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Italy's Agusta To Develop Advanced Composites With Enichem

36980265b Rome RASSEGNA PETROLIFERA in Italian 1 Feb 88 pp 83-84

[Article: "Agusta Group-Enichem Group Accord on Composite Materials"]

[Text] The frame of the planes of the future will not be made of metal but rather of carbon fiber. With this in view, the Agusta Group and the Enichem Group have initialed an agreement to cooperate in the development of advanced composite materials.

The memorandum of agreement provides for the forming of a new company owned jointly and equally by the two Groups. The new company will produce and market components for the high-performance transport industry, the aerospace industry, and the energy industry, as well as customized components for high-technology industrial applications. The new company will also be devoted to the development of new materials and industrialization processes. The agreement between the Enichem and Agusta Groups ensued from a survey of the considerable market potentialities offered by composites and their increasingly numerous applications in advanced sectors.

The agreement will enable Italian industry to acquire greater competitiveness particularly in the aerospace sector, where traditional materials are destined to be replaced by such composites as are characterized by higher performance, longer life and lighter weight.

A joint effort in this sphere of activity, centered on the technologies of materials and processes, can also contribute to an easing of access to the world market.

The new company will obtain its know-how from the wealth of technologies already mastered by the Agusta Group and the Enichem Group in their respective sectors of specialization.

Investments will be centered on the developing of the Agusta Group's Anagni plant for production and manufacturing activities, and on the Enichem Group's industrial complex at Pisticci for the pre-impregnated and semifinished materials. The Agusta Group, which years of research and international joint ventures have qualified among the top world-class aerospace companies, possesses a know-how and specific plant facilities ranking tops in Europe, in the field of composites as well. With the forming of the new company, the Agusta Group will expand its presence in Europe to include also sectors complementary to the traditional aerospace ones, by consolidating and expanding the competitive position it has already attained in the composites sector.

The Enichem Group possesses, in the sphere of high-technology materials, the experience developed by Enichem in high-technology resins, high-technology polymers, pre-impregnated materials, laminates, and advanced composites being used in the most sophisticated electronics and transport applications.

This agreement will also enable the Enichem Group to exploit the correlation among end-user requirements, transformation technologies, and the properties of materials.

The strategy will be a cutting-edge approach, consisting of a shift from the phase of mere substitution of high-performance materials for traditional ones, to the phase of custom-designing materials on the basis of their intended applicational end-use.

9238

French CNRS Discovers Metal Cation Absorbing Plastic

3698a161 Paris SCIENCES & AVENIR in French Feb 88 p 11

[Text] After the hydrocarbon sponge, here is the metal absorbing sponge! It is a kind of specialized plastic whose atomic structure captures the cations of dissolved metals. This procedure is reversible: If the polymer is oxidized, the sponge is squeezed, i.e., the metal cations held in the molecular cages of the polymer are expulsed.

This new material was discovered by a research team at the university of Rennes headed by Jacques Simonet, research director at CNRS [National Center for Scientific Research]. It is directly in keeping with the theories of Prof Jean-Marie Lehn, the 1987 winner of the Nobel Prize for Chemistry. Among the first possible applications of these metal sponges feature: water cleansing by extraction of heavy metals such as mercury, cobalt, nickel, or cadmium, or the treatment of radioactive effluents.

25063

ICI of UK Develops New Polyester Film for Optical Data Storage

36980255a Duesseldorf VDI NACHRICHTEN in German 25 Mar 88 p 8

[Text] Hannover, 25 Mar 88 (VDI-N)—A new model has joined the ranks of optical storage media, which keep data in the indentations of a rigid disk, similar to the digital audio disk: During the Hannover CeBIT fair, the British chemicals company ICI [Imperial Chemical Industries] introduced a flexible synthetic film. Diskettes made from it should store the same quantity of information as the fixed CD-ROM disk that is already in use, but should be more economical.

The shiny silver foil consists of a polyester substratum coated with organic dyes and polymers. This flexible medium can be cut into strips for the production of storage tape or labels, or pressed into plates for diskettes.

Storing one megabyte of data would cost no more than one pfennig, ICI spokesmen emphasized. Two full reports requiring around one megabyte on a PC would cost two hundred times as much if it were stored on a magnetic fixed disk. However, while a magnetic disk can be erased and thus reused repeatedly, this film can be written on only once. A laser burns small holes into the surface. If the foil is housed in a diskette-like casing, this information can then be optically read later by a micro-head the size of a fingernail. In the CD-ROM drives currently available, this head is nearly as big as a cigarette pack.

If the film is cut into storage tape, a piece 880 m long and 0.5 inches wide will reportedly hold around six gigabytes. This would be the same as the contents of 1,000 diskettes or 300 full-length motion pictures. According to ICI information, it is only the state of currently available laser-writing technology that prevents an even greater amount of data from being stored. It is anticipated that future laser developments will very soon lead to an increase in these figures. One producer of the corresponding tape drives that is being mentioned is the Canadian firm Creo, headquartered in Vancouver.

Executives of the British chemicals company appeared to be convinced that the introduction of this flexible medium would also result in a new generation of powerful optical diskette drives. ICI announced that high recording and reading speeds—up to 10 megabytes a second for the ratio of signal to background [line of text missing], which is necessary for data storage—is possible with the new medium. In addition, the high data density reportedly allows rapid access, regardless of whether the medium is used in diskettes or cassettes. The corresponding technology was developed by Bernoulli Optical Systems Corporation (Bosco), headquartered in Boulder, Colorado, an independent branch of Iomega Inc. This organization was founded specifically for cooperation with ICI.

Michael Strelitz, British production manager for this area of data storage, explained during the fair that he expected the drives to be available as early as in 1989. He said that Bosco will market its own model, but that this technology would also be available to other manufacturers.

12271

AEROSPACE, CIVIL AVIATION

French-Soviet Cooperation in Space Organized

Annual Meeting

3698a142 Toulouse LA LETTRE DU CNES in French 7 Dec 87 pp 5-6

[Article under the "Scientific Programs" rubric: "French-Soviet Meetings on Space (Trouville, 13-20 October 1987)"]

[Text] All the programs and projects conducted within the French-Soviet cooperative framework were examined and new prospects for cooperation were raised at the annual meetings on space held in October in Trouville.

As part of the cooperation in astrophysics, the French Sigma [random-mask gamma-ray imaging system] telescope should, by the end of 1988, be installed on a Soviet gamma- and X-ray astronomy satellite called Granat for a mission lasting 18 months. Its principal scientific purpose is imaging in the low-energy gamma-ray range, where most phenomena determining the dynamics and evolution of stars and galaxies are subject to violent processes. This instrument is being built under the prime contractorship of CNES [National Center for Space Studies].

The payload of the Granat satellite will also include the French Phebus experiment designed for research into high-energy gamma bursts. This high-energy astronomy program will be completed by the launch, in the second half of 1988, of the Gamma 1 telescope, designed to map very high-energy gamma radiation sources, carry out a detailed study of known sources, and look for new sources. The optical system is supplied by France.

The next planetary mission to be carried out in cooperation with the Soviet Union is the Phobos mission, aimed at studying the Phobos satellite, the planet Mars and its environment, the Sun, and the interplanetary environment. This mission, scheduled for July 1988, will involve two almost identical probes carrying some 30 experiments conceived in a broad international context. Several French laboratories are taking part in this space mission, during which a probe should overfly Phobos, carry out active experiments, and jettison two landing vehicles.

Research into the interplanetary environment, achieved thanks to the COMET [Collection of Extraterrestrial Matter in Orbit] program, should be continued with the KMP-3 experiment which should be set up on the Mir station.

Research into the Earth's environment, substantially undertaken with the Arcad-3 project, will be continued thanks to Interball, a Soviet project for researching particle acceleration mechanisms in the magnetosphere.

This program, designed using two satellites and their subsatellites, will make simultaneous and, above all, coordinated measurements possible in the upper auroral magnetosphere and in the tail of the equatorial magnetosphere. These satellites are scheduled to be launched in 1990. Three French laboratories are taking part in four spaceborne experiments.

In the field of space meteorology and aeronomy, two projects were discussed: Alissa and Scarab. The main aim of the Alissa project is the detailed description of the upper layer of cloud formations. The instrument is a lidar which is being jointly developed and can be carried on board the Soviet station Mir. It should be operational by 1991. The Scarab project is designed to study the radiation balance of the Earth's atmospheric system. The instrument is a scanning radiometer which will be mounted on a Soviet Meteor-type satellite scheduled to be launched after 1990.

Finally, these French-Soviet meetings have made it possible to confirm the timetable for the second 30-day flight of a French astronaut on board the Soviet Mir station and the associated scientific and technological program. This flight, called "Aragatz," is still scheduled for the end of 1988. A series of eight experiments is planned; two of them will take place outside the station during the French astronaut's spacewalk. The two French astronauts chosen, Jean-Loup Chretien and Michel Tognini, have been training at the City of Stars since the middle of November 1986.

In addition, new prospects for cooperation were raised. These could be in the field of Mars exploration, for which the future Soviet program anticipates the launch, probably in late 1994, of two probes each consisting of an orbiter and a landing module (which could include a balloon and a small, automated "rover" vehicle). Other projects could involve research into asteroids with the Vesta mission, which seeks to closely overfly several objects in the asteroid belt and a fairly inactive comet; research in X- and gamma-ray astronomy; or finally, in space telecommunications.

Structural Testing

3698a142 Toulouse LA LETTRE DU CNES in French 7 Dec 87 pp 8-9

[Article under the "Scientific Programs" rubric: "ERA, A Space Experiment Under Water"]

[Text] From 26 through 28 October, CNES carried out operational tests on the ERA experiment (unfolding hexagonal structure) in a basin belonging to COMEX (Maritime Expertise Company) in Marseilles. After these successful underwater trials carried out by two diver-astronauts, ERA is ready to be taken aboard the Soviet Mir station as part of the next French-Soviet flight, Aragatz (November 1988).

Some 10 CNES and Aerospatiale engineers and a few divers from COMEX spent those 3 days checking whether the equipment was functioning properly and perfecting the procedures for implementing the ERA experiment. To achieve this, a painted steel model representing the airlock and part of the Soviet Mir station was immersed 5 meters in the diving area.

In November 1988, a French astronaut will spend nearly 30 days on board the Soviet Mir station, during which time he will make an extravehicular excursion into space accompanied by a Soviet astronaut, to carry out the ERA experiment and set up the Echantillons [samples] experiment (study of the impact of the space environment on different materials). In all, nine experiments are planned; five in the biomedical and four, including ERA ("air" in Russian), in the technological areas.

Built by Aerospatiale, this system. consisting of 1-meter long composite material bars linked together in a pattern of triangles, should form a hexagonal structure 3.8 meters in diameter in space.

When folded, as it was in Marseilles, the system forms a 1-meter long cylinder with a diameter of 0.6 meter. Once attached to the side of Mir, it will be unfolded using the control console located inside the station and then ejected automatically or manually into space. Associated imaging systems will make it possible to monitor the astronaut's activity.

Designed under the aegis of CNES, the ERA experiment foreshadows the systems which will be used to form the structures of the large orbital stations of tomorrow or even the large antennas of the future.

At a depth of 5 meters the two astronauts simulated leaving the airlock to set up the ERA experiment, which was also under water. Three cameras placed around the Mir model and one placed on the side of an astronaut's helmet made it possible to monitor the movements of "astronaut 1" and "astronaut 2" on screen. So for over an hour the various phases of the procedure were overviewed: positioning the docking unit, positioning and unfolding (simulation) the folding structure, fitting the structure in the ejection configuration, ejection (simulation), etc.

Taking advantage of the ERA experiment, a study of an astronaut's motor behavior during extravehicular activity is being included for the first time in a space program; a series of behavioral measurements was thus recorded for the two divers.

The results of these three days of experiments were declared positive. The ERA equipment went to the USSR in November in order to undergo further testing. The two French astronauts chosen, Jean-Loup Chretien and Michel Tognini, will begin intensive training in

January in the basin at the City of Stars in Moscow, in order to learn how to handle ERA and to make a success of the first European excursion into space.

Biosatellite

3698a142 Toulouse LA LETTRE DU CNES in French 7 Dec 87 p 9

[Article under the "Scientific Programs" rubric: "The French-Soviet Biosatellite Experiment"]

[Text] The main scientific aims involved research into the effects of space, relative weightlessness, and radiation on various living organisms.

An initial set of French-Soviet experiments was aimed at studying the metabolic reactions of the tissue systems of rodents and primates with a view to adding more detail to findings obtained during the previous Biosatellite flight (1985—5-day flight). This set of experiments was complemented by a study of the behavior and biological rhythms of primates. In cooperation with their partners at the Moscow Institute of Biological and Medical Problems, these experiments were carried out by teams from the Lille University of Science and Technology (Professor Mounier), the Claude Bernard University (Professor Gharib), the University of St Etienne (Professor Alexandre), and the Air Force's Aerospace Medicine Research Center (headed by C. Nogues).

In addition, work in the field of cell biology concentrated on the characterization of growth stimulation phenomena observed during earlier experiments in orbit. This work was carried out on single-cell ciliates: Tetrahymena (by the Soviets) and Paramecium Tetraurelia (by the French Toulouse Medical Biology Laboratory—Professor Planel).

Finally, there was the problem of studying the more specific effects of cosmic radiation on the Artemia cyst by directly exposing cysts to cosmic radiation (Professor Planel).

The flight of the Cosmos 1887 satellite, carrying all the biological experiments described above, took place from 29 September to 12 October 1987. The two primates (one of which had succeeded during the flight in undoing a strap holding one of its paws, thereby worrying the experts) and the other animals and living organisms were recovered in good shape (except the guppies), despite a 24-hour delay due to the fact that the satellite landed about 3,000 km north-east of the scheduled spot.

25065

Belgium's IAL Space Designing Spaceborne Systems

3698a174 Brussels NOUVELLES DE LA SCIENCE ET DES TECHNOLOGIES in French Oct 87 pp 201-203

[Article by Andre Monfils, director, and Claude Jamar, project manager at IAL Space: "The European Space Agency's Coordinated Facilities at IAL Space"]

[Excerpt]

IAL Space

Liege was not particularly predisposed to become a testing center for spacecraft. France and Germany, prompted by an ambitious space policy, had to acquire testing facilities indispensable to the success of their own projects. In Belgium, it was a lucky coincidence that launched the same process. Although Belgium does not have a national space program, it was entitled to have Belgian scientific observation instruments sent into space thanks to its participation in ESA.

Thus, at the Astrophysics Institute of Liege University, with the help of Belgian industry and the collaboration of British scientists, an initial space telescope was built the results of which were later to be appreciated throughout the world. To build this telescope, it was necessary to develop methods for optical testing under vacuum unique in Europe. The usefulness of these testing methods was subsequently recognized by ESA and they were then used for the certification of Meteosat satellites, well known to television viewers who follow weather forecasts. A long process first led to the recognition of the usefulness to European space activities of the Liege installations, then to their classification as coordinated facilities. This enabled trained personnel to offer their expertise to the European Community and to maintain, develop, and adapt their installations to changes in European space research.

After several years, due to the growing economic importance of telecommunications satellites, the earth's resources, navigation, and meteorology, the Ariane rocket developed into a full-fledged launcher with the arrival of the Ariane 3 and Ariane 4 rockets. To keep up with progress and remain operational, the installations had to be modernized and, more specifically, expanded. Moreover, they had to offer clients facilities up to par with the growing difficulties and ambitions of projects. A financial agreement was reached between the Walloon Region and ESA and a new center was created at the Sart Tilman industrial park in Liege. A new vacuum optical test bench was built capable of receiving the ESA's new instruments. These new installations have been operational and in continuous use since 1984.

Space Activities in Liege

IAL Space's major activity involves scientific research in astrophysics using space vehicles. Thus, IAL Space participated in the recent success of the camera on the

Giotto probe, which was built to examine Halley's Comet by a European consortium of five institutes including IAL Space. The camera's sensors, CCD retinas, were selected in Liege. The camera itself was tested in Liege on a flight simulator to eliminate any uncertainty concerning its automatic monitoring system during picture taking. The Giotto camera is an extremely complex instrument capable of carrying out highly complex tasks without requiring contact with the earth. Such a sophisticated and costly instrument could not be built in one single European institute, and collaboration among the five partners involved was the sine qua non of its success.

Still, despite the opportunities for collaboration among the institutes, scientific research in space does not show enough continuity. Obviously, intermittent operations are incompatible with the expertise required of personnel and the maintenance of sophisticated equipment. Slack periods are therefore taken up by industrial and commercial projects associated with the Coordinated Facilities.

IAL Space, which is still specializing in optical device certification under vacuum, is participating in an industrial consortium led by Matra to develop the Hipparcos astrometrical satellite. Within this scope, IAL Space developed a number of extremely high performance metrological instruments based on optical and optoelectronic properties. These instruments are used while testing the Hipparcos payload, whose performance requires dimension and form stabilities never before attained in space.

Furthermore, the sensors which constitute the European contribution to the big orbital telescope of NASA (Hubble Space Telescope) are tested in Liege. Built by British Aerospace (BAe) using a prototype developed by IAL Space, these sensors will be the most powerful ever sent into space. They will allow us to push back the limits of the known universe 10 times farther.

In the near future, new skills will be acquired in cryogenic testing thanks to the ISO project. ISO is an orbital infra-red observatory developed by Aerospatiale of Cannes and MBB [Messerschmitt-Boelkow-Blohm] of Munich. Within the framework of this project, IAL Space is measuring the distortion of the mirrors and of the telescope's structure at 4 K.

Conclusions

IAL Space's space activities concentrate on two major fields. First, the scientific part, which is very intermittent due to Belgium's small size and limited budget. Because of the complexity of current projects, this work is always conducted in conjunction with other institutes, as was the case for the Giotto camera. Second, there is the industrial part, which has gradually been expanding ever since the current increase in the use of utility satellites.

All these activities provide opportunities for contacts at an international level with either scientists or manufacturers. These contacts are fruitful and give Belgians the chance to measure their knowledge and experience against that of top performing high-tech industries. This therefore constitutes an opportunity for intellectual and technological enrichment which Belgium alone would not be able to achieve, and as contacts are established at the highest level, they prevent any stagnation from taking place.

European space activities thus provide Belgians the opportunity to participate in programs that are much more ambitious than any project conducted by an individual member state.

25041

Belgian Participation, Government Funding of Airbus Surveyed

3698a162 Zellik TECHNIVISIE in Dutch 3 Feb 88 p 3

[Text] The Belgian Government has recently agreed to back Belgian companies contending for Airbus contracts by granting interest-free advances repayable by installments according to the number of aircraft sold. Funding applies to R&D costs, production machinery, as well as to test parts and parts for prototypes. The A310 received 1.1 billion Belgian francs in funding, the repayment of which could be spread over the sale of 300 aircraft. Some 150 A310's had already been ordered even before production was begun. The A320 version received 1.7 billion Belgian francs in support, the repayment being spread over 600 aircraft. The A330 and A340 models together have been granted 2.3 billion Belgian francs, repayable over 800 aircraft. In this case industry must account for 20 percent of the non-recurring costs.

These amounts seem to be very high, but this is not quite so when compared to the expected Belgian turnover. The turnover for the A310 amounts to 7.5 billion Belgian francs, for the A320 up to 20 billion francs, whereas the projected turnover for the A330-340 is estimated at 30 billion francs. Flemish industry would account for 50 percent of this, 75 percent of which goes to ASCO and 25 percent to Watteeuw.

With this advance funding the government assumes part of the risk. In case not enough aircraft are ordered, no repayment will take place. However, according to Mr Maes, who heads ASCO's aviation department, industry, too, takes its share of the risk in that it must make the investment in production machinery. If the projected sales figure is not achieved, that machinery will simply be idle.

For the A310 the government is investing 37 million francs on behalf of ASCO, which itself invested 80 million francs. For the A320 government and ASCO investments amount to 187 million and 120 million francs, and for the A330-340, to 240 and 200 million francs, respectively.

Furthermore, the project also provides new jobs: If quotas are reached, the A320 orders will generate some 150 jobs. In 1994, when orders for the A330 and A340 start coming in, another 170 jobs will be created.

More Technical Problems

The take-off of the A330-340 aircraft will cause pressures of up to 210 metric tons on the tracks, which is three times higher than with the A310. The tracks will therefore be enlarged from 80 cm to 1.5 m, while their actual measurements must be of the same accuracy. This means that the processing and hardening of the maraging steel becomes even more important. Hence the research into measurement calculations (milling is done with a certain margin to obtain the right size after hardening), into part straining (so that deformation during hardening is minimal and occurs in a previously established direction), as well as into polishing (necessary for the finishing touch).

Funding Problems Not To Be Underestimated

In addition to the technical problems there are also funding problems. According to Mr Maes we must not forget that all costs are calculated in dollars which could seriously affect a company like ASCO bearing in mind present fluctuations. Here, too, the government provided assistance by dividing the risk between the national and regional governments as well as the company involved.

Another problem consists in Airbus' deferred payments. Airbus only pays when the aircraft is actually flying. Since ASCO supplies parts requiring 10 months in manufacturing time before actual assembly can start, it takes more than a year before the aircraft is assembled, delivered, and the bill finally paid. Therefore, during peak delivery periods billion-franc revenues can be blocked, for which ASCO provided the necessary investments (material purchase, 10 months in manufacturing time, overheads).

This is characteristic of Flemish companies, since the other companies involved in this sector both at home and abroad are in fact state-owned. That is why the Flemish Government set up Vlairbus. This company, set up by the GIMV [Regional Development Authority of Flanders], owns a capital stock of 175 million Belgian francs and pays the 30th day of the month after delivery. It thus acts as an intermediary between Flemish manufacturers, such as ASCO and Watteeuw, and Airbus. In this way the Flemish Government accounts for 50 percent of the financial burden.

25024

Dornier To Build Payload Carrier Assembly for Commercial Titan

3698m213 Friedrichshafen DORNIER POST in English No 3, 1987 pp 47-48

[Text] Beginning in 1989, Dornier will deliver the lightweight graphite epoxy payload carriers to Martin Marietta at Cape Canaveral/Florida for installation on the launch vehicles. The first flight of the carrier on the Commercial Titan is scheduled for 1989.

Payload Carrier Assembly (PCA)

The payload carrier assembly is designed to transport two payloads (satellites) aboard a launch vehicle and to deploy them separately into orbit. The PCA forms part of the payload module which is under development by Martin Marietta for the new Commercial Titan launch vehicle. The payload module is accommodated above the propulsion vehicle and, apart from the PCA, also includes the payload fairing which is jettisoned at an altitude of 50km after penetration of the atmosphere. The upper satellite can then be separated at the requested altitude. Prior to the deployment of the lower satellite the upper part of the PCA must be jettisoned.

The PCA, consisting of a cylindrical and a conical segment, has a diameter of 4 m and is 6 m high. The maximum allowable weight is 550kg. Weight in this connection is a critical performance parameter as each kilogram saved in this part of the launch vehicle can be used as extra payload capacity. For this reason the structure is made of graphite epoxy. Apart from low density this material provides outstanding strength and stiffness properties. As a result, this material is optimally suited to withstand the high dynamic loads during the ascent phase. Since the carrier structure also serves as the outer skin it is exposed to extremely high temperatures due to aerodynamic heating. A layer of insulating foam on the external surfaces reduces temperature to approximately 130 degrees C.

In order to jettison the upper part of the PCA after deployment of the first satellite, the PCA is provided with a seperation mechanism. This mechanism operates as follows:

At the separation line the cylinder wall has a hollow aluminium ring in which an explosive charge is integrated. Upon charge ignition, the aluminium ring is completely separated. The explosive itself remains in an intact tubular case to prevent environmental contamination. A kick mechanism arranged over the circumference then generates a small impulse which displaces the front part of the PCA off the remaining satellite. A high-precision spring system is necessary to avoid collision with the satellite during this phase.

"The selection of Dornier for this key elements of the launch vehicle further illustrates the new international character of the Commercial Titan vehicle," said Richard Brackeen, president of Martin Marietta Commercial Titan. "The Dornier payload carrier assembly, along with the payload fairing being developed by the Swiss firm, Contraves, will provide the Commercial Titan vehicle with enhanced payload capability based on the most advanced proven technologies in composite materials."

