JPRS L/9425

4 December 1980

West Europe Report

SCIENCE AND TECHNOLOGY

(FOUO 14/80)

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APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000300060006-6

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WEST EUROPE REPORT

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CONTENTS

ENERGY

FIRST PILOT SOLAR POWER PLANT DESCRIBED

Hamburg ERDOEL & KOHLE ERDGAS PETROCHEMIE in German Aug 80 pp 343-344

[Text] Under contract from the Ministry for Research and Technology the Messerschmitt-Boelkow-Blohm Co Ltd in Munich has developed the first fully operable pilot plant for a solar thermal power station in Germany. The operating principle is thermochemical conversion of solar energy into usable mechanical or electrical energy. The sun's irradiated energy is converted by flat collectors into thermal energy and transported by water, which is used as the heat transfer medium, to the heat exchanger of the processing circuit. There a suitable medium, in this case $C_2Cl_2F_4$, is vaporized at a suitable pressure. In the processing machine, an expansion screw machine, expansion of the working gas produces mechanical energy which is subsequently converted into electrical energy. The Linde Co in Cologne is supplying the mechanical part of the processing circuit.

Table 1: Technical Data

Output	$10kW_{el}$
Current	220V~
Collector field inlet temperature	88°C
Collector field outlet temperature	95°C
Working medium	$C_2Cl_2F_4$
Vaporization pressure	10.5 bar
Condensation pressure	3.6 bar
Cooling	Water
Cooling water inlet temperature	3°C
Cooling water outlet temperature	39°C
Storage	Thermal:
	$35m^3$ of water

This model solar power station is capable of delivering 10 kW of electrical output to outside consumers. At the same time all sources of consumption, such as pumps, valves and control systems, are supplied with energy. The plant is fully automatic. A precise adjustment unit guarantees that frequency and voltage are maintained within normal generating station limits, even at load variations up to 100 percent. After the necessary development tests the plant was set up for long-term testing with the Indian firm Bharat Heavy Electricals Ltd, New Delhi, in Madras in South India, at the Indian Institute of Technology and started up.

The 10-kW solar plant will serve principally as a pilot plant for the investigation of solar research problems and for the training of personnel in this new technology.

Because of the extremely low operating temperature overall efficiency is relatively low.

Further development is therefore principally directed toward evolving more effective and cost efficient solar thermal power stations by increasing the operating temperature.

To do this, thermal energy from solar irradiation must also be obtained at a higher temperature. Accordingly, MBB has developed, among other things, concentrating collectors of various types for the next generation of solar power stations.

One of them is a paraboloid mirror which concentrates sunlight 200-fold on a spherical receiver located at the focal point. The heat transfer medium flows through the receiver and is heated to 350°C. This type of collector is being installed in a 100 kW_{el} solar power station currently under construction.

A double-axis tracking mirror, called a heliostat, was developed for power stations with a higher output. A suitable number of such mirrors concentrates sunlight on a receiver which is located on a tower above the mirror field. Here, for example, steam is generated which drives a conventional turbine generator. The MBB heliostat is being used in a 1-kW pilot power station under a project sponsored by the EEC and the pertinent ministries in Italy, France and the FRG.

9581
CSO: 3102

INDUSTRIAL TECHNOLOGY

STATUS, CURRENT FOCI OF R&D IN MANUFACTURING SYSTEMS

Duesseldorf VDI-Z in German No 15/16, 1980 pp 625-629

[Article by Herman J. Schulte: "Flexible Manufacturing Systems. On the Status of Work Being Done in Special Research Sector 155 in Stuttgart"]

[Excerpts] Special Research Sector 155 for "Manufacturing Technology" at the University of Stuttgart is concerned with basic research for industrial production facilities, in particular with the development of flexible manufacturing systems. Those involved are the Institutes for Industrial Manufacturing and Factory Operation (Prof H.-J. Warnecke, doctor of engineering), Machine Tools (Prof K. Tuffentsammer, honorary doctor of technology), Design and Manufacturing in Precision Engineering (Prof A. Jung, graduate engineer), Control Technology for Machine Tools and Manufacturing Facilities (Prof G. Stute, doctor of engineering) and Metal Forming (Prof K. Lange, doctor of engineering). This article provides a look at the work currently in progress and briefly describes the level of development which has been achieved in certain subsectors.

1. Flexible Manufacturing as a Task of R&D

Special Research Sector 155 for "Manufacturing Technology" is one of the 114 currently existing special research sectors (SFB) which the German Research Association (DFG) is supporting as key fields of advanced school research in a large number of scientific areas. In the current year alone, the DFG has approximately DM250 million available for this; three-fourths of this amount is supplied by the Federal Government from the budget of the minister for education and science, one-fourth by the Laender.

