind Japan. If the export of high-tech products is chosen as the basis for comparison (which, in retrospect, may not appear relevant for the current conditions, but may be a more important indicator for the attainment of future markets) then the picture looks even worse than it does in relation to total export performance.

If a target date were set (for example, 15 percent renewable energy in Germany by the year 2010 as a possible preliminary stage in the world-wide crash program for renewable energy called for in the new report of the Club of Rome), then one would not be satisfied with references to the supposedly nonexistent PV market, but rather would try to reach such a goal with the most fully developed technology and optimized mass production possible.

Such a target date and limited action would not block the path to more advanced and mature technologies, as is often erroneously maintained. Japan will not waste time lamenting about the unavailable PV market, but, as has often happened before, will create or else develop this market for itself. Europe took the same route with the Airbus.

The longer the construction of large PV production facilities is delayed, the greater the danger that Japanese manufacturers, already leading in technology and pricing, will once again get the business, and Germany will abandon or else not even enter another future market. If this danger is not faced, then by the mid-90s the European producers may no longer be able to penetrate the flooded market (see the auto market in the U.S.) without having to accept ruinous conditions. Those who come too late to the market, even if they command the appropriate technology, no longer earn what they invested in product development and cannot finance the next generation of technology. This principle can be demonstrated most graphically in the area of microelectronics, but is true in principle for every product capable of being mass-produced, and thus ultimately for photovoltaic systems.

Furthermore, in Japan a competitor has emerged which has no fundamental money problems, commands high liquidity, and need not always act in a profit-oriented way. Low or no returns are accepted over longer periods on the development of strategically important products and on the introduction of products to the market (keiretsu concept).

Germany Lacks a Broad Consensus

In addition, Japan now makes the greatest amount of money available for aid to developing nations, in contrast to earlier years, and is thus beginning to control the markets of these countries (for example, southeast Asia) to an increasing degree (and with them, a large part of the regions especially suited for PV power production).

Opportunity in Germany and also within the EC lies in the availability of a highly qualified, innovative and creative work force, in the entrepreneurial drive to open up new areas of business, and in a possible release of large sums for financing—DM12 billion worth of coal subsidies alone in Germany annually—which could be used for massive programs introducing regenerative/environmentally sound energy production technologies to the market.

Germany appears to be among the leaders in R&D, but as the industrial country with the highest percentage of export dependency, it has not been able to achieve a positive export/import balance for high-tech products. This would mean that, in contrast to its strongest competitors in the area of high technology—Japan and the U.S.—Germany has not been able to convert its high R&D status into marketable products quickly and extensively enough, which will lead to an ever greater dependency on a few suppliers of high technologies.

If Germany industry wants to assume a leading role in the area of high technology, then an acceptable target with a fixed deadline developed jointly by the state, industry, and employee representatives and with which industry as well as the population as a whole identify is helpful or urgently needed. Such a process is the real strength and danger of our Asiatic competitors.

Japan is systematically developing away from thinking in terms of specialized individual systems (product) to thinking in terms of complex systems (functional thinking). Thus it sees the path to the "information society" largely prepared and is beginning to devote itself increasingly to social issues such as the environment, raw materials and recycling, energy, dissatisfaction and uncertainty, intellectual resources, creation of markets, and improving the quality of life. This should succeed through the combination and integration of new technologies—and photovoltaics belongs to these strategic new technologies.

German University Develops Fluidized Bed Electrolysis of Chlorinated Hydrocarbons

92WS0414A Duesseldorf VDI NACHRICHTEN in German 21 Feb 92 p 33

[Article: "By-Product of Garbage Incineration To Be Utilized; Acid Under Current: Chlorine and Hydrogen Produced From Hydrochloric Acid by Means of Electrolysis"—first paragraph is VDI NACHRICHTEN introduction]

[Text] VDI-N, Duesseldorf, 21 Feb 92—Mostly heavily contaminated hydrochloric acid is produced as a by-product of the treatment of flue gases after the incineration of garbage or hazardous waste. Fluidized bed electrolysis can be used to economically exploit waste hydrochloric acid.

During the incineration of waste materials containing chlorine—PVC, for example, or chlorinated hydrocarbons—exhaust gases are produced that also contain hydrogen chloride (HCl, hydrochloric acid), among other materials. Progressive plans for the wet treatment of flue gases provide for an acid-operated washing method to

separate the hydrogen chloride. Since by this method other materials are also washed out, the resulting hydrochloric acid with solid materials, heavy metals, organic substances, mineral acids, and salts is contaminated.

Methods that decontaminate and concentrate the hydrogen chloride through distillation and which afterward may break it down into its components, hydrogen and chlorine, are costly in terms of both process engineering and energy consumption. The University of Erlangen-Nuremberg has now developed a method of processing waste hydrochloric acid by electrolysis as an alternative. By means of this the acid is separated into its chemical elements, chlorine and hydrogen, with the aid of electric current.

The design for this: a fluidized bed instead of electrodes. Since conventional HCl electrolysis requires more concentrated and uncontaminated acid. If, however, plate electrodes are replaced with a fluidized bed composed of particles that conduct electricity (graphite particles, for example) and which are charged by means of supply electrodes, according to a report from the university, the principle of electrolysis can also be applied to waste hydrochloric acid. Since a "three-dimensional electrode" like this permits them to obtain acceptable results with small concentrations of acid as well on the basis of the greatly enlarged surface. Since the movement of the particles in addition results in a cleansing of the supply electrodes and the membrane, contaminated initial products can also be used.

The electrolytic cell built for the chair for chemical engineering consists of a hydrodynamically well-shaped framework that contains the particle electrodes between two parallel graphite plates. The waste hydrochloric acid flows upward through the cell so that the particle electrodes are fluidized.

First, the cell was operated discontinuously so that the acid was circulated until the desired reduction in concentration was obtained. The rate of conversion of the waste hydrochloric acid was high. Sharp reductions in heavy metal concentrations could also be observed during the tests. The final concentrations of mercury, cadmium, or copper were under the legally established threshold values for discharges into waterways requiring official authorization.

On the basis of the promising results that were obtained on the laboratory scale, they plan to apply them on a semi-industrial scale. To accomplish this, a pilot plant is supposed to be erected, in collaboration with the Sigri Company of Mietingen, which will take on the production of the electrolysis cells, on the grounds of the Company for the Disposal of Hazardous Waste (GSB) in Ebenhausen. A partial current of the waste hydrochloric acid that accumulates there will be decontaminated to test the suitability of the application of the idea in continuous operation.

EC Goals for June Environmental Summit Discussed

92WS0414B Duesseldorf VDI NACHRICHTEN in German 21 Feb 92 p 4

[Article by Christa Friedl: "Political Pressure Required for Environmental Protection in EC; Farewell to Lowest Common Denominator; One Out of Every Two Guidelines Not Yet Put Into Practice"]

[Text] VDI-N, Brussels, 21 Feb 92—For many EC member states, environmental protection is an evil: Up to now, half of the environmental guidelines created by Brussels have not yet been put into practice. With the so-called Fifth Environmental Action Program, the protection of water, soil, and air in the Community is supposed to become more effective.

Discharges of untreated industrial effluents is on the agenda in the southern EC states in particular. DM8 billion a year must be invested for the protection of the waterways in order to raise water-quality levels to those of the 1950s.

The hole in the ozone layer, the greenhouse effect, increasing pollution of the North Sea and the Baltic, the threat to ground water posed by intensive agriculture, and, not least of all, the growing mountains of garbage—there is no shortage of pressing environmental problems in the European Community. "No one has any reason to rest on his laurels." Ten months before his term as Community commissioner for environment comes to an end at the end of this year, Carlo Ripa de Meana spoke out once again in plain language last week in Brussels.

There are not many laurels at all. EC environmental protection measures are often only on paper. According to a study by the Brussels Club, "European Environmental Policy," more than half of the approximately 160 EC guidelines concerning protection of the environment have to this day not yet been implemented or are in practice completely undermined by countless special regulations. In 1990 alone, the EC issued warning to member states 168 times for this reason. "Often without any results," said Laurens Brinkhorst of the EC Commission's General Directorate for Environment. "The realization that environmental protection not only costs money, but also brings in money is just now beginning to gain acceptance."

De Meana said last week in Brussels that 1992 would be the year of the environment for the EC. He indicated that the UN summit on environmental affairs in Rio de Janeiro in June would be the biggest challenge. "We have to speak with one voice there," the environment commissioner appealed to his listeners. The Community of Twelve has also spoken with one voice in the past, but that was mostly the voice of the lowest common denominator. The reason: The European act requires unanimity among the member states for the adoption of appropriate ordinances or guidelines. Thus, guidelines or ordinances pertaining to the environment are oriented only in terms of just what the most powerful state to apply the brakes deems feasible.

"No citizen of Europe can yet understand the environment policy in the EC," Brinkhorst complained. The procedures are so complicated, communication among the different agencies is poor, and the bureaucracy is too slow." There is an abundance of examples of this. Brinkhorst cited one of the most cogent of these last week at a Brussels Club conference. "To this day the member states have not yet reached agreement on where the European Environment Agency should have its headquarters." A great deal is expected of this institution. Thus, the agency is expected to collect, coordinate, and evaluate data on the pollution of water, soil, and air from all 12 member states, to monitor the flow of garbage, keep tabs on the transporting of hazardous substances, and at long last provide the background information necessary to make environmental policy decisions.

France is still blocking the decision [on the agency] because discussion of the headquarters of the agency is linked with the future headquarters of the European Parliament. "These two questions must be separated," Brinkhorst said to VDI NACHRICHTEN. As he sees it, the offices of the agency could remain in Brussels and the agency directors would rotate from city to city within the EC. "A decision on this must be reached within the next few weeks," Brinkhorst insisted.

The Community of Twelve looked into the climatic changes we were threatened with last year. The member states—not counting the new [German] federal states—emitted about 3.1 billion tons of carbon dioxide (CO_2) in 1990, which, according to the EC Commission, corresponds to 13 percent of the worldwide CO_2 burden of human origin. In a resolution the member states set themselves the goal of reducing greenhouse emissions to the 1990 level by the year 2000.

Price policy offers the most effective incentives for conserving energy. "Energy is too cheap in the Community," Peter Faross of the EC Commission's General Directorate for Energy asserted. According to current plans, a barrel of crude oil should be $3 more expensive as of 1993 with the introduction of a tax on energy. This surcharge will be increased to $10 a barrel by the year 2000. De Meana says: "This will lower energy consumption to the point that the Community will have attained its goal of reduction."

Despite lengthy debates, there are still vehement opponents of the energy tax. "New taxes will hamper the industry's willingness to invest," Guido Venturini, the director of the Italian chemical association, Federchimica, predicted at the Brussels Club conference. Alain Terrenoire of the French energy combine, Elf Aquitaine, also rejected a tax on energy. "Such burdens should not be introduced in the EC alone; they weaken firms' ability to compete worldwide."

The "Fifth Environmental Action Program" is awaited with suspense for the end of this year. The new guidelines for Europe's environmental policy should be established in it. The details have not yet been negotiated. Environment Commissioner de Meana only made public the general direciton they will take. "Environmental policy in the EC must no longer be isolated, rather it must influence all other policy areas."