Martin Marietta, which entered the commercial launch vehicle business in August 1986, has two firm contracts for satellite launches in Commercial Titan. The first contract, with the International Telecommunications Satellite Organization, is for the launch of two INTELSAT VI satellites in 1989 and 1990. The second contract is for the 1989 launch of a satellite built by Hughes Communications, Inc., for the Japan Communications Satellite Company, a joint venture between Hughes and C. Itoh & Co and Mitsui & Co., both of Japan. Martin Marietta also has six other launch reservation agreements.

An outgrowth of the Titan III space booster built for the US-government and National Aeronautics and Space Administration planetary missions, the Commercial Titan can launch multiple payloads into low-earth orbits or directly into geosynchronous transfer orbit. The Titan III has a 96.3 percent operational success rate.

Commercial Titan

Martin Marietta Commercial Titan, Inc., is offering a version of the Titan III space launch vehicle for launches of commercial satellites. The Commercial Titan can place payloads in excess of 31,000 pounds into low-Earth orbit, and launch large communications satellites two at a time.

The common core vehicle consists of two liquid-propellant booster stages that are the central propulsion element. Twin 10.2-foot diameter solid-propellant rocket motors (SRMs) are attached to each side of the core vehicle and provide additional thrust during the boost phase. The Commercial Titan launch vehicle uses five-and-one-half-segment SRMs.

Martin Mrietta is using a 13.1-foot diameter payload fairing for the Commerical Titan.

The Commercial Titan luanch vehicle can accommodate a variety of specialized upper stages, and can be configured for various of orbits, multiple payloads, and complex mission operations.

The first operational launch of a Titan III was on July 29, 1966. As of September 22, 1987, the Titan III had recorded 130 successful flights in 135 operational launches for a 96.3 percent success rate.

Titan III began service in 1964 and has delivered more than 200 payloads into Earth orbits or on missions to the Sun and planets. Titan IIIs were employed to launch the Viking spacecraft to Mars in 1975 and the Voyager deep-space probes in 1977.

08800

MBB of FRG Designs Ground Infrastructure for Space Programs

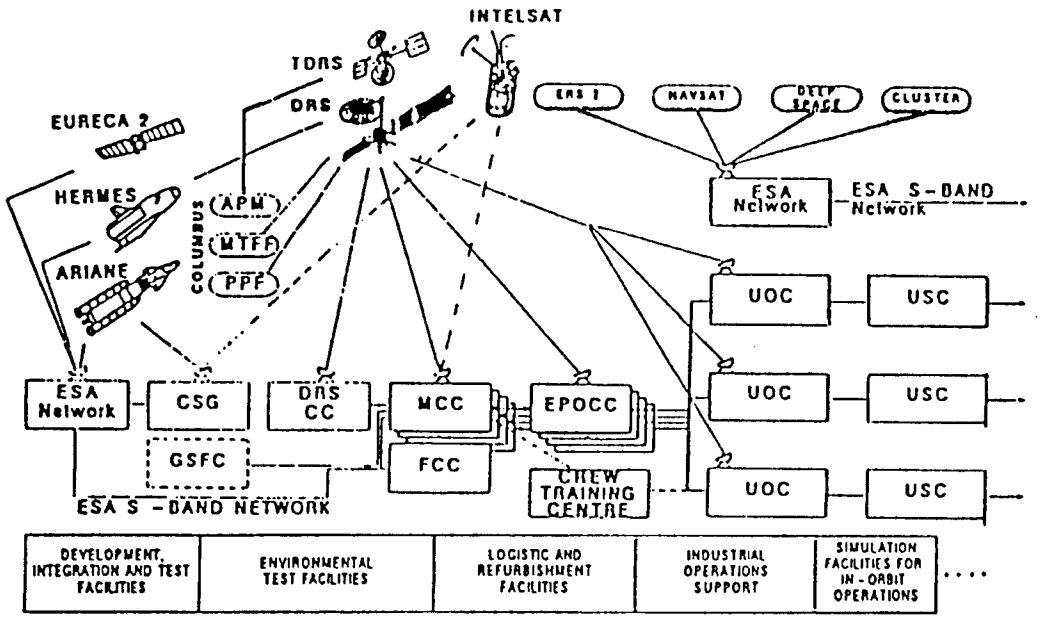
36980231a Coburg MIKROWELLEN MAGAZIN in German Vol 14 No 1, 1988 pp 6, 8

[Text] Bremen—Coherence is the term for one of the requirements for the future space-travel scenario being developed by the European space industry on behalf of the ESA [European Space Agency]. This coordination and dovetailing of the major program policies with the platform Eureka, the Columbus space station components, the giant payload carrier Ariane 5, the manned space glider Hermes, the data relay satellite DRS, and huge scientific research platforms require an operational support on a previously unprecedented scale.

Although the presently existing ground infrastructure is able to support the current Ariane program and scientific and application satellites and even specific manned missions, nevertheless any further handling on a case-by-case basis would be too cost-intensive. This finding is also supported by experiences from the NASA shuttle program. Therefore both nationally and within the ESA framework, preliminary work has begun on the development of new ground infrastructures.

Within the national framework, MBB-ERNO is working on a BIZEPS program, whose title arises from the task assigned to the study—"Ground Infrastructure of Future European Space Programs." Building on the operational analyses of the forthcoming programs, a conceptual plan is being elaborated so as to be in coordination with all the projects, which is intended to lead to a low-cost result. Here, MBB-ERNO is working together with the DFVLR [German Research and Development Institute for Air and Space Travel], the IABG, and Interatom, as well as with the firms of Dornier and AEG.

And on the international level as well, MBB-ERNO has been able to land a study contract. ESA as the requester has specified a study on industrial organizing for electric ground support facilities as a support for the European space program. Phase A of this study involves the execution of two tasks: Designing a data infrastructure model as a basis for all the payload integration centers that are to be erected, and the elaboration of a plan for an industrial consortium that will ensure the provisioning, maintenance, and operation of all electrical ground facilities for the major programs.



SPACE / GROUND SEGMENT SCENARIO

Coherent space/ground segment scenario: The future infrastructure concept for the major European space programs connects the stations in orbit with the ground facilities. This begins with the corresponding integration and test facilities, and extends via environmental test centers to industrial support for operations in outer space. It is on the basis of these requirements that the comprehensive infrastructure program for industrial support is being studied and developed.

Then in a phase B, a data infrastructure model is to be built. The basis for this model is a payload integration and testing center with ESTEC [European Space Technology Center], which later will serve as a reference model for all national centers.

This study is to be worked on by a team that was assembled from firms of four European ESA member states. Moreover, Aeritalia is to be in overall charge for the Italian firms (Laben, Selenia, Telespazio), Marconi for Great Britain (with British Aerospace, Logica, Marcol, and RCA), and Matra for France (with Aerospatiale). MBB-ERNO heads the German-European group along with Dornier, Norspace, Fokker, BTM, and CIR.

In addition to these firms mentioned, numerous other European and also FRG businesses have come forward and indicated they would like later to be involved in appropriate subcontracting orders. These bids are in response to the necessity of operationally running the future major programs in a joint fashion in order to make available an integrated ground operating system in cooperation with European system firms.

12114

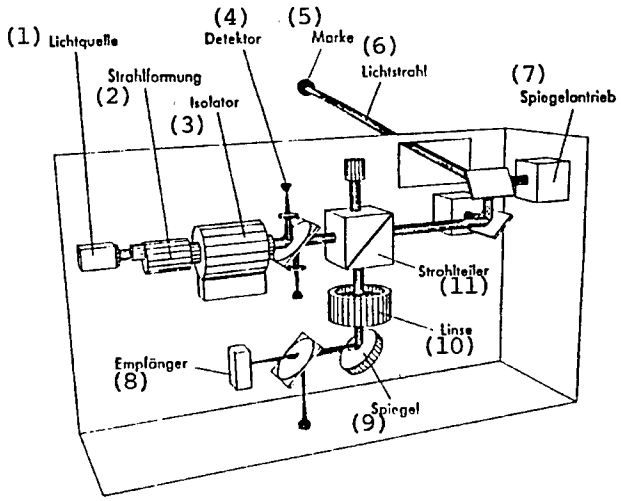
Krupp of FRG Designs Optical Sensor for Space Docking

36980231d Coburg MIKROWELLEN MAGAZIN in German Vol 14 No 2, 1988 p 218

[Text] Automation and robotics are a focus of the German laboratory trip into outer space planned for 1990, called the D2 Spacelab Mission. The Krupp concern is likewise occupied with automation and robotics. Its previous contributions to German or international astronautics include, for example, antennas for satellite communication or experiments on materials during the D1 mission in 1985.

On order from the BMFT the Krupp Research Institute at Essen is drawing up a preliminary study for the system concept Ross-Rotex as a contribution to the D2 mission. This preliminary study is to determine the technical feasibility and the likely specifications of the system. Ross stands for Remote Optical Scouting System and signifies a sensor that as a robot eye makes possible automatic docking maneuvers in space. To this end, one of the two docking partners is given an optical memory, similar to that of the millions of compact discs (CD) already in use. When the memory is irradiated with a laser beam from a few meters away it divulges its contents: Information about position and orientation. A reading device in the other docking partner receives the data and passes it on to the robot drives as long as needed for the two partners to join together.

Rotex stands for Robot Technology Experiment and means the robot installed in the space shuttle whose behavior one wants to check under conditions of weightlessness. In the system ROSS-ROTEX, the optical memory would be attached to the robot hand. The position and orientation of the hand could be measured continuously by the reading device placed in the vicinity of the



Sketch of the preliminary study for the system concept Ross-Rotex drawn up by the Krupp Research Institute on behalf of the BMFT. Ross signifies a sensor that as a robot eye enables automatic docking maneuvers in space. Rotex stands for the robot installed in the space shuttle (D2 Spacelab Mission) whose behavior is intended to be examined under conditions of weightlessness.

Key:—1. Light source—2. Beam shaping—3. Insulator—4. Detector—5. Strobe—6. Light beam—7. Mirror drive—8. Receiver—9. Mirror—10. Lens—11. Beam divider.

robot. After a return to earth of the space glider, it would then have to be seen whether the data recorded by the computer describe the actual movements of the robot.

12114

MBB Conducts First Test of Ariane 5 Upper Stage Device

36980231c Munich-Ottobrunn MBB AKTUELL in German Feb 88 p 2

[Text] Lampoldshausen/Ottobrunn—The first propulsion unit test in the European Ariane 5 launch vehicle program went off successfully on 13 January 1988. The first coaxial injector head for hypergolic propellants made its debut. This German-French occasion took place at the MBB site of Lampoldshausen. On the testing grounds in the presence of representatives of the French contract orderer CNES, the manufacturer MBB demonstrated in a test run the fitness of coaxial injection for the 20 kN propulsion unit that is designed for the L-5 upper stage of Ariane 5, and in a similar version for the Hermes drive.

The test with the experimental propulsion unit using the hypergolic propellants nitrogen tetroxide and monomethyl hydrazine (N_2O_4/MMH) was a complete success. Particularly acclaimed was the first coaxial injector head in the world for hypergolic propellants, which MBB has developed specifically for the Ariane 5 upper stage drive system.

In the design of this new 20-kN propulsion unit, which is 1.90 m in height, MBB has combined knowledge and experience gained from two drive technologies: The know-how from the HM7-/HM60 thrust chamber developments for the launch vehicles Ariane 1 to 5, in which the high- energy propellants liquid hydrogen and liquid nitrogen react with one another via coaxial injector elements, and the technology of the drives for orbital, attitude-control, and apogee maneuvers, between 10 N and 3,000 N of thrust, which work with hypergolic propellants and rotary injection.

In both drive technologies MBB can point to a tradition of many years that is associated with successes in substantial programs.

A technology program for the 20-kN propulsion unit was commissioned by CNES to MBB in 1986, as a part of the German ESA contribution. Meanwhile, MBB has also been chosen for the construction of the complete L-5 upper stages, which are to be operationally ready from 1995 on.

12114

MBB of FRG Tests New Ion Propulsion System

36980231b Munich-Ottobrunn MBB AKTUELL in German Feb 88 p 4

[Text] Ottobrunn/Giessen—The ion propulsion system RITA, without competition in Europe and even on a par with a U.S. development, has passed a performance test lasting 100 hours as a part of the qualification tests at the First Physics Institute of the University of Giessen. RITA was developed and built by MBB in contract with the ESA and with financing from the BMFT.

The test was run in a special vacuum chamber under simulated outer-space conditions—that is, RITA worked in cycles of a few operating hours, intermittent with cooldown phases. Thus the test corresponded to the operational statuses of the propulsion unit as are called for in connection with orbit control on board a satellite. The commands for the switching on and off and for the selection of the operational status were given by a simulated ground station outside the vacuum chamber.

The interplay among all components and the performance of the fully automatic control program via the integrated computer functioned satisfactorily under all anticipated conditions. Because of its low propellant consumption the use of an ion propulsion unit for space platforms and communications satellites recommends itself. The lifetime of such space systems would double.

12114

BIOTECHNOLOGY

European Position on Biotech Regulations Overviewed

3698a175 Brussels NOUVELLES DE LA SCIENCE ET DES TECHNOLOGIES in French Oct 87 pp 205-206

[Article submitted by CEFIC: "Biotechnology Safety and Regulations"]

[Excerpt]

Summary of a Position Recently Issued by Biotech User Industries

A number of international organizations, i.e.:
AMFEP [Association of Microbial Food Enzyme Producers];
CEFIC [European Council of Chemical Industry Federations];
CIAA [EEC Confederation of the Agro-Food Industries];
EFPIA [European Federation of Pharmaceutical Industries Associations];
GIFAP [International Association of National Agrochemical Producer Federations],
which are organized within ECRAB [European Committee for the Regulatory Aspects of Biotechnology], have taken a common stand on the safety and regulations regarding industrial applications of biotechnology. The industry position is based on the idea that any law regulating biotechnological applications should acknowledge the benefits of these techniques while also attempting to reduce the risks. In addition, European industry should be guaranteed the means to compete on equal footing with American and Japanese industry.

Considering the vastness of the biotechnology field it is impossible to include every aspect in a single law. Instead, a distinction must be made between conventional and modern biotechnology. Conventional biotechnology uses living organisms (viruses, bacteria) found in nature or produced without introducing foreign genetic material. This, in fact, is the familiar and sometimes old way in which cheese, beer, wine, and yogurt have been produced, to mention just a few applications. Of late, this technique has been used to produce new plant species and livestock breeds. These more recent applications of conventional biotechnology are achieved by altering an organism's genome through crossbreeding and/or using mutants. The same results can be produced in certain cases by applying modern genetic techniques.

Conventional biotechnology methods have been used for many years by the pharmaceutical, chemical, and food industries, as well as by the enzyme industry and in agriculture. All of these applications are extremely safe, both for workers and consumers and for the environment. Therefore, regulations do not seem necessary in this area.

It is another story for modern biotechnology, which is not governed by any existing rules or guidelines and which is of great concern to the public. These new technologies involve purposely releasing into the environment living organisms containing a foreign gene or gene component intentionally introduced through genetic engineering.

At first, regulatory groups should be flexible in defining risk, taking into account in particular the various levels at which it may occur. For example, risks, and consequently controlling measures, will not be the same for rapidly multiplying organisms (bacteria, viruses) as for slowly reproducing species (plants, livestock). This is why a graduated approach to risk assessment is necessary, going from a project's initiation to its commercialization, covering along the way lab experiments, small-scale testing, and field use.

Considering that some organisms travel beyond national boundaries, it is also important that risk assessment be on a common European standard and that it be mutually recognized in each country.

As for the actual regulations, appropriate measures should be proposed which address the public's legitimate concerns about potential risk while complying with the following criteria:

—creating a legislative and regulatory framework which will enable European industry to take full advantage of the possibilities offered by the new technologies, in view of the creation of both new products and new jobs;

—being simple and flexible enough to encourage research;

—maintaining and bolstering European industry's competitive position vis-a-vis the United States and Japan;

—allowing for adaptation to scientific progress.

Industry accepts its obligation to inform the authorities, according to an approved formula, of the outcome and conclusions of its risk assessment work at every step of the process. It expects the authorities to ensure that this information will be treated with all due confidentiality and will not be disclosed to organizations unable to respect its confidential nature.

Europe has been called on to play a leading role in the field of biotechnology. To do this, we must put an end to the current climate of uncertainty concerning future regulations of industrial applications of biotechnology. In addition, the new laws and regulations ought to not only offer adequate protection for workers, consumers, and the environment, but also give Europe the opportunity to develop a new industrial activity for which it can rightly claim to be the world leader.

25069

ADEBIO of France Promotes Biotechnology Industry

3698a144 Paris BIOFUTUR in French Dec 87 p 74

[Text] At the International Exhibition of Advanced Technologies (SITEF) on 3 October 1987, ADEBIO (Association for the Development of Bioindustries) held its general meeting. Pierre Monsan, scientific director at BioEurope and reelected ADEBIO president for 1988, presented an evaluation of the association's activities and future prospects.

Regional Branches

ADEBIO has continued its attempts to set up regional branches to foster activities that will increase and intensify contact and exchanges among those active in biotechnology. This led to the establishment on 15 April 1987 of the Lyons-Rhone regional center, which is supported by the local Biotechnology Club, as a result of the publication of the report on "the significance of biotechnology for the Rhone-Alpes region." Likewise, the Aquitaine regional center was formed on 30 June 1987. Today ADEBIO has a structured network of regional centers (see table) which will allow it to launch various activities in the coming months (particularly in conjunction with the BIOFUTUR magazine). (Footnote 1) (This has already culminated in the organization of a day, held during BioExpo 87, devoted to various regional policies in the field of biotechnology.)

Services

In 1987, in addition to distributing information abstracts to members, ADEBIO published a new edition of the ADEBIO ANNUAIRE DES BIOTECHNOLOGIES. (Footnote 2) (Speaking of this publication, Pierre Monsan and ADEBIO expressed warm and sincere gratitude and homage to Mr Grosborne who, after many years of dedication to ADEBIO, has decided to retire from the position of general secretary.) The appearance of this annual, produced in collaboration with the publishing house Editions Biofutur, has been greatly improved. Thanks to the sustained efforts of the general secretary, the number of references has increased from 1,500 to 2,000. Twelve-thousand copies of the annual have been distributed, including distribution at the BioExpo fair.

The information exchange project, based on the electronic bulletin board of CTBio-Provence-Alpes-Cote d'Azur, has become a reality with the creation of the Bioservice database in conjunction with the Bernard Gregory Association. This database, which can be consulted on Minitel (3615 - code GIE, Bioservice), provides information on available and requested training courses, jobs, and technologies, proposals for exchanges, and purchase and sales of equipment.

Funding

To encourage researchers to become business-minded and to give them access to potential sources of financing, ADEBIO took part in the creation of Finovebio, an initiative of Partenaire-Projet. This funding pool will be housed at the Compiegne University campus and will consist of a consultant network of top-ranking biotech scientists. This network will rapidly and efficiently judge the feasibility of a project and encourage the support of financial and industrial partners interested in being involved in its implementation.

Reflection

The theme of reflection suggested this year to the regional branches is that of biotech training. It has become increasingly obvious that the constantly expanding practical and theoretical training facilities in biotechnology do not always meet the demands of the biotech business. ADEBIO seeks to tailor training courses to the real needs of industry, starting by trying to define these needs as accurately as possible. Before the end of the year, a synthesis of the results of this analysis will be presented on a national level.

Internationalization

ADEBIO's international breakthrough was underlined by the presence of a Walloon [French-speaking region of Belgium] and a Brazilian delegation during the presentation of the chairman's report, as well as by the presence of Prof Saburo Fukui, vice-chairman of BIDEC, who spoke at the general meeting about the current state of biotechnology development in Japan. Furthermore, a meeting has been planned next month with BIDEC leaders to strengthen the ties between ADEBIO and BIDEC, which plays a very dynamic role in Japan. One of the objectives of this meeting is to discuss the organization of a French-Japanese, or more accurately, European-Japanese, meeting in Paris in July 1988.

The projects initiated in 1986 have produced several concrete developments in 1987 and the president, Pierre Monsan, declared that this objective was to step up ADEBIO's regional, national, and international activities for another year.

[Box]

Regional ADEBIO Centers:

Alpes
General secretary: Paulette Vignais
Research Director, CNRS [National Center for Scientific Research]
Nuclear Research Center of Grenoble (CENG)
BP 85 X, 38041 Grenoble
Phone: 76.88.30.36

Alsace
Regional secretariat: Pierre Hoehn
6 rue Griesheim, 67200 Oberschaeffolsheim
Phone: 88.81.22.22 - x 428

Aquitaine
President: Professor Daniel Combes
Experimental Biocenotic Institute of Agrosystems
UA CNRS 340 Avenue de l'Universite, 64000 Pau
Phone: 59.92.31.47 or 59.92.30.00

Brittany
General secretary: Mr Blanchard
Technology consultant at Societe OTV Ouest
10 rue du Sergent Guihard, 35003 Rennes
Phone: 99.36.38.49 or 99.36.29.95
(CRITT [Regional Center for Innovation and Technology Transfer])

Lorraine
General secretary: Francois Gautier
Promotech
10 rue Isabey, 54042 Nancy

Provence-Alpes-Cote d'Azur
Vice president: Patrick Alleman
CT-Bio
20 boulevard Carabacel, 06000 Nice

25042

French University Establishes New Biotech Institute

3698a145 Paris BIOFUTUR in French Dec 87 pp 74-75

[Unsigned article: "The Biotechnology Institute of Nancy"; first paragraph is BIOFUTUR introduction]

[Text] Biotechnology has now entered an intense industrialization phase. The aim of the Biotechnology Institute of Nancy (IBN) is to serve as an interface structure for more efficient transfer of discoveries and know-how from university laboratories to benefit industrial innovation.

An Original Undertaking in France

Competitive R&D in biotechnology requires a critical mass of competence and resources. Right from its start-up, IBN therefore wished to associate with a maximum number of university and socioeconomic partners: the Universities of Nancy; the national research organizations such as CNRS [National Center for Scientific Research], INSERM [National Institute for Health and Medical Research], and INRA [National Institute for Agronomic Research]; the regional authorities, and commercial companies. Thus, under the biotech umbrella, a totally original multidisciplinary scientific group was formed including teams working on genetics, biochemistry, microbiology, chemistry, and process engineering. These teams belong to the faculties of science, pharmacy, and medicine of Nancy 1 University and to the engineering school of the National Polytechnic Institute of Lorraine [INPL].

In addition, it should be noted that Nancy is also one of the main training centers in biotechnology: It has engineering schools (ENSAIA [National School for Advanced Studies in Agronomics and the Food Industry] and ENSIC [National School for Advanced Chemical Industry Studies]) for basic training, institutes issuing master's degrees in biochemistry and doctor's degrees in microbiology and enzymology. Research training is provided through doctoral work at the University of Nancy 1 (biology applied to nutrition and bioindustries, metabolism of medicines and clinical pharmacology, biological and medical engineering), at the INPL (biotechnology and food industries), and within the scope of the new FIRTECH [Engineer Training Through Technological Research] center for process engineering. There are also specialized medical, pharmaceutical, and odontological training courses. Moreover, beginning in 1990, basic training courses will be available at the future Biotechnology High School.

The Institute's Priority Research Topics

The laboratories that make up the IBN are for the most part associated with CNRS or INSERM and develop their own research programs in their respective disciplines, but they also collaborate in cooperative projects. Ongoing research mainly involves the health and agro-food sectors:
- animal cell cultures for the production of monoclonal antibodies and proteins used for therapy or for biological reagents;
- production of enzymes through recombination of microorganisms, associated to enzyme remodeling;
- agro-food fermentation: production of lactic bacteria, beer, amino acids;
- biological treatment of effluents;
- purification of biomolecules: chromatography techniques, supercritical extraction;
- sensors and process automation.

These projects benefit from contracts from domestic European organizations. Assistance from the Regional Council of Lorraine, the General Council of Meurthe-et-Moselle, and the Nancy Urban District was decisive in the start-up of the IBN projects.

The Strategy of Industrial Transfer

Transfer to and implementation in industry and the creation of new economic activities are the institute's priority objectives. Yet bioindustry companies are very diverse in size, activities, and level of technology. Therefore, the IBN has different types of relations with industry.

Research subcontracting involves, for the most part, large groups and often entails medium- and long-term programs.

The institute develops new products, processes, or equipment which are its own property, but which are subsequently implemented by French companies. Recent examples of such transfers are sensors for fermentors and various reagents.

Several small- and medium-sized businesses have recently been formed by Nancy teacher-researchers to ensure direct implementation of their findings. Providing scientific and technological support to these companies is one of the priorities of IBN, which seeks to encourage the creation of new companies and thus extend the network of small- and medium-sized biotech businessesin Lorraine.