Minister for Education and Science Juergen Schmude visited SFB 155 in Stuttgart at the end of February; his visit gave the participating institutes an opportunity to show what work has been going on since 1973 and the results which have been developed in that period. During his visit Schmude quoted an opinion by DFG experts who, in assessing the Stuttgart project, had come to the conclusion that the pilot plant which was developed there has "already become a place of pilgrimage for scientists and engineers from leading industrial nations."

There are no doubts about the essentials of what is being done in SFB 155 for "Manufacturing Technology" in Stuttgart, but conceptually there does not appear to be total overall agreement. The key phrase is "flexible manufacturing systems."

According to a report[1] in the journal AMERICAN MACHINIST there is still no generally accepted definition. As stated there, one can, of course, call every manufacturing factory a manufacturing system, but at best the adjective "flexible" must be taken in a relative sense. Nonetheless, among metal working experts, the concept of a flexible manufacturing system has in the last five or even seven years taken on a meaning that is characterized by these three features:

--independently operating numerically controlled [NC] machine tools,

--a conveying and handling system,

--a control system which coordinates the functions of machines and conveying/handling facilities.

2. Basic Issues and Planning

In terms of the definition put forth by G. Stute in Stuttgart a flexible manufacturing system consists of several individual machines which are linked together and on which various workpieces can be processed automatically and without interruption for changing over. Thus, the components of flexible manufacturing systems involve facilities for manufacturing, storing and transport and also a control system. Electronic data processing is especially suited to planning the components and controlling the entire system. The equipment used ranges from large computers and process computers to microcomputers.

Technical, organizational and work-technical considerations influence the decision for a flexible manufacturing system. The following are cited as technical reasons:

--greater flexibility and plant availability for prototype series, in the case of product expansions and changes, of decreasing lot sizes and increasing the number of variants;

--higher use of machines, lower idle-machine times (possible by reducing change-over times, by direct transport and by buffers on the machine);

--increasing quality and precision (saving on resettings, less reworking, fewer rejects).

Organizational reasons are shorter machining time, higher degree of adherence to schedules and greater capability to react to breakdowns.

Work-technical reasons are lower risk of accidents, avoiding monotonous, fatiguing activities, disengagement of the worker in respect to time and location, and expansion of job content, operator's positions and thus, the creation of exacting jobs.

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1 "Aiming for Flexibility in Manufacturing Systems," AMERICAN MACHINIST, Vol 124, No 3 (March), 1980, pp 167, 182, Special Report 720.

APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000300060006-6

Table 2 provides an overview of the flexible manufacturing systems which have since been ralized in various industrial nations. Table 3 refers to the development to date in the FRG. Although at the beginning of the 1970's several systems were fully operational in foreign countries, here at home we were just starting development; no one felt really responsible. The origin of SFB 155 for "Manufacturing Technology" in Stuttgart dates just from 1973. The goals of this SFB are studies on planning and development and the building and operation of flexible manufacturing systems, Figure 1. In the manufacturing tasks being considered here, the main focus is on milling, drilling and measuring tasks for prismatic parts and on forming tasks for rotation parts.

In addition to basic studies, the research program comprises the testing and functional proof of components and subsystems in models, especially with a pilot plant. This plant, Figure 2, consists of high rack storage for the workpieces and four processing centers which are linked together in the flow of material by a rack control device. The facility permits practical testing of the complex relationships and the results of theoretical studies.

Basic tasks include development of various methods of planning with which diverse technical and organizational solutions for this new manufacturing structure can be achieved. Essential to this is, for example, the design of the flow of material. With simulation models, in which the spectrum of workpieces, the number of processing stages and other parameters can be varied, the flow of workpieces is copied and the operations in respect to time of the different models can be compared. With the results it is possible to determine the utilization factor of manufacturing systems, to provide an enterprise with guidelines for system design and to identify use limits. With that, the total cost of different designs can be estimated and evaluated at the start of the planning phase.

Possible other tasks are the development and optimization of the required manufacturing control and studies on possible conveying facilities. Thus, for example, a linear motor-operated pallet conveyance system was designed and built as an experimental facility. The pallets are driven individually, the drives, however, can be coupled and uncoupled, which makes it possible to achieve cost-favorable pallet transport.