Germany: Crops Proposed for Fuel, Chemical Raw Materials

92WS0419A Duesseldorf HANDELSBLATT in German 19 Mar 92 p 26

[Article by Guenther Fleischer: "The Search for Economically and Ecologically Acceptable Technologies"]

[Text] In a joint project supported by the Federal Ministry of Research, the four chemical firms of Chemie AG Bitterfeld Wolfen, LeunaWerke AG, Buna AG, and Filmfabrik Wolfen, as well as Ingenieurgesellschaft fuer Umwelttechnologie und Forschungsconsulting [Engineering Society for Environmental Technology] mbH, Aachen, and a group of scientists from the faculty for food technology at The Humboldt University in Berlin investigated the utilization of renewable raw materials in the future technologies of central German chemical firms and the requisite research projects by a study of the technological consequences.

The study starts with the assumption that new and better products, more economically efficient processes and ecologically acceptable technologies are important prerequisites for a change in economic structure in the chemical triangle of Halle/Leipzig/Bitterfeld.

Because of their interconnections and key functions, the existence and development of the chemical industry in central Germany is a matter of fundamental importance for the eastern German economic area not only in terms of a single economy but also in macroeconomic terms. How problem ridden the restructuring and reorganization of this area and the search for strategies accepted by the majority and what the socially workable solutions are, can be made clear by three statements.

While, in 1991, sales for the West German chemical industries with their 600,000 employees amounted to roughly DM170 billion, the chemical firms in the new Federal Laender took in about one-twentieth of that. Of the 330,000 jobs in the chemical industry in the former GDR, fewer than 100,000 will remain in the long term.

The closing report of the trust institution about the management concepts for Bitterfeld, Leuna, Buna and Wolfen of 4 July 1991 states: "Based on the current situation, from the point of view of pure business economics competitiveness for large-scale chemical enterprises can hardly be achieved in any area." But an industrially impoverished zone with broad areas which have been turned into wasteland or steppes, and the social consequences, are not beneficial to anyone.

So it is necessary to find and to put into practice promising and socially workable innovations, while eliminating outmoded technologies, consistently excluding old-fashioned technology, and introducing modern technologies with

significantly greater efficiency and demonstrable ecological advantages. The product lines and end products mentioned in the study show that a qualitatively and quantitatively expanded utilization of renewable raw materials can be one way—though certainly not the high-profile way or the one promising the biggest profits—to move towards developing a "gentle chemistry" for the fuel-converting industries of Saxony-Anhalt.

The case for the use of such agrarian raw materials as starch, sugar, plant fibers, wood, vegetable oils and fats for the production of drugs, natural plant protection and growth regulators, and also the utilization of certain cultivated plants to treat polluted soils, is based particularly on the following considerations:

- The need to find more ecologically favorable technologies for fuel conversion, product recycling, utilization of waste and excess products of the land, forest and foodstuffs economies;
- and in future—the need to be able to fall back on renewable resources to a greater degree;
- the need to increase safety in provision of fuel and energy;
- the need to be able to contribute to a reduction in the problem of agricultural overproduction.

Experts estimate that within 10 years approximately 4 million hectares of land in agricultural use will have to be converted. It makes sense that the loss of acreage for food production primarily affects lower quality soils. The soil resources of the new Federal Laender will be particularly threatened, since they include, besides 30 percent productive, easily workable soil and 17 percent soil with adequate groundwater, 7 percent soil which is hard to work, 12 percent soil seriously endangered by standing water and 27 percent sandy soils or soils far from groundwater.

By itself the last group, which is best suited for elimination, makes up approximately 1.69 million hectares of the useable agricultural acreageof the new Federal Laender. Roughly 600,000 hectares of acreage (about 9.7 percent of the total area) have already been put out of production since 1990. Further agricultural utilization of soils of lower quality to produce "renewable raw materials" is, particularly in Brandenburg, Mecklenburg-Western Pomerania, and parts of Saxony-Anhalt, one of the requirements for economic consolidation which should be under political protection because they are essential.

The idea of using renewable raw materials in the energy economy—even more in the fuel economy—is not new. Germany's chemical industry alone already draws about 1.9 million tons (10 percent of their raw material requirements) from these "natural sources" and thus is more intimately linked with natural cycles.

The Federation, the Laender, the association of the chemical industry, the umbrella organization for agrarian research, among others, have been supporting a great number and variety of projects for years with sums amounting to millions. It is true to say that the future of "renewable raw materials" has already begun.

Germany: Yttrium Barium Cuprate Crystals Studied

92WS0419B Duesseldorf HANDELSBLATT in German 19 Mar 92 p 26

[Article by Jochen Brinkmann: "Keeping the Electrons' Path Clear in the Crystal"]

[Text] Oxidic high-temperature superconductors, such as yttrium barium cuprate, undergo chemical change when attacked by carbon dioxide and hydrogen. In addition, abnormal phases can form in the boundary layers adjacent to metallic contacts. Both phenomena have been investigated by researchers at Clausthal.

Grain boundaries are problematic for superconducting, since at this point the crystal's symmetry is disturbed, thus reducing the critical current density attainable. In addition, impurities usually penetrate the crystal along these boundaries and lead to abnormal phases which can interrupt the contact between the superconducting grains. Producing large single crystals which have no disruptive grain boundaries will not be possible in the foreseeable future.

The kinetics of atom transport in the grain boundaries must therefore be thoroughly understood so that rules for the manufacture of high-temperature superconductors and for extending their life can be established. A working group at the Clausthal Technical University, led by Professors Guenter Borchardt and Rainer Schmidt-Fetzer, is working on the question of the rate at which gases such as oxygen, hydrogen or carbon dioxide penetrate the crystals.

To answer this question, senior engineer Juergen Claus is pursuing an obvious course. He is using rare, stable isotopes of the relevant elements, like nitrogen-18 instead of nitrogen-16 or deuterium instead of hydrogen. These "spies" behave just like their "normal brothers" in reactions, but can be easily localized within the crystal because of their different masses.

For this purpose, after the reaction the surface of the superconductor is removed, atomic position by atomic position with an ion beam. The secondary ions produced in the process are separated by mass. Thus a quantitative picture of the course of the reaction is provided by the distribution of the "spies." Such investigations are supplementd by electron spectroscope analysis of the chemical bonding conditions on surfaces and at grain boundaries.

Professor Schmidt-Fetzer guesses that above-ground superconductors will not be made because of the expensive nitrogen cooling. Superconducting connections between two computers or housing which protects against magnetic fields are thinkable, since up to a certain magnitude a superconductor repels the external effect of a magnetic field. For such applications, the contact properties between a metal or silicate and the ceramic superconductor will decide whether the superconductor can be successfully employed or not. Which metals are suitable for this contact?

To answer this question, the structural development of metallic boundary layers which have first been compressed

in a capsule between the metal and annealed at temperature around 800°C are examined under the light microscope and the screen electron microscope. The yttrium barium copper oxides form reaction zones of varying depths with the metals or silicates at the boundary layer, depending on the annealing time and temperature. If the ceramic powder is mixed with a metallic one, it is possible after heating to establish with the help ofthe X-ray diffractometer which phases are being formed.

FACTORY AUTOMATION, ROBOTICS

Italian Factory Automation, Robotics Industry Assessed

Italian Market Prospects

92MI0298A Milan ITALIA OGGI in Italian 18 Feb 92 p 5

[Text] Over the next five years the Italian automated factory market is expected to grow steadily, bringing it to 9 trillion lire by 1995. According to 1991 figures, the more promising sectors are manufacturing management systems (865 billion lire with a 17.7 percent increase over 1990) and auxiliary design systems (765 billion lire with a 16.8 percent increase). These were the most significant figures on factory automation presented yesterday at the Genoa fair's convention hall during the opening of AF (Automated Factory Show) 1992, inaugurated by Filippo Maria Pandolfi, EEC vice president, and Carlo Patrucco, vice president of Confindustria [General Confederation of Italian Industry].

"The market potential for technology and solutions for the automated factory is very high in Italy," observed AF president, Franco De Benedetti. Users, however, need to acquire greater knowledge, and suppliers need to break down barriers to enter the market."

The figures on the automated factory in Italy were presented by Giancarlo Capitani, managing director of Nomos Research, which directs the permanent observatory on the automated factory, sponsored by the associations that promoted the AF show. "The prospects for the future are positive," he stated, "despite the fact that the economic situation brought about a slowdown in 1991. After years of growth rates exceeding 10 percent, the 1991 growth rate was a mere 4.3 percent at 6.55 trillion lire. The only sector with a zero growth rate over the previous year was factory automation, which remained stable at 4.745 trillion lire," concluded Capitani.

As Pandolfi announced during his speech, after Maastricht the role of the automated factory has become so strategic that research investments will jump from 3.8 trillion to almost 8 trillion lire in the 1992-1997 period.

Although Confindustria Vice President Carlo Patrucco stated he was in favor of accepting a quality challenge, he expressed the hope that an advanced tertiary sector would help small and medium-sized companies, which were not ready to face innovation costs for economic reasons. Concerning the professional capabilities of those working in factories, Confindustria's vice president said he was in favor of public authorities handing the management of professional training courses over to companies.

World Market Share

92MI0298B Milan AUTOMAZIONE E STRUMENTAZIONE in Italian Jan 92 p 232

[Text] According to statistics released by the Confindustria [General Confederation of Italian Industry] Studies Center, the world robotics market reached $3.7 billion in 1989, two-thirds of which in Japan, one-fifth in Europe, and one-tenth in the United States. Cases of success in Europe were linked to the features of national markets and the development of specific skills. Some examples are the Swedish company Asea (which became ABB after merging with Brown Boveri), the German company Kuka in the field of welding, and the Italian robotics industry, which is characterized by measuring robots (DEA, Prime Industrie, and Speroni). In Europe, the highest concentration of robot manufacturers is found in Italy and Germany.

In terms of the diffusion of robots in manufacturing systems, the classification is as follows: Sweden is first with 3.5 robots for every 1,000 employees in industry, followed by Germany (ex-FRG) with 2.8, and Italy with 2.2 robots per 1,000 employees.

The automotive sector still remains the chief market for robotics in the main European countries, even though new fields of application are being consolidated.

In Italy there are currently about 70 industries working in robotics and more than 15 importers, among them some branches of multinational groups.

Italy's position can be defined as satisfactory, according to Confindustria's evaluations and statistics. Measuring, assembling, and spot welding are the fields with the greatest technological and market success. Two main interrelated factors are:

1) some large companies (especially Fiat and Olivetti) have invested in innovative technologies, thereby permitting robotics to incubate through the creation of a market, in addition to developing specialized skills internally;

2) this push is supported by the presence of a consolidated manufacturing tradition in the field of inspection and machine tools, thus leading to the establishment and creation of innovation companies both as branches of large groups involved in automation processes or thanks to the initiative of new entrepreneurs.

Confindustria's Study Center is therefore optimistic about strengthening Italy's competitiveness in the robotics sector as long as there is a flow of venture capital toward the sector, in support of innovation.

Matra Unveils Mobile Robot

92WS0400B Paris L'USINE NOUVELLE in French 27 Feb 92 p 54

[Article by Stephanie Farhi: "Mobile Robots Get On Their Marks"; first paragraph is L'USINE NOUVELLE introduction]

[Text] The principal problems to be solved are environmental perception, navigation, and computerized supervision. Scientists are making progress...

Adam is slated to take his first steps in Toulouse during March. Matra Marconi Space developed the autonomous vehicle so named as part of the AMR [Advanced Mobile Robots for Public Safety Applications] EUREKA project. Adam is a precursor of mobile robots designed to intervene in critical situations, such as fires, earthquakes, and nuclear accidents. Its strong point is its ability to navigate autonomously, so that it can travel alone to its target once out of reach of remote control. Such autonomy requires the absolute cutting edge in sensor, computer "merging," and artificial intelligence technology.