Moving Towards a Biotech City

IBN's eventual objective is to pool the expertise of university, industrial, and financial bodies in view of conducting projects which could lead to new economic activities. This cannot be achieved without pooling the heavy equipment. The first pilot equipment will soon be installed in a joint center, the embryo of a future biotech city.

The IBN and this biotech city will enable the city and region of Nancy to enjoy maximum benefit from industrial spin-offs of the Lorraine research potential to prepare for the changes on the horizon.

For further information, contact: A. Bagrel, general secretary of the Nancy Institute of Biotechnology, faculty of pharmacy of Nancy University, 5 rue Albert Lebrun, 54000 Nancy.

[Box, p 75]

Small- and Medium-Sized Businesses Coming from Biotechnology in Lorraine

Four R&D companies have come out of the Lorraine universities and are doing innovative work in the biotechnology field. Two of them jointly offer original extraction processes, the other two are more geared toward the area of laboratory reagents.

Separex conducts separation processes on request. This company uses high-performance gas or liquid chromatography for solving fractionation problems which cannot be solved by conventional techniques. Three types of products are offered: study and development of fractionation techniques for industrial clients, design engineering for extraction units, and separation processes ranging from a few grams to several tons. Separex has joined forces with **Prochrom** (formerly Chromatelf) to achieve its goals. Set up at the same site of Champigneulles, Prochrom designs, manufactures, and sells equipment: It is the only owner of patents on the axial compression technique for filling high-performance liquid chromatography columns of industrial dimensions.

In the field of laboratory reagents, **Stabiligen**, as its name indicates, has developed stabilization processes for enzymes, proteins, and substrates. This company offers control devices for clinical biology and immunological reagents for dosing medicines and food contaminants. It produces small quantities of immunogens, antibody-secreting clones (polyclonal and monoclonal), or metabolites from medicines or poisons. Stabiligen also develops reagent kits which, after tests for specificity, precision, accuracy, stability, and practicability, can be produced industrially.

In December 1986, a new company was created at the Nancy-Brabois technology site: **Bio-France Reactifs**. This firm develops, manufactures, and markets reagents for clinical biochemistry, hematology, and immunology, specifically for etalons and control serums.

In addition, it develops defined composition mediums and specific separation mediums for cell culture.

Separex and Prochrom,
Chemin des Blanches Terres, BP 9, 54250 Champigneulles.
Phone: 83.31.24.24 (Separex)—83.31.22.44 (Prochrom).

Stabiligen,
30 rue Lionnois, 54000 Nancy.
Phone: 83.35.69.62.

Bio-France Reactifs,
15 rue du Bois de la Champelle,
Parc d'activite de Brabois, 54500 Vandoeuvre-les-Nancy.
Phone: 83.27.00.62.

25041

British Animal Cell Program

3698a146 Paris CPE BULLETIN in French Dec 87 pp 12-13

[Text] The SERC (Science and Engineering Council) and five industrial companies—Beecham, Glaxo, Celltech, Porton International, and Wellcome Foundation—will provide 1 million pounds in funding over 4 years to a new biotechnology program for animal cell research. The program's goal is to apply the techniques succesfully used for cloning proteins in bacteria, in particular E. coli, to animal cell cultures.

Bacteria have drawbacks which, in theory, the use of mammalian cell cultures could overcome, but these cells grow less rapidly, produce proteins more slowly than bacteria, and the introduction of genes is more difficult. Therefore, research aims at increasing the productivity

of the animal cell cultures used for cloning proteins, and at enlarging the range of products they generate by improving the techniques necessary for inserting genes in animal cells.

Six university teams—Oxford, Kent, Surrey, Strathclyde, Glasgow, and the Polytechnical University of Manchester—are involved in this research, which is coordinated by Dr J. Clegg and by a committee made up of representatives of SERC and the aforementioned companies.

25063

First Phase of Italy's 'Icaros' Biomedical Project Satisfies Objectives

3698m284 Milan ITALIA OGGI in Italian
3 Mar 88 p 27

[Article by Simonetta Guidotti: "An All-Italian 'Spare Heart'"]

[Text] Rome—A total of 215 billion lire for a spare heart made in Italy. This is the estimated cost of completing the Icaros project for the research and production of cardiological equipment, scheduled for 1991. While the temporary heart using valves made in Italy is almost a reality, we will have to wait until the year 2000 to have a permanent artificial heart available throughout the world.

This piece of news was reported by Luigi Donato, the director of the Icaros project, during a press conference held yesterday in Rome. The promoters and the manufacturers involved in the project also took part in the press conference, along with Luigi Rossi Bernardi, head of the CNR [National Research Council], Cesare Romiti, CEO of the Fiat Group, and Antonio Ruberti, the minister for scientific research. Icaros is the first project approved under law 46, which ratifies a "national program" for economic and scientific cooperation between private industry, public sector organizations, and universities.

Taking part in the project launched 2 years ago, are the Ministry of Scientific Research with an appropriation of 105 billion lire, the CNR with 20 billion lire, IMI [Italian Institute for Financing Personal and Real Property] with 35 billion lire, and other firms led by Fiat's Sorin Biomedica company.

Two years from launching, the project seems to be operating to everyone's satisfaction, especially Fiat's. As Romiti remarked: "In this first phase, the Icaros project has achieved the goals we set for it." The current "declared goal," Romiti said, is to become the European market leader, and he went on to say that: "In Italy, the conditions exist to create a European biomedical industry, and we are trying to move our bioengineering sector in this direction." This is controlled by Snia-BPD, a group which, according to Romiti, "must aim for greater development in advanced sectors not related to the automobile industry."

According to a report prepared by Tecnobiomedica (the IMI firm coordinating the project), Italy is the fifth largest biomedical market in the world. However, notwithstanding the extensive development that has taken place over the last few years, the technological demand in the field of cardiovascular disease far outstrips Italian production, with the result that there is a general dependence on foreign suppliers. The Icaros project aims to overcome this condition of inferiority. Ruberti maintained that: "Bearing in mind the expected results and their application on an industrial scale, we can expect to increase current production by a factor of 10. This means that there is a real possibility for Italian industry to achieve a leading position in this sector."

The development of Italian technologies, products, and components that are competitive at world level is thus one of the major objectives of the program. Fiat is not the only firm interested in the project: IRI [Institute for the Reconstruction of Industry] and a group of small firms are also taking part.

In the financing system adopted by Icaros, the public-sector firms invest the revenues from the commercial application of the technologies initially available and the subsequent product developments made at each technological level. The National Research Council has a double function: to provide guidelines for research studies, and to evaluate the clinical use of the products being tested. The IMI Fund for Applied Research is responsible for establishing new objectives for the products on the basis of the availability of the new technologies.

For Rossi Bernardi, Italy is experiencing a golden age in the field of cardiovascular research. The head of the CNR mentioned the recent achievements made in this sector at the hospitals of Bergamo and Pavia, accomplishments which are "also due to Icaros and to the agreement signed with the Fiat Group."

In his speech, the research minister stated that "the availability of new Italian technology and products aimed at reducing the number of hospital admissions will make it possible to rationalize utilization of the structures of the Italian national health system."

The Icaros Project in Figures.
Current and Projected Funds (in millions of lire)

Source	Already Allocated	Projections	Total
CNR	5,000	15,000	20,000
Finance Ministry	45,000	60,000	105,000
IMI	10,000	25,000	35,000
Industries (self-financing)	15,000	40,000	55,000

08615

COMPUTERS

New European Standardization Organization for Factory Automation

3698a139 Amsterdam COMPUTABLE in Dutch 15 Jan 88 p 17

[Article by Ate van Eek: "SPAG Counterpart Focuses on MAP/TOP: CCT, the Offspring of an ESPRIT Project"; first paragraph is COMPUTABLE introduction]

[Text] Brussels—The factory automation sector in Europe now has its own organization to ensure that manufacturers and suppliers build appliances and systems in compliance with current standards. The organization is a continuation of the ESPRIT CNMA [Computer Networking for Manufacturing Applications] project and shall also develop testing tools.

According to the English electronics newspaper IDB, the members of the new European CCT [CNMA Conformance Testing] group include Acerli (an association of test departments of major French companies), BMW, British Aerospace, Bull, the Fraunhofer Institute, NCC [National Computing Center], Nixdorf, Olivetti, and Siemens. SPAG—the OSI [Open Systems Interconnection]-oriented Standard Promotion and Application Group—is also participating in CCT. Cooperation with the American Corporation for Open Systems (COS) will be established.

First Project

CCT can be considered the continuation of ESPRIT project number 955 aimed at finding a European solution to the standardization problems of industrial computer networks. The project participants decided to set up the CCT in cooperation with some other companies and organizations after they had been requested by the American Society of Automobile Engineers to conduct MAP/TOP tests. The organization is expected to need 2.5 million guilders. Half this amount could be financed by the European Community. The testing tools developed by the consortium could be marketed by SPAG. It is also possible that products developed in cooperation with COS or products designed by the separate organizations could be exchanged. The first CCT project, commissioned by the United States, involves conformance testing to MAP/TOP and OSI standards of systems for the Enterprise Network Event (ENE)'88 International in Baltimore, Maryland, where products of different manufacturers will be installed in an operational environment for the first demonstration of the 3.0 version of MAP and TOP.

The ENE'88 will be held at the Baltimore Exhibition Center from 6 through 9 June. The stands taking part in the demonstration will be interconnected via two local area networks. One will be based on the 802.3 standard, the other on the 802.4. More information on the specifications of the 3.0 version to be used in Baltimore can be obtained through Michael Tew of the MAP/TOP Users Group, One SME Drive, PO Box 930, Dearborn, MI 48121.

25068

Summary of French Neural Network Research

36980234a Paris ELECTRONIQUE ACTUALITES in French 19 Feb 88 pp 1, 11

[Article by D. Girault: "Neural Circuit Research Pinning Hopes on Pattern Recognition"; first paragraph is editorial lead-in]

[Excerpts] The rising star of the electronics world, neural circuitry is capable of mimicking human behavior at its basic level, the neural network and brain. Designed to recognize patterns, the upsurge since 1985 in colloquiums devoted to the subject is a tribute to its success. The latest example is the nEuro'88 colloquium, presided by Mr G. Dreyfus, professor at ESPCI, which will be held next June on the campus of the Paris Physics and Industrial Chemistry College (ESPCI).

Active European Research

Europe is active in this field, which does not enjoy as much private sector support here as it does in the United States. In Europe, the companies involved are Siemens, Thomson, Philips and Plessey. The BRAIN program (short for Basic Research in Adaptative Intelligence), which has a budget of Fr7 million, has been set up and comprises a neural network job subroutine for data processing (pattern recognition and information processing), and a second project to define the contribution biology can make to pattern recognition research.

As part of the ESPRIT 2 program, EPSCI has received funds for a project to construct a neural processor (including integration of the processor slice). Thomson is working on a computer-simulated neural tool.

EPSCI To Build a CB With "Integrated Learning" on the Chip

Mr Dreyfus informed us that France in active in this area, as shown by the contract between DRET and EPSCI to build a CB using 2 μm line width CMOS technology and incorporating an integrated contents addressable memory with its "learning" built into the chip. Its capacity, calculated in neurons, is 64, which could pave the way for a 400,000 transistor circuit. The College will use it for studies of failure tolerance, a critical factor in the ultimate use of these machines for military, spacial and industrial applications. It is likely the foundry work will be done by ES2, which indirectly supplied ESPCI with a Solo 2000 station through the system used to set up the Paris Microelectronics Center (which purchased several). ESPCI will handle neural design, the Polytechnical School silicon design and ES2 the foundry work.

ESPCI has also received funding for the "Merging Physics and Biology" program, initiated by the Ministry of Industry and Research, whose goal is the construction of a transputer-based simulator. This "neuro-computer" is based on an IBM PC, a transputers card and a software program adapted for the purpose.

Since optics seems to be perfectly suited to parallel processing, (photon lines do not interact), Jessy de Toulon and EPSCI have jointly submitted a project for funding to CNET. At stake is the construction of a neurocomputer 8 times more rapid than the Apollo stations, based on the 68020. It requires a network of 512 neurons.

Finally, interdisciplinary research on neural networks is being conducted by the CNRS, and the University of Grenoble, ESPCI and Polytechnic are collaborating within the GCIS.

[Box p 11]

nEuro'88

The nEuro'88 Congress will be held in Paris from 6 to 9 June, 1988. The purpose of this first-ever European conference, organized by the Paris Physics and Industrial Chemistry College (EPSCI) and the National Telecommunications College (ENST), is to bring together primarily European, but also non-European, researchers involved in this discipline. Specifically, the conference will discuss memory and learning models, perception, motor control, problem-solving methods specific to neural network help, artificial network architectures, achievements in optics and electronics, and applications. For additional information, contact G. Dreyfus, 10, rue Vauquelin, 75005 Paris.

09825

FACTORY AUTOMATION, ROBOTICS

FRG, Norway Report First Results From Joint CAD/CAM Project

36980246 Coburg MASCHINE UND WERKZEUG in German Mar 88 pp 42-46

[Article by Brigitte Michel: "German-Norwegian Joint Project Develops CAD/CAM System: Integrating Information Technology in Production"; first paragraph is MASCHINE UND WERKZEUG introduction]

[Text] A recently concluded German-Norwegian CAD-/CAM development project shows how meaningful cooperation can result in new findings. The goal of the undertaking was to develop modern CAD/CAM tools and systems and to prepare them for industrial use. The idea was to thus strengthen the productivity and competitiveness of the manufacturing industries.

The first usable results of the APS [Advanced Production System] development project were presented by those responsible for the Norwegian-German CAD-/CAM cooperation at the end of November 1987. The joint project was set up by the NTNF [Norwegian Technical and Natural Sciences Research Council] and the BMFT [Federal Ministry for Research and Technology] and begun in 1982. The BMFT provided a total of approximately DM 20 million. The industrial project partners had a 50 percent interest in the primary costs.

The goal of the project was to develop and test a modularly designed, integrated program system for CAD/CAM applications, especially in mechanical engineering, and to make this system available to industry as software components and as the basis for further developments. The main idea was that the productivity and competitiveness of the German and Norwegian manufacturing industry be strengthened.

Furthermore, there is hope for an increase in the efficiency of the independent software and systems suppliers, as a response to the major investments in the CAD market and as a further alternative to turnkey solutions. The colleges and research institutes involved, together with the participating software firms from the FRG and Norway, gained in this production technology project a good opportunity to take future-oriented development steps. On the German side, the participants included five industrial partners, the IPK Fraunhofer Institute for Production Facilities and Construction Technology, Berlin, and the WZL Laboratory for Tool Machines and Operations of the Rhenish-Westphalian Technical College, Aachen.

Integration Possibilities Explored

The international joint project was realized in two phases, the "short-term phase" and the "long-term phase." The short-term phase lasted from 1982 to 1984 and was characterized by studying and exploring the integration possibilities of already existing or modified software products. During this period, work was also begun on individual focal points and on the geometric modeler. This plays an important role within the overall APS plan and is linked with the construction and work planning system by way of a defined system interface.

In the long-term phase, from 1985 to 1987, effective prototype modules were developed further and incorporated into the system environment of the software houses. Research on the data structure of a manufacturing operation strengthened the ability to offer integrated systems.

For the sake of gaining a better overall view, the APS project was divided into subprojects, as follows:

- product structure and data model,
- 3-D construction of mechanical parts,
- technological work planning,
- special construction tools,
- modules and systems.

The product structure and data model subproject was supposed to find, for example, fully integrated solutions for the overall range of commercial-technical-organizational tasks in a manufacturing operation. From suppliers, this requires the ability to provide a clear picture of all relevant data, their flow and their availability for subtasks.

In technological work planning, work plan systems were developed that encompass nearly all technological areas, from turning and milling to welding and drilling at processing centers. In addition, the system is expanded to include graphic simulation of operating cycles, connection to production planning systems, expansion of the connection to NC parts programming and CAD as graphic-interactive components.

In man-machine communication as well, APS did significant work on basic functions such as improving the dialogue on the terminal screen and systematizing the data structure.

Geometric Modeler

The basis and focal point of various CAD/CAM systems, as well as the foundation for further developments in the graphic management of work piece stress, processing and procedural studies—for spray-painting automobile body parts, for example—is the geometric modeler. In general, the geometric modeler permits the computer-internal representation, generation, manipulation and linkage of three-dimensional bodies. In the "Advanced Production System (APS)," it is based on two previous developments, which it combines. First of all, there is the "Compac" system by IPK in Berlin, which was developed for analytical bodies. In contrast, the second system, "SS" [Skulptured Surfaces] by SI in Oslo is particularly well-suited for free-form surfaces and bodies with these complex surfaces.

The geometric modeler combines the very efficient manipulation of analytical components with the high flexibility of free-form surface configuration. Moreover, it allows determination of the intersection lines and contours, as well as the formation of profiles and the generation of projections with extraction of concealed edges and surfaces. The most recent result is the possibility of inputting hand sketches and handwritten measurements and of editing two-dimensional projections for 3-D modeling with the "Casus" system by IPK. The geometric modeler is also the basis for the 3-D part of the "Technovision" 2D/3D-CAD/CAM system by Norsk Data. This system environment contains all the hardware and software functions needed for a present-day CAD/CAM system, for input, maintaining data, output and interfaces to other areas of tasks in a manufacturing operation.

The construction process provides a concrete form of the idea and principle of that which manufacturing is to realize at a later point. This means that graphics, drawing and the manipulation of drawn designs first appear at the very bottom of the list. Much more important is the geometric model for a real part; the best thing to have, however, is a "geometric tool box" that supports the route from the conceived function to the main functions of the components and parts. This type of "top-down construction system" was drawn up at WZL in Aachen using the geometric modeler and presented as a prototype.

From the planning documents, such as the drawings or data of the geometric modeler, and the technological constraints, such as the machinery, tools and raw materials, the necessary job-scheduling data—including those for PPS systems—are drawn up for manufacturing planning. These include:

- parts lists for the end product,
- work plans for the machine, hand and assembly sites to be used,
- processing cycles for the individual machine,
- processing and set-up times as a basis for job-scheduling and calculation.

Admittedly, the roles for these planning steps are clearly not to be found in the literature or in norms. For this reason, the APS "technological work planning" subproject developed its own methods and software for this area. In the technical domain, the following has been

completed thus far: turn processing, drill processing, inspection, sheet metal processing, welding connections and the clamping of turned parts and prismatic work pieces.

Flexible Work Planning

In order to do justice to the multitude of parts, processes and materials and to the rapid developments in a manufacturing operation, there must be a particularly flexible technical work planning system. The road to this development is through the generation of a truly dialogue-capable module assigned to a family of parts, whereby the current properties are indicated or changed externally during the input phase. This route is described by the Exapt house with its "Capex" system, which determines, largely automatically, machine sequences, work cycles and working times in a dialogue with the planning engineer, and then passes this information along to PPS systems, NC work scheduling and others. These technology algorithms, drawn up under APS, are currently being integrated into "Capex."

With very unambiguous product spectrums, a route using variant planning is more appropriate. Here, the two companies Kvaerner Brug, Oslo, and Sintef, Trondheim, producers of off-shore parts, turbines and freight cars, have developed an efficient system, "Param," which can be adapted to other families of parts.

Further developments are currently moving in two directions:

- The filling in of the technical-scientific foundations (algorithms, formulas and procedures) for further and new processing technologies, such as milling and surface treatment.
- The use of modern methods of "artificial intelligence" in the sense of expert systems as a foundation for developments to support the planning of processing sequences and work cycles. Sintef has contributed initial experiences in this area with the prototype of an expert system for planning welding connections. From the very outset, the APS program has devoted a considerable effort to basic functions. Thus, improvements on the possibilities of dialogue on the screen have been drawn up, as has been the systemization of data structuring as the basis for coordinated activity by all data processing systems in an enterprise. A large number of software products and theoretical results are already available from this.

On the basis of product structure data model studies, Sintef and Kongsberg have implemented the "Tereg" drawing archives system in the CDM 300 CAD/CAM system, and developed the "Ipros" general production information system together with Kvaerner Brug. This is intended to give the planning engineer access to all necessary information, including graphics, and show the effective possibilities of integrated systems for the manufacturing industry. The Norwegian pilot experiences are also resulting in fundamental work on the product structure model.

Machine Elements in the Software Package

Classic machine element applications will continue in the future to be crucial for dimensioning calculation-supported constructions. The issue here was to incorporate tried-and-true and new processes as well as verification in a modern software package. Intensive cooperation with the WZL ensured the broad range of offered processes, such as tooth matching, shaft, drive fit, spring and so on as predetermination and verification. The "Conus-M" and "Ginpro" systems are currently available. The MBP and Partec system houses are working on integrating calculation with CAD systems. The WZL included these calculations in the "Design" prototype for the general construction process.

Intensive developments in the interfaces of hardware to software have resulted in comfortable, high-performance modules for screen-window management, graphic dialogue generation tools and linkage support to the actual user programs. Thus, the Norwegian company Ican was able to effectively increase the performance of its work stations with this. The "Tornado" data base, developed for CAD/CAM functions, also gained significantly expanded functions. APS gave it multi-user capability, distributed data storage with host and work stations, and a hybrid data model.

Among the directly tangible results are extensive and valuable experiences in using the comprehensive cooperation, project management, assessment and need on the market, long-term advancements in basic knowledge, such as in geometry, technical process planning, etc., and cooperation with pilot users.

12271

Details on New Aerospatiale Automated Riveting Workshop

Process Overview

36980247 Paris MACHINE MODERNE in French Mar 88 pp 41-44

[Article by Daniel Chabbert; first paragraph is MACHINE MODERNE introduction]

[Text] To enhance productivity and competitivity in furtherance of commercial successes to date, Aerospatiale at Saint-Nazaire has now completed the installation of a fully-automated riveting workshop designed primarily for the production of Airbus A320's, A340's and A330's. Result: The time required to drive a rivet (a single section contains 16,000 rivets!) has been reduced from 40 seconds to 7 seconds.

The bonding element most commonly used in the airframes of planes is the aluminum rivet. A modern plane, such as the Airbus A320, contains some 600,000 rivets. In the portion of the assembly for which it is responsible under this program (cockpit and the portion behind it back to the wing root) Aerospatiale Saint-Nazaire installs 29,000 of them. To enable the Saint-Nazaire production unit to step up its monthly output rate, considerably augmenting the amount of riveting to be done, in order to keep up with the increased rate of commercial successes being scored, it has become necessary to revise the manual and semi-automatic methods that have been used until now.

To meet this forthcoming additional load, the Saint-Nazaire Plant has also installed an automated assembly workshop occupying an area of 887 square meters.

Five CNC Axes

Involved as of now are subassemblies for the Airbus A320, and particularly that of the upper bell mouth of a section and of the lower panel of the forward part of the plane. These two subassemblies will constitute the main workload, for the time being, pending the start of production of the Airbus A340 and A330.

Made up, as it is, of three (two lateral and one center) panels, each 6 meters long by 2 meters wide, the upper bell mouth requires the driving of 16,000 rivets to produce it.

The assembly is done on a Recoules Preca 300 riveting machine, the largest such machine made to date by this French company. Five axes, numerically controlled by an Num 760F, move the panel, which is supported inside a frame with a capacity of 10m x 4m, and position it in the riveting "C" with an accuracy of 0.1 mm obtained through the use of two feeler-gage-type automatic correction systems, at which point the riveting cycle begins—drilling, countersinking, deposition of sealing compound in the countersink, selection of length and placement of the rivet, and clinching of the rivet—and is completed, all operations included, in 7 seconds versus the erstwhile 40 seconds. The three panels thus joined constitute what later becomes the upper bell mouth of a section.

Automation of the assembly stage involving the frames comprising the principal structure of the fuselage had—because of their perpendicularity to the skins—never before been undertaken, until now. Aerospatiale at Saint-Nazaire has also designed, jointly with the Italian firm Jobs, a machine for driving rivets in zones that until now, using traditional methods, have been difficult to access. This extremely compact machine, which has a Jobs 5-axis manipulator that transports a Recoules Preca Delta riveting head, drives rivets, up to 4.8 mm in diameter, automatically. A feeler gauge automatically corrects, as required, for deformations in shape of the structures. This same machine, after rotating its machining head 180 degrees, will be used in otherwise idle time to rout fuselages during manual mounting of the frames on the structures. To maintain the virtually continuous flow of subassemblies and tools from one station to another, a traveling-gantry crane capable of movement in five axes has been designed and built by Mace, a regional firm. This manipulator consists of a beam with a span of 36 meters, which moves on rails so as to cover the entire area of the workshop. A gripping automaton does the positioning by means of rotatory and rocking movements.