3. Computer Numerically Controlled [CNC] Measuring Center

To guarantee the quality of manufactured workpieces a CNC measuring center, Figure 3, was developed which can be integrated into the flow of material and information in flexible manufacturing systems. On the basis of a multicoordinate measuring instrument, which is available on the market, with an attached procews computer an instrument system was developed which, with the use of a program system for controlling the measuring center and for processing the measurement data, provides an automatic measuring operation for all lengths on prismatic workpieces.

As H.-J. Warnecke explained in a short lecture, the CNC measuring center, which is equipped with automatic measuring head changing (similar to the tool changers in a processing center) shows economic advantages, especially in complicated

components which are manufactured in small lots. Automation of the measuring operation contributes to the fact that the measuring results are quickly and objectively available for corrective measures which are to be introduced in manufacturing.

4. Multispindle Drilling Machine With Automatic Tool Changing

In the project sector being handled by the Institute for Machine Tools, among other things, the concern is with the development of a multispindle drilling machine with numeric control and automatic tool changing. Multispindle drilling means the simultaneous processing with axially parallel rotating tools which are generally joined together into a spindle unit, the multispindle boring head. The rate of feed is the same for all tools.

Multispindle drilling has been successfully used in transfer lines for a rather long time in mass production, particularly in automobile construction. However, in small and medium-scale series manufacturing this procedure is used only here and there, primarily because the multispindle heads are relatively expensive and the total production costs must be apportioned over the number of workpieces manufactured; this means that the cost share is all the greater, the smaller the number of workpieces produced is. This led to discussions about fast, and to the greatest extent possible, numerically controlled convertability of such boring heads in order to be able to manufacture various hold patterns with such a boring head.

From the point of view of multispindle boring in flexible manufacturing systems, on the one hand this required automatic conversion to a new boring pattern, and, on the other hand, it required low investments for a boring pattern which are tied to the workpiece. Within the PSB 155, several boring spindle units which fulfill these conditions were since designed, developed and in part even built. Among other things, eccentric spindle heads with two and three spindle eccentric cams were built which can be automatically inserted into the main spindle of a processing center. Thus, the two-spindle eccentric spindle head permits reductions in machining and idle time of up to about 50 percent and the three-spindle eccentric spindle head permits reductions up to about 67 percent in contrast to single-spindle processing which is done serially. In this way, there is at the same time better use of the relatively high machine capacity in the NC processing centers; the economy of the high-quality and expensive machines is increased.

With the eccentric spindle heads borings can be made with a pitch between 32 mm and 144 mm. Until now, prior to use, the boring heads must still be set manually on an optical setting device which was likewise developed in the SFB. The operator receives the setting data in the form of a special setting sheet which contains all the necessary data.

Based on the principle of the eccentric spindle heads a machine was developed, Figure 4, in which the spindle eccentrics are positioned in a numerically controlled manner. The machine has two eccentric heads that can be rotated 180°. While work is proceeding with the one head, it is possible with the other head to undertake automatic tool changing and the new setting of the boring pitches. For example, the many small borings for bolt holes and similar things can be done faster with the machine. It is being planned as a supplementary work unit

in a flexible manufacturing system and is primarily supposed to relieve the expensive processing centers of these simple drilling tasks and keep them free for complicated manufacturing operations. Its use is most favorable in connection with smaller and medium-sized numbers of workpieces while the rigid multispindle heads, which were mentioned at the beginning, with their unchangeable hole pattern, operate economically only when the number of items is very high and it is actually better to consider them for transfer lines.

5. Automatic Holding Device

The more flexible a manufacturing system is supposed to be in order to accept multiform workpieces, the more difficult the problem of holding these pieces becomes. As mentioned by K. Tuffentsammer, this means having a highly trained special crew; to be sure, work at the machine is done with "compromised" productivity, but on the other hand an increased number of operator positions in the clamping stations must be provided for. One solution to this situation would be to include in the processing station a clamping machine which likewise can shift its clamping elements via numerical control in such a way that they provide for the clamping requirements of the different kinds of workpieces that come along. Figure 5 shows such a development; it would permit doing away with the now customary pallet and instead it would permit automating the holding device system which is now adjustable and is attached, as the case may be, to the work unit.

6. CNC Radial Metal Forming Machines

While flexible manufacturing systems with machining processes are already in use to a certain extent, in most developments today metal forming processes have generally been off to one side. The existing advantages of metal forming processes in respect to saving material, saving energy, favorable mechanical properties of the workpieces or short processing times still could not be utilized in these systems. At present, because of these problems, the theoretical and practical possibility of including metal forming processes in flexible manufacturing systems is being studied at the Institute for Metal Forming.