AMR is EUREKA's largest mobile robot project to date, with a budget of 640 million French francs [Fr]. It involves a heavy mobile robot with an articulated arm, that carries a smaller robot to perform specific tasks. The ENEA [Italy's Atomic Energy Commission] and a transalpine consortium including Ansaldo, Elsag, and Alenia, among others, are making the large robot. Spain and the aircraft manufacturer Casa are in charge of the articulated arm. France is producing the "small" robot, which has been broken down into three pre-prototype "demonstrators," each to study a different function. Technicatome, a subsidiary of CEA Industrie, developed Dato to study remote operation of the arm; Framatome and the laboratories of Marcoussis d'Alcatel-Alsthom built Frastar to investigate locomotion and obstacle avoidance. Finally, there is Adam, to study navigation. Matra Marconi Space worked with the Toulouse Automation and Systems Analysis Laboratory (LAAS), which is among the most advanced in robotics and artificial intelligence, to develop Adam. Three points were considered priorities: environmental perception, navigation, and computer supervision of the robot. Unlike cruise missiles, Adam does not have a predrawn map of the terrain it will be traveling through stored in its memory. The terrain is unknown, full of obstacles, and uneven. Adam must recreate the environment to select the path that will lead it to its target.

The first innovation used in Adam is the 3D laser imager that was developed by the Laboratory for Electronics and Data-Processing Technology (LETI). The imager spans 10 meters, is accurate to 1 centimeter, and, unlike a camera, can measure distance directly. The imager merges successive pictures, correcting them as it goes along, to produce a navigational map describing the terrain. Those data are then combined with information from the inertial unit, which gives angle measurements. Then the data are "merged" to create a single picture of the environment. At that point, computer supervision involving artificial intelligence enables the robot to "intervene"—whether through a series of actions or by reacting immediately to an incident—while taking its environment into account.

LASERS, SENSORS, OPTICS

Germany: Developing Better-Quality CO_2 Lasers To Increase Competitiveness

92WS0418A Duesseldorf VDI NACHRICHTEN in German 21 Feb 92 pp 1, 28

[Article by Burkhard Boendel: "Powerful Lasers From a Compact Source;" first paragraph is VDI-N introduction]

[Text] In the next few years a new laser technology will enable greater power of up to 60 kW while simultaneously improving the quality. In order to do this, the Fraunhofer Institute for Laser Technology (ILT) and the Trumpf mechanical engineering company have joined forces with the "third-generation high-performance laser" research project.

Until now, lasers in the upper performance range were considered too big and could therefore only be conditionally adapted to production. Within the framework of a research project, the Fraunhofer Institute for Laser Technology in Aachen and laser manufacturer Trumpf in Ditzingen are going to create high-powered facilities which meet the demands of industry. In this project, which is being funded with nearly 20 million German marks [DM] by the Land of North Rhine-Westphalia, CO_2 lasers with a capability of up to 60 kW are to be realized.

Another goal for this research venture is to improve the quality and variability of the laser beams. The two partners also hope to use the project in order to reduce the lead in know-how of the Japanese and U.S. competitors.

According to the present level of technology, the limit for industrial application is 25 kW, and at the moment even that much power is only produced by high-performance equipment at the cost of limited application possibilities. The model from the only supplier in the world in this performance class, the U.S. United Technologies Corporation (UTC) group in East Hartford, Connecticut, has a 27 m^2 footprint and weighs 13.6 t.

Such bulk could perhaps be tolerated with corresponding performance quality. But even in this respect the present technologies have reached their limits, reports Peter Loosen, in charge of laser beam sources at ILT. Adaptability to the manufacturing processes is clearly restricted. Adjustment of the laser is very clumsy. And even the quality of the beam suffers with higher kilowatt output.

But with ILT and Trumpf, the Germans, who so far have had little to say in the field of high-performance lasers behind the United States and Japan, have opened the competitive race for the next laser generation. In a five-year research project, which is being funded by DM19.25 million from the Land of North Rhine-Westphalia, the partners intend to construct compact CO_2lasers with power up to 60 kW. The first modules are to be ready as early as three years from now.

No stone will remain unturned in order to make the energy-rich light sources suitable for industry, according to the statements of laser expert Loosen. In addition to a new principle of excitation, the gas exchange systems will be significantly modified and new pumps will be used.

Conventional CO_2 lasers use a direct-current exciter to add energy to the lasing medium. The gas discharge is fed using one tungsten and one copper electrode. This principle is what sets limits for the technology. Controlling the beam output is not possible for reasons of beam stability and beam quality. The only operational modes are "on" or "off." "But many applications require variation in laser

performance during the manufacturing process or laser pulses of varying frequency and pulse duration," Loosen says describing one weak point. Small lot sizes with flexible production methods increase the need to make lasers capable of handling the process and not the opposite, subjecting the process to the laser.

Direct current excitation has another disadvantage. Due to the high power density, the electrodes gradually evaporate, they "sputter." With unacceptable consequences for the optics: The metal vapor settles on the mirrors and thus reduces the beam quality. The latter is already limited because of the excitation technique. With focal lengths of up to 40 cm, large distances between laser and work piece are necessary, even for focal points which at 0.5 to 1 mm are rather big for lasers.

This will change in the future. The new source of energy for high-performance lasers will be high-frequency excitation. For this purpose generators build up an alternating electric field of up to 27 MHz, which excites the lasing medium and causes emission. By making it possible to vary the alternating field rapidly, the laser beam itself can now also be modulated. Further, the problem of electrode erosion is also solved. Since the alternating field is transmitted through a dielectric as well, the electrodes can be mounted outside the medium. The favorable result is longer tool life and better optics.

But high-frequency excitation results primarily in better beam quality. Here there is very much less fluctuation and the beam is clearly more homogeneous. According to Loosen, quality can thus be increased by a factor of three.

Altered guidance of the gas flow also contributes to this. The lasers must be cooled due to the constant energy supply. Until now, the lasing medium was circulated perpendicular to the light beam. Because of the varying temperature distribution, the gas then acts as a prism and impairs the optics. For this reason the designers of the new generation rely on the axial gas flow principle, in which the medium is conducted along the beam.

The developments toward a compact form of construction are proceeding in parallel with the improvement of the laser beam. According to information from ILT expert Loosen, future lasers will require only about one-third of the space needed so far. In this respect, high-frequency excitation kills two birds with one stone: The power density, meaning the laser performance produced per gas volume, is approximately 10 times greater. That by itself makes it possible for the future high-performance lasers to slim down, and added to this are the new laser-adapted flow devices.

"Since the market for these lasers has been relatively small up to now, no pump manufacturer has undertaken any particular development in this sector," Loosen relates. But now three companies are offering laser-adapted pumps in small sizes, which makes it possible to save space in the construction.

"Only now are people slowly beginning to really utilize the space offered by a more compact construction," Loosen says and refers to the waste of valuable space in previous models. Here the second partner in the project, laser manufacturer Trumpf, can bring its experience into play.

There is no lack of potential applications: Steel construction and shipbuilding, which have to process steel plates up to 5 cm thickness, offer many application possibilities. Today's high-performance lasers could profit from the new developments.

A study by the Basel Prognosis Institute from 1987 reported a European market potential for 110 lasers with power in excess of 20 kW by the year 2000. To be sure, Arnold Mayer, marketing leader at Trumpf, regards this prospect "as somewhat optimistic from today's perspective." But Mayer is certain that the market for such equipment is so lucrative that the involvement will pay.

NUCLEAR R&D

Hamburg Synchrotron Radiation Laboratory Expands

92MI0305 Bonn WISSENSCHAFT WIRTSCHAFT POLITIK in German 12 Feb 92 p 4

[Text] A further section of the Hamburg Synchrotron Radiation Laboratory HASYLAB was opened at DESY [German Electron Synchrotron] on February 6, during this year's international users' meeting. At the beginning of the next measurement period, the Doris storage ring will start up with six new wigglers and undulators and two new magnetic beam controls. This will not only expand the quantity of the research facilities that the HASYLAB offers international scientific circles, but also substantially improve their quality. The number of measuring stations for tests involving synchrotron radiation will increase from 29 to 41, while the intensity of the X-rays emitted will be up to 100 times, and in certain cases as much as 1,000 times, higher.

The demand for experiment time at this improved X-ray source is so high that even now not all the requests from universities and research institutions can be satisfied. Every year 1,000 users from 25 countries bring their equipment and test samples to DESY in Hamburg for experimental research into surface physics, chemistry, crystallography, molecular biology, geophysics, and medicine. Comparable sources of this kind are currently being built in Grenoble, France (expected to enter service in 1994), Argonne, USA (1996), and Japan (1997).

Doris is a high-energy ring accelerator where electrons and their antiparticles, the positively charged positrons, circulate in opposite directions and are brought into collision at a predetermined point. Ninety physicists in the Argus research team are currently using the eponymous detection device to study the particles created in these collisions. They are researching the microcosm, the smallest components of matter, and their interactions. Two-thirds of the DORIS operating time is used for elementary particle physics and the same goes for the experiments with synchrotron radiation in the HASYLAB; the rest of the time,

HASYLAB is the "main user" and determines the best operating conditions for Doris for the purposes of synchrotron radiation experiments.

Now that the new wigglers and undulators have been installed, the geometry of the accelerator has changed to such an extent—it now has a circumference of 289 meters—that the high-energy electron-positron collisions can now be studied only in one (previously there were two) straight stretch, which is thus of higher quality.

SUPERCONDUCTIVITY

Germany: Laser Heating Process for Superconductive Material Production

92WS0440B Landsberg PRODUKTION in German 19 Mar 92 p 7

["Better Production Through Laser Heating"]

[Text] Frankfurt—**High-temperature, superconductor thin-layers of high quality are being achieved through several production processes. However, they all require a crystalline carrier material and a rather high thin-layer temperature. Laser heating can greatly reduce the temperatures required and consequently the technical expenditures involved.**

Since 1987 ceramic high-temperature superconductors [HTSL] with superconductive temperatures higher than the temperature of liquid nitrogen (77 K/-196°C) have been known. Contradicting all expectations, this material group's hoped-for transition to technical utilization has remained unfulfilled. One major obstacle has been the difficulty in shaping these brittle ceramic materials, especially in the matter of producing wires.

The case of using high-temperature superconductor thin-layers is different. There are two problems involved, however: 1) the need for single crystal carrier materials, and 2) the need for high temperatures in layer production.

The Battelle Institute in Frankfurt has now made a promising breakthrough in the solution of the temperature problem. To date, in the growth of high-value, single-crystal high-temperature superconductor layers, temperatures of from 600 to 750°C have been indispensable in the growth layer.

Moreover, in conventional heating, the maximum process temperature had to be increased an additional 100 to 150°C from the back side of the layer carrier outward. In Battelle, growing high-temperature superconductors have now been heated directly by means of a CO_2 laser.

In this way, the maximum process temperature is reduced to a required growth temperature of 600 to 750°C, instead of the previous 750 to 900°C. Furthermore, the temperature is now generated precisely where the layer is to grow. No additional heating is required.

The layers on a ZrO_2-carrier, so obtained in the vaporization of $YBa_2Cu_3O_{7-x}$ by means of an Excimer laser, reach top international values for these high-temperature superconductor and carrier materials (superconductive temperature 90 K and current load capacity of 2.5 x 10^6 A/cm^2).

The CO_2 laser radiation of the high-temperature superconductor layer takes place through a window in the process chamber and eliminates the need to install a conventional heater with its problematical operation in an oxygen atmosphere, as would be required for the formation of the superconductive crystal phase. A further advantage of CO_2-laser heating of the high-temperature superconductor layer lies in the fact that the temperature of the back side of the carrier material can be reduced by more than 200°C.