The different trajectories of this manipulator crane have been defined in advance by the (by means of Euclid CAD software) by the Aerospatiale Research Center, specifically to avoid potential collisions. The panels being moved are voluminous, fragile and costly pieces.

Moreover, the operation of the riveting workshop depends on leading-edge automation techniques based on a particularly sophisticated data processing concept. On the basis of graphic data transmitted by the Design Bureau at Toulouse, Aerospatiale at Saint-Nazaire has had to create, then develop and refine a software capable of handling the automaton and robotics problems connected with the two—the Preca 300 and Jomach 16—operating centers.

The driving of a rivet in a formed piece being defined by five movements (four translational and one rotatory), this three-dimensional program produces the necessary data for accurately defining the travel of the riveting head and the positioning of the pallet-carrier frame and the "C," thus bringing the practical points into close agreement with the theoretical.

These data are directly exploitable by a VAX 780 operations computer as regards everything involved in the assembly of pieces whose cross-section is cylindrical and whose components are curviform. This software will be further developed under the future Airbus A340 and A330 programs.

Investment of Fr14 Million

While the cost of this installation, totaling Fr14 million may seem high, the gain resulting from it is no less substantial. In a conventional (manual riveting) workshop, the total assembly time bordered on 858 hours. Now, that total has been reduced by 86 percent! Clearly, this has required a total revision of production methods, starting from scratch. Personnel costs have been reduced by a ratio of 13 to 1, with laborers replaced by technicians. According to Aerospatiale, the return on such an investment is realizable within not more than 3 years.

In view of the planned rise in output of planes—from 60 in 1987 to 86 this year to a projected 250 in 1995—Aerospatiale at Saint-Nazaire must expand this workshop. This year, it will buy a second Preca 300 riveting machine, immediately following which—to convert to a "just-in-time" mode of production (very little stocking

of parts prior to the final stage in the assembly line)—it will undertake the modeling of the workshop and its facilities, the remote loading of the CNC machines, and real-time end-to-end control of the entire operation. The workshop will be equipped with an automated storage warehouse for the panels, and certain operations will be automated, such as the drilling of the stringers and the application of sealing compounds.

Machine Details

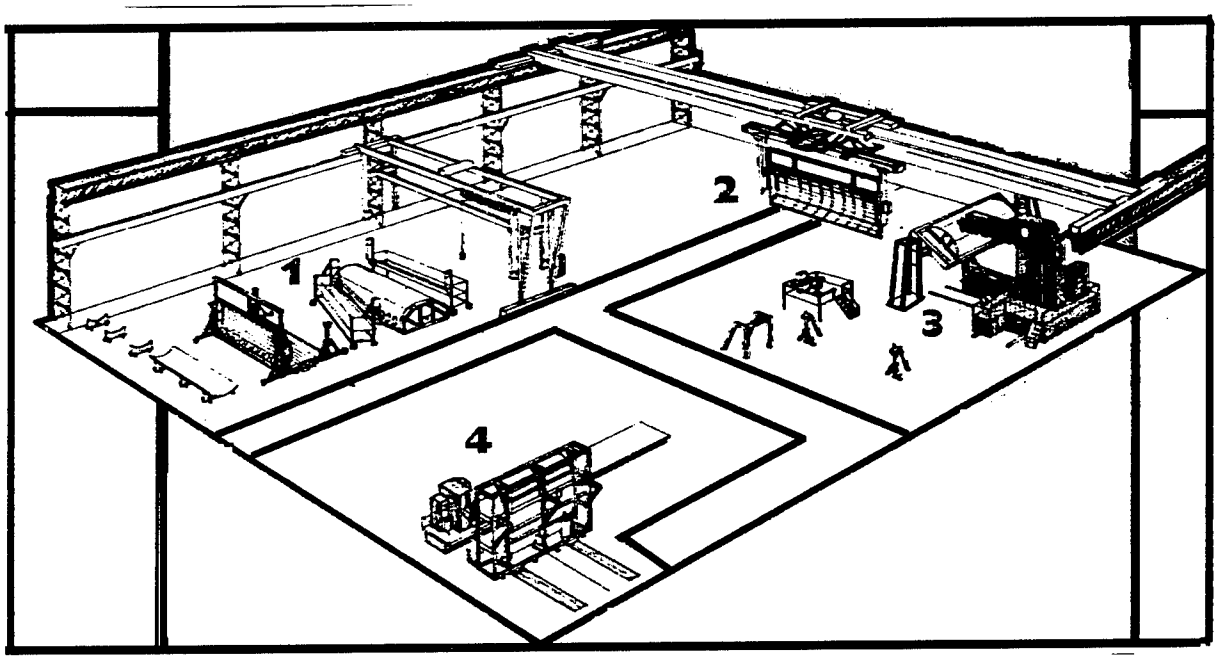
Paris L'USINE NOUVELLE in French supplement to 24 Mar 88 pp 18-19

[Article: "European First: Aerospatiale's Flexible Riveting Workshop"]

[Text] Aerospatiale at Saint-Nazaire has just completed installation of Europe's first flexible riveting workshop, for the production of A320 subassemblies. The objective was to reduce the costs of fabrication and handling of materials, improve working conditions (the multiple clinching of rivets is especially noisy), and keep pace with the rise in output of the Airbus A320 (eight planes per month by the mid-1990's). The overall investment of Fr14 million, which is expected to be amortized in 3 years, makes it possible now to complete the fabrication of a bell mouth in 120 hours. Prior to this, with a semi-automatic mode of production, the time required was 430 hours. The astounding gain of 86 percent is explained by the use of entirely new machines and by the automation of materials-handling operations.

Pending the start of production of the Airbus A330 and A340, the workshop (see above sketch of layout) will assemble two types of subassemblies: The bottom panel of the forward portion of the plane, and the upper bell mouth of Section 13/14, which is made up of three panels 6 meters long by 2 meters wide, and requires the driving of 16,000 rivets. The workshop (887 m^2) includes a manual-preparation zone (1), an automated overhead traveling crane with a span of 36 meters (2), which initially will feed the 5-axis riveting machine (3), then the frame-positioning machine (4). The entire workshop will shortly be operated by a real-time workshop control system developed at Saint-Nazaire. This system will pace production on a just-in-time basis, remote-load programs into the CNC machines, and will coordinate a multiplicity of factors. Final adjustments having now been made to the plant, it will be operating on a 2 x 8 basis by the end of the year. As of today, it employs from 6 to 10 persons (one supervisor per machine; the others working on preparation of the pieces).

[This and succeeding paragraphs are associated with illustrative photos otherwise uncaptioned and not reproduced here] After being rotated 90 degrees, the section is delivered to the 5-axis Jomach 16 machine that will be drilling and riveting the connecting components (frames), which are positioned manually. To check the deformations of the structure, the machine first executes a cycle of feeler-gauge measurements. The positions thus determined are transmitted to the CNC computer for correction. The drilling and riveting cycle can then begin. The rate of output here is 10 seconds per rivet. The finished piece is taken over by the automatic traveling crane and moved out.



The initial assembly is performed by a 5-axis Recoules Preca 300 riveting machine (an investment of Fr 5.7 million). The CNC system positions the panel under the riveting head, with an accuracy within 0.1 mm. The complete cycle (drilling, countersinking, application of sealing compound, selection of rivet length, placement and clinching of rivet) is completed in 7 seconds, versus 40 seconds heretofore. The clinching of the rivet, which is done by application of slow pressure, is noiseless.

The 5-axis, 2-ton-capacity traveling gantry (cost: Fr2.6 million) manipulates voluminous, fragile and costly components (rotation, inversion of frame) to feed the machines. To prevent rocking of the load and facilitate positioning of the frames on the machines, a pantographic solution was used. The complete set of trajectories has been memorized and the movements are executed automatically under the supervision of an operator.

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Philips Participating in Four New BRITE Projects

3698al67 Amsterdam COMPUTABLE in Dutch 22 Jan 88 p 2

[Text] Eindhoven—Philips has increased its share in BRITE [Basic Research in Industrial Technologies for Europe] by four projects. The Dutch multinational now also participates in research into interconnection techniques as well as mathematical models for computer aided design and manufacturing.

Furthermore, a prolongation has been requested for one project in which Philips was already involved, namely the search for new testing methods for optical storage techniques. In all, Philips now takes part in 10 BRITE projects.

BRITE is an EEC research program aimed at implementing advanced technologies in existing and more conventional branches of industry such as textile, machine construction, or material processing. EEC funding of the program now totals some 240 million guilders. The average duration of the 110 BRITE projects is 4 years.

In addition, the EEC has already earmarked 920 million guilders for the BRITE II follow-up program, according to Philips. Research efforts for the next 4 years have been established in an EEC framework program which shows that the BRITE II budget is two to three times bigger than the BRITE I budget.

25024

LASERS, SENSORS, OPTICS

Overview of European Efforts To Apply Lasers Industrially

36980245a Paris L'USINE NOUVELLE in French 31 Mar 88 pp 4-8

[Article: "Laser: Siemens Is Piling On the Pressure"]

[Excerpts] Taking advantage of the fact that, exhausted by their research efforts, laser manufacturers are marking time, Siemens, already well placed on the laser market with Rofin-Sinar, is purchasing Spectra Physics. The new number one worldwide is thus preparing to tackle tomorrow's market: the automobile industry.

Less than 1 year after taking over Rofin-Sinar in Hamburg, Siemens is completing a new step in the field of industrial laser by acquiring the specialized division of the U.S. company Spectra Physics. As a coincidence, at the very time when the German giant was announcing its decision, Cilas-Alcatel, one of the few French laser manufacturers, decided to eliminate 226 jobs, i.e. half of its personnel. The CGE [General Electricity Company] subsidiary will focus its efforts on military lasers, although it will not give up industrial lasers.

These two major events illustrate the worldwide battle in which industrial laser manufacturers are currently engaged. Because markets are not as large as expected and because much has been spent on research, the day of reckoning has come. The stronger only will survive.

The emergence of the number one worldwide, Siemens—which also includes KWU [Power Plants Union], the German counterpart of Framatome (excimer lasers)—occurs after much upheaval. Last year, Spectra Physics had already been acquired by Ciba-Geigy. From now on, the Swiss group will retain only the scientific and medical operations and is therefore selling the industrial laser operations to Rofin-Sinar, which itself has now been taken over by Siemens. "It costs several millions of deutsche mark to develop a laser," Samuel Simonsson, chief executive officer of Rofin-Sinar explained, "and we invest 15 percent of our sales in research. The financial strength of Siemens will enable us to increase our effort in this field and help us implement our policy of becoming established worldwide."

Samuel Simonsson's strategy is now paying off. He becomes the number one worldwide in CO_2 lasers, with sales of about Fr200 million, at a time when the automobile industry is beginning to make massive investments in that technology. One example: the side rails of the new Fiat are welded by laser.

Industry remains the largest potential market for this technology (Fr3.2 billion). But the expected expansion did not take place: growth was expected to reach an annual rate of 30 percent per year; it hardly reached 9 percent last year.

Several reasons account for these poor results. First, the regression experienced by the electronics market in the past 2 years. "This sector, which accounted for up to 60 percent of solid laser sales (YAG [yttrium-aluminum garnet] lasers) has experienced a sharp decline," Gilles Ari, head of the French operations of the Canadian group Lumonix, confirmed. But manufacturers remain confident: "The introduction of laser in the machine-tool, automobile and aerospace sectors should enable our industry to progress on a wide front," Samuel Simonsson explained.

Lagging Behind

These three industries, in particular the automobile industry, will enable a laser breakthrough. Volkswagen, Audi and BMW were the first in Europe to bank on lasers. French manufacturers followed with a 1-2 years' lag. Thus, Renault is currently installing laser-cutting facilities at its Sandouville factory, and Peugeot already has a center of expertise on CO_2 lasers within its directorate of research and scientific affairs, in Velizy. That decision was taken at the highest level in the group. For a total investment of Fr8.2 million, the facility includes a 5-kW Rofin-Sinar CO_2 laser and several machines, including a Held gantry that will be used for cutting and welding tests.

It was the flexibility of the new tool that carried the engineers' decision: ease of transport (a single source can supply several work stations), no cutting force applied to the part, no wear, possibility to use it even in hard-to-reach places. The laser tool thus makes it possible to manufacture prototype parts without a punch-and-die type of tool, and without having recourse to manual methods for very small series. Time savings are considerable (50 percent vs. manual methods), and reproducibility and quality enhanced. Laser will also make it possible to accelerate the practical development of routing tools. A study is currently in progress at Citroen, in Rennes, the largest stamping center of the group; its goal is to define tool contours on the first try.

Still at Citroen in Rennes, another application using a low-power (1 kW) CO_2 laser in the upholstery department is about to be implemented. This does not involve merely the replacement of one process by another, but the redesigning of an entire plant around the cutting tool. Under the new organization, tense-flow operation will become possible and there will no longer be a plethora of seats. Whereas, for the BX car, each option requires a stock equivalent to nine vehicles, when a laser tool is used seat fabrication will start only 3 to 5 hours ahead of time.

Finally, on assembly lines, a cutting laser makes it possible to customize a vehicle at the very last minute. Economies of scale, no need for production management of different parts, etc. These are attractive assets at a time when options are plentiful. Volkswagen, the most advanced in this field, already has two lasers installed on its Golf assembly line, in Wolfsburg. Before, air vents and windshield washer openings were cut systematically right and left to correspond to the driver's seat, so as to avoid complex management operations and to work on large series (3,800 Golf are produced every day). The openings that were not used were plugged again. Today, two 400-W CO_2 lasers made by the British company Ferranti will cut only the openings needed, at a rate of 5 m/min. The gains achieved by elimination of the replugging operation, and the improvement in quality (no sealing problems) have enabled Volkswagen to recoup its investment within 6-8 months.

This, therefore, is already one market that suppliers of laser sources and systems are watching carefully. Indeed, the requirements of the automobile industry are estimated at one or two 500-W to 1-kW lasers per assembly line, i.e. about 10 to 20 systems per manufacturer. Other solutions are currently being evaluated. Witness the tests made by Austin-Rover with a 400-W YAG laser and a robot-guided fiber optic system to rout the quarter panels of its vehicles at a rate of 3 m/min.

Speed

The drilling market is also of interest to YAG-laser manufacturers, and they have already proved themselves in the aeronautical industry. The most advanced tests—drilling oil holes into cast iron connecting rods and crankshafts—appear to be taking place at the plants of a British automobile manufacturer. Formerly, stepped drills were used and demanded very long machining times. With a YAG laser, everything is much faster: the holes are drilled directly, at the ideal angle with respect to the surface (something which is not possible with a traditional tool). Lumonics, which developed its JK-704 for this application (an indication of the size of this potential market), claims that it takes only 1-1/2 seconds to drill a hole 0.5-mm in diameter and 15-mm long.

The only drawback of YAG technology is that the present operating rate does not exceed 75-80 percent. "This is due mainly to the need to change and adjust consumables (lamps, lenses, etc.)," Guy Brasselet, engineer at SNECMA [National Company for Aircraft Engine Study and Manufacture], pointed out. As for prices (Fr700,000 to Fr1 million), they are much higher than for electric-discharge machining (Fr400,000), but the latter is not as fast and flexible.

Eventually, car body welding will represent a much larger market. Using laser to weld car bodies would make it possible to reduce the vehicle weight by 30 percent, as rigidity would be improved and thinner sheetmetal could be used; also, weathertightness and corrosion resistance would be greater. These are attractive prospects, even though there is no lack of technical pitfalls. Hence a wide range of approaches.

Pilot Assembly Line

One of the solutions considered consists in replacing with laser spots the 100-120 weld spots which ensure proper body alignment. Thus, at its Vitry-sur-Seine plant, Sciaky, a leading European manufacturer of welding lines, has been working on this project for two years. The prototype facility is built around an 8-kW CO_2 laser which, through a distribution head, distributes the laser beam over 60-100 optical heads placed at strategic points around the car body (100-120 weld spots per minute). This year, Sciaky is planning to make a pilot line for a German car manufacturer. "Manufacturers are finally getting interested in using laser for welding," we were told by Georges Sayegh, Sciaky scientific director. "They even finance comparative economic studies."

Another approach consists in the continuous welding of car bodies, which assumes that the sheetmetal panels are perfectly lined up. This is a problem which has already caused some failures, in particular at Ford in 1973 (underbody welding). The problem has now been solved at Audi where 17 laser welds are made on the Quattro underbody; but it requires high- precision stamping.

Because gantry-type facilities are usually not flexible enough, engineers are working on robots whose arms would guide the laser beam. Fiat, at its Comau subsidiary, was one of the first to develop that type of equipment. But the foreseeable size of the market has attracted other companies: Kuka, a West German robot manufacturer well established on the automobile market, is currently developing a test plant with the U.S. laser specialist Coherent General. "It's worth it, since this application would require three or four lasers per production line," Marc Watremez, sales manager of Coherent General France, indicated. Each manufacturer could thus use 20-30 laser robots.

New Studies

The rise of lasers, illustrated by the commercial availability of the first 5-kW CO_2 lasers, will make it possible to undertake heat-treatment, surface-treatment and recharging tasks. "These are applications which mean a lot to the automobile industry," Jacques Adrien, in charge of advanced materials and technology at Citroen Industrie, explained. "But it also presupposes new metallurgical studies."

One of the first applications has to do with localized surface hardening. Fiat uses it to harden stamping dies. It is also possible to modify the chemical composition of the surface of a material by introducing an additive element or injecting a reactive gas (e.g. silicon on steel will improve wear and corrosion resistance). Another development orientation: the localized deposition of coatings on mechanical parts subject to considerable local wear.

[Box, p 6]

[Interview with Samuel Simonsson, CEO of Rofin-Sinar, by Philippe Escande: "We Shall Remain Laser Manufacturers"]

When it acquired the industrial laser operations of Spectra Physics, Rofin-Sinar became the world leader for this activity. Its Swedish CEO, Samuel Simonsson, 39, explains his strategy.

L'USINE NOUVELLE: What will the goals of the new Rofin-Sinar Inc. be?

Samuel Simonsson: First, to improve our positions on the American market and to produce on location so as to benefit from the current low rate of exchange of the dollar. The new company will also be in a position to expand its product line and coordinate research and development activities.

L'USINE NOUVELLE: How will the group be organized?

Samuel Simonsson: Its European headquarters will remain in Hamburg and will oversee the Munich and Milan subsidiaries. The San Jose and Detroit unit will be retained. The joint venture we have established with the Japanese Marubeni will handle the Japanese market from Tokyo. The new group will have a total staff of 275.

L'USINE NOUVELLE: 1986 and 1987 have been lean-cow years for companies in this sector. Is it over now?

Samuel Simonsson: We think it is. During the first years we experienced rapid growth, from 20 to 50 percent, but 1986 and 1987 saw a temporary saturation of the market, and a shift of manufacturers who turned, sometimes en masse, to the Europeans and Japanese. The Americans, focusing on scientific aspects, actually waited too long to shift to other technologies. Growth should increase again in 1988 and 1989.

L'USINE NOUVELLE: Will the automobile industry represent the main source of laser development?

Samuel Simonsson: Obviously, the automobile industry will play an increasing part in years to come, especially if 10-20 percent of the spot welding robots can be replaced in 5 years. But, on the other hand, the introduction of laser in branches such as machine-tools or the aerospace industry should enable our industry to progress on a wide front.

L'USINE NOUVELLE: Do you intend to do what many have done: to offer not only laser sources alone but complete machines as well?

Samuel Simonsson: That is out of the question. Our policy is to be a supplier to machine manufacturers. We are solely a laser manufacturer and we do not wish to compete with these manufacturers.

L'USINE NOUVELLE: Are you afraid of the Japanese?

Samuel Simonsson: Not on the European market. For the time being, their sales involve only standard equipment. The strong point of the Europeans is that they can always adapt themselves to the customer's requirements. This is the specific characteristic of this market, that systems manufacturers and laser manufacturers are expected to provide competent advice to the customer, no matter in what country. This is a service that the Japanese competition does not offer. Worldwide, it is certain that companies like Mitsubishi or Panasonic, which are now entering the U.S. market, will be among our competitors.

L'USINE NOUVELLE: Should we expect to see the number of manufacturers decrease in the next few years?

Samuel Simonsson: Yes. There will be a severe decrease. There should soon remain only about 10 manufacturers throughout the world.

9294

French Firm Designs X-Ray Tomography Unit for Industrial Use

36980245b Paris L'USINE NOUVELLE in French 24 Mar 88 p 50

[Article by Odile Esposito: "Nondestructive Testing; Scanners About to Conquer the Industry"]

[Text] Intercontrole is about to market the first European industrial X-ray tomograph.

For materials as well as for people, for flaws in the former and tumors in the latter, a scanner is unquestionably an effective testing tool. But the comparison stops there. Whereas the physician is faced with individuals of similar sizes and compositions, the manufacturer, on the contrary, wants to be able to examine parts extremely variable in nature and size. This difference accounts for the fact that, until now, materials scanners were mostly used in the laboratory.

Intercontrole, a subsidiary of the CEA [French Atomic Energy Commission], is setting out to offer, for the first time in Europe, an industrial X-ray tomograph. It will be marketed starting next June, and Aerospatiale is already interested and should soon place an order.

Aerospatiale plans to use it to test propellant tanks 2 m in diameter and 2 m high. The operation will last close to one-half hour. Under these conditions, it should prove difficult to install the scanning system on the production line! Why, then, choose this method over other nondestructive testing methods, X-ray radiography for instance? That is because tomography does not just detect flaws. It also indicates their size and orientation with remarkable precision, of the order of one thousandth. In addition, it will perform shape, assembly, dimension and density tests. As for the data acquisition time, it can be reduced if several detectors are used. All these characteristics are interesting for manufacturers who cannot afford to make mistakes, e.g. those in the nuclear, aeronautical or armament sectors! The scanner offered by Intercontrole and developed jointly with LETI [Laboratory for Electronics and Data Processing Technologies] has already several nice achievements to its credit; for instance, it was used to test the conformity of a turbo-jet engine injection vane and to detect cracks in a radioactive waste concrete drum.

All these experiments were made in the laboratory and the tomograph must now prove itself in an industrial environment. A large investment (Fr3- 8 million) that is likely to appeal to quality-conscious companies!

9294

FRG To Provide DM194 Million for Laser Research 1987-90

36980226b Duesseldorf HANDELSBLATT in German 18-19 Mar 88 p 8

[Excerpts] Funding in a total amount of DM194 million will be furnished by the Federal Ministry for Laser Research and Laser Technology during the period 1987-1990. This is supposed to create a foundation for highly developed know-how and modern technology, with the objective of enhancing and securing for the long term the competitive position of German industry, especially small and medium businesses that are potential users.

The Federal Research Minister Heinz Riesenhuber emphasized, when presenting his funding catalog, that 27 years after the construction of the first laser, the properties of laser radiation are now being used only to a limited extent in the processing industry, in medicine, in printing, in information systems, and in science. In industrial materials processing, the possible applications include cutting, welding, surface treatment and marking, but only a few processes have been introduced and especially they have been applied to only a few materials. Medicine likewise is routinely using lasers only in selected applications, for example in eye therapy.

The minister emphasized that the results of laser application are enticing in both areas. In medicine, retinal welding in the human eye, without operative interventions, is possible for the first time. This operation can be performed without incurring the costs of a hospital stay. Riesenhuber pointed out that laser research has been classified as an important key technology in all industrial countries.

As a funding model, Riesenhuber cited the association research, in which the research institutes and the corporations collaborate purposefully and with an appropriate division of work. An essential element of the association research is supposed to be the organized technology transfer between science and industry. By means of the association research, small and medium businesses especially are given the opportunity of participating at an early stage in the newest results of research and development, in collaboration with the research institutions, and to use these developments for their market-proximate product and process development. This is supposed to be especially true for the EUREKA Laser Project, in which small and medium enterprises, too, collaborate in the association, which extends all over Europe.

The minister then named three association research areas which have priority in terms of funding policy:

- EUROLASER association projects within the framework of EUREKA;
- association projects for working out basic material processes with lasers;
- laser technology and laser analysis.

The funds will be administered by the project manager, VDI Technology Center (VDI- TZ) in Duesseldorf. The recipients are enterprises in commercial business and research institutions which perform research and development work in the relevant civilian areas.