An analysis of all metal forming processes showed that basically all unbound metal forming processes and also several "bound" metal forming processes with an appropriate spectrum of parts can be introduced into flexible manufacturing systems. Some of these processes are, for example, surface rolling, flat-die thread rolling, thread grooving and also round moulding. On the basis of the last-mentioned process the design of the radial metal forming machine was developed and realized at the Institute for Metal Forming.

In this radial metal forming machine, Figure 6, the principle of radial power introduction into parts with a definite longitudinal axis was realized. New in this connection is also the possibility of processing sections of workpieces which are set off in an axially parallel manner. Thus, workpieces having a marked longitudinal axis are being planned for; in this connection changing cross-section sizes and shapes can also occur on elements which are staggered in an axially parallel manner. In the case of workpieces with a straight axis we are talking about axles, shafts, spindles or shaft- and pinion-shaped parts.

The group of workpieces with axially parallel offset sections includes crankshaft-shaped parts and parts with eccentric sections. Circles and polygons having a number of corners divisible by 4 (processing with four tools) can occur as cross-sections; in this connection a constant or a steadily changing cross-section size is permissible.

The overall plant consists basically of four construction groups:

--the central unit with four rams arranged in an X-shape,

--the positioner,

--the process computer, and

--the hydraulic unit as drive components.

The machine operates with four hydraulic cylinders arranged in an X-pattern with a constant ram stroke of 50 mm and a rated power of 500 kilonewtons per ram. The adjustment for position of stroke (adjustment of the ram zero point) is accomplished in each case with a spindle gear combination using a d.c. permanent magnetic motor. A manipulator positions the forging between the forging tools.

The radial metal forming machine contains all the functional systems necessary for the automatic manufacturing of workpieces, such as the drive system, processing system, operating system or control system. Optimal finishing of the various individual functions to control the radial metal forming machine on the basis of a computer assisted control system, a CNC control, is possible only with the help of a process computer. This computer takes over all functions which can be realized by it, such as converting geometric data to a machine-oriented system of coordinates, computing the courses of required values of the various positioning control loops, executing programmable control, recording the process signals present in analogue or digital form, direct digital control and drive supervision and analysis of breakdowns.

The data necessary for the successful finishing of the control programs, in respect to the geometry of workblanks and completed parts and the sequence of processing operations, are determined in the PRORUM program system and taken over by the process computer, checked and, if need be, transformed.

Figure 1. Project Sectors in SFB 155 for "Manufacturing Technology" at the University of Stuttgart. General Topics and Task Structures

SFB 155: Manufacturing Technology: Flexible Manufacturing Systems

Project Sectors

Study of the technical combining relating to organization and material flow	A
Construction design and construction	B
Information processing, construction and operation of a model plant	C
Integration of metal forming processes	D

Development Tasks For:

Planning		Construction		Operation	
Planning methods	A	Machine system	BCD	Manufacturing planning	B
Structural planning	A	Tool system	BCD	Manufacturing control	A
Implementation planning	ABCD	Workpiece system	BCD	Recording of control and operating data	C
Assessment of economy	AC	Transport, storage system	AC	Model plant	C
		Control system	C		
		Measuring, monitoring system	AC		

Table 2. Industrial Flexible Manufacturing Systems Abroad

Country	Number	Year Operation Commenced	Kind of Workpieces Processed
Japan	15	1973 to 1975	3 rotational, 12 prismatic
United States	10	1967 to 1976	- 10 prismatic
GDR	5	1971 to 1972	3 rotational, 2 prismatic

Source: ISW Stuttgart

Table 3. Flexible Manufacturing Systems in the FRG

Using Firm	State	Completion Date	Workpieces	Number of Parts	Processing Stages	Number of Machine Tools	Linking	Control Structure
HDAG	R	1972	flat side pieces	97	s	10	roller conveyor	hierarchic
Bauer	R	1976	geared motor casings	193	s	9	roller conveyor	single stage
Volvo	R	1978	truck gear cases, gear covers	3	m	3 at present	roller conveyor	single stage
MBB	R	1978	integral parts	170	m	28	cars	hierarchic
VFW-Fokker	R	1978	structure-form milling parts	250	m	6 at present	rack control device	hierarchic
HELLER	TR	1981	gear cases		m	2	rack control device	single stage
Daimler-Benz	TR	1980	vehicle unit components	150	m	7	cars	single stage
VW	TR	1980	gear and rear axle housings	2	m	7	roller chain	single stage

R: realized; TR: partially realized; s: single stage; m: multistage

Source: ISW Stuttgart

Figure 2. Pilot plant of a flexible manufacturing system to manufacture prismatic workpieces on four drilling and milling centers with automatic tool chaining, which are linked together via a rack control device.