Also deserving of special mention is the fact that the CO_2-laser-heated zone is spatially well delineated and a high-temperature superconductor layer can even be produced in close proximity to sensitive structural elements.

UK: Progress in High Temperature Superconductor Applications Progress Reported

92WS0444P Toddington NEW MATERIALS INTERNATIONAL in English Feb 92 pp 3-4

[Article: "Demonstrations Sought for Superconductors"]

[Text] At the end of a three-year collaborative research programme six major industry sector companies, together with scientists at AEA Technology are reporting major progress in the fabrication techniques required to turn high temperature superconducting ceramic powder into wire, tape and bulk components.

The £2 million programme—funded by Air Products, BICC, BOC, Ford, Johnson Matthey and Oxford Instruments, together with the DTI—brings high temperature superconductors one step closer to their first 'power engineering' applications.

One of these is likely to be in high temperature superconducting magnets which will replace or complement the liquid helium-cooled variety currently used for example, in magnetic resonance imaging (MRI) medical 'body scanners.' And further down the line—possibly before the end of the century—there will be applications in power generation and transmission, electromagnetic stores for off-peak electricity and transport systems which use magnetic levitation.

"This programme has placed Britain at the forefront of world development in high temperature superconducting technology," claims Dr. Alan Hooper, ceramics development manager of AEA Technology. "The results we have obtained on superconducting wires and tapes are equal to the best obtained in the U.S. and are comparable with the best results from Japan and Germany, where far more resources have been invested to get this far."

"The dynamic structure of the research programme made sure that we reviewed and refocused our efforts constantly in what were a highly intensive three years. It also ensured that all of the partners collaborated very closely," he added.

The six industrial partners supplied 50 percent of the funding, and the commercial focus to develop superconducting conductors for practical applications. The programme has culminated in successful technology transfer by two of the collaborators—Oxford Instruments and

BICC—which are now taking the technology forward in-house. BICC is considering its use in power transmission while Oxford Instruments is following the medical line of investigation.

The Defence Research Agency (Holton Heath) was an associate member of the club and acted in a consultative role to the industrially-chaired steering committee.

Ford joined the group because of its aerospace interests which subsequently have been sold off. The interest here was in the use of superconducting materials for microwave devices in spacecraft. Even so, Ford stayed with the project to the end because of the transportation implications. Superconductivity is transport-related—it can be used for levitation systems.

The Japanese are using levitation (but different technology) for the transport of goods in factories, according to Dr. Hooper. This could have implications for Ford in the materials handling context.

Ford's interest now, bearing in mind its cash crisis, is a watching brief—hence its despatch of superconductivity to the backburner.

The other 50 percent of funds came from the DTI as part of its National Industrial High Temperature Superconductivity Programme. The research and development programme was carried out primarily by a multidisciplinary team of AEA Technology scientists based at Harwell in Oxfordshire in association with engineers seconded from the industrial partners. Oxford University was subcontracted to investigate a range of microstructural and electrical characteristics of the new materials.

"AEA Technology's expertise in ceramic fabrication, wire-drawing, sol-gel processing and plasma spraying formed the bedrock of the research programme," continued Dr. Alan Hooper. "A variety of these routes were used to fabricate test components including multifilamentary wires, current leads and microwave cavities. Current densities of 25,000 Acm^{-2} at liquid nitrogen temperatures have been achieved in silver-clad wires.

"The next stage is to translate this performance into large-scale demonstrators suitable for application in industry. This will be a substantial task, presenting difficult materials development and engineering problems. Nevertheless, we anticipate that, given adequate resources, high temperature superconductors could reach the power engineering market before the end of the decade."

Dr. Hooper is currently talking to a number of companies to help fund the next stage but so far no one is ready to sign up.

High temperature superconductors are materials which lose their electrical resistance at temperatures in excess of 77° above absolute zero—the temperature of liquid nitrogen (a readily available industrial coolant). Made from the oxides of elements such as barium, yttrium, copper and bismuth, they bring superconductivity closer to applications in industry where low temperature superconductors—which attain their superconductivity at the temperature of liquid helium—are impractical.

Significant breakthroughs in 1987 produced high temperature superconducting ceramic powders, and while scientists across the world continued to pursue the still elusive room-temperature superconductor, others focused on turning the powders into practical wire, tape and bulk components. Among these were the Harwell-Industry Superconducting Ceramics Club.

Materials which lose their electrical resistance at the temperature of liquid nitrogen are said to have 'huge' potential in the world of power engineering. Superconducting magnets used in medical diagnostics are likely to be the first beneficiaries, taking over from conventional varieties which use complex liquid helium refrigeration plant. Power generation and transmission, magnetic levitation for transport and off-peak electrical storage are likely to be beneficiaries further along the line.

TELECOMMUNICATIONS

German, British Cooperate on Fiber Optic Telecommunications Systems

92MI0322 Stuttgart LASER & OPTOELEKTRONIK in German Feb 92 p 8

[Text] British Telecom and German Telekom have launched a joint project scheduled to run until Spring 1993 to devise viable specifications and proposals for standardizing fiber-to-the-loop fiber optic line systems. Their aim is to provide potential suppliers with a large, readily identifiable market, thus bringing about price reductions for major system components. BT and Telekom are currently collecting the information that they need to draw up a comparative survey of the requirements made of fiber optic systems. Successful collaboration would be of particular benefit to Telekom in the new laender, where optical fiber technology will be used in the near future to install a modern infrastructure capable of meeting future needs.

JESSI High-Definition TV Development Program Launched

92MI0331 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German 18 Feb 92 pp 7-8

[Text] The "High-Definition Television" (HDTV) application project forming part of the EUREKA [European Research Coordination Agency] JESSI [Joint European Submicron Silicon Initiative] project has now been launched. This JESSI "flagship" includes development work that will create the circuits with state-of-the-art semiconductor technology required for the television of the future. Test methods for microelectronic circuits and systems of this kind are also being developed. Ten firms from Germany, France, the Netherlands, Britain, and Belgium are involved in this work, the total cost amounts to around 230 million German marks [DM] for the period 1992-1994, about a quarter of which are for Germany's

account. The Federal Minister of Research and Technology (BMFT) is contributing around DM30 million to the cost of the requisite standardization work.

The major features of high-definition TV are sharper, clearer, and larger pictures, with considerably improved sound quality, the criteria for this ambitious development being the quality of 35-mm cinema film and compact disc sound.

HDTV therefore constitutes the next stage in TV innovation, to which enormous market expectations are attached. The JESSI project is designed to create a system architecture in the form of a set of integrated circuits for an HDTV receiver based on the European HDTV standard, as defined in the EUREKA HDTV (EU 95) project. Owing to the high demands for complexity and speed set by the processors that have been developed, the prototypes built for this project set the pace for further integrated circuit developments in the consumer sector.

This project is supported by parallel circuit design technique developments focusing primarily on the testing of methods whereby complete new circuits can be rapidly inspected to ensure that they meet the specifications to which they were designed. European standardization of test methods will thus make system design more independent of individual production processes.

Achieving high-definition TV also constitutes a major technological challenge, and it is only progress in microelectronics that makes it possible to translate complex technical systems into consumer electronics products. HDTV receivers require a number of highly complex integrated circuits, which modern microelectronics makes it possible to produce economically.

Owing to the large production runs required in the consumer electronics sector, the mass market that HDTV will generate will bring a massive demand for state-of-the-art circuits. This boost in demand will have major consequences for the European microelectronics industry, which aims to develop a powerful European microelectronics base through the JESSI project so as to ensure unrestricted access for chip users.

EUTELSAT To Increase East European Coverage

92WS0376B Paris AFP SCIENCES in French
13 Feb 92 p 13

[Article: "EUTELSAT Accelerates Modification of One of its Satellites To Help East Europe"]

[Text] Paris—The European Satellite Telecommunications Organization (EUTELSAT) has decided to step up its participation in international aid to the former East Bloc countries by modifying (six months in advance) one of its next three satellites in such a way that it can be used for two-way connections between Central and Eastern Europe and the West to alleviate the telephonic isolation that is impeding economic growth, the organization announced on 12 February.

To do so, EUTELSAT has decided to modify its Eutelsat-II-F4 satellite, which is scheduled to go into orbit in late June aboard an Ariane rocket. The modifications will also be made to the fifth satellite of the series. Before the decision taken at its latest board meeting, these modifications, primarily affecting the antennae, were scheduled to be made only for the Eutelsat-II-F5 and F-6. Thd modifications will make it possible to extend the coverage of the EUTELSAT network to that whole part of Europe starting in June or July, instead of in late 1992.

According to a EUTELSAT spokesman, the decision responds to urgent requests made by many western companies that want to establish telephone networks or services in the countries of Central Europe or the member states of the CIS [Commonwealth of Independent States] in order to facilitate creation of enterprises and trade.

The countries concerned have already authorized the installation of ground-based aerials that permit utilization of EUTELSAT satellites. Networks have been established between Vienna (Austria) and Tbilisi (Georgia), London and St. Petersburg, Rotterdam and Kiev (Ukraine), and between Germany and Moscow. Additional aerials are now being installed in Prague.

As a direct consequence of the improved communications with the former countries of the East, the European Broadcasting Union (UER) will merge in 1993 with its Central and Eastern European counterpart, the OIRT. The two will thus be able to serve almost all their members. The first phase of this operation will be the late 1992 transfer of UER traffic, which up to now has been handled through a Eutelsat-I satellite, to four of Eutelsat-II-F4's wide-band repeaters.

To boost the network's capacity in certain parts of Europe, the Eutelsat governing board asked the organization to make a detailed study of co-location of two Eutelsat-II satellites, which would provide the 40 television channels in one orbital position needed to meet the need.

EUTELSAT is currently operating a system of seven satellites to provide fixed communications (telephone, television, telex, data) and to support mobile ground stations throughout Europe.

Tailor-Made Communications

92WS0380A Heidelberg NET—NACHRICHTEN ELEKTRONIK + TELEMATIK in German
Jan-Feb 92 pp 10-12

[Article by Dr. Hans Peter Quadt (Head of Department 214, Telekom Main Office)::Video Communication 'a la carte']

[Text] **After long preparations and the resolution of a considerable number of problems associated with the technical implementation of videophone service, Telekom will initiate its pilot videophone project in February. For the first time, Telekom will make the equipment available to its customers in greater numbers.**

The desire to communicate both by speech and video over great distances is as old as telecommunications itself. The technical prerequisites for a profitable conversion to video telephony on a broad scale have only been in place for a

short time. Telekom has been involved in the Video Conference since the early 1980s and with the introduction of its own videophone service since 1987. It has developed a three-stage plan for the implementation of this future-oriented mass service. The most important prerequisite was the introduction of the ISDN (integrated service digital network). With access to an ISDN terminal, customers had available in their telephone service two digital channels each with 64 kbit/s.

On the basis of work done at the Research Institute of the German Postal Service, one of the first steps in the project was the development and production in small numbers of six different laboratory videophone models. As the result of an international competition, each of seven German companies delivered four sets to the German Postal Service Telekom. Specialists, and also numerous visitors to fairs and demonstrations tested and evaluated the videophones. At the same time, delegates familiarized Telekom and the companies with international standardization requirements. Thus, by early 1990, with the experience gained and more advanced standards in place, a request for bids for the next generation of equipment could be initiated.

Limits of Technologies Seen

During the implementation of the program, the limits of today's available technologies became clear. The comprehensive computer operations needed to reduce the image involved the use of specially equipped, fast processors and generous storage capabilities, which constituted a challenge to the semiconductor and end item industries. Nonetheless, these requirements were successfully met.