8348

Philips Develops Semiconductor Laser for Optical Disks

36980226a Duesseldorf HANDELSBLATT in German 16 Mar 88 p B7

[Excerpts] Phillips Laboratories have developed a semiconductor laser which emits radiation visible to the human eye. The laser consists of aluminum-gallium-indium-phosphide mixed crystals. It emits at a wavelength of 650 nm and therefore should be especially suitable for digital optical memories. The power of the output pulses is more than 0.1 Watt.

At the present time, a semiconductor laser emitting radiation at about 800 nm is used to read out the stored information.

But when the wavelength is smaller, the information density on the disk can be considerably increased.

The new semiconductor laser consists of several single-crystal layers of aluminum-gallium-indium-phosphorus compounds with different composition and doping. During a chemical reaction in a gas mixture, these layers grow on a gallium arsenide substrate. The scientists have recently succeeded in optimizing the growth technology. They thus obtain materials of such purity and perfect structure that the internal losses in the laser are minimal and thus light is generated with high efficiency.

Caption [Photo not reproduced]

A semiconductor laser in operation, radiating at 650 nm, that is in the range of visible light. The laser is situated at the front side of the small copper cube with an edge length of 2 mm, which takes care of the effective cooling. The oscilloscope image on the right top shows that the spectrum of the emitted radiation truly consists of only a single line.

8348

MICROELECTRONICS

Italy: CNR Project Director on Materials, Solid State Electronics

3698m258 Milan EO NEWS in Italian No 6, Jan 88 pp 1-4

[Interview with Prof Antonio Paoletti; date and place not specified: "Microelectronics: Europe Takes Stock"]

[Excerpts] Antonio Paoletti, director of the CNR's [National Research Council] finalized project on Materials and Devices for Solid State Electronics, has raised the question of whether the Italian microelectronics industry risks isolation from the rest of Europe "at a time when the number of initiatives is increasing just as the "Old World" is really beginning to take stock of its research structures—even though it is not said openly."

Our country must conform to the organizational standards established by our more technologically advanced European partners.

EO NEWS: Why this finalized project?

Antonio Paoletti: The reason behind this finalized project was to verify the extent of cooperation and coordination in this strategic sector between the research carried out in universities, government research bodies, and industry; it was also intended to develop know-how, up to the prototype development stage if possible, in sectors which are strategic for Italian industry.

This finalized project was conceived in 1980. An extremely precise feasibility study was carried out in which the industrial sector played a major role right from the beginning. The project entered the operational phase in September-October 1986.

EO NEWS: How is the project backed up financially?

Antonio Paoletti: The total figure available over a 5-year period is 127 billion lire; this must then be doubled because our financing mechanism follows the European Community model according to which a firm is required

to spend a certain amount, to which we then add 100 percent. We also ask universities to make available staff and facilities for a value equivalent to the appropriation. Thus we believe that approximately 250 billion lire is involved, a fairly substantial figure.

EO NEWS: What is your opinion of the current status of the Italian microelectronics industry?

Antonio Paoletti: The biggest problem with microelectronics is that it requires very sophisticated experiments to be conducted, which in turn require highly efficient organizational structures. You can well imagine that it is difficult to resolve these contradictions in this country. Sophisticated instrumentation costs money and efficient organization is difficult to achieve in Italy, particularly at the present time.

EO NEWS: Are you referring to the public sector?

Antonio Paoletti: Primarily the public sector, but the private sector also. Huge diseconomies exist in this country, but that is another matter.

EO NEWS: Let us get back to what we were talking about before.

Antonio Paoletti: Certainly. As things stand, what happens is that the people involved in microelectronics tend to move toward CAD or simulation, while only a few people are courageous enough to conduct microelectronics experiments.

Twenty-four companies, 22 CNR institutes, and 40 university departments and institutes are taking part in the finalized project. If we compare this with the commitment of our firms at international level—and we can use the ESPRIT program as a point of comparison—we see that only 5 firms, 2 university institutes, and 1 CNR institute of the group in the finalized project are also participating in the ESPRIT program. Of these eight bodies, four are working on subprojects involving CAD and only four are involved in experiments.

EO NEWS: Why is this?

Antonio Paoletti: Because the organizational standards, work times, and respect for deadlines imposed by ESPRIT are stricter than those required for the finalized project.

However, this is a very dangerous aspect because it isolates us from the rest of Europe at a time when initiatives are increasing in number and Europe is really beginning to take stock—even if it is not called this—of its research structures. Europe is assessing which firms and research institutions are first class, which are second class, and so on. This is what is actually happening.

We lack an organizational base—especially in terms of management and efficient administration—to accompany the organizational effort required to conduct scientific experiments.

However, we have been able to concentrate our resources in certain positive areas, thus overcoming the financing problem. The organizational obstacle still remains but there is very little we can do about this.

Overall, the results obtained so far have been fairly good, but the fact remains that the total effort has been modest, especially in terms of human resources. The finalized project appropriations do not permit government research bodies to hire extra personnel, because those involved in the research already have to be on the public payroll. The only thing I have been able to obtain is a few dozen scholarships, and a scholarship announcement was issued recently.

These are the constraints within which we must work, and I do not believe it is realistic to think we can relax them.

EO NEWS: What are the major themes of the finalized project?

Antonio Paoletti: After the first year of "brainstorming session," in the sense that people were left pretty much to themselves provided that they came up with reasonable ideas for valid proposals in areas of current interest, we started to identify sectors and goals to be pursued in a coordinated way.

For example, in the gallium arsenide field, we have the participation of Telettra and Selenia, as well as of a dozen or so university and CNR institutes doing the more basic work. The test vehicle in this case is a gallium arsenide amplifier operating at approximately 20 GHz. We do not think we will get as far as the prototype stage but hope to have something that will work. We hope to get to this stage in 3 years' time and this would really be an important first for us. The coordinator is Professor Giannini of the electronics department of the University of Rome; this project forms part of the optoelectronics and microwave devices subproject directed by Prof Vito Svelto of the electronics institute at Pavia University.

Then we have an initiative in the optoelectronics field coordinated by Misiano of the Selenia company which brings together a dozen or so firms and research institutes.

We are also trying to bring some order into the software used in CAD [Computer Aided Design]. This is being coordinated by Professor Antognetti of the Turin Polytechnic. In practice, what will happen from now on is that all the Italian universities working in the microelectronics CAD field will use the same software. This is an

enormous advantage. The software developed by Silvar Lisco has just been tested. In addition, I recently proposed a similar initiative in the physics of models.

We are working on a limited number of projects, about 10 in all; however, these take up all our resources.

We have only 300 people working on the entire project. This is a ridiculous figure compared with the figures we see in other countries. However, I can assure you that we have really done everything in our power. If you look at the companies involved, you will see that all the ones that count are there. This does not mean that they are working at full capacity on this project, because obviously they have their own production requirements as well.

We have been careful to maintain links with the Italian microelectronics program proposed in law 46, in the sense that Zocchi is the coordinator of VSLI activity in both programs. I must say that we are very happy with the level of coordination achieved and the spread of information. All the public sector researchers know what the firms are interested in, and the companies know what the public sector researchers are doing. However, I want to repeat that this is a problem of size. There are only a few people involved, against thousands of German and French researchers and tens of thousands of Japanese.

EO NEWS: Could we say that this lack of human and financial resources is the result of what we might call a "political" interest in the finalized project on the part of the firms?

Antonio Paoletti: No. The companies are genuinely interested in the project, and I must say that Italian firms are technologically advanced. The companies have know-how in many sectors that the universities do not have. The firms involved in the finalized project emphasize research which will have applications within 5-10 years. Unfortunately, with the dollar crisis, Italian firms are experiencing a difficult period economically, and the entire components industry is having difficulties—as are all firms with orders billed in dollars. However, if the results have been good it is because we have got into the habit of working together. The problem is that we are undersized for the job we have to do. This is a different story, because, if we are undersized, it is because we are graduating too few engineers; and if too few engineers are graduating it is because engineers still do not have the status which is their due in this country. There is an economic boom going on right now and economics is a field offering openings and prospects which unfortunately neither a degree in engineering nor physics is able to manage to provide, despite the commitment which is surely no more than is necessary to graduate in these fields. This is the nub of the problem. This country, which lacks a true and proper scientific tradition, is heading for some rough times ahead. All things considered, electronic engineers are poorly paid in Italy, because industry must be internationally competitive. However, in this country international competitiveness does not come into play in sectors such as public health, the postal service, and transporation. But let's change the subject.

EO NEWS: These are problems which are difficult to resolve in the short term.

Antonio Paoletti: Yes. But you have to discuss these problems. A firm loses market share if its production costs go up 10 percent.

EO NEWS: The prospect for Italy is greater technological dependence on foreign countries. Given this situation, would it be possible for government authorities to give more emphasis to international projects? Could we not become promoters of some large-scale research project and gather funds from foreign countries?

Antonio Paoletti: Italy does not have much credibility. A country where the postal service does not work does not have credibility. Unfortunately, we first of all have to prove at the international level that we are different from the general Italian run of the mill. We are accepted only after we pass this test. As far as ESPRIT is concerned, for example, we are putting pressure on firms to get moving, to get involved, because it is not only a matter of funds here. Another four finalized projects linked to electronics—robotics, telecommunications, optoelectronic technologies, advanced materials—are about to get off the ground; this means that the money is there. What we want is international comparisons and to obtain them we have to compare our work with our French, English, and German partners. But when ESPRIT 2 was presented in Rome, Milanese researchers and firms were not able to be present because of the airplane strike. It is inconceivable that such a thing could happen in a modern country.

08615

Belgium's SdM Leading in ASIC Design, R&D

3698a171 Brussels NOUVELLES DE LA SCIENCE ET DES TECHNOLOGIES in French
Oct 87 pp 129-130

[Article by Thierry Watteyne, director of Euridice, Societe de Microelectronique: "SdM: A European Vocation"]

[Text] The Societe de Microelectronique (SdM) is well known in Belgium—but also beyond the borders—for developing application specific integrated circuits, or ASIC's. As an independent company for silicon manufacturing, it can offer a complete range of technological methods from several manufacturers but, contrary to the majority of independent design houses, it assumes total responsibility for the product which is being developed and produced.

In addition to its customized design activities, SdM has led numerous internal R&D projects since its creation in 1981. Although initially they were mainly focused on microelectronics through the development of libraries or CAD software, these projects were progressively oriented toward certain application fields such as telecommunications, flat screens, terminals, etc.

This reorientation gave rise to significant activity at the systems level and to a line of data communication products which are now offered for sale by the subsidiary SdMA (Applied Microelectronics Company).

SdM now actively participates in two important EUREKA development projects under the aegis of the SPPS (Science Policy Planning Service). The first project, the European Workshop for Custom IC's, is conducted in collaboration with ES2 (European Silicon Structures), a pan-European company of which SdM is the Belgian partner.

This project, of course, belongs to the microelectronics sector and deals essentially with CAD and cell library problems. MOSES (Multimedia Open Systems European Standard), the second project, concerns networks and terminals. SdM's contribution is at the terminals level. In this project, SdM is associated with Bull-Copernique.

ES2: "European Workshop for Custom IC's"

ES2 was created at the end of 1985 by the big names in the European semiconductor industry responding to the increasing need on the European market for custom-made IC services and products which could be adapted to this market's specific character. ES2's objective is to offer a completely new service in this field:
— by integrating sophisticated design tools which allow designers to implement directly the systems that they design thanks to silicon compiling techniques;
— by assuring the rapid manufacturing of the custom circuits that they design, with prototype delivery within a few weeks time, regardless of the volume to be manufactured, and at a very competitive price.

Consequently, the emphasis is on CAD on the one hand, with high productivity design tools which are also intended for system designers, and on new manufacturing techniques on the other hand (direct writing on a wafer) allowing reduction in prototype delays and manufacturing costs. Insofar as ES2 appeals to all electronics engineers, it must be omnipresent and offer high-quality flexible services.

This policy of presence is carried out throughout Europe by a network of independent design centers with which ES2 has franchising agreements. Such an agreement was concluded in Belgium with SdM and led to the creaton of a dedicated design center named Euridice in Brussels in 1986. The center's objective is to offer its clients the interfaces which are best adapted to their needs, together with design expertise which will ensure necessary support and good project development. In practice, this is accomplished—depending on the case—by software training courses, software sales or rental, design assistance, or the assumption of complete control over circuit design.

The European Workshop for Custom IC's involves all subsidiaries of ES2 in several European countries, including SdM. It addressed significant CAD developments in which SdM participates, and also training, launches of design centers, and manufacture by Electron-Beam (France). The SdM effort (for the most part) within Euridice essentially consists of developing libraries to enhance the design system potential as well as the software interface and application potential allowing still greater flexibility and increased efficiency for system design engineers.

The MOSES Project

The second EUREKA project in which SdM participates is an ambitious project for the development of a network architecture and an improved terminal. The objective is to respond to the needs of a category of local network users who are essentially information consultants and geographically rather widespread.

SdM leads the development of a user terminal. It is a multimedia terminal allowing simultaneous display of computer data, images, and voice. Its main function is to consult data stored in the important multimedia server.

The development of such a terminal will obviously, for reasons of space and cost, involve specific integration. It becomes clear that both projects are closely linked, since the terminal's specific IC's will be conceived as a result of methods developed by the first project and will be manufactured by ES2.

Conclusion

Within ESPRIT and EUREKA, SdM has already been involved in European-scale projects both as a subcontractor of ACEC [Electrical Construction Works of Charleroi] for specific integrated component development and as an expert in this field. The recent work with ES2 via Euridice as well as direct active participation in two EUREKA projects clearly shows the European level of its know-how in both microelectronics and some of its application fields.

25063

New French, German Semiconductor Production Equipment Exhibited

36980233a Paris ELECTRONIQUE ACTUALITES in French 11 Mar 88 pp 1, 15

[Article by S. Dumontet]

[Excerpts] Zurich—Equipment for the production of future generations of 4-and 16-Mbit circuits was the topic that surfaced most this year at the Semicon Europa

Exposition of equipment and materials for the manufacture of semiconductors held in Zurich from 1 to 3 March. Actually, no new concepts were featured as such, but rather their materialization in the equipment that was exhibited: Microwave systems for the etching and deposition of thin films; 1-line steppers for the lithographing of lines thinner than 1 micron; new systems for the measurement of submicronic dimensions; and cold-wall systems for the deposition and direct etching of ASIC circuits by laser. So much for the principal trends. In general, the equipment exhibited had been redesigned for circuits of future generations, and featured: A generalization of versions for 200-mm wafers; reduction of particle contamination at the robot-manipulation level of wafers and equipment fronts; more and more extensive automation; increased rate of wafers output; and ease of maintenance.

Worthy of mention also is an announcement that is sure to attract attention—namely, the one by Nippon Kogaku (NIKON) concerning the opening in April of a semiconductor manufacturing equipment sales subsidiary in West Germany.

The firm stated that the opening of this subsidiary "represents its determination to share in this promising market."

As for France, the equipment manufacturers we met there appeared to us, on the whole, only very moderately optimistic; the market projection as seen by them was rather flat. In particular, in the view of some, the recent mergers among semiconductor manufacturers do not point in the direction of massive investment in the immediate future (given the shutting down of units that would otherwise lead to an equipment glut). Others, such as Applied Materials, expect SGS-Thomson to invest heavily in 1988-89. Applied further expects that investments will also be taking shape following the entry of Philips in Phase 2 of the Megabit Project.

Microwave Systems for Etching and Deposition

An etching and deposition technology that seems to be developing involves the use of ECR [electron cyclotron resonance]. Electrotech acquired a license from CNET as of some time ago to use this process for etching (see ELECTRONIQUE ACTUALITES of 19 June 1987), and has since marketed a machine of this type—the MPM-390. Recently, Alcatel CIT, for its part, also acquired a license from CNET to use the ECR process for etching and deposition. The company has now introduced a distributed ECR microwave plasma etching machine—its RCE-160. We might mention that one advantage of this type of reactor is its lessening of etching-induced faults.

Future Lies in Multi-Process Machines

Presently, thin-film production processes require a growing number of successive operations (ionic pre-dipping, deposition, planarization, fast annealing,... etc). These operations are generally performed by a number of different machines, resulting in a rather awkward process and involving problems introduced by the changing of machines. In Electrotech's view, the future unquestionably lies in the multi-process machine, with several rooms for performing the different operations. The firm, which already specializes in etching, CVD [chemical vapor deposition] and spraying, is also actively working on fast-annealing systems (RTP [reinforced thermoplastics]). (We point out that, for the time being, RTP machines are not yet being marketed). And there also, says the firm, lies an entire basis for future developments.

The many innovations announced in the domain of etching and deposition included, in particular: The Wafer-etch 616, a single-room multi-processing triad etching system; Alcatel's GIR-820 production-type etching machine with two independent reactors and designed for clean rooms of the 1 to 10 class; Varian's CVD-5103 multi-room, cold-walled deposition machine. Genus also introduced its Model 8720. a cold-walled LPCVD system for the deposition of tungsten. The system is especially designed to enable selective depositions.

Direct Etching by Laser

Another technology that seems to be developing rapidly is that of direct writing by laser. The introduction of these systems is being predicated on the projected growth of the market for ASIC's. A laser direct-writing system, the LPS [Laser Pattern System], was introduced at the Exposition by the German firm Heidelberg Instruments. This system is designed for the fast production of prototypes and for flexible small-scale batch production. The company states that the system can expose an area of 100 x 100 mm^2 [as published] in less than 200 seconds, regardless of the complexity of the structure.

PHOTO CAPTION [Photo not reproduced]

P 1. Alcatel's two-independent-reactor system GIR-820, designed for submicronic etching of up to 200-wafers. Various types of reactors can be installed on the system, including the new ECR plasma reactor.

9238

Siemens of FRG To Market 'RISC' Chip

36980233b Paris ELECTRONIQUE ACTUALITES in French 19 Feb 88 pp 1, 15

[Article by P. Maslo: "32-Bit Microprocessors: RISC Generation Gaining Ground"]

[Excerpts] There are some 10 manufacturers of these fast circuits.

A European Enters the Race

Although the origin of these developments is entirely American, a European is hastening to also enter the RISC [Reduced Instruction Set Computer] market. Siemens has just acquired from the Otto Muller Laboratory what is a combined RISC and CISC [Complex Instruction Set Computer] design. Typically, that is, it will execute RISC instructions (in 1 clock-cycle) but will also have CISC functions. It will operate at a speed of 25 MHz to reach a rated performance of 20 MIPS [million instructions per second]. The sampling of this product is scheduled to begin in March.

9238

ES2 Acquires Philips CMOS Technology

36980233c Paris ELECTRONIQUE ACTUALITES in French 11 Mar 88 p 18

[Article: "Identical Technological Processes for ES2 and Philips"]

[Text] Philips Components and European Silicon Structure [ES2]d have signed an agreement that will enable ES2 to use Philips' 1.5-micron, 2-metallized-layer, then, between now and the end of 1988, its 1.25-micron, and finally, its submicron CMOS technologies. The use of identical processes will provide the clients of both firms the option of a smooth and entirely transparent transition from ES2 prototypes to Philips' mass-produced units. This agreement follows by 1 year the one signed by Texas Instruments, Philips and ES2, under which ES2 was to furnish ASIC prototypes produced by a compatible System Cell (2-micron CMOS) process to the European clients of the two big firms.

9238

NUCLEAR ENGINEERING

ENEA, EC Commission Award Funding for New Ansaldo Research Projects

3698m287 Rome FINMECCANICA NOTIZIE in Italian 31 Jan 88 pp 10-11

[Excerpts] ENEA [National Committee for Research and Development of Nuclear and Alternative Energies] has granted Ansaldo Ricerche the funding required to develop two technological research programs.

The first program, which concerns the development of new components for fuel cells, provides for the definition of the production process of nickel-plated alumina anodes for fused carbonate cells (MCFC) and a study of corrosion phenomena in these energy collection and gas distribution cells. For this project, worth 1.5 billion lire, the EC will grant additional financing in the form of an allocation that has already been approved.

In addition, ENEA has awarded Ansaldo Ricerche a contract for over 1 billion lire to study and implement a prototype segment for the first wall of the Euratom NET (Next European Torus). This study, which forms part of the European program for development of the NET fusion machine, will be conducted by Ansaldo Ricerche, both in terms of the design phase and in terms of the new technologies; for this purpose, models will be prepared simulating the operating conditions of the plasma interface components.

Ansaldo Studies and Projects Approved by the EC

The European Commission has approved four studies and projects submitted by the Ansaldo company, for a total financial contribution of 1.49 million ECU's.

The third project—entitled "Feasibility study of a Superconductive Magnet for the Stabilization of Power Load in a Steel Mill Arc Furnace" concerns the study of a superconductive magnet which will be applied to an electric furnace in a steel mill located in Terni Umbria Region in order to stabilize the furnace power load, thus eliminating the absorption peaks created by arc operation.

The fourth project, the first phase of which has already been approved, is called "Demonstration Unit for the Generation of Electricity with Phosphoric Acid Fuel Cells," and is for a 1-megawatt plant using phosphoric acid technology. The largest to be built in Europe so far, it will supply one of the substations of the Milan Municipal Electricity Company (AEM).

08707

SCIENCE & TECHNOLOGY POLICY

EC FAST Director on Technology Policy

3698a136 Paris POLITIQUE INDUSTRIELLE in French No 10, Winter 1988 pp 53-63

[Article by Riccardo Petrella: "Toward a Common Technology Policy"; first paragraph is background note on author; second paragraph is source introduction]

[Text] Riccardo Petrella, 46 years old, doctorate in economics and sociology from the University of Florence, heads the FAST (Forecasting and Assessment in Science and Technology) program at the Commission of the European Communities and was formerly director of the European Research Center for Social Sciences in Vienna.

The globalization of the economy makes formulation of a European technology policy particularly delicate. It is not enough to initiate programs. Only a strategy built on clarity and strength will advance the cause of Europe.

Pondering European technology policy leads to a dual query:

- What is the current and future role of EEC countries in the ongoing change in the industrial economy and the world under the influence of, among others, scientific and technological change?

- Will it be easier for Europeans to achieve the new industrial and technological revolution on an individual basis or through joint efforts integrated with the Community?

It is increasingly recognized that the problems confronting the industrially advanced countries of the world since at least the end of the sixties are not due to occurrences that are somewhat more violent than usual, but rather to a structural change in the industrial economy. We are beginning to measure the extent of that change, without, however, being able to perceive the long-term effects. This leads both to a sense of uncertainty about the future—as if that were not also the result of the strategies of today's players—and to easy enthusiasm over the technological revolution which promises a very rosy future—as if solutions to structural problems could be found in tools!

The current transformation of the industrial economy can be characterized by four phenomena.

First, there is the increasingly intangible nature of economic activities. This is seen not only in the growing separation between "heavy" raw materials and finished products, because conventional raw materials are being replaced by more sophisticated and "lighter" raw materials, or because the economic weight of raw materials relative to the value of a finished product and the GNP has diminished substantially. The trend toward more intangible economic activity is also seen in the relative increase in "intangible" investments (R&D, training, maintenance, high-value-added services, etc.) in the overall structure of company investments, as well as in the increased importance of information and communication as integral parts of the production process. This, along with other factors, has led to the substantial rise of services as the major sector in terms of employment and contribution to GNP, leading many socioeconomic observers and players to speak of the end of industrial economy and the emergence of a service economy.

Technology Has an Ever-Increasing Need for Science

The second phenomenon is the ever-increasing impact of the leading edge of scientific research on technology. Progress in technology is achieved through the acquisition and mastery of new scientific know-how. This is seen in chemistry and biotechnology, as well as in the fields of advanced materials and microelectronics. This "scientification" of technology has two major effects on industry and the public authorities (the government and parliament), and thus on public opinion and the public's attitude toward science and technology.

- First, R&D costs are increasing substantially. The cost of designing and developing a new generation of Boeing 747 aircraft has been estimated at more than $2 billion. Similarly, the development of a new generation of pesticides would cost at least $100 million. Cost estimates for designing and developing ISDN (integrated services digital network) range from 500 billion to more than 1,000 billion ECU's over the next 20 years.

- Second, cooperation in R&D and technological development among firms is becoming an absolute necessity in today's world because no firm has adequate resources to engage effectively in all the scientific and technical fields on which short- and long-term competitiveness depends.

It is true that we are witnessing a trend toward increased corporate R&D expenditures and, in this context, a relative increase of basic research activities over development. In-house R&D activities, however, no longer constitute an adequate response—even for the very large firms—to industry's need for scientific knowledge. That accounts for the boom in national and particularly international cooperative agreements among firms active in the same sector over the past few years.