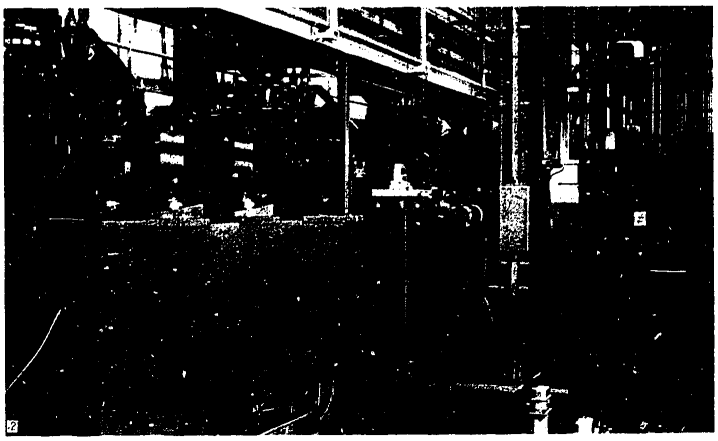


Figure 3. Numerically controlled multicoordinate measuring instrument with attached process computer and automatic measuring head change facility.

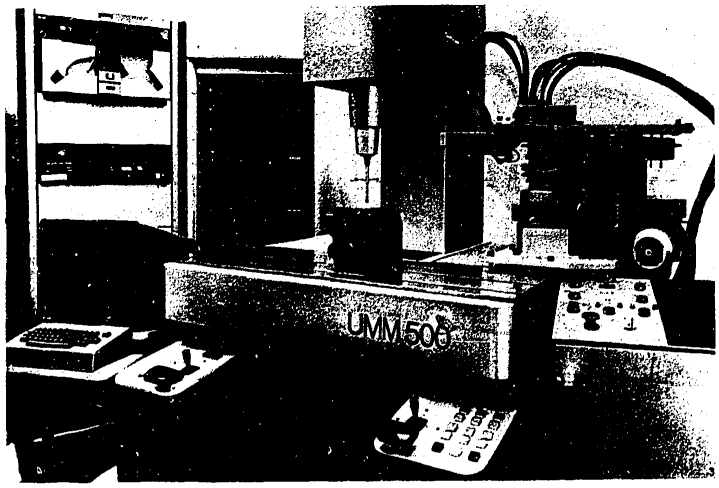


Figure 4. Design of a multispindle machine in which different bore patterns are represented by numerically adjustable boring spindles.

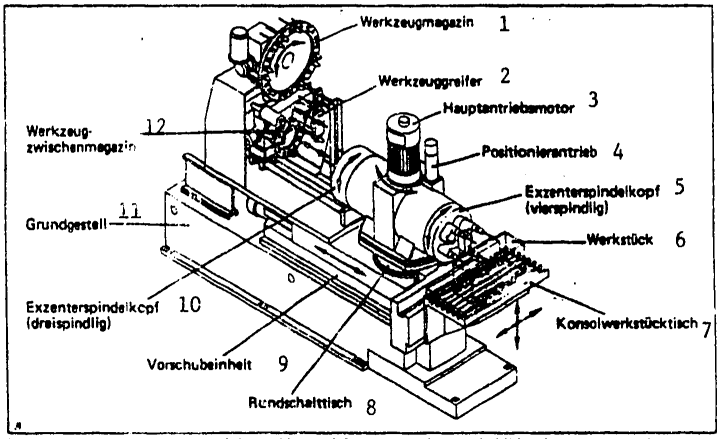


Bild 4. Konzept einer Mehrspindelmaschine, bei der verschiedene Bohrbilder durch numerisch einstellbare Bohrspindeln darstellbar sind.

Key:

1. Tool magazine
2. Tool holder
3. Primary drive motor
4. Positioning drive
5. Eccentric spindle head (four-spindle)
6. Workpiece
7. Workpiece bracket table
8. Turret table
9. Feed unit
10. Eccentric spindle head (three-spindle)
11. Stand
12. Intermediate tool magazine

Figure 5. Design of a freely positionable holding device system with which workpieces with a complicated geometry can be held at the station for processing.