The first instruments in this second stage of introducing videophone service are dedicated end items, i.e., they will operate as independent videophones on an ISDN-base terminal or on an ISDN telecommunications facility. The coder and decoder (Codec) required to reduce the video signal are kept in a separate housing. Integration in the instrument—without cutting back on the quality of the image—can follow in subsequent steps.

Whoever buys or rents a videophone set from Telekom only needs access to an ISDN terminal. Telekom then needs only to switch the service identification code needed for videophone service in the switching office. After that is done, the videophone can communicate with all other video and speech instruments authorized to use the videophone service. Thanks to complete compatibility with regular telephone service, the user can telephone anywhere in the world.

Telekom's pilot videophone project begins in mid-February. At that time, the first videophones will have been made available. Since the demand for this totally new mode of communications cannot be estimated, Telekom has divided the total volume of videophones to be produced into individual lots. In this way, it will be possible to react more flexibly to the wishes of Telekom's customers.

Special Marketing Supports Participants in Pilot Project

The videophones were proffered to the customers in a Telekom marketing event. Very little by way of information or explanation was as yet available on videophone service, even though the videophone set itself has been so designed that it can be operated without having to read extensive instructions on its use. The marketing of the sets was therefore undertaken by Telekom's Special Video- and Wide-Band Communication Marketing Office, which was specially established for video communication. Under the single telephone number 01 30 05 22, anyone in Germany will be able to reach the special marketing office at no cost. Later when communication with video and speed has become more commonplace, consultation will be given over to the Telekom's local marketing offices. However, during the pilot project the specialists are being called upon. Nevertheless, anyone can walk into a Telekom shop at any time and purchase a videophone set.

But the pilot project offers more than just the opportunity to install a videophone. The first generation videophone sets are very innovative and therefore quite expensive. Even with the knowledge gained from the pilot project and with the introduction of the videophone, it is still difficult to purchase it at a favorable price.

Interesting Applications are Being Sponsored

The pilot project is the beginning of video communication in the ISDN specifically, and the beginning of a new type of mass communication in general. Several hundred videophone sets are available for the pilot project, and are being installed for interested customers. Telekom then works out the basis for further service and sales with the users.

It is essential that the videophones be used as intensively as possible so that a comprehensive picture can be obtained. Installations, made simply for purposes of image-building, will be avoided in the project. Telekom therefore has decided to calculate the rental and sales prices in the order of magnitude of the prices that have been anticipated for a long time for videophone. The Claudia Q, Lisa C, and Christa R models will cost 980 German marks [DM] a month, and DM38,500 to buy. Of course, the existing value-added tax must also be added in.

Videophones for All Tastes

The three videophone sets Telekom offers are mutually compatible, although their individual performance may differ somewhat. Even the design of the sets differs one from the other. Thus, the customer is able to select the videophone set that best suits his needs and taste. Since the sets can all communicate with each other, all three models may be used without difficulty within the same company and even by the same team. Moreover, compatibility with other videophone systems beyond the borders of Germany is also being assured.

Model Claudia Q is equipped with an ISDN comfort telephone component. This module, which in addition to the telephone component also contains part of the control

logic for the videophone, can, like any other telephone, be placed on a desk. All the performance features available in ISDN can be used (e.g., call rerouting). The monitor and the camera form a single unit that can be set up as the user desires. The still separate Codec in this generation of equipment can be put either on or under the table. Owing to its dimensions, it is easily integrated. Control is exercised via the telephone component's display with the fixed programmed keys or the soft keys.

In many cases, a document camera is suggested as a sensible accessory. It is offered with all three models and serves a dual function as a desk lamp. Thus, the videophone system has been designed so that even now it can fit harmoniously in the work place without affecting the full range of this new mode of communication's functions at all.

The Lisa C model has a rather unusual design. The under-the-table design of the Codec is highly recommended. Besides the electronics for changing the picture, it also contains the control logic. As a result, the telephone component is flatter and somewhat futuristic in appearance. The monitor has its own secure base, which facilitates moving the monitor a considerable distance up- and downwards. One of the most remarkable properties of this videophone is the degree of parallax freedom between the monitor and the recording camera for the picture that is being sent to the party at the other end. By means of a semitransmittable mirror situated in front of the monitor, the optical axes of the built-in camera and monitor are combined. By means of this arrangement, one literally looks his counterpart "right in the eyes." Usually, because of the relatively small distance between the personal camera and the viewer, a distracting false angle often occurs when one is looking at the person at the other end in the video camera. Instead, one ought to be concerned about the proper depiction of his own image in the camera. This problem is avoided in this particular set-up, while the naturalness and true-to-life quality of the images are enhanced. The space required for the mirror results in the monitor being at somewhat greater depth, but at the same time the arrangement increases the contrast and the immunity against other light sources that could be reflected in the monitor screen. Overall, it is a rather futuristic design.

Externally, the Christa R model resembles Telekom's familiar Multitel. The telephone component and the user keyboard are combined into a larger unit. The set is all black and, by virtue of its modern design, blends in well in many offices. Like Multitel, it permits extensive use of address storage and the use of screen text service. On long business evenings, one can also watch television with the Christa R model. The TV tuner is built in and is used by way of the monitor.

Telekom offers document cameras with all of its videophones. Because of the high resolution needed, special requirements are put on these external cameras, so that not just any system can be used. All of the aforementioned sets may also be used to transmit data in the ISDN, but caution must be exercised in this regard since each videophone may differ in capability.

In addition to the purchase or rental contract, Special Marketing can conclude a promotional contract with videophone customers. The purpose of such an arrangement is simply to promote the use of videophones. Telekom receives monthly reports from the uses describing their experiences with the system, Telekom works together with the customer in further marketing, and publishes and shares information with the users. Telekom then uses this experience for its service definition and end item description. In exchange, the customer receives reimbursement from Telekom for the expenses incurred by the test program. Telekom is prepared to spend up to several hundred marks a month in interesting applications. It is generally interesting for the customers in this initial period to document their own experiences. Telekom and customer proceed from congruent interests. Telekom's reimbursement for expenditures makes the decision for a videophone easier.

Concomitantly with the pilot project, individual tests are conducted with selected participants. In this program, individual formulations of problems are examined in coordination with the "pilots" who have been put in charge. A European project must be mentioned here. Norway, Great Britain, France, Italy, Germany, and The Netherlands are now cooperating in a European working group—EVE 2—to establish an international videophone service. The first technical tests were very promising. At Telecom '91, videophone service was successfully conducted between Great Britain, France, Germany, and The Netherlands.

Europe-wide and Global Interest

In the first months of 1992, an international consulting company, hired by the telecommunications companies of the EVE-2 group, sought out businesses to participate in this international endeavor. The first installations of videophones in these firms are planned to begin in April.

But throughout Europe, too, interest in videophone service and video communications in general is very great. Presently, Telecom is conducting tests together with the United States and Japan to develop compatible equipment on all sides. The basis for these international standards are those that Telekom has established for its equipment. Consequently, the same equipment used by customers in the pilot project in Germany will be used in the tests being conducted throughout Europe and the world.

Comprehensive Offer Looked For

For Telekom, videophone service and the video conference are the foundations stones for a comprehensive offer of video communications services. It can reasonably be expected that in a few years a worldwide network and the equipment to be used in it, will become available. This network will permit images, tests, data, and natural speech to be exchanged in true dialogue communication in the quality customers demand.

French Prime Minister To Select HDTV Transmission Standard for Telecom 2A Satellite

92WS0386A Paris LE MONDE in French 28 Feb 92 p 15

[Article by Michel Colonna D'Istria and Pierre-Angel Gay: "Prime Minister Must Decide Telecom-2A Satellite Transmission Standard—A Confrontation Between Canal Plus and European Electronics Industrialists]

[Text] Prime Minister Edith Cresson must soon decide the standard on which public satellite Telecom 2A will base its transmissions—D2-MAC or SECAM [European line-sequential system]—and implicitly, on which method of coding—Eurocrypt or Syster. The decision is an important one, in that it will condition durably the economic viability in France of the new D2-MAC standard developed by the two big European consumer electronics groups: Philips and Thomson.

No holds are being barred. Nor are any of the arguments that are being advanced, publicly and in the corridors, to convince the government to adopt the "right" transmission standard for the Telecom 2A French satellite, which recently passed its first test with flying colors, when it succeeded in relaying the Olympic Games from Albertville in HD MAC, the European HD standard (LE MONDE 22 February). Seven thematic channels (movies, sports, children's,...) are awaiting only the putting of this satellite into commercial service, to fully capture half of the French public, which will not be wired for cable service before the end of the century. These will be pay-per-view channels. They will therefore be encrypted as is Canal Plus, and will thus require use of a decoder.

Around the beginning of March, the government is to issue an interministerial decree setting forth the transmission standard for the new satellite. Will it be D2-MAC, the standard that enables a new screen format—the 16/9—recalling that of cinemascope; multiple language channels; and a better quality of image; and that prepares the way for the advent of the HD MAC wide screen? Or will it be the good old "4-tiered" SECAM—in use now for several decades in French households—enhanced, for the new purpose, with the Syster encoding system developed by Canal Plus?

Choice of the D2-MAC 16/9 standard implies a bet on the future and the adoption of a new technology by the public, entailing, for the moment, the purchase of a new and costly television set (currently over 20,000 francs[Fr]). Choice of SECAM implies—at least initially—opting for the present and facilitating the reception and hence the development of satellite channels. Two opposite strategies laden with consequences for the television viewers, the electronics manufacturers, and the television industry as such. Two strategies whose advocates militate actively in the media and the corridors of government, exacerbating the tensions. The CEO of Canal Plus, Mr. Andre Rousselet, threatens now to not use Telecom 2A for his channel, "nor, probably, the other thematic channels in which we are involved," if D2-MAC is chosen. "I doubt that there will be many other candidates," he adds, in order to add weight to his stand. Mr. Rousselet, who was long an ardent promoter of the new European standard, denies a total reversal of his previous stand on the issue. Did he not state in LE MONDE of 11 December 1991 his belief in the D2-MAC 16/9 standard but... on other satellites: the TDF1-TDF2, whose success is uncertain and that are to be followed by the Europesat satellites, which are still in the planning stage?

In the view of Canal Plus's CEO, the virtual absence—and the price—of 16/9-format TV sets, imposes, for the moment, 4/3-format broadcasts. And commercial reasons preclude the mixing of the two formats on a single channel. Under these conditions, says Mr. Rousselet, compulsory use of the new D2-MAC standard on Telecom 2A would entail more of a handicap than an advantage: It would require more costly decoders, without inducing the sale of a single additional TV set. Neither the end-user nor the manufacturers would benefit from it. Hence, hurrah for SECAM. And since these would be pay-per-view channels, hurrah for Syster.

The manufacturers take an opposite view. Not only, they say, is D2-MAC in association with the Eurocrypt encryption system—which has been standardized and is open to all operating entities—already a reality in Europe with the Scandinavian market's 200,000 decoders, but the existence of channels being broadcast in the new standard format, and the forthcoming availability on the market of cheaper 16/9 TV sets—at less than Fr15,000—augur well for the outlook. Far from cutting the French market away from the rest of Europe, choice of this standard on Telecom 2A would confer on it a decisive advantage. It would also dovetail with the strategy of industrial groups that are prepared to invest Fr20 billion in the development of HDTV under the European EUREKA program.