The boom in intercorporate cooperation is not solely the result of the "scientification" of technology, but also of a larger process—the transnationalization on a world scale of the economy and technology.

In an Economy That Is Becoming Global, Regional Entities Are Emerging

The worldwide transnationalization of the economy and technology is closely linked to the massive use of world technologies such as:
- Technologies made possible by science that has become, or is trying to become, boundless;
- Technologies designed, developed, produced, and marketed directly or by multinationals whose interests and strategies are now global (the latest IBM advertising slogan is "We are the global communication");
- Technologies capable of contributing to the solution of problems on a large scale for large numbers of people;
- Technologies that make possible the production of goods and services for vast markets and that require a global infrastructure.

Television, computers, satellites, insulin, nuclear energy, antibiotics, the heat pump—all are global technologies. One of the major effects of the new branches of information technology, biotechnology, and new materials technology has in fact been the further globalization of technology.

Fast food, credit cards, pop music, the translation industry, the training of top managers, etc., all represent a new generation of transnational goods and services. That is to say, they are designed and developed from the outset for

transnational markets by transnational production and distribution organizations within the framework of a products and services flow that is intrinsically and extrinsically transnational.

Finally, the fourth phenomenon and distinctive feature of the recent technological and economic development—which may at first glance seem to contradict the preceding one—is the reconstitution (in the context of a national economy that is being diluted within a transnational economy) of local or regional economies that are closely linked to their region and to the transnational economy. In fact, it is at the level of towns and/or well-defined rural zones that the change in the industrial economy is felt in concrete and specific terms. It is at the local level that firms close their doors, that employment is lost (or created), that new activities emerge, that the conditions and ways of life change, that the quality of the environment is affected. It is therefore the wish to master the change that pushes local developers to acquire adequate means for action, most of the time without succeeding or with recourse to poorly adapted means such as the creation of "technopoles," scientific parks, "teleports," and other technology-promoting facilities, as was done at an earlier time with industrialization centers, industrial cities, industrial parks, etc.

From the Industrial to the "Meta-Industrial" Company

At the heart of the changes that we have touched on briefly are two changes of fundamental importance to the long-term future of the economy, and of Europe in particular. What is at stake is the change in business structure and the redefinition of the role of the state in society, and in the economy in particular.

According to FAST studies, business is undergoing profound change, shifting from an industrial to a meta-industrial type enterprise.

The meta-industrial enterprise is characterized by the increasing importance internally and externally of the tertiary sector in its production system, massive penetration by "intangible" technologies, transformation into a network of units for the design and production of a small package of sciences and services, closer ties with users, highly segmented world markets, highly qualified human resources, etc.

It is industry which is on the front line of change and which is obliged to assume responsibility for developing and testing new solutions, including in fields such as education and training which industry has traditionally left to other organizations. However, it is to industry that social and economic policymakers—particularly national and local authorities (the state)—increasingly delegate the job and the responsibility of solving current problems and taking advantage, in the interest of the entire community, of the opportunities offered by the new technology and the emergence of a transnational economy.

That is the structural sense of the current trend toward privatization and reprivatization. Beyond the significant surface turbulence, what is important and crucial is the belief that today's state is no longer capable of ensuring the best possible allocation of resources and optimum collective well-being. This belief is growing not only with industry and the business world, but also within the political world and among the public in general.

Business, especially large multinational firms, however, is considered the type of organization best adapted to cope with current and future changes. It is said to have the financial and human resources which measure up to the scale of the markets (for example, it is often said that IBM alone spent $3.97 billion in 1986 on R&D, whereas the 12 members of the Community scarcely managed, after a long battle, to agree to spend a little over $6 billion over 5 years!). The major multinationals are reputed to have the experience needed to act in global markets, a transnational managerial culture, and the capability to decide and act quickly, etc. Personally, I consider these viewpoints and current trends with increasing reservations and a certain uneasiness. But that is not the problem; what matters are the facts and the logic behind them.

It is in this evolving context that we can decipher the nature and measure the size of the two challenges facing the European Community's technology policy.

Balancing Globalization and Europeanization

The first challenge is the need to achieve a balance between the process of transnationalization of the economy and technology, primarily on the basis of market goals, and the process of "Europeanization" of the economy and technology, primarily on the basis of the goal of building a European community.

What can and what must Europe do given the fact that current technological developments are mainly the work of companies—especially of major multinationals—and that the public authorities, the education and training system, and every other important element are supposed to contribute to their competitiveness?

What can, what must Europe do when:

- The mixed economy, which until now has been the dominant mode of the economic system of the advanced, industrialized countries of the West, is gradually but significantly open to question;
- The capacity of the nation-state (government and parliament) to influence, guide, and control the technological and industrial strategy is showing major, ever greater limits.

Must Europe play the card of rapid and intense globalization of European firms by favoring, for example, the multiplication of agreements with the firms of partner (and competitor) countries such as the United States and

Japan? But does such an approach not risk promoting the emergence of major networks—world oligopolistic conglomerates—and the influence of private multinational organizations on world economic developments, thus hampering the emergence of clear and consistent joint European technological strategies? Or must Europe give priority to the EEC approach and to the Europeanization of industry to achieve the efficient globalization of our economies?

Does such an approach, however, not run the risk of giving rise to a protectionist isolation process and of eventually aggravating conflicts among Europeans?

That is the source of the current problems with any national and European technological and industrial policy. It is caused by the growing gap between, on the one hand, an economy that is undergoing transnationalization based on world technology and on the decisive role of private multinational enterprises, and, on the other, a "mixed" economy, organized on the national scale, which is less and less supported by the public authorities and whose Europeanization is too slow and risks not being achieved at all in the next 10 to 15 years.

Reconciling Technological Development and the Socioeconomic Fabric

The second challenge for Europe is internal in nature. It relates to the consistency between technological development, which is ultimately dictated by market requirements, and socioeconomic cohesion within the European Community.

New technology, in the fields of data processing and communications in particular, in theory represents a great potential for decentralization as well as functional, geographic, and social deconcentration. Still, the facts show that, for now, this technology has contributed more to new forms of centralization and concentration around social groups with greater access to new technologies and in already developed regions. Thus, a major gap exists between the producers and promoters of new technology, whose strategies go beyond specific local development, and the officials and promoters of local socioeconomic development, particularly in regions which offer no particular advantage in the context of globalized technological development strategies.

The role of regional technology policy at the national and EEC levels would therefore consist of preventing the emergence of such a gap. In reality, the policy must try, through inadequate means, to make up for the effects of the gap, thus creating a veritable waste of resources.

The Multiplicity of European Initiatives Can Jeopardize Their Effectiveness

What do Europeans really want? This question is a fair one. Thirty years after the signing of the Treaty of Rome, Europe is having a problem getting organized technologically. In addition, Europe has just entered an era of drastic changes in organization forms and modalities which can rightly be questioned as to their consistency, effectiveness, and medium- and long-term relevance. I am thinking specifically of the various and sometimes competing forms of European technological cooperation such as:

- The projects carried out at the EEC level. Such projects range from so-called precompetitive R&D programs (such as ESPRIT [European Strategic Program for R&D in Information Technologies], BRITE [Basic Research in Industrial Technologies for Europe], EURAM [European Research on Advanced Materials], etc.) to demonstration programs (in the energy field) and basic and very long-term research (thermonuclear fusion) and projects to stimulate innovation (SPRINT [Strategic Program for Innovation and Technology Transfer], COMETT [Community Program for Education and Training in the Field of Technology], etc.);
— The pan-European (West Europe) scientific programs such as CERN [European Center for Nuclear Research], EMBO [European Molecular Biology Organization];
— The private-initiative projects that also have decisive public support, such as Airbus, and which also include certain ESA projects such as Ariane. Such projects represent a joint effort among two, three, or more European countries, but they often give rise to competing projects on the part of other European groups, often allied for this purpose with the United States or with other non-European countries;
— The activities of ESA, whose annual R&D spending is higher than the joint R&D budget of the 12 EEC countries;
— The EUREKA projects, the aim of which is to foster technological cooperation among West European companies for new, immediately marketable processes, products, and services. Launched in 1985, the aim and scope of the EUREKA projects are outlined for industry without any coherent public framework or program. They have succeeded in obtaining several billion ECU's from the national authorities, funds which will, of course, no longer be available for funding possible joint EEC projects, given the limited public R&D budget;
— And last but not least, the military technology cooperation projects, which, it is fair to say, do not always represent small investments.

Such diversity and multiplicity of initiatives should in theory constitute a substantial advantage for Europe. In reality, under current conditions and given the compartmentation and even the occasional competition and conflict among such initiatives, such multiplicity results in a reduced return on investments, a reduced visibility of the building of the European Community, and thus, reduced long-term strategic capacity for European business in the key high technology sectors, compared to Japanese and American business.

Of course, occasional even though important, examples of successful European technology cooperation projects are not lacking (JET [Joint European Torus], CERN, Airbus, Ariane, ESPRIT, etc.). Still, all circles directly

involved have the clear impression that, despite these successes, the Europe of technology as it is currently organized is still lacking an organic, systematic, and strong structure based on a clear strategy and possessing necessary and essential means of action.

The Europeans spend the considerable resources that they have decided to pool primarily in the field of agriculture. For the rest, they diagnose and discuss 1-million-ECU projects for months, but they refuse to seriously discuss the major strategic issues that relate to the technological and industrial future of Europe, as the Commission has often asked them to do.

At stake is the survival of the technological and industrial independence of the EEC countries. This truth, often pointed out in the past in all circles, has not until now produced the expected impact on Europeans and the creative initiative worthy of the challenge. The paths to follow are known and clear to everyone (integration in a consistent strategy of sector-oriented measures such as the single domestic EEC market, opening up public procurement, greater joint R&D efforts, stronger intra-European cooperation among companies, more effective relations between universities and industry, Europeanization of high-level training, etc.). But what do the Europeans really want?

25050

Riesenhuber Outlines Goals of EC Council Presidency

36980232a Duesseldorf HANDELSBLATT in German 10 Feb 88 p 6

[Text] Bonn, 9 Feb—During the period of the German presidency of the EC Council in the first 6 months of 1988, Federal Research Minister Heinz Riesenhuber wants to advance the European states a bit further along the path to a technology community. This is what Riesenhuber said on Tuesday in Bonn.

In order to realize this goal, the German research minister is setting out for Brussels with the following working program:

1. Decisive progress with the current management or even new adoptions of the kind of EC research programs that have a great significance to the planned common inland market. Riesenhuber includes in this above all the Esprit II program in the sector of information technology, with a duration of 5 years beginning in December 1987 and a total volume of 1.6 billion ECU (DM3.31 billion) and the program for basic industrial technologies, with a duration until 1988 and a volume of 185 million [sic] ECU (DM383 billion).

2. Adoption of the follow-up program "nuclear fusion" (1987-1991) and a recommitment to the joint research establishment, the four research laboratories in Ispra, Karlsruhe, Geel, and Petten.

3. Decisions should be taken on the program proposals on metrology and chemical analyses, cooperation and information exchange in the sciences, biotechnology, and promoting access to major items of scientific equipment.

In addition to these decisions, Riesenhuber as chairman of the competent EC council wants to suggest the following program-overarching initiatives:

1. The Community should get involved more than hitherto in Eureka projects and recognize them as a contribution to and a tool for achieving competitiveness for European industry.

2. Riesenhuber wants to reduce costly detours and dead ends in connection with technological innovations in the EC and to avoid the emergence of competing standards in the member states, which hinder the further development of technology.

3. Against the background of the work done by the commission on guidelines for genetic engineering and biological safety, Bonn would like to see an examination and discussion of the corresponding aspects in the council of the EC. Thereby serious differences within the EC in research methods and requirements as well as the drifting off of certain research work into regions with more lax regulations are to be avoided.

4. The Federal Research Ministry considers as essential within the Community an understanding about where ethical limits arise, for example in research on human embryos. Therefore the federal government will propose a conference in the EC on the subject of bioethics. At such proceedings, these questions should be discussed by scientists of all disciplines and foundations for joint orientations should be found.

12114

Goals of 'Comett,' New EC High-Tech Training Program

36980227b Duesseldorf VDI NACHRICHTEN in German 4 Mar 88 p 28

[Article by Michael S. Wald; first paragraph is VDI NACHRICHTEN introduction]

[Text] Duesseldorf 4 Mar (VDI-N)—At the end of last year, the European Community invited the program leaders of the proposals determined worthy of support by the new EC program 'Comett' to Brussels to discuss details of the ideas of the EC with the partners. The acronym Comett stands for Community Program on Cooperation Between Universities and Enterprises in Education and Training in Technology.

Comett combines four basic emphases. The most important is the formation of regional and sectorial partnerships for support for training which cooperate with

similar partnerships in other EC member countries or wish to initiate and design training projects with individual companies and institutes outside the EC. These partnerships, so-called UETP's (University-Enterprise Training Partnerships), are to consist of an organization formed jointly by industry, business, and universities.

Another objective of Comett is the placement of students and university professors with foreign industrial and business partners for training purposes as members of UETP's while qualified business people will be similarly placed with foreign universities. Projects of this type are supported by grants—a maximum of 4,000 ECU's for the student practicums and up to 12,000 ECU's for professionals (1 ECU = DM2.06).

Comett also supports the development and testing of joint projects in the area of continued training. Included in this are intensive short courses and the development of teaching materials for continued training. Support for this can amount to as much as 500,000 ECU's per project.

The final program area involves support of multilateral measures for development of multimedia training systems, in which new data processing and communications technologies are used, and particular emphasis is placed on training instructors and professionals from business. The EC's financial contribution to these projects can be as much as 400,000 ECU's.

From the first round of applications, the EC funded 70 UETP's, including seven from the FRG. In addition, 215 student practicums, 15 industry or university fellowships, 45 continued training projects, and 23 multimedia training projects were considered. A total of 13 million ECU's was provided for the first year and approximately the same amount for the years 1988 and 1989, i.e., the first phase of the Comett program.

Obviously, the Comett program is an ambitious program, and nothing like it has ever been tried anywhere before. It complements the conventional research programs funded by the EC and will significantly promote the competitiveness of small to medium-sized industries by means of continued training. The first meeting of the UETP's with EC representatives demonstrated that the EC itself is placing high demands on the subsidized partners in terms of ideas and design contributions to the program because the complexity and innovation of the program still represents an uncertain foundation for assessment of its possible success. To be sure, many diverse elements of training projects are included in the program.

The design of the student practicums is not yet fully defined. For one thing, because such practicums have until now been implemented as an integral part of university training by only a few FRG laender, while they have been more or less elective in other EC countries. And for another thing, because established programs already exist in this area, such as, for example, that of the Carl Duisberg Society in the FRG. There is also the question, as prior experience with such practicums—especially with the United States—has demonstrated, of whether it might not be more useful to postpone the practicums until after the student receives his diploma or at least until the final period of study before entry into professional work.

12666

European, FRG Computerized Research Networks To Be Linked

36980227a Duesseldorf VDI NACHRICHTEN in German 26 Feb 88 p 23

[First two paragraphs are VDI NACHRICHTEN introduction]

[Text] Duesseldorf 26 Feb (VDI-N)—Data communication of the research institutes is standardized. Worldwide, 2,000 computers are connected.

The dream of humanities scholars is already an everyday research reality for physical scientists and computer scientists: Access to international databanks, use of very remote mainframes, and the possibility of electronic mail. With the German Research Network (DFN) and the European Academic and Research Network (EARN), there are in Germany two computer networks tailored to the needs of science and research. EARN is now going to be incorporated into DFN.

Both networks came into being around 1984. However, whereas DFN was undertaken almost exclusively under the initiative of scientists and with the financial support of the BMFT [Federal Minister for Research and Technology], EARN developed with financial support from IBM.

But, now the IBM grant has run out. Because the effort and the expense for two networks is too great, EARN is being integrated into DFN.

Nationwide, 180 computers are linked to EARN; in Europe, approximately 600. Worldwide, with BITNET (U.S.A.) and NETNORTH (Canada) networks based on the same technology, approximately 2,000 computers in universities and research institutes are linked together.

With DFN, 300 research computers are connected to each other. "And this is still growing," reported Prof Eike Jessen, chairman of the DFN association, at a press conference in mid-February in Bonn. Approximately 13 billion bytes are transmitted monthly via the network. If this amount of data were printed out, the result would be a 500-meter-tall pile of DIN A4 pages.

The fundamental technical difference between EARN and DFN is in their communications protocols. This refers to the standardized arrangements (the protocol) forming the basis for the exchange of data between different computers. DFN is based on the OSI-standard (Open Systems Interconnection) whereas EARN uses SNA (Systems Network Architecture).

The OSI-standard, which is independent of the hardware manufacturer, is increasingly predominating. "Even the other networks will climb on the OSI bandwagon," stressed Friedrich Winkelhagen, secretary of the Society for Mathematics and Data Processing (GMD). According to him, with their decision in favor of this protocol, the DFN association has assumed a pacesetter role in the data processing community.

The gradual integration of EARN into DFN has run smoothly so far, still according to Winkelhagen. It should be completed by mid-1989. The German central computer, the so-called central exchange, is currently located in the GMD's computer center in Bonn. It organizes international communication and is converting the EARN standards to the DFN standards.

With the research networks, scientists have achieved a new quality of work, reported Winkelhagen, referring to the 4-year experience of the DFN association. On the one hand, they have taken part in the international exchange of information; on the other hand, forms of cooperation which were inconceivable in the past have become possible. For example, at the universities of Kaiserslautern and Aachen, parallel programs and computer-assisted courses are being developed for universities in India. Several times a day, data and program revisions are exchanged between the institutions.

"I would very much like to see an expansion of DFN into countries outside Europe, even into the Eastern bloc," stated Eike Jessen in closing. However, his wish oversteps the bounds of the COCOM list. At least, there are already some initiatives with India and Kuwait.

12666

BMFT Report on Technological Competitiveness of FRG Industry

3698M229 Bonn ZUR TECHNOLOGISCHEN WETTBEWERBSFAEHIGKEIT DER DEUTSCHEN INDUSTRIE in German No 53/87, 8 Dec 87 pp 3-23

[Unattributed report published by the FRG Ministry of Research on Domestic and International Economic Trends]

[Excerpts] Domestic economic conditions for 1988 are not unfavorable. Income tax will be reduced at the beginning of the year, which means a tax relief of around DM14 billion for 1988. Exports are expected to increase from the previous year for the first time since 1985. Thus, exports will again act as a support to overall economic growth. Everything seems to suggest that the upward trend will continue for the sixth year running. Despite the stock market crash, the Experts' Board expects a real increase in the national product by 1.5 percent in 1988.

Investment in plant and equipment will play an important role. Processing industry intends to increase investment by 6 percent. However, it is important for industry to maintain its efforts and invest, for example, in state of the art equipment in order to maintain long-term competitiveness.

3. The Situation Abroad

Foreign economic indicators demonstrate that the FRG economy has again proved its ability to react flexibly to changes on the international market.

Despite unfavorable foreign economic conditions, according to Ifo [Institute for Economic Research] private enterprise expects industrial exports for 1987 to return to the level reached in 1986.

Table 2: Comparison of Export Rates of Selected Industrial Nations (exports as a percentage of GNP)

	1975	1980	1985	1986
FRG	21.1	26.2	32.0	32.5
USA	5.9	10.2	7.1	7.1*
JAPAN	10.8	13.7	14.8	13.8*

*estimated
Source: NIW [Lower Saxony Institute for Economic Research]

The important role played by foreign trade in the FRG economy is emphasized by the fact that the most important exporting industries also represent the core of FRG industry. A large number of people are employed in this area:

electrical engineering—962,000;

mechanical engineering—985,000;

automobile industry—838,000;

chemical industry—570,000 employees (all figures for 1986).

In 1986 export rates, that is, foreign sales as a percentage of overall sales, were as follows: electrical engineering, 31 percent; mechanical engineering, 46 percent; automobiles, 46 percent; chemical industry, 42 percent. These four sectors alone accounted for 58 percent of FRG exports in 1986.

4. Research Intensive Sectors Boost Employment

In 1986 research intensive sectors provided the strongest impulses for an increase in employment (see Table 3).

Table 3: Employment Figures for Selected Export Sectors

SECTOR	1000 persons			Percentage to last year		
	1984	1985	1986	1984	1985	1986
Electrical engineering	878	923	962	0.5	5.1	4.3
Mechanical engineering	930	950	985	-2.7	2.1	3.7
Automobile industry	785	809	838	1.1	3.0	3.6
Chemical industry	553	559	570	0.3	1.2	1.8

Source: Federal Bureau of Statistics, calculations by the DIW [German Bureau of Economic Research]

The highest increase in employment was in the electrotechnical engineering sector with 40,000 new jobs. In the high-tech sector "manufacture of meters, telecommunications, appliances for measurement and control, electro-medical devices and components" there were almost 19,000 new jobs (plus 6 percent).

The mechanical engineering sector, also highly intensive in terms of human capital and research, provided an additional 35,000 job (plus 3.7 percent).

The automobile sector, which invests a relatively high amount in production technology, particularly in flexible assembly systems, also increased its employment figures by 29,000 jobs (plus 3.6 percent).

The chemical industry, which enjoys a worldwide reputation, particularly in the pharmaceutical sector, employed an additional 10,000 persons in 1986 (plus 1.8 percent).

5. Outstanding Export Success in Research Intensive Sectors (Footnote 1)

If the level of participation in world trade is taken as a measure for international competitiveness, then the FRG has achieved extraordinary successes over recent years:

After a decade of decline in international trade, the FRG has managed to recover its 1973 position with a share of world sales of more than 11 percent (see Figure 1).

Research intensive products account for about 54 percent of FRG exports, of which around 11 percent belong to the high-tech sector and 43 percent to the high-level consumer technology sector. In 1986 the increase in exports of research intensive products (plus 36 percent) was greater than the overall increase in exports of processed industrial products (plus 33 percent).

The increasing significance of research intensive products for the FRG on the international market is particularly noteworthy if one considers that the increase in FRG exports is higher than that of the United States and Japan (only exception: high-tech sector), (see Table 4).

Table 4: Percentage of Increase in Exports for 1986 Compared to 1985

Category	FRG	U.S.	Japan
R&D intensive products including:	plus 35.8	plus 4.0	plus 24.0
—high-tech	plus 26.1	plus 6.6	plus 38.0
—high-level consumer technology	plus 38.3	plus 1.8	plus 26.1
processed industrial products	plus 33.1	plus 2.2	plus 19.1

Source: NIW

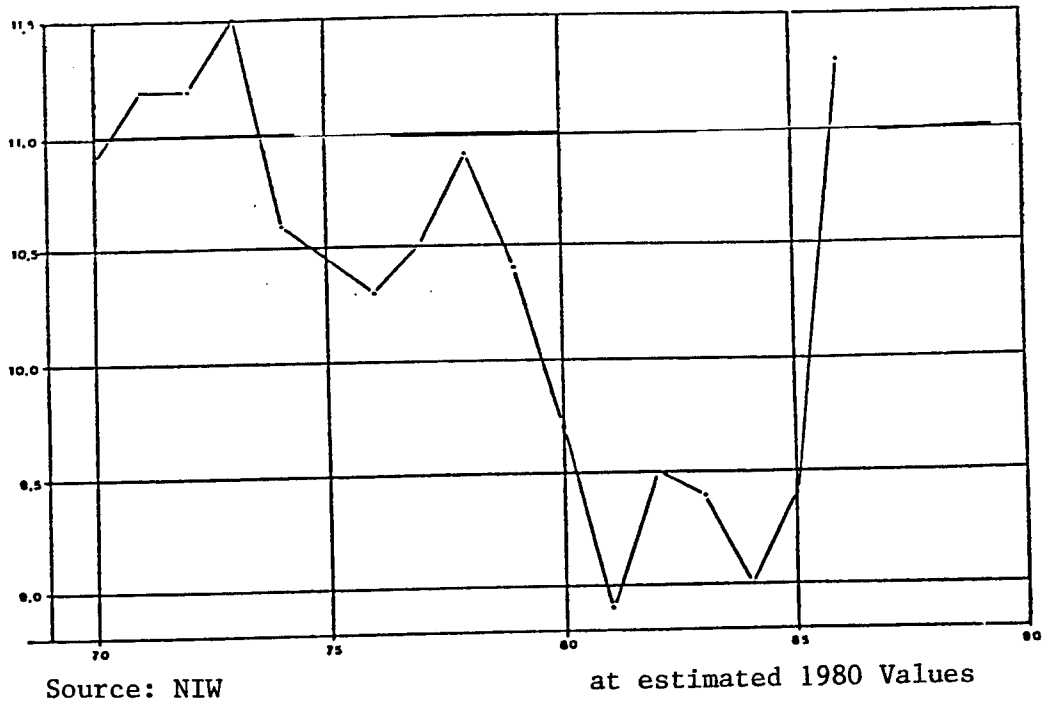


Figure 1: Percentage of FRG Share in World Exports Between 1970 and 1986

Source: NIW

The FRG is particularly strong in the following high-tech sectors:

- electrical products (equipment and devices for power distribution, starters, generators, signal and monitoring systems);
- measurement, control and regulation technology;
- optical instruments;
- nuclear reactors
- pesticides, organic primary products (pharmaceutical substances and products).