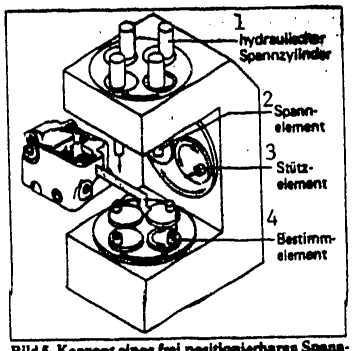
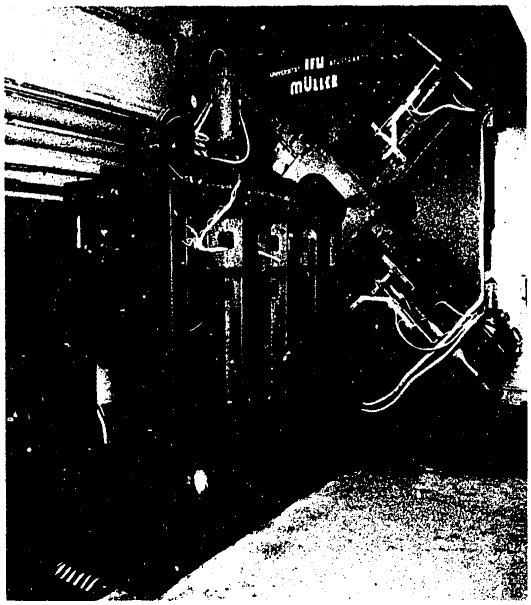


Bild 5. Konzept eines frei positionierbaren Spannvorrichtungssystems, mit dem Werkstücke mit komplizierter Geometrie zur Bearbeitung an der Station gespannt werden können.

Key:

1. Hydraulic holding cylinder
2. Holding element
3. Support element
4. Determining element

Figure 6. Radial metal forming machine with four rams in an X-pattern, used to process the turning workpiece.



Source: SFB 155

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CSO: 3102

BRIEFS

ROBOT TESTS, ANALYSES--Bologna--Yesterday, the Emilia-Romagna press was introduced to the "Robot Tester 4," a very sophisticated machine from Meccanica Speroni, planned and developed for industrial testing. This apparatus allows a thorough geometric and analytical examination with the aim of increasing the functional relationship between end item and original plan. Actually, it can be said that the "Robot Tester 4" guarantees a better functionality, allowing for dimensional testing of all components, as for example, of an airplane or automobile engine thus allowing those firms using the engine greater economy of machinery use, of manpower (only one man is needed to operate the machine) and of time. The Meccanica Speroni machine is capable of pinpointing trouble spots in 5 to 6 minutes. Thanks to the various testing configurations, "Robot Tester 4" has many varied uses and is already operational in large automobile production plants such as Lancia and Peugeot. [Text] [Milan IL SOLE-24 ORE in Italian 2 Oct 80 p 5] 9209

CSO: 3102

SCIENCE POLICY

GOVERNMENT AID TO INCREASE EXPORTS OF SELECTED INDUSTRIES

Paris COMITE D'ORIENTATION POUR LE DEVELOPPPEMENT DE INDUSTRIES STRATEGIQUES (C.O.D.I.S.) in French 18 July 1980 pp 1-15

[Information Memorandum Issued by the Guidance Committee for Development of Strategic Industries (CODIS), Paris, 18 July 1980, pp 1-15]

[Text] French industry is engaged in an extensive effort to adapt to the changing world market and the new conditions of international competition.

In support of this effort, government authorities are endeavoring to enhance the effectiveness of the assistance they can provide to initiatives taken by industrial firms.

In this spirit, a government order dated 16 October 1979 created the "Ministerial Committee Charged with Establishing Guidelines for Strategic Industrial Development Actions" (CODIS).

1. Function of the CODIS

The CODIS selects sectors of industrial activity that have a determining influence on the national economy's future. It also coordinates all forms of government support, particularly financial support, capable of enhancing the international competitiveness of the firms concerned.

2. Operating Principles

a. Action by government authorities must be guided by the analysis of the international market. Selection by the CODIS of those activities to be supported is based on forecasts of product and market changes, forecasts prepared with the help of outside nongovernmental consultants.

b. Firms are to be widely informed of the categories approved for support and will be invited to submit their proposals. Any firm, irrespective of its size, shall be eligible to submit projects.

c. The CODIS will intervene in behalf of those firms which have:

(1) Submitted a technical, industrial, and commercial strategy capable of enabling them to capture a significant share of the world market;

(2) Demonstrated specifically by past performance that they have the industrial, commercial, and financial capacity to carry out their proposed program.

d. The CODIS will coordinate the government's various means of action in support of these firms. For this purpose, CODIS can recommend that the firms sign "development contracts."

3. The "development contract" stipulates for a period of several years, on the basis of the program submitted by the firm, the government's and the firm's respective obligations. It puts the government's various resources to work in support of this program.

3. Administrative Processing

A ministerial committee, chaired by the prime minister, coordinates the government's various means of providing support.