'Mr. Rousselet's Monopoly'

"Adoption of SECAM, however," says a manufacturer who prefers to remain anonymous, "would press three million then five million French households into equipping their sets with Syster decoders that have been developed by and would remain the property of Canal Plus. That would further confirm Mr. Rousselet's monopoly. Economic viability would be categorically denied to any other pay-per-view channel in France. The question, therefore, is whether the government really can put an end to the current situation. It would be scandalous were a private company to be accorded possession of a parcel of the public domain enabling it to arrogate to itself a private monopoly."

SIMAVELEC, the electronics industry association, cites "the imperious need" of "freedom to compete for the products and services of pay-per-view television." Mr. Pierre Steenbrink, head of the French Philips company, also uses the term "monopoly" and says, with reference to industrial policy, that "France has before it the making of an historic decision."

The manufacturers also see the forthcoming decision on Telecom 2A a clear test of the government's real intent. In the name of the policy that has consistently been followed

by the government and by Europe since 1986. In the name of the billions that have been spent in public funds. They are fearful of the domino effect of a possible slip-up: No D2-MAC in France, no D2-MAC in Europe, hence no HD MAC, and thus an outright capitulation to Japan and the United States, which are closely guarding the results of their research on HDTV.

As proof of its good intentions, Canal Plus is offering to open its Syster to anyone who wishes to launch a pay-per-view channel; to participate in specific programs in the 16/9 format, to be broadcast in parallel with thematic channels; and, eventually, to change the decoders of those of its subscribers who may prefer to adopt D2-MAC. In this way, Canal Plus would be hewing to the spirit of the European directive in the process of being drawn up (LE MONDE of 21 December 1991). This "minimal" directive does not compel broadcasting on D2-MAC prior to 1995.

In this context, Canal Plus does not want a standard that is not yet even a European standard to be suddenly imposed on it. The security of its clients and stockholders precludes it from assuming the risk of a possible future abandonment of D2-MAC, whose future is being threatened by the advance of the German PAL Plus, if it delays too long, and by the American digital standard, which is expected to be defined by the end of 1993. Seen in this light, betting everything on D2-MAC would be a mistake of the same order of magnitude as the building of an industrial Maginot Line.

It is perhaps around this view of the risk involved that a compromise between the two positions can be structured, such as would avoid a situation of gridlock: Subsidization of the broadcasting of programs in the 16/9 format, absorption of the possible excess cost of the decoders, reciprocal commitments to continued utilization of satellite channels. The Prime Ministry has asked all the ministries involved to submit their positions in writing. Given their past positions, it is hard to imagine one of them arguing against the D2-MAC standard. But each one is being careful to respond for its own, and solely its own sector. It is now up to the prime minister, who has shown her keen interest in industrial questions, to referee this one.

Telecommunications Firms Face Market Changes

92WS0399B Paris L'USINE NOUVELLE in French 27 Feb 92 p 30

[Article by Jean-Pierre Jolivet: "Manufacturers Jolted by Consumers' Demand for Telecommunication Sets"; first paragraph is L'USINE NOUVELLE introduction]

[Text] With innovations, design, and low prices now the norm, telecommunications manufacturers can no longer sell to administrations or companies. They have to seduce consumers.

Telephone sets are being sold in blister packs; faxes are going for under 3,000 French francs [Fr]. Cordless phones will soon be marketed for less than Fr800, while radiotelephones for under Fr5,000 are around the corner. Telecommunications sets are becoming a consumer product, and their manufacturers are making a not entirely painless adjustment to a new line of work.

The industry is undergoing a change. Design sells. The speed at which products are being replaced is accelerating; technical innovation is moving ahead at a gallop; and selling prices are collapsing. Manufacturers must amortize shorter production runs more quickly, and production costs must be "stretched" to the utmost.

The new game will significantly affect French manufacturers, who are more accustomed to public and professional markets. Alcatel, which ranks first in Europe and second in the world, still sells 75 percent of its handsets to public carriers, half of them in France. But things are changing rapidly. "The carriers' 'products' policy is changing. By next year, they will make European manufacturers compete with the Asian and Americans," predicts Philippe Glotin, vice-president of the Consumer Products Division of Alcatel Business Systems. At the same time, the diversity of demand is fragmenting the market horribly. The challenge to the industry is so great that, before it created a "consumer" division, Pierre Suard's group wondered whether it should stay in the business.

Although the manufacturers' challenge is commercial, it is first and foremost technological and industrial. The cost of developing a product has increased tenfold within a few years. Innovation has become indispensable—starting with innovation in designs. "We are seeing more and more purchases based on 'love at first sight.' It is true even in small businesses, where it is the boss who selects the phone sets. He will let himself be guided by design, ergonomics, and functions," explains Laurent Cuvelier, who is the marketing director of Barphone.

Barphone specializes in small business needs, and uses human engineers and a designer who works with the Japanese. Alcatel has created "focus groups" of European users, who consider future esthetic trends. In fact, a recent Alcatel study shows that telephones are selected first for their ergonomic value (26 percent), ahead of price (23 percent). Matra Communication has a team of designers who work in close collaboration with the technical design and production teams.

Modular Product Designs

The "hip" look of handsets is raising new technological problems. Matra Communication's Crystal phone, which is set in a translucent block of acrylic crystal, required some original solutions. The handset's line plug is magnetic, and the electrical connections are made by incorporating silver-coated wires along the length of the set. The rounded shape of the new Solaris phone forced Barphone engineers to opt for a single electronic board twisted to fit. Such a design would never have been possible without surface-mounted components.

Handset manufacturers must now take into account the innovations race born of competition. Innovations also sell phones. Particularly innovations that involve more functions, such as voice amplification, dialing without picking

up the phone, answering machines, call date and time display, and the use of scrolling menus and icons on future flat-screen phones. "All that means software and new development costs for manufacturers," comments Laurent Cuvelier.

The only economically feasible approach is to use technological "building blocks," which enable manufacturers to turn out sets virtually on demand. Each block represents a function. Alcatel has reduced the number of its products from 280 to 60 in two years by using them. And next year, the company will have only four internationally marketed set lines.

Another big challenge is to revamp production facilities. "A factory that makes fewer than three million sets a year is not profitable," says Philippe Glotin. That makes the rapid changes in products and the increasing number of functions (options) new hurdles for manufacturers. "The S63 handset—the famous "little gray phone" of the 60s—had a product life of 20 years. Today telephone sets are only marketed for a few years; tomorrow, we will be counting in months," explains Michel Salaun, who is Matra Communication's assistant director of manufacturing operations. Production runs will be clipped accordingly. The Douarnenez factory used to make three million S63s a year. It now puts out four million, but with 80 to 100 references on 12 types of sets.

Automation and the installation of flexible production lines have not come close to solving all the problems, even though they have reduced manufacturing time by 20 percent a year. Instead, manufacturers have found modular set design and rationalization to be the solution. Alcatel's Consumer Products Division has reduced its component references from 6,000 to 600.

That leaves the low end of the handset market. The modest selling price of the phones leaves manufacturers no choice but to shift production elsewhere. Many companies are thinking about doing so, especially since the supply sources for the components are located in Southeast Asia. To win the telephone war, telecommunications manufacturers must adapt to the demands of the consumer electronics industry—particularly as the big manufacturers in that industry are now their most serious rivals.

Philips Attempts to Market HDTV to Industry

92WS0402C Duesseldorf HANDELSBLATT in German 5 Mar 92 p 16

[Text]

BTS GmbH: High-Definition Television Technology Sold for DM100 Million

Philips Subsidiary Wants to Sell HDTV Technology to Institutes and Industry

According to company information, the Dutch Philips group, Eindhoven, has invested several hundred million German marks [DM] in the field of high-definition television (HDTV) in recent years. This includes all expenditures for picture tube development, retooling of the Aachen plant, microelectronics, studio engineering, and new television equipment.

In order for the tremendous investment to pay off, the Philips subsidiary **BTS Broadcast Television Systems GmbH** (Philips: 75 percent; Bosch: 25 percent), Darmstadt, involved in the development of HDTV, is to increase sales of HDTV studio equipment. Target groups include private and public TV programmers, explained BTS spokesman Friedrich-Karl Reichardt to the HANDELSBLATT.

The programmers may be interested in high-definition television technology. However, up till now they have shied away from heavy investment in studio equipment for the television of tomorrow. The public broadcasters are also holding back because they see the link between the HDTV studio technology offered by BTS and the future European HDTV transmission standard HD-MAC. They do not want to support the controversial standard—at least not officially (see HANDELSBLATT of 19 Feb 92). BTS hopes to break the ice by training television technicians and cameramen.

No wonder that the Philips subsidiary—which employs 1,800 workers in Darmstadt (Germany), Breda (Netherlands), and Salt Lake City, Utah (U.S.)—is looking around for other sales markets. Reichardt has found new customers: "Advertising agencies, universities, medical institutions and industrial enterprises." These customers are interested in high image quality. In the long term, considerably more business can be done with them than with the equipping of TV studios.

BTS is "still too little known" among this "group of customers." This area accounts for only a small part of BTS' total sales ("between 300 and 350 million German marks [DM]" in 1991). Nevertheless, the Darmstadt firm has already sold HDTV cameras, tape machines, mixers, and outside broadcasting vans worth DM100 million. About DM60 million of this amount was accounted for by the "Vision 1250" organization, which, among other things, was responsible for HDTV broadcasts of the Winter Olympic Games from Albertville. The Dutch broadcaster "D2-TV" bought studio equipment for DM30 million. And the Oberhausen HD center has placed an order.

The idea of using HDTV technology in the scientific, academic, and industrial area is not new, however. The dreaded Japanese competition has been at work for years selling its equipment to German industry. The **Sony group**, for example, has outfitted **Ford-Werke AG**, Cologne, with a high-definition video system. With it, the design of new auto models will be accelerated considerably.

European Debate on HDTV Standard Continues

Industry, Broadcaster Positions Polarized

92WS0432A Paris LE MONDE in French
6 Mar 92 p 13

[Article by Pierre-Angel Gay: "The High-Definition Television Debate"]

[Text]

The Bind

D2-MAC or SECAM? The debate is not being publicly waged. And yet the decision will be one of the most important industrial decisions of the decade. It is also one of the most difficult to undertake for many reasons: in placing their successive technological bets, the administrations have often made the wrong choice; the confrontation between the electronics manufacturers and the boss of Canal Plus, Mr. Andre Rousselet, is a public one; high-definition TV [HDTV] is the card on which the European industrialists—and above all, Thomson Consumer Electronics (TCE), which derives the major portion of its revenues from the sale of receivers—are gambling their future; and in Andre Rousselet, the ministers, who all fear the man, know that they will be confronting a "friend" of the president of the republic, a man who has already proven exceptionally pugnacious...

And because in the end, and above all, the government finds itself confronting television's two ever-underlying logics: On the one hand, that of the industrial and commercial sectors, and on the other, that of the program sector. The logic of the industrial and commercial marketplace is what is driving both these groups to wage a tooth-and-nail defense of their market of the future. The logic of the program sector is the one being posited by Andre Rousselet, the CEO of Canal Plus, who points out that there is still only a very small number of television sets capable of receiving the new television standard, and an even smaller number of compatible programs. Andre Rousselet puts all of his weight behind this second logic, threatening not to let the bundle of television channels he directs go up on Telecom 2A satellite if the new standard is chosen.

Without programs, there is no television, and no television industry. Andre Rousselet knows that he holds an essential weapon. The government, which in its virtual entirety leans toward adoption of the D2-MAC standard, has understood this and is postponing the confrontation. It is eyeing the door that Canal Plus's CEO cracked open when he said that he is prepared to commit himself to launch a channel entirely in D2-MAC format, provided he receives initial satisfaction. It is also, without a doubt, betting on some financial and other counterproposals that are in the process of being worked out. By now the only solution to the confrontation is compromise.