Positive changes in the FRG's share of the world market for pharmaceutical primary products are particularly encouraging. It was possible to achieve an increase from 20.7 percent in 1984 to 21.8 percent in 1985. The increase of the world market share in the data processing sector is also to be welcomed, particularly as the FRG traditionally falls short of Japan and the United States in this sector. FRG industry was able to increase its world market share in this sector from 9 percent to almost 11 percent.

Positive results in the field of high-level consumer technology were achieved mainly in the following sectors:

- mechanical engineering;
- certain sectors of the electrical engineering field, such as televisions, transformers, medical instruments, household appliances;
- automobile industry;
- precision mechanics and optics;
- steel pipes, construction and tools;
- almost the whole synthetics sector including dyes and plastics, paints and lacquers, inorganic chemistry, and some special chemical products.

These sectors have also experienced satisfactory increases in their share of the world market. For example, the world market share of FRG printing machines rose in 1985 from 35.8 to 37.6 percent. In this sector, the top international position was occupied by FRG companies. Japan and the United States had to be content with only about 12 percent respectively in the same year.

A substantial jump forward was achieved in the field of medical instruments in 1985; the world market share rose from 18 to 29 percent!

6. Improved Export-Import Ratio Compared to the United States and Japan

The analysis of international competitiveness in terms of the share in the world market only measures the competitive situation of domestic producers on foreign markets. Therefore, competitiveness is assessed only in terms of the competitive situation of FRG firms abroad, while domestic outlets are not taken into account.

However, if the competitiveness of a sector is measured in terms of the export-import ratio (exports as a percentage of imports), that sector is particularly competitive if it succeeded in selling more goods abroad than its domestic competitors.

A study of the export-import ratios of the FRG in trade with Japan and the United States in the case of research-intensive products provides the following results (see Table 5):

Table 5: Exports as a Percentage of Imports in the Case of Research Intensive Products—FRG Trade with the United States and Japan

	1981	1982	1983	1984	1985	1986
Compared with the USA						
High-tech	27.2	36.0	39.2	46.9	45.8	54.8
High-level consumer technology	239.9	264.5	277.2	340.5	368.0	467.5
Overall	115.0	141.6	150.8	185.4	194.4	238.6
Compared with Japan						
High-tech	59.9	55.4	40.0	32.4	29.6	32.9
High-level consumer technology	30.7	35.3	33.1	31.2	34.4	32.7
Overall	34.4	38.4	34.3	31.5	33.5	32.8

Source: NIW

The FRG balance of foreign trade compared with that of the United States in the research-intensive product sector was quite positive during the period covered by the report. Particularly noteworthy is the enormous improvement in the high-level consumer technology sector between 1984 and 1986. In 1986 alone, FRG exports of high-level consumer products to the United States were four times higher than those of the United States to the FRG. In the case of high-tech products, the FRG still imports more, although a gradual improvement is apparent over the years.

FRG industry achieved the best comparative advantages in the following sectors: automobile industry, mechanical engineering, precision mechanics/optics, and in metal processing. The United States dominates in the following sectors: nuclear fuel and breeding material, data processing systems and office equipment, aeronautics and astronautics.

Compared to Japan the result of foreign trade in research-intensive sectors was negative for the period covered by the report, although the FRG has managed to maintain its position since 1984.

If the product groups are considered individually, the best results have been achieved in the chemical industry, while deficits are apparent in the following sectors: data processing systems and office equipment, electrical engineering, precision mechanics and optics, metal processing and automobiles.

The relative strength of a product group (compared with overall industrial production) can be expressed as the relationship between the export-import ratio of that product group with the export-import ratio of national trade.

The "Relative Export Surplus" (RCA) (Footnote 2) value of a given product group is positive if foreign competitors in that sector are unable to gain such a strong position on the FRG market as FRG companies on the foreign market.

A comparison of the RCA values for 1986 shows the strong points of the respective test countries in the field of research intensive products (see Table 6). The U.S. trade structure is distinguished by its strength in the high-tech areas. In this area the FRG comes second followed by Japan. The outstanding position of the United States must be seen in terms of international cooperation in R&D activities.

The United States is below average in the area of high-level consumer technology. Japan has a clear lead here, followed by the FRG.

This shows that the FRG always maintains the center position between the United States and Japan in the international comparison. Its strength lies in the high-level consumer technology sectors, while it is below average in the high-tech sectors.

Table 6: RCA 1986 for Selected Research-intensive Products in a Bilateral Comparison

	R C A 1986		
	FRG	USA	Japan
Overall high-tech	-19.0	100.8	-32.3
including:			
—pharmaceutical primary products	42.3	135.9	-82.2
—data processing systems	-54.4	87.0	70.0
—optical instruments	54.3	53.8	70.0

Table 6: RCA 1986 for Selected Research-intensive Products in a Bilateral Comparison

	R C A 1986		
	FRG	USA	Japan
High-level consumer technology	51.9	-22.1	122.8
including:			
—construction machinery	79.1	106.1	225.5
—printing machines	146.0	-15.3	23.9
—automobiles	87.5	-138.0	227.8
—medical instruments	50.3	90.9	-11.4
—cameras	-5.7	-28.8	145.0
Overall R&D intensive products	33.7	18.7	74.8

Source: NIW

7. Positive Trends in the Case of Selected Product Groups

A study of the development of the relative foreign trade positions for the FRG between 1978 and 1985 shows that the following selected product groups are distinguished by positive development trends (see Table 7):

High-tech:

- pharmaceutical primary products
- data processing systems
- optical instruments

high-level consumer technology:

- construction machinery
- printing machines
- automobiles
- medical instruments
- cameras

Table 7: Development Tendencies in the Competitiveness of Selected, Research-intensive Products from 1978 to 1985 (percentage of yearly average

	Overall	Increase in exports	Increase in imports
Overall high-tech	-2	-1.5	-0.5
including:			
—pharmaceutical primary products	0.5	1	0
—data processing systems	1	-1	2.5
—optical instruments	1	-3.5	4.5
High-level consumer technology	-1	-0.5	0
including:			
—construction machinery	4.5	-0.5	5
—printing machines	2	0.5	1.5
—automobiles	8	0.5	7.5
—medical instruments	2	6	-3.5
—cameras	3	-0.5	4

Source: NIW

Table 7 shows to what extent the improved position is due to export expansion or import substitution. It is apparent that the positive trends were mainly achieved by import substitution which means that FRG companies in these sectors have succeeded in ousting foreign competition from the domestic market. The tendency toward export expansion is not so strong, as success on the domestic market is often accompanied by a drop in exports. A converse tendency can be observed only in the case of medical instruments. In this case substantial increases in exports are accompanied by a drop in domestic sales.

8. Further Improvement in Dynamics

The generally positive developments in the share of world trade and in the export-import ratios are, however,

no reason for complacency. This becomes obvious when the actual foreign trade successes are compared with the possibilities offered by the international market. The fact is that the world market for research-intensive products has developed more dynamically than the corresponding advances made in research-intensive products by the FRG. This is particularly true in the case of mechanical engineering, certain electrotechnical products, and photographic equipment.

The following points must be considered with regard to an improvement in dynamics:

National Economic Growth

Success of research intensive products on the world market requires dynamic economic development at home. There is still room for improvement here. The Experts' Board recently submitted proposals for increased promotion of expansion. These include:
better economic conditions at national level;
an increased level of private investment;
the elimination of administrative hindrances in the services sector;
more private enterprise in agriculture, telecommunications, and transport.

The transition to new products and, thus, to research-intensive branches of industry is also complicated by unsolved industrial crises, such as in the coal and steel industries and shipbuilding.

Access to New Markets in the Pacific Zone

Future markets in Asia and in the Pacific Zone, including Japan, the ASEAN [Association of South-East Asian Nations] countries and—more recently—China, offer excellent opportunities for expansion and should be taken advantage of by FRG industry. The United States and Japan have a clear lead here. West Pacific markets account for only a modest 7.7 percent of FRG machine exports worldwide, while the United States dominates with a share of 70 percent of Japan's machine imports (FRG: 11 percent). However, many companies, particularly small ones, are put off by the high market entry costs. Apart from this, the main problem seems to be adapting the products offered to the preferences and requirements of oversees users and consumers.

Faster Application of Research Results

Although there has been a satisfactory increase in cooperation between industry and science, it is still far from becoming an automatic procedure. Substantial incentives are required to make industry and science join their efforts.It must be made clear to those concerned that technical progress in many industrial sectors can only be achieved by close cooperation with research.

9. R&D and Training Capital As Indicators for the Future

Adequate R&D combined with suitably qualified personnel are prerequisites for success on the international competitiveness. R&D opens up a world market necessary to maintain and increase the high income levels in the FRG. According to the economic theory, this means that FRG industry is behaving rationally if it specializes in those goods for which it has comparative advantages over its competitors.

The FRG economy has the greatest comparative advantages in the fields of "R&D capacity" and "training capital."

According to estimates by the Battelle Institute, the FRG will presumably spend DM59 billion on research and development in 1987. The greater part of FRG research funds is provided by industry. In 1987 they are expected to be DM36.5 billion. Thus the private sector has increased its research spending by about DM14 billion compared to 1981. At the same time, the self-financing ratio of industry will rise to an anticipated 84 percent. This means that it has substantially increased its research activities, thereby providing good prospects for long-term competitiveness.

The level of the R&D activities of a nation and the share of R&D expenditures borne by industry are not the only significant factors in the assessment of future success on the world market. Successful research and development can only be achieved by adequately qualified personnel.

The FRG is one of those countries that has always been able to accumulate abundant training capital and that has even been able to increase its share of highly qualified personnel (see Table 8).

Table 8: Training Capital and R&D Intensity in OECD Countries (in percent)

Country	Training Capital Intensity			R&D Intensity		
	1975	1980	1985	1975	1980	1985
Canada	38.2	40.6	43.4	1.15	1.17	1.30
U.S.	41.9	43.0	42.0	2.38	2.46	2.83**
Japan	30.0	29.8	30.6	2.01	2.22	2.81
Australia	35*	37.5	39.9	1.0*	1.0*	1.14
New Zealand	34*	35*	0.87	0.9*	1.1*	

Table 8: Training Capital and R&D Intensity in OECD Countries (in percent)

Country	Training Capital Intensity			R&D Intensity		
	1975	1980	1985	1975	1980	1985
Belgium-Luxemburg	32*	34*	36*	1.30	1.4*	1.43*
Denmark	33*	37*	42.6	1.08	1.04	1.26**
France	35.0	35*	36*	1.80	1.84	2.31**
FRG	35*	36.7*	38*	2.24*	2.4*	2.66*
Greece	17*	21*	22*	0.20	0.2*	0.34**
Ireland	25*	29*	32*	0.86	0.7*	0.80**
Italy	22*	25*28*	0.93	0.86	1.33	
Netherlands	37*	41*	44.6	2.02	1.89	1.99**
Great Britain	38*	44*	49*	2.03	2.3*	2.33**
Austria	22.7	23.8	34.8	0.92	1.1*	1.27**
Finland	31.9	32.6	36*	0.91	1.1*	1.53**
Iceland	k.A.	k.A.	k.A.	0.94	0.7*	0.83**
Norway	30.7	35.1	38.6	1.34	1.27	1.53
Portugal	15*	17.7	21.1	0.3*	0.33	0.4*
Spain	17*	19*	20.6	0.35	0.40	0.4*
Sweden	36*	40.8*	46.8	1.80	2.0*	2.79**
Switzerland	36*	38.5	41*	2.40	2.3*	2.3*
Turkey	8.2	8.9	9*	0.2*	0.6*	0.2*

*Trend values
**estimate
source: NIW

The FRG is behind the United States but ahead of Japan. It is also noteworthy that in a number of smaller national economies, such as Denmark, Austria, Norway, Sweden, Switzerland, and particularly Great Britain and the Netherlands, substantial efforts have been made in this respect.

10. Further Selected Indicators of Competitiveness

R&D activities serve to maintain and improve the competitive position of a nation with respect to innovation and quality. The success of these efforts is reflected later in international trade. Additional indicators prove this:

Innovation Dynamics in FRG Industry Led to Increase in Sales

The product range of FRG industry consists of goods which correspond to different stages of the product cycle. Product improvements tend to extend these phases, thereby providing greater market coverage. New products give rise to new cycles. These innovation activities are measured by the Ifo Institute by means of an innovation test based on the share in sales achieved by the various products.

It is noteworthy that the share of sales achieved by products in the pioneering and growth phases has increased since 1982 (see Figure 2). These products accounted for almost 30 percent of sales in 1982 and

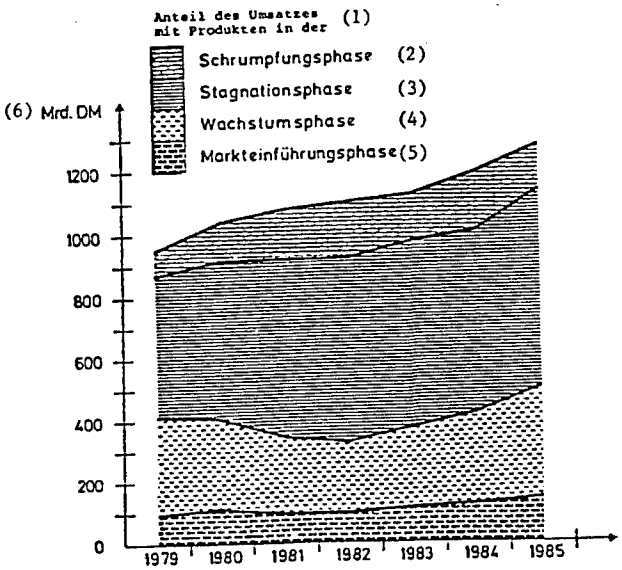


Figure 2: Sales Structure of FRG Industry According to Product Cycle Stages From 1975 to 1985

Key:
1. Share of sales of products in the:
2. Decline phase
3. Saturation phase
4. Growth phase
5. Initial marketing phase
6. DM billions

Source: Federal Bureau of Statistics: Annual Abstract of Statistics (various volumes); calculations by the Ifo Institute; Ifo innovation test

more than 38 percent of total sales for 1985. This proves that the favorable development in growth is due to improved innovation dynamics in the case of important product innovations.

Growth Encouraged by Companies with High Innovation Dynamics

The sales structure varies from company to company. However, it is obvious that in the growth sectors the companies are offering a range of products in which sales of innovative products (preliminary stage) are higher than those products in the declining stage. An IFO study covering the year 1985 shows that 51 percent of FRG companies—weighed according to personnel levels—have this structure. Over a period of time, this strategy also has favorable effects on sales in the growth and saturation stages.

High Technological Standards Due to R&D

The intensive R&D efforts on the part of FRG industry have a positive effect on technological standards. This is also proved by an ISI study. (Footnote 3) The following statistical comparison of selected high-tech sectors illustrates this:

Technology Sector	Technological Standard		
	FRG	U.S.	Japan
Industrial Robots	0.78	0.84	0.78
Laser Beam Sources	0.71	0.86	0.53
Biocatalysts	0.65	0.74	0.72
Sensors	0.63	0.69	0.60
Genetically Engineered Pharmaceuticals	0.60	0.89	0.34
Solar Cells	0.53	0.72	0.70

According to this, the FRG technological standard for industrial robots, laser beam sources, biocatalysts and sensors is close to that of the U.S. and exceeds Japan's technological standard in the case of laser beam sources, sensors and genetically engineered pharmaceuticals.

FRG Patent Activities in "Promising" Technologies Assure Tomorrow's Standards

If the number of patents is taken as a measure of the future success of R&D activities, interesting conclusions may be derived from comparative patent analyses for different countries, particularly in the case of activities in technology sectors with promise for the future. However, these conclusions must be treated with caution as, due to varying patent practices, an international comparison is only possible to a limited extent. It must also be noted that there is still no firm evidence that technical progress is reflected by increased patent activity in individual technical sectors.

In the course of an IFO study (Footnote 4), statistical methods were applied in an attempt to identify promising technologies and to compare the patent activities of various countries in these technological sectors. According to this study, the United States and Japan have the highest level of patent activity in "promising" technology sectors (see Table 9). In the third position, the FRG has a clear lead over France and Great Britain.

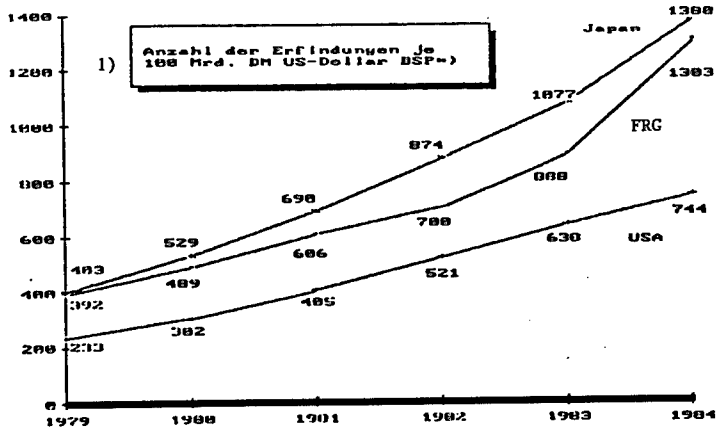
Table 9: International Comparison of Patent Activities (1) in "Promising" Technology Sectors (1984)

Country of Origin	Inventions	
	Number	Proportion in Percent
FRG	1,095	16.9
France	367	5.7
Great Britain	484	7.5
U.S.	2,147	33.2
Japan	1,702	26.3
World Total	6,463	100.0

(1) for patents registered in more than one country

If the number of inventions are considered in terms of the gross national product of the respective countries (see Figure 3), the FRG is seen to have a relatively strong position. The United States is only in the third place; the Japanese are leading and show a high rate of increase; the FRG occupies a strong second position and has the highest increase rate. In 1984 the FRG almost reached Japan.

The number of inventions is even more impressive when related to the number of persons employed (see Figure 3). In this case, the FRG is in the lead, followed by Japan and the United States.



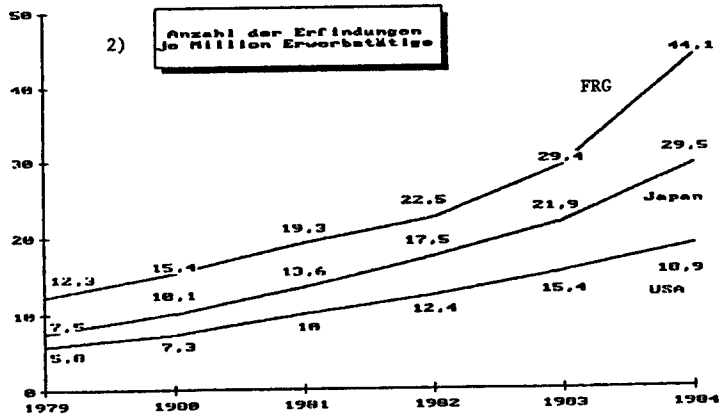


Figure 3: Inventions (a) in Selected Countries in Future Technology Sectors

Key:
1. Number of Inventions per DM100 Billion, U.S. Dollars, BSP-(Prices and Exchange Rates for 1980)
2. Number of Inventions per Million Employed.
a. Patents Registered in More Than One Country.

Footnotes

1. Research intensive sectors are classified as follows: High technology includes those sectors in which R&D expenditure amounts to at least 8 percent of sales; high-level consumer technology includes those sectors in which R&D expenditure is above the average of the production industry, presently about 3 percent.

2. The indicated "Relative Export Surplus" (RCA) Revealed Comparative Advantage (RCA) provides a value for the extent to which export surpluses (or deficits) for a particular product group deviate from the average for industrial output as a whole. If the export-import ratio of the product group is equal to the average for all industrial goods, then the value is zero. Positive values indicate an above average position. Negative values mean that international competitiveness is below average.

3. Fraunhofer Institute for System Technology and Innovation Research (ISI): International Comparison of Technological Standards for Selected Research-Intensive Products, Karlsruhe, March 1987.

4. Fausl, K.: Forecasting of Technical Developments on the Basis of Patent Data, Munich (IFO), March 1987.

8706

Future FRG Technology Policy Outlined in '1988 Research Report'

36980232b Duesseldorf HANDELSBLATT in German 24 Mar 88 p 8

[Text] Bonn, 23 Mar—Increased international cooperation and support geared to small business are to be the main emphases of the future research policy of the federal government. This emerges from the perspectives put forward in conjunction with the 1988 Federal Research Report.

On the occasion of the presentation of the report on Wednesday in Bonn, Federal Research Minister Heinz Riesenhuber said that even though in the wake of the tax reform—which for its part considerably improves the basic conditions for innovations—some promotional programs have been discontinued that from the outset were for only a fixed period (this pertains above all to the personnel costs subsidy program of the Federal Ministry of Economics and the support for research personnel expansion of the BMFT), nevertheless support that is geared to small business will remain a central aspect of the government's research and technology policy.

According statements made by Riesenhuber, at present the following measures are being examined or being set up:

1. Expansion of cooperative research in industry;
2. Improved technology briefing and greater user friendliness for data banks;
3. Promoting technology transfer also for small-scale crafts and trades;
4. Simplifications in administration, in order to facilitate access to project assistance;
5. Continuation of the measure "research cooperation between industry and science."

According to Riesenhuber, on the international scale the FRG wants in the future to be involved "to the extent allowed by its great scientific tradition and economic resources." As a contribution to further integration, the federal government will fight above all for more research cooperation in Europe, he said. Important "mileposts" are, according to Riesenhuber:

1. The translating of the German-French Eureka idea into a great success of research cooperation on the business level, "with an impact more widespread than hardly anyone thought possible." The minister described the total volume of the started projects as being about DM9 billion.
2. The new framework research program of the EC, for the success of which Bonn will fight particularly hard within the framework of the German presidency of the EC council.
3. Stepping up the German push for a prompt joint standardization to accompany future developments.
3. Decisions of the federal government on financial participation in the new high energy accelerator as well as in the European synchrotron radiation source, with a combined German share in the capital expenditures of about DM1.1 billion.
4. Bonn's support for the basic policy decisions made on developing an independent European space-travel program. In this area, he said, the project Columbus above all is assuming the function of a bridge to increased transatlantic cooperation.

It follows from the 1988 research report that in the report period covering the past 4 years, basic research has been given a distinctly greater weight. Its share in the budget of the federal research ministry rose from about 28 percent at the beginning of the 1980's to about 37 percent in 1987. As Minister Riesenhuber stated, for the next few years the federal government views as a priority task a dovetailing even better between program-oriented basic research planned for a specific period and unrestricted, broadly financed research.

Applications-oriented basic research is to be further strengthened, both by way of financial commitment and debureaucratization and also through encouragement of cooperation and competition. In this connection, Riesenhuber called on business and labor to energetically push innovation and high-quality workmanship. The federal government and the Laender will have to work together as partners in order to ensure productive university research and to support the next generation of scientists.

Backlogs Caught Up With in Environmental Research

In the sectors of key technologies, above all information engineering, technologies of materials, and modern biology, and also in connection with supporting market-oriented technologies, the federal government wants to continue its assistance, although the sums in question could not be further expanded in all sectors as was done in the past, Riesenhuber stressed. Increasingly, support will be directed towards collaborative research with a basic-research orientation and thus will be somewhat more degressive for the economic sector as the recipient.

In environmental and quality-of-life research Riesenhuber's judgment is that in recent years backlogs have been caught up with in terms of understanding the problems involved. In these sectors, increasingly within the next few years "future-oriented knowledge about courses of action and organization is to be acquired and the contribution that research and technology can make is to be demonstrated by model solutions."