This ministerial committee's deliberations are prepared by a management committee chaired by the delegate general for industry. This committee is composed of the following senior officials: the delegate for territorial development and regional action, the planning commissioner, the delegate for employment, the director of the Treasury, the director of external economic relations, and the director of the budget.

The management committee formulates a position at the end of each of the three principal stages of the screening process, namely selection of the fields in which support is to be provided, the selection of firms and resources to be involved, and the conclusion of development contracts. This committee's secretary general is Francis Lorentz, a special representative of the director of the Treasury.

The management committee is assisted by specialized working groups composed of representatives from all of the government departments and agencies concerned. Each working group is chaired by the competent director from the Ministry of Industry.

Six working groups have already been formed, each corresponding to the following six categories (see enclosed data sheets): office machines ("bureautique"), mass-market electronic equipment, automated production systems ("robotique"), bioindustry, offshore oil and gas operations, and energy-saving equipment.

4. Procedures For Submission of Requests for Committee's Supportive Action

No prior record has to be established with the committee for it to take official cognizance of a request. Such cognizance is taken upon submission of a summary project description form (copy enclosed) to the general secretariat. If the project is deemed referrable to the management committee, a more detailed study is then initiated.

Additional information may be obtained from the following:

a. Chairmen of working groups:

(1) Office machines, mass-market electronic equipment, and automated production systems: Mr Samlit-L'Izard, 120 Rue du Cherche-Midi, 567-52-34.

(2) Bioindustry: Mr Langlois-Meurinne, 66 Rue de Bellechasse, 555-93-00.

(3) Offshore oil and gas operations: Mr Capron, 5 Rue Barbet de Jouy, 555-93-00.

(4) Energy-saving equipment: Mr Gadonneix, 23 Avenue Franklin Roosevelt, 555.93.00

b. Secretary general: Francis Lorentz, 151 Rue St-Honore, 297-23-50.

c. Rapporteurs of working groups: office machines: Mr Alba; mass-market electronic equipment: Mr Delabriere; bioindustry: Mr Biancarelli; automated production systems: Mr Pringuet; energy-saving equipment: Mr Thomazeau, 4 Rue Las Cases, Paris 75700, tel: 705-04-40; and offshore oil and gas operations: Mr Naouri, 151 Rue St-Honore, 297-23-60.

7. Enclosures

1. Data sheet on office machines

2. Data sheet on mass-market electronic equipment

3. Data sheet on automated production systems

4. Data sheet on bioindustry

5. Data sheet on offshore oil and gas operations

6. Data sheet on energy-saving equipment

7. Application form

Enclosure 1

Office Machines

The term office machines ("bureautique") encompasses all techniques used in office work, in other words everything employed in the process of preparing, transmitting, receiving, recording, and storing not only documents but, more frequently, information in various forms, namely in words and images.

The office machines industry involves both technological and economic stakes:

a. Development of technology in this field could, in the more or less near future, enable us to market such items of equipment as word-processing machines, automatic message-sending equipment (capable of transmitting a message from one office to another), voice-operated office machines, television-equipped telephones displaying words or pictures (with fiber optics), as well as, in the more distant future, such instruments as a voice-operated (dictation-taking) typewriter.

b. The demand for such types of equipment is expected to increase rapidly. It is estimated that by the mid-1980's the office machines industry will be doing a volume of business of the same order of magnitude as the electronic data processing industry (the latter including private telephone exchanges). In the United States, office machines or business systems equipment reportedly already represents 80 percent of the information-processing equipment market.

A sound and resolutely implemented strategy in this field should permit:

a. Creation of a coherent and competitive French industry capable of covering 15 percent of the world market by 1985;

b. Easier restoration of a favorable balance of trade by 1985, whereas prolongation of the current situation could produce a deficit of 8 billion francs by that date;

c. Continued rapid growth of France's electronic data processing and telecommunications industries, developments which will depend in part on these new capabilities.

To achieve these objectives, government authorities are prepared to promote the establishment of strong industrial bases capable of withstanding international competition, particularly on the commercial level, and capable also of accelerating implementation of the most promising projects within very special "slots" where PMI [Small and Medium-Size Industries] can assert themselves and gain acceptance.

Enclosure 2

Mass-Market Electronic Equipment

Mass-market electronics products include:

a. Traditional products such as radios, television sets, tape recorders, high-fidelity systems, etc.

b. New products, either already well known to the general public (toys, calculators, video games), or recently introduced:

(1) New audiovisual products such as video tape recorders, video discs, small home computers, remote text-transmitting terminals, etc;

(2) Traditional products improved by electronic system, as is the case, for example, in the electric household appliance field.