Matignon's Ambiguous Support of D2-MAC Standard

On Wednesday, 4 March the Hotel Matignon [Prime Ministry] chose a discreet and belated press release to make known the government's position on the Telecom 2A satellite television standard. "The government," says the statement, "confirms its intention to develop the new television system by way of the 'D2-MAC 16/9' standard and to fully support its diffusion. The new generation Telecom 2 satellites will participate in this approach. The implementing of these guidelines will be addressed between now and 15 April."

For weeks now, the European manufacturers of consumer electronics products—France's Thomson and Netherland's Philips, discreetly supported by France-Telecom—have clashed with Canal Plus on the choice of this standard. Engaged in an implacable competition with their Japanese competitors, the manufacturers have invested big in the development of the new D2-MAC standard, from which they expect to derive a boost in television set sales, in particular owing to the new "16/9" (Cinemascope) format made possible by that standard. Canal Plus, the only declared candidate to broadcast via the Telecom 2A satellite, stated that it would not use it if the D2-MAC format were forced upon it. Canal Plus deems that the absence of a consumer base of installed TV sets capable of receiving the new standard would jeopardize the success of its projects (LE MONDE 28 February).

On the face of it, Mrs. Edith Cresson and the seven ministers involved, with whom she had been careful to surround herself (Mr. Pierre Beregovoy, Mrs. Elisabeth Guigou, and Messrs Georges Kiejman, Jack Lang, Paul Quiles, Jean-Marie Rausch, and Dominique Strauss-Kahn) chose the manufacturers' viewpoint over that of Canal Plus's CEO Andre Rousselet, although he had often been portrayed as "the friend of the president of the republic." It would have been difficult, actually, for the government to disown the support it had provided for years to the development of the D2-MAC standard and high-definition television, for which 3 billion francs are to be released to Thomson over a period of five years. "The support for the D2-MAC standard is clear-cut," was the Matignon's brief comment.

But upon reading the statement, the manufacturers were disappointed. Far from being defined, the specifications for the use of the new standard D2-MAC by satellite Telecom 2A were not specified. They were postponed until after the elections.

Ad Hoc Group To Reconcile Differences

92WS0432B Paris LE MONDE in French
7 Mar 92 p 13

[Article by Pierre-Angel Gay: "Government To Appoint Ad Hoc Group To Define Specifications for Use of D2-MAC Standard"]

[Text] On Thursday, 5 March, the manufacturers received rather reservedly the Hotel Matignon [Prime Ministry] statement reasserting the government's intention to "develop the new television system by way of the D2-MAC 16/9 format." An "ad hoc group," in the words of Minister of Telecommunications Georges Kiejlman, will be appointed to remove the hedge in this announcement by

making every effort to reconcile the positions of the manufacturers and Canal Plus between now and 15 April.

On Wednesday, 4 March, industry had expected a decision from the seven ministers gathered around Prime Minister Edith Cresson. They had a right to a position of principle. The sibylline statement published Wednesday evening by the Hotel Matignon reasserts France's commitment to the new D2-MAC television standard, but the document is very careful not to specify the conditions under which the standard is to be used by the Telecom 2A satellite, which is to become operational on 16 April (LE MONDE 6 March). "This is good news from a policy standpoint. We hope that, on 16 April, it will become good news from an operational standpoint, translated, that is, into concrete facts," is the cautious comment from Thomson Consumer Electronics (TCE) headquarters. "We have won a battle, but certainly not the war," adds Philips with a warlike air stemming, no doubt, from the visit to Paris, last Tuesday, of the Dutch multinational's CEO, Mr. Jan Timmer, who had come to personally plead the D2-MAC cause before the prime minister.

Many are the ambiguities to be cleared up. To begin with, that of the government's position, which the publishing of the Matignon's statement, almost on the sly, has as much obscured as clarified. One minister who thought he and his colleagues had definitively decided in favor of D2-MAC, confesses that he is unable to completely understand the statement's subtleties. An official acknowledges differences of opinion between the prime minister (rather favorable to D2-MAC) and her principal adviser, Mr. Abel Farnouk (nearer to Canal Plus's ideas in favor of the present SECAM standard). The refusal of Matignon officials to comment upon the decision contributes even more to the persistence of the fuzziness.

A Starting Point...

With unaccustomed frankness on such a sensitive issue, Mr. Georges Kiejlman, minister of telecommunications, termed the government position a "starting point" and announced the forming of an "ad hoc group" responsible for drawing up the specifications of the standard. He launched "an appeal for the rallying of all energies to the development of programs in the D2-MAC 16/9 format, trusting that the effort will be as totally European as possible." It is, in effect, a recognition that after years of work and weeks of debate, the issue is far from being wrapped up. It is an effort as well to throw a bridge across to Canal Plus and its CEO, Mr. Andre Rousselet, who is more hostile than ever to immediate generalization of the new standard.

In an interview given to LA TRIBUNE DE L'EXPANSION, Mr. Andre Rousselet became intransigent: "We will go aboard the satellite, but, with all the good will we can possibly muster, we can accommodate only one special channel in D2-MAC 16/9 format, side by side with our seven channels in SECAM 4/3. We do not want to drown the audiovisual and our own interests by submitting to imbecilic diktats." Sure of himself, sure of his financial power—rare in the audiovisual—strong with his stocks of programs (particularly movies, without which nothing can be done), Canal Plus's president is patiently upping the ante.

"Rousselet knows very well that if he refuses to go aboard the satellite, the odds are virtually 100 percent that the satellite will simply orbit idly," comments a disenchanted industrialist. Thus, the playing of footsie and the cracking open of doors continue. Some among the fervent, long-intransigent D2-MAC partisans in the government admit today that all of the Telecom 2A satellite channels will not be in D2-MAC. As one government adviser sums it up: "At bottom, the Matignon's statement is nothing more than a coded message of sorts addressed to Canal Plus's president: Let us negotiate."

European Operators Embark on Videophone Project

92WS0444M Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 24 Feb 92 p 3

[Article: "Operators Embark on Videophone Experiment Project"]

[Text] Following six months of preliminary testing by operators' laboratories, France Telecom, BT, Deutsche Bundespost Telekom, Norwegian Telecom, PTT Telecom Nederlands and SIP of Italy, have begun installation of an experimental European videophone service for business use as part of EVE-2, the European Videophone Experiment project.

According to France Telecom, the project marks the first time that companies with ISDN links in these six European countries will be able to use videophone services and terminals in a real business environment.

The project, which will involve installation of 50 terminals in each of the six countries, is aimed at providing a real-life verification of European ISDN videophone service criteria using such CCITT standards as H261, says France Telecom.

As preliminary tests draw to a close, the six companies are lining up representative test customers and seeking corporations with major communications needs.

In France, 50 terminals, supplied by Matra Communication and SAT, will be installed at test customers in the near future, says France Telecom, allowing them to use videophone communications.

COMPUTERS

Hungary: Software Products Compete in West European Event

92WS0393B Budapest COMPUTERWORLD/ SZAMITASTECHNIKA in Hungarian 18 Feb 92 p 3

[Article by Sandor Mester: "Five Hungarian Programs at Hannover"]

[Text] Two internationally famous Hungarian intellectual creations and three new ones striving for similar laurels represent our country at the Software in Europe competition. There is no need to introduce to our readers the product of SZKI Recognita Ltd., Recognita Plus, on our continent the market leading program in optical character recognition, or ArchiCAD, the architectural design program of Graphisoft Ltd., written for a Macintosh. Nor is the Ekszer text editing program, now being sold by Eksoft Ltd., unknown among Hungarian computer specialists; this program can handle all the languages of Europe, including Greek and Russian.

Two lesser known Hungarian products have also appeared at Hannover. One of them can perform text-to-voice reading. The name of the system is Multivox, and as appears from the name it can make audible Hungarian texts put into the computer as well as texts in an additional seven languages, from Finnish to Arabic. Multivox is a service patent of the Telecommunications and Telematics Department of the Budapest Technical University. People from the Linguistic Sciences Institute of the Hungarian Academy of Sciences also played a part in its development. The Vision system, a product of Divicon Ltd., displays industrial processes. The software, prepared by the object oriented programming method, can run in an MS-DOS or UNIX (System V/386) environment. One of the most important advantages of the system is that it does not require high level programming expertise from the users.

The products entered in the Software in Europe competition, with the support of the IDG in Hungary, will be described in detail in papers from our publisher.

TELECOMMUNICATIONS

Hungary: Csucstechnika CEO on Developments, Strategy

92WS0412A Budapest MAGYAR ELEKTRONIKA in Hungarian Jan 92 p 3

[Interview with Sarolta Makara, Madame Director of Csucstechnika Ltd., by B. L.]

[Text] Csucstechnika [Peak Technology] is the only firm in Hungary which is now developing telephone subexchanges. Our readers already know these small switchboards from our issue No 3, 1991. My new interest in the firm was aroused by the fact that they have opened a shop in Obuda and by the fact—not least of all—that the editors have entrusted the modernization of their telephone system to Csucstechnika.

MAGYAR ELEKTRONIKA: It is a bright spot in the life of a journalist if he can interview—in the line of duty—a smiling, blonde lady. Let me ask you first to say a few words about how you got started.

Makara: Csucstechnika was formed in 1986. This 100 percent private firm came into being in the small cooperative form then permitted; since then we too have become a limited liability company.

Originally we were computer technicians, so our goal was the development of computerized systems. At that time we thought that it would be good to deal with the Apple compatible category, since it was not yet of interest to the firms formed earlier. However, the quickly spreading IBM XT and AT compatible computers soon forced us from the market. By the time this happened we had learned what can be done with a microprocessor, and even today this is our favorite "toy."

It is also part of the chronicle of the beginning period that—in cooperation with ITEX—we developed a projection terminal for the printing industry. Seeking other microprocessor applications we got into the small telephone exchanges. There was a great shortage in Hungary of small exchanges using one or two incoming lines and four to six outgoing lines. At the same time there was a great demand for them, since there were few main lines (this is still true!) available to subscribers. Our little exchanges help these problems.

MAGYAR ELEKTRONIKA: So we have come to the little exchanges. Could you outline your developmental concept?

Makara: When we began to deal with the development of microprocessor telephone exchanges two years ago many people smiled at us. But our experts predicted that 1,000 small exchanges could be sold on the domestic market. We were right. We are already beyond 1,500 units.

Two factors determine our developmental thinking: our developmental capacity or material resources and microprocessor development experience.

In the course of our developments thus far we started from the given situation, that there are few "city" lines and many extension lines and that even telefax should be connectable to one to two incoming lines. So we made the Telecenter in 1/5, 1/6 and 2/6 incoming/outgoing line versions, with an automatic fax selection card. We are counting on an increase in incoming lines in the future; thus, for example, our 4/8 exchange will be ready soon. There is an ever increasing demand for local fee accounting also; many small firms lease premises and lines in large office buildings. The Tone mode version will be able to use the services of the new digital main exchanges.

We have asked the aid of the OMFB [National Technical Development Committee] to speed up the developments; we hope that they will support the development of domestic industry in more than principle.

MAGYAR ELEKTRONIKA: You also got into buying and selling when you opened your shop in Obuda. I know that

today in Hungary this is the sort of investment with the shortest payback time, still a question occurs to me. Why would an undertaking typically involved in development activity "poke its head" into something like this?