The Federation of German Industries (BDI) has welcomed the intentions announced in the federal research report on supporting small and medium-sized industry, but in a statement it made it added that this cannot be a substitute for the elimination of DM1.2 billion in indirect support for research.

The research-policy spokesman of the SPD Bundestag fraction, Josef Vosen, called the 1988 federal research report a "non-committal public speculating by the federal research minister about research policy as it could be or ought to be." He said that the report is largely identical to the "1986 Factual Data Report," with the latter merely having been "polished up with an ideologizing, philosophical opening paragraph."

12114

France: 1988 National Research Programs

Focus: Computers, Electronics, New Materials, Eureka

36980168 Paris ELECTRONIQUE ACTUALITES in French 22 Jan 88 pp 1-2

[Article by R. Font: "Ministry of Research Launches an 'Electronics and Computers' Program"]

[Text] The year 1988 begins under the reorganization sign for the Research and Technology Fund (FRT), which is managed by the Ministry of Research, and about one-quarter of whose Fr930 million of allocations for 1988 concern electronics.

Speaking to the press on 12 January, Jacques Valade, minister of research, explained that since the beginning of the year 11 "national research programs" have replaced the former major and other priority programs within FRT.

Three of these 11 new programs very directly concern our industries: they are the Electronics and Computers, New Materials, and Technology and Computer Integrated Manufacturing programs.

Heading these 11 programs are "scientific committees of experts" specifically responsible for issuing calls for bids, and for selecting research proposals. In 1988, these calls for bids will be issued toward mid-February.

Mr Valade wishes that henceforth, allocations made as part of FRT serve as incentive leverage. It is not acceptable, he said, for some laboratories and enterprises to benefit from "situational pensions" in the distribution of allocations.

The projects which will be accepted as part of FRT will allow the acquisition of "technological keys," but only as long as they open a "significant potential economic profitability."

On the other hand, priority will also be assigned to projects that encourage cooperation among enterprises and public research agencies, or among manufacturers. The ministry thus wants to influence technology transfers between large companies and PME (small and medium sized enterprises), as well as between public and industrial research.

Each of the 11 new research programs include several "priority research actions" (APR) of 3-5 years' duration. For 1988, they represent about one-half of FRT's total endowment: Fr400 million out of Fr930 million.

Devoted essentially to components and semiconductor devices, to languages and expert systems, the Electronics and Computers program will receive Fr80 million during this year. (It should be pointed out however, that the bulk of the government funds allocated to electronics is managed by the Ministry of Industry rather than by the Ministry of Research).

Another FRT program, Technology and Computer Integrated Manufacturing, will receive Fr70 million. "Projects involving mechanics will be extended into optics, and more particularly into optoelectronics, computer integrated manufacturing, robotics, product design, ergonomics, as well as electrical engineering, so as to form a coherent whole," the ministry indicated.

As to the New Materials program, Mr Valade stressed that he wanted to "go all the way" on it. Dealing with ceramics, composites, and high temperature superconductors, this program has a 1988 endowment of Fr60 million.

The "superconductors" APR alone will receive Fr10 million this year, which will be added to the first Fr20 million authorized by Mr Valade last autumn for 1987.

Five new projects have been selected for this APR following the call for bids issued at the end of 1987. Intended to provide "a transition from research to industry," these projects involve in particular CNET, CNES, AEC, and seven manufacturers (Thomson, CGE, Pechiney, Rhone-Poulenc, Telemecanique, Bull, and Saint-Gobain).

One of these five projects, led by Pechiney, involves the creation of ceramic strips to be used as current conductors, and to coat hyperfrequency cavities. Thomson is participating in this project.

Led by CGE, another project covers on one hand, the production of a superconducting conductor capable of carrying several tens of amperes per mm^2 at 77 K, and on the other hand, an elementary Josephson device operating at the same temperature.

Another superconductor project, led by Thomson this time, seeks the development of ceramic powders useful for electronics.

Headed by Saint-Gobain, the objective of a fourth project is to study various means for achieving stable thin films and ancillary techniques (encapsulation, contacts, silk screening) that would allow their utilization in an integrated process.

Lastly, the fifth selected project, led by Telemecanique, concerns the application of superconducting materials to low voltage switching devices.

In addition, the fundamental physics area will launch this year as part of FRT, the production of a very high field superconducting magnet intended for future accelerators. This project joins AEC, CERN, and Alsthom.

In mentioning CIFRE (Industrial Agreements for Training Through Research), about 40 percent of whose enterprises belong to the electronic and computer industry, Mr Valade indicated that their number will increase by 10 percent during this year, to a total of 400.

The minister also discussed the constantly growing appropriations of French regions to research. In his view, this is a "very important" phenomenon. As part of the 1988 FRT, Fr120 million (compared to Fr103 million in 1987) is devoted to support the efforts of regional councils, efforts geared essentially to facilitate transfers of knowledge and technology between public research and industry.

Questioned about ANVAR (National Association for the Implementation of Research), Mr Valade considers that the agency was "absolutely indispensible," and hoped that in the future it would continue to function according to the principles that have led to its success. It should be added that a thorough reform of ANVAR is foreseen at the Ministry of Industry after the departure of Mr Marbach (whose successor is to be designated soon). If we are to believe him, the least that can be said is that the minister of research does not appear very convinced of the need for such reform.

Research Technology Fund (FRT) Allocations

36980168 Paris AFP SCIENCES in French
14 Jan 88 pp 7-10

[Unsigned article: "Bright Days for the Research and Technology Fund"]

[Text] Paris—Superconductors or biotechnologies, computers and mechanics in regional areas: with Fr930 million to distribute in 1988 (compared to 750 million in 1987), the Research and Technology Fund (FRT) is faced with a bright future.

Having been evaluated and reorganized in recent months, this form of support for urgent technological developments was presented to the press by the minister of research and higher education, Jacques Valade.

Committees have been formed to manage each topic: from calls for proposals to project selection, follow-up and evaluation will be assured by experts in the sector, under the supervision of a ministry secretariat. Overall, the program seeks to train industrial personnel through research, to finance a French portion of the European technological program Eureka, to support the transfer of knowledge from laboratories to industry, and to confront the identified challenges of the next decade.

Distribution of Research and Technology Fund Endowments in 1988

	1988 Endowments in Millions of Francs
National Programs	
Biotechnologies	21
Food	40
Medical Research	50
Demographics and Social Sciences	15
Technology and Computer Integrated Manufacturing	70
Electronics and Computers	80
Research on Facilities and Transportation	19
Natural resources	9
New Materials	60
New Chemistry	13
Research for Development	13
National Program Total	400
Training Activities	160
EUREKA Program	200
Regional Activities	120
Other Activities (among which International Relations and Scientific Computer Networks)	50
FRT Total	930

Research and Technology Funds

NATIONAL PROGRAMS	Priority research activities	Chairmen of scientific committees	Executive secretaries
BIOTECHNOLOGIES	1. Microbiology engineering	Mr Douzou	Mr Aigle
	2. Enzyme engineering	Vice-chairman:	Mr Thomas
	3. Biotechnology engineering	Mr Boschetti	Mr Thomas
		Program committee: Mr Menoret	
NUTRITION	1. Food sources	Mr Sabin	Mr Bassino
	2. Transformation of agricultural products	Mr Feillet	Mr Molle
	3. Nutrition	Mr Flanzy	Mrs Bonnot
MEDICAL RESEARCH	1. Retrovirus, AIDS	Mr Louisot	Mrs Bonnot
	2. Aging and neurological handicaps	Mr Widlocher	Mr Fleury
	3. Human genome	Mr Dausset	Mr Jeanteur
	4. Drugs, molecular pharmacology	Mr Sassard	Mr Fleury
	5. Biological and medical engineering	Mr Burg	Mr Broun
DEMOGRAPHICS, SOCIAL SCIENCES	1. European space	Mr Lavroff	Mr Machelon
	2. National community	Vice-chairman: Mr Jacque	
	3. Mankind and technological change	Mr Bellon	Mr Lichtenberger
TECHNOLOGY AND PRODUCTION	1. Mechanics, optics	Mr Lachat, Vice-chairman: Mr Imbert	Mr Richard, Mr Bulabois
	2. Computer integrated manufacturing, robotics	Mr Blanchard	Mr Lhote
	3. Product conception, design	Mme Quarante	Miss de Vendeuvre
	4. Ergonomics and productivity	Mr Wisner	Lichtenberger
	5. Electrical engineering	Mr Amiet	De Vries
ELECTRONICS AND COMPUTERS	1. Advanced microelectronics	Mr Aigrain	Mr Quannes
	2. Computers	"	
RESEARCH ON FACILITIES AND TRANSPORTATION	1. Land transportation	Mr Lagasse	Mr Eurin
	2. Civil engineering	Mr Chapon	Mrs Brachet
NATURAL RESOURCES	1. Living resources and forestry	Mr Cauderon	Mr Monties
	2. Exploitation of mineral resources	Mr Dietrich	Mr Cony
		Program committee: Mr Causse	Mr Bourgeois
NEW MATERIALS	1. Changing conventional materials	Mr Pomey	"
	2. Composites	Mr Gobin	"
	3. Ceramics	Mr Sifre	"
	4.Superconductors	Mr Jerphanion	"
NEW CHEMISTRY	Molecular engineering	Mr Faure	Mr Blanchard
RESEARCH FOR DEVELOPMENT	1. Environment and resources, utilization and conservation	Mr Garagnon	Mr Turenne
	2. Growth, mobility, socio-economic concentration phenomena	"	"
	3. Food production, technology innovation and transfer	"	"

Research and Technology Funds

NATIONAL PROGRAMS	Priority research activities	Chairmen of scientific committees	Executive secretaries
TRAINING ACTIVITIES (CIFRE, FIRTECH, scholarships)			Mr Montel (Dr)
EUREKA PROGRAM			Mr Pagezy (DIT)
REGIONAL ACTIVITIES			Mr Pagezy (DIT)
INTERNATIONAL RELATIONS			Mr Petit (DAI)
FUNDAMENTAL DISCIPLINES	Includes scientific computer networks		Mr Petlau (Dr)
SPECIFIC ACTIVITIES	Includes technology transfer		"

Significant Financial Effort

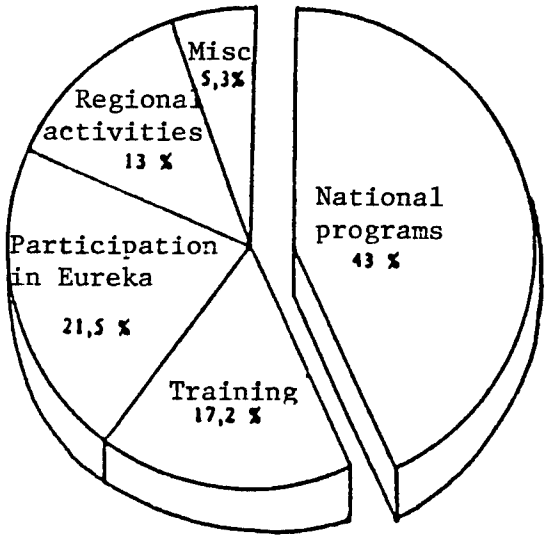
In 1987, the financing of the 11 national programs with allocations from the Research and Technology Fund, represents 50 percent of the financial contributions from other partners: enterprises, professional technical centers, ministries, public agencies, universities and major schools, associations, and local communities.

1987 Distribution of Financial allocations by Program Among FRT Endowments and Other GFinancing, as Percent of Total Amount for each Program (estimated).

Regional Programs	FRT	Others
Biotechnologies	34	66
Food	22	78
Medical Research	56	44
Demographics and Social Sciences	52	48
Technology and Computer Integrated Manufacturing	46	54
Electronics and Computers	48	52
Research on Facilities and Transportation	15	85
Natural Resources	43	57
New Materials	27	73
New Chemistry	43	57
Research for Development	26	74
Total	33 percent	67 percent

National Programs in FRT Activities in 1988

- National programs represent nearly one-half of the financing allocated by FRT to all its activities (43 percent).
- Training: Industrial agreements for training through research, third stage scholarships and allocations, centers for training engineers through technical research (FIRTECH) (17.2 percent).
- FRT share in the Eureka program (21.5 percent).
- Regional activities (13 percent).
- Miscellaneous: International relations, scientific computer networks, and so on (5.3 percent).



Superconducting materials, electronics, biotechnologies, the new chemistry, as well as transportation and health are part of the 11 topics selected for the new list. Some have disappeared, and others have been established on the basis of expert evaluations. "What we must not do is establish situational pensions, instead, we must evaluate results and best distribute resources through regional collaboration," explained Mr Valade.

The money available in FRT is intended for laboratories and businesses which respond to the call for research proposals issued by committees of scientific experts for each of the topics. These experts then select the activities to be undertaken and closely follow up on the work in progress.

In addition to the programs already mentioned, the topics concern food, demographics and social sciences, technology and production, natural resources, and research for development. Superconductors for instance, will have a budget of Fr20 million in 1987, and Fr10 million in 1988.

11023

Philips President Blames Dollar Fall for Low Profits

3698a169 Amsterdam COMPUTABLE in Dutch 22 Jan 88 p 19

[Text] Eindhoven—Philips CEO C.J. van der Klugt again blamed the further fall of the dollar for the decline in the company's 1987 net profits, which fell short of expectations in that they did not increase as compared to 1986. At a New Year's meeting with the company's board of directors, he said that these results were caused by the provisions that had to be made to fund the extra reorganization and cost control projects linked to the lower dollar rate and by lower utilization of production capacity.

In fact, Philips sales volume grew by 7 percent in 1987 compared to 6 percent in 1986. The negative effects of currency fluctuations (9 percent) and deconsolidations (2 percent) caused revenues to fall to 52.7 billion guilders at constant sales price levels. The 1986 net revenues totaled 55 billion guilders, i.e., down 8 percent on the 1985 total result of 60 billion guilders. In 1985 net revenues in guilders still increased by 12 percent.

Net Profits

According to Van der Klugt, 1987 net profits will be lower than in 1986, when the company still made 1.015 billion guilders in net profits, i.e., 6.3 percent of its equity capital. In 1987 the stock level (as a percentage of turnover) also decreased. In 1986, the stock/turnover ratio was 23.3 percent, as compared to 23.2 percent in 1985.

At the New Year's meeting on 12 January Van der Klugt pointed out that the dollar fall had changed their competitive position in such a way that sales prices could not possibly be increased during the last months of 1987. The sales price level remained the same, whereas in 1986 it had increased by 2 percent.

Furthermore, 40 percent of Philips' trade volume consists of dollar-linked currencies, as compared to only 25 percent of its costs (purchases included). The unfavorable effect of the dollar's fall on profits outweighs the favorable effect on costs, according to Van der Klugt. That is why he thinks it is inevitable that the manufacturing activities be gradually moved to dollar areas. He also announced Philips' intentions to take sweeping measures to improve profit margins. These measures will be aimed at reducing costs and strengthening the company's strategic force. The 1986 annual report features similar statements by Van der Klugt. At the time he assumed that in the short term no real changes would occur "in this precarious situation" (caused by the 26-percent fall in the dollar, editorial note) and announced that corporate policy would be closely reviewed.

Philips' annual returns will be made public on 25 February.

25024

British Establish Center To Boost R&D Investment

3698a147 Paris CPE BULLETIN in French Dec 87 p 21

[Article signed R.B.: "National S&T Implementation Center (CEST) Based in Manchester"]

[Text] The Center for the Exploitation of Science and Technology (CEST) has been officially inaugurated. It will assist the Advisory Council on Science and Technology (ACOST), which is attached to the office of the British prime minister and is commissioned to define the priorities for university and industrial R&D.

To ensure some independence, government funding is limited to a maximum of 20 percent of the initial investment. The remaining 5 million pounds are supplied by 19 companies (250,000 pounds each), including British Telecom, Rolls-Royce, and British Aerospace. The GUARDIAN reported the participation of two American giants, IBM and ESSO, and the absence of three important British companies GEC, Plessey, and ICL.

CEST will be based in Manchester in the science park near the university; this contradicts rumours about the Warwick technology center being the favorite site among the 13 candidates.

CEST's role is to favor the increase of British industrial R&D investments by creating an atmosphere of confidence between the partners of the public and private sectors; it is to provide strategic options following commercial and industrial evaluations. Its president, Sir Robin Nicholson, also hopes that CEST will be able to influence the government's education policy in the field of science and engineering.

Meanwhile, the SPRU [Science Policy Research Unit] of the Sussex University has published a study on "the persistent decline of science in Great Britain," which was based on the analysis of 3,000 international scientific magazines. The share of British articles in all scientific publications decreased by 2 percent between 1978 and 1981 and by 4 percent between 1981 and 1984. It now amounts to 8.1 percent of the items published worldwide; Japan's share increased by 21 percent in the same period and the U.S. share decreased by 1 percent. An analysis per sector showed a weakening of technological research in metallurgy, applied chemistry (polymers), and solid-state physics.

26063

SUPERCONDUCTIVITY

EC Discusses Fund, Programs To Promote Superconductivity

Report from EC Commission

36980229a Duesseldorf VDI NACHRICHTEN in German 4 Mar 88 p 7

[Excerpts] The Common Market Commission wishes to press European collaboration in superconductivity research. According to the executive agency in Brussels, appropriate invitations to bid within the framework of a common technology program can be expected already this spring.

In the view of the Commission, a world-wide research and development competition is in progress to develop "superconductivity as a technology with potential strategic importance." Up to now, Europe has met this challenge by mutually isolated projects.

As regards the status of European efforts, the Commission report reads: "Better coordination of research activities in this area by international cooperation could help to avoid unnecessary duplication of work and the more rapid achievement of results. This is especially true for the area of information technologies, where these materials presumably will find their earliest use." In its initiative, the Commission tries to connect with the most recent successes of European technological collaboration: "International collaboration in research and development - such as has taken place in the context of the ESPRIT program (information technology) has helped Europe in 1987 to develop the most powerful microchip in the world. This success with semiconductors can be continued with superconductors only in the context of the second phase of ESPRIT, which is currently becoming operational."

In the context of ESPRIT II, according to the Commission, 65 million European currency units (ECU = DM2.06) have been provided for those areas of basic research in which projects for superconductivity are also being considered. Invitations to bid beyond the already existing project applications are to be expected by the end of March.

In view of superconductivity and "European solutions," the experts in Brussels are currently also working on a program-supervening "stimulation project." Besides the offer existing in ESPRIT II, attention is to be called to research and development opportunities also within the BRITE program (industrial technologies). To this must be added research sectors in the area of new materials or projects in the so-called stimulation program "Europe the Researcher." At this time, according to the Commission, the inclusion of partial aspects of work on superconductivity within Common Market research programs on nuclear fusion is also being examined.

Finally, the Commission report underscores the importance of its initiative in the area of superconductivity.

8348

Committee for Disseminating Superconductivity R&D Information

36980270b Paris ELECTRONIQUE ACTUALITES in French 1 Apr 88 p 11

[Text] A standing committee made up of research organizations from various European countries has been established to improve the flow of information on high temperature superconducting materials among these different countries.

The committee includes representatives from France's CNRS [National Center for Scientific Research], Italy's CNR [National Research Council], West Germany's DFG [German Research Association] and MPG [Max Planck Society], and Great Britain's SERC [Science and Engineering Research Council]. The CNRS's committee representative is Jean Hanus, director of CNRS PIRMAT's Interdisciplinary Materials Research Program.

The committee's first meeting was scheduled for the beginning of March, shortly after the International Conference on High Temperature Superconductors held in Interlaken in Switzerland.

09825

TELECOMMUNICATIONS R&D

CNET of France Announces 1988-91 R&D Plan

36980234b Paris INNOVATION TELECOM in French Feb 88 p 2

[Text] CNET-Grenoble's new plan for the 1988-1991 period was presented 13 January, 1988.

J.P. Poitevin, CNET director, has decided on two objectives: integration of the most advanced technology, not yet available on the market, into systems design at CNET's other centers; and maintaining its present lead to remain one of the best large microelectronics research centers.

Specific goals include designing and building circuits of strategic importance in the telecommunications industry and using CNET's resources to standardize functions whose integratibility has been demonstrated by the company. In drawing up the corresponding "product plans", four areas were suggested:
—Videophones developed for the CNET Visages project: integration of the wide-band word encoder/decoder and the image movement predictor.
—High-resolution television (HD MAC norm): preparation of components of the future HD MAC decoder, such as convertors and filters, and construction of a complete circuit as soon as the norms have been established.
—Asynchronous time switching: demonstration of the integratibility of the 16 multiplex circuit core with CMOS.
—Mobile telephones: integration of the 13 kbit/s word encoder/decoder using a signal-processing microprocessor core.

Circuits may also be developed for other fields: artificial intelligence, multiplexing, and communication protocol processing. CNET-Grenoble's first plan concluded with the description of a micron product line for telecommunications needs: the CMOS WAI 1 micron product line, turned over to the MHS company, will be manufactured by it during 1989. (see IT No.42).

09825

France Designs Secure Computer Communications Circuit

36980234c Paris INNOVATION TELECOM in French Feb 88 p 2

[Text] To enhance the security of computer communication link-ups between terminals, both for electronic money transfers and electronic mail, SEPT and CNET-Grenoble are working together to design a circuit incorporating a data number signature, based on the public RSA (Rivest Shamir Adlemann) check digit algorithm. This algorithm is currently the most widespread one, but the circuit can be used for any other algorithm based on the same type of elementary operation (Diffie/Hellman, Fiat/Shamir, etc.).

Validation of the circuit showed it was operational with check digits 256, 512 and 1,024 bits in length. Calculations should be completed in 300 ms for 512 bit words, which would rank it among the best European circuits. The circuit contains 100,400 transistors.

09825

New Facility for Micro-Optoelectronics R&D at CNET of France

36980234d Paris INNOVATION TELECOM in French February 88 p 5

[Text] A new Bagneux Science Group building dedicated to micro-optoelectronics research opened its doors in Bagneux, 21 January, 1988. Mr Feneuille, CNRS general director, and Mr Poitevin, CNET director, were present for the opening.

The Bagneux Science Group is composed of the CNET Laboratory and the CNRS Microstructures and Microelectronics Laboratory (L2M). One of its current objectives is the study of microstructures made of III-V semi-conducting alloys, such as the quantum wells and supernetworks that form the basis of the new generations of optoelectronic (lasers, light modulators, photodetectors) and microelectronic (two-dimensional gas field effect transistors and bipolar transistors) components.

This building is an addition to the facilities of the Science Group's two laboratories. Bagneux now possesses a complete inventory of equipment for III-V semiconductor technology. Its electronic nanomasker, a recent investment, can attain an etching precision of 20-30 nanometers in line width; these combined resources pave the way for the design of new basic component structures for tomorrow's networks.

09825

Nokia of Finland Participates in RACE

36980229b Coburg MIKROWELLEN MAGAZIN in German Vol 14 No 1, 1988 p 12

[Text] Nokia has signed contracts with the European community concerning participation in the RACE program (Research and Development in Advanced Communication Technologies for Europe). The objective of the RACE program is the development of a pan-European, integrated broad-band telecommunication network. Nokia is participating in five RACE projects. The projects are concerned, among other things, with the determination of general tasks of the network, the development of the basic technology, and the development of mobile telecommunications.

The collaboration of the EFTA countries in the RACE projects is a guarantee that they will participate in the future technical development of the telecommunications branch. It is important to develop a uniform telecommunications standard in all of Europe, according to the Nokia board member, Timo H.A. Koski.

The estimated total cost of the RACE program will run to 1.95 billion Swiss francs, of which the Common Market will finance 0.9 billion Swiss francs. The remaining costs will be financed by the enterprises and by the various organizations of the EFTA countries.

Besides the enterprises, universities and research institutes of various countries are also participating in the project. Timo H.A. Koski reports that Nokia intends, within the framework of the project, to collaborate with technical universities and the State Technical Research Center of Finland.

The technical skills of Nokia are considered to be at a high level. This appears from the fact that Nokia takes over the role of a responsible project manager in numerous component projects of mobile telecommunications and of CPN (Business Customer Premises Network) projects.

The new telecommunications network makes it possible to transmit voice, pictures, text, and data in the same network. The new network differs from the narrow-band ISDN network, which has repeatedly been reported in recent times, in virtue of the fact that it also makes possible the transmission of video pictures. Data can be transmitted very rapidly in the network, thus increasing the efficiency of data processing. For example, this could make possible more efficient utilization of data bases.

It is estimated that the new broad-band network will be in the trial stage at the beginning of the 90's. In 1995, it will presumably be used to a large extent.

8348

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