Makara: The thing is very simple. On the one hand we want to reduce the burden on the developers, so we are turning to trade activity. On the other hand, as you said yourself, this is a good investment. Development requires money, and goods must be sold. In this shop we will sell primarily our own products, but, naturally, we will try to satisfy the desires of the customer. We thought that there was not yet a suitable offering in this part of the city and that there would be enough demand so that we could maintain a small shop economically. The Florian Square area is well trafficked enough that if people know about our shop they will come to see us.

Hungary: Austria's Schrack To Rebuild MAV Communications Network

92WS0412B Budapest MAGYAR ELEKTRONIKA in Hungarian Feb 92 p 53

[Unattributed article: "Schrack's Gigantic Deal With the MAV"]

[Text] At the cost of no small effort we have learned something about development at the MAV [Hungarian State Railways]. In an earlier issue (No 11, 1991) we reported on a joint venture with Alcatel, now we have received information about a very significant deal with Schrack.

Surely not everyone knows that the MAV has the largest so-called private network in Hungary. Still, the MAV is owner and operator of a national telephone network. The network of the MAV, naturally, is not public, it serves only to connect railway installations and transmit railway information. Nor is it surprising that this network is just as obsolete as the public, postal network. (More precisely, the national, public subscriber network of the MATAV [Hungarian Telecommunications Enterprise].) Here also the rotary exchanges still revolve, and it is actually a technical miracle that these machines, some 50-60 years old, can do so. The fact is that they no longer meet contemporary needs and soon there will be no spare parts for them, so a better place for them would be in a museum rather than in a national network.

Many competed to replace the exchanges of the MAV. Out of many well known firms the competition was won—as Istvan Mandola, chief of an MAV main department, said—by Schrack Telecom A. G. The result is not so surprising as earler Schrack got a similar commission from the GYSEV [Gyor-Sopron-Eberfurth Railroad], the old partner—in telephone matters—of the Austrian railways (OBW).

Readers of MAGYAR ELEKTRONIKA are already acquainted with the digital exchanges of Schrack. The Multidat 10,000 is a very modern digital exchange capable of providing many services which can also be used to set up large private networks. (Our readers can find more detailed information about its technical specifications and services in issue No 3, 1991, of MAGYAR ELEKTRONIKA.) The modular construction makes it possible to install it in a configuration meeting the needs.

In addition to the main MAV exchange in Buda many—small and large—exchanges must be replaced in such a way that operations can be shut down for just a moment. The leaders of the Schrack firm—according to Mr. Werner Kastler, a member of the Schrack directorate—imagine doing this by putting all the exchanges into operation at the same time. Accordingly, they are training the MAV experts to operate them so that the switch over will be a matter of a moment. Then the old exchanges can be taken to a museum.

The MAV network is an analog one, so the digital exchanges—at least it so appears for the time being—can be connected together only in the analog way. Complete renewal of the transmission network involves a sum which exceeds the present financial strength of the MAV. In the course of the interview Mr. Mandola stated that it would be good if partners were found for network construction. For example, it would not mean substantially greater expense to lay a multistrand, larger capacity optical cable from which other firms might get lines (fibers) even if only on a given section. The associated firm could decide what equipment to connect to the two ends of the cable. The lack of a telecommunications law is causing no small problem in realization of the ideas.

Financing the project was the biggest problem. The contra item of the order received by Schrack is 80 million schillings, the largest private order the firm has ever received. The money is being provided—within the framework of export financing—by the Austrian bank Credit Anstalt; the Hungarian sponsor is the MHB [Hungarian Credit Bank].

Hungaro DigiTel's Operating VSAT System Described

92WS0413A Budapest MAGYAR ELEKTRONIKA in Hungarian Jan 92 pp 21, 22-23

[Article by Tamas Fraknoy, Denes Jobbagy and Jozsef Keringer, of Hungaro DigiTel Ltd.: "An Operating VSAT System in Hungary"]

[Excerpts] There is increasing interest in our country in VSAT [Very Small Aperture Terminal] systems. The majority of potential users already know that development of a network realized with VSAT technology is a realistic possibility in Hungary too; one which can be achieved at a rational price and, what is more, it can be realized quickly.

Today the development of the computer technology infrastructure in Hungary has already gone beyond the use of individual computers. A real and urgent need to develop networks has appeared. This development can be followed well in the development of the activity of the Muszertechnika [Instrument Technology] Company. A recognition of the Hungarian need for VSAT networks came about in connection with the Muszertechnika Company's search for data communication possibilities which can be realized realistically and quickly. This led to active cooperation in

the Hungaro DigiTel firm. Hungaro DigiTel was created two years ago to provide VSAT. The founding members were the Muszertechnika Company, the Telecommunications Research Institute, the American firm GTE Corporation and the Austrian firm Credit Anstalt Investbank. A sense of purpose dictated the "finding one another" of the founders of Hungaro DigiTel. Realizing VSAT systems is to a significant degree a computer engineering and network design task. The Muszertechnika Company is coordinating this, in cooperation with partner firms and users. The experience of experts from the Telecommunications Research Institute in the area of microwave systems is another pillar of the undertaking. The Credit Anstalt Investbank acts as investor.

The defining member of the consortium is the GTE Corporation, still little known in Hungary. Last year GTE united with the Contel firm, thus becoming the largest telecommunications enterprise in the United States. Also in the recent past it began to spread in Europe as well. GTE Spacenet—which is a member of the GTE Corporation—now operates 11 artificial satellites the total value of which is about $1 billion. All the satellite telecommunications services which exist today are offered by it. Within this it operates a number of networks—several hundred made up of several thousand VSAT's.

The figure illustrates the Skystar Enhanced system, the newest VSAT system of GTE Spacenet. One can see in the figure the members of the transmission chain and the optional dialing reserve lines. Even without detailing the functions of the several elements of the system it can be seen that it is built up of similar subassemblies. This modularity makes possible simple expansion and the development of optional redundancy.

What advantages justify domestic use of the Skystar system of GTE? One of the unique features of the system is that it permits use of the Compact Hub. The Compact Hub is a low power hub equipped with a small antenna (2.4 meters) which can be operated economically even in the case of 30-50 VSAT's. Naturally this is not the upper limit, the system can be expanded further. The largest Skystar system operated by GTE Spacenet—that of the K-Mart department stores—contains 2,200 VSAT's. Use of the Compact Hub under Hungarian conditions is very favorable as it can be installed with a relatively small investment. Returning to the operating mechanism of VSAT networks, the advantage of using a domestic hub is obvious. Connecting the host (or hosts) in Hungary to a hub somewhere in Europe (Portugal, for example) would be a little clumsy, so probably the solution would be VSAT-to-VSAT communication. An additional disadvantage of this—going beyond the already mentioned double response time—is that it also doubles the satellite channel capacity needed for transmission. At present European prices this is not a negligible factor. Another advantage of the Compact Hub is that it makes possible, even for smaller networks, a choice between a dedicated hub and a shared hub. In the photograph one can see the antenna of the Compact Hub of Hungaro DigiTel on Kinizsi Street. Its size is well indicated by the TV receiving antenna installed beside it.

Another advantage of the system to be mentioned is the incoming media access protocol, AA/TDMA [Adaptive Assignment Time Division Multiple Access], developed by NEC. We distinguish three typical types of data traffic in the case of differing applications. The first is interactive, where the size of the transactions is small and the response time requirements are strict. Querying a record of a database would be an example. In the case of batch type traffic we are talking about transmission of larger volumes of data; an example would be a file transfer. The last has a stream character, where an application uses a given band width continuously (an example of this would be continual collection of measurement data). A well suited satellite channel access mode can be found for each type of traffic. Aloha (also called RA/TDMA—Random Access TDMA) is for the interactive type, place occupying (or DA/TDMA—Demand Assignment TDMA) is for the batch type and permanently assigned (Permanent Assignment) is for the stream type. Naturally, from the fact that these traffic types differ from one another in this way, it follows that a given channel access protocol transmits with much worse efficiency traffic which does not suit it. For example, it is not very good to realize file transfer with Aloha. The problem is that in general these traffic types occur in a mixed way, in ratios which vary in time relative to one another.

One widespread solution to the problem is to divide the available channel capacity among the three access modes depending on the needs. The great disadvantage of this solution is that it cannot adapt to the dynamically changing need variations which arise in the course of time. A typical example of this is the daily traffic of a bank. During working hours the interactive type is typical, while the batch type is typical after closing. The adaptive algorithm of AA/TDMA solves this. After setting aside the band width needed for stream type traffic the remainder is of the RA/TDMA or DA/TDMA type depending on the length of the message to be transmitted. If the packet fits into a single frame it is sent according to the random access of Aloha. If not, the first frame of the packet goes with Aloha but in the frame there is a demand for occupation of the number of frames needed to send the remaining part of the packet, so the rest of the packet is transmitted with the place occupying protocol. It can be seen that due to its dynamic adaptation to conditions AA/TDMA uses the available satellite channel capacity much more favorably.

The first thing to be installed in Hungary was a demonstration Skystar VSAT system—primarily in the interest of testing the different network systems in a real environment. The State Insurance Company is the partner of Hungaro DigiTel in this still ongoing experiment. The hub was installed in the building of the computer center of the State Insurance Company and five VSAT terminals were installed at various points in the country. In the first phase of the project interconnection and testing of the UNIX based networks was done with an X.25 interface. UNIX, worthily proud of its openness and developed communications possibilities, passed the test well in the "domestic" VSAT environment, but AT&T, SCO and SINIX UNIX systems were also used, mixed together, in the network.

The experiments are continuing, already in the direction of concrete uses. On the basis of experience with the demonstration system thus far the earlier anxieties in connection with installing the American system in Hungary have proven to be without foundation. The years of experience of the American provider greatly contributed to the untroubled installation and initial operation of the network.

We hope that correct professional and business activity will finally prove successful and will create a real and efficient communications possibility for VSAT users in Hungary. We are confident that Hungaro DigiTel will become a successful provider of domestic VSAT.

Hungary: KFKI Firm Presents Computer Network System Solutions

92WS0413B Budapest MAGYAR ELEKTRONIKA in Hungarian Jan 92 p 25

[Article from KFKI Computer Networks Ltd.: "Computer Networks from the KFKI"]

[Text] Experts at KFKI [Central Physics Research Institute] Computer Networks Ltd. have for years been dealing with—among other things—the design, construction and operation of Ethernet networks and with aligning, optimizing and debugging already existing networks.

Our firm is constantly developing its own family of IEEE 802.3 (Ethernet) devices, and hopes primarily to get on the market with new devices aiding network operation which will increase the reliability of installed systems. We would like to report here on two of our new developmental achievements.

The NR 828 multiport IEEE 802.3 (Ethernet) repeater, which is very widespread in the country (more than 100 operating units already), has been expanded with a screwed line pair (UTP) port. A port contains one or two standard RJ 45 connectors which makes possible direct connection of workstations and the cascading of repeater units. In this way the NR 828 supports any standard IEEE 802.3 (Ethernet) medium (thick or thin coax, opto, UTP), which makes possible network construction from inhomogeneous physical mediums.

Considering the great success, both national and beyond the borders of the country, of the Ethernet Network Monitor Center (ENMC) we exhibited at the COMPFAIR show a monitoring system which can be remotely queried, having a Kliens-server architecture (the RENMC). We can now report that we have a version which operates under Microsoft Windows 3.0. This makes possible continual monitoring of the network by MS-Windows users even with the simultaneous running of other user programs. These software products require no special hardware environment (they work on the WD8003 and WD8013 cards), their prices are favorable, and with their aid the discovery of network failures can be greatly accelerated.