Expansion of the mass-market electronic equipment industry has assumed major importance for two main reasons:

a. It is a very profitable market in which France has valuable industrial expertise;

b. National independence in the audiovisual equipment sector depends on expansion of the mass-market electronic equipment industry. In fact, it appears that "hardware" (video tape recorders, video discs) problems and software (programs) problems will be closely intertwined in the future.

Furthermore, it is obvious that strong and resolute action is necessary to reduce or eliminate the current deficit in our balance of trade which, in the absence of such action, could reach 7 billion francs in 1985.

For this reason, actions initiated by government authorities are designed to encourage operations in France and abroad that would permit:

a. Creation of an industrial group of international stature in the field of mass-market electronic equipment, a group capable of competing with the largest foreign companies in this field;

b. Accelerate the growth of PMI manufacturing specifically mass-market electronic products.

The PMI can advantageously bring their main assets--innovation, flexibility, and ability to change rapidly--into play in this field by basing their activity on the penetration of electronics into everyday life: games, home computers, peripheral telephone equipment, alarm and security systems, etc.

Enclosure 3

Automated Production Systems

The automation of production methods is an imperative requirement for industrial nations within the current context of strong international competition and rap d technological and social change (hours of work and working conditions). Because automated systems can be used most easily in continuous-process manufacturing industries--chemical, glass, etc--automation was initially applied to such industries. But automation must also be employed extensively in both small-scale manufacturing and mass-production industries. A certain number of countries, with Japan in the forefront along with the United States, Sweden, and the FRG, have already gained an indisputable lead in the development and widespread use of automated production systems.

Consequently the CODIS has selected automated production systems ("robotique") as one of its priority action categories. This category can be divided into four major parts.

1. Flexible Automated Plants (AAF)

Small-scale and medium-scale manufacture accounts for more than 70 percent of the output of manufacturing industries (machines, lumber, etc.) But the unit cost of these products is considerably higher than the cost of mass-produced goods.

Flexible automated plants are designed to manufacture small and medium quantities of goods at costs approximately those of mass-produced items. Their automated plants are said to be flexible because they are capable of indiscriminately producing different items, as opposed to assembly-line conveyer bells or chains which are adapted strictly to one single product.

AAF's are an industrial reality today and more than 100 of them have been counted around the world. Several manufacturers already offer them in their catalogs. In these automated plants, computers operate and guide numerical-control machine tools, automated transfer machines for the handling of materials and storing of products, plus other control systems. These small systems, or on the contrary, large systems, are specifically designed for small and medium-size industries. Their profitability results from increased productivity, reduced production time, less handling of product between processing units, and enhanced quality.

2. Industrial Robots

Several tens of thousands of these robots are in use around the world. The market for them is booming, + 30 percent per year in Japan, for example. They are being employed in varied tasks such as the transfer or feeding of materials into machine tools, painting, welding, assembly, etc. A continuously operating robot replaces several production workers. It can be programmed and is, therefore, by nature a flexible automated system.

3. Assembly and Packaging Machines

These machines reduce the large share of production costs represented by these final, highly manpower-intensive stages of manufacturing processes. Benefits derived from the use of these automated machines include: reduced direct or

indirect production costs, lesser shop space required--an assembly machine generally takes much less floor space than a manual assembly line--, and increased quality.

4. Components for Automated Systems

The last part of the automated production systems category is that of components, and more particularly motor drives and sensors for automated machines.

These components play an essential part in the development of automated production systems. Foreign examples--United States, FRG, etc--show that a sound machine industry has to be buttressed with a highly efficient components industry.

French industry, however, lags somewhat behind in this field: American and Japanese industries lead in the development of special motors for automated machines, imports supply 85 percent of the French domestic market for hydraulic components, etc. Effort in the selected special fields will, therefore, center upon standardization of those components most widely used in automated machines.

Enclosure 4

Bioindustry

Biotechnologies employ microorganisms--yeast, bacteria, enzymes, etc.--to produce chemical reactions and fabricate products. Bioindustry is the industrial application of these biotechnologies.

Biotechnological processes are commonly divided into four distinct major groups:

a. Cell cultures, or growth and multiplication of cells or microorganisms as such;

b. Fermentation which consists in transforming organic matter--generally glucose, cellulose, and starch--by microorganisms that grow and multiply;

c. Enzymatic engineering, the purpose of which is to use an enzyme to catalyze a chemical reaction;

d. Genetic engineering which attempts to alter the genotype of a cell or microorganism for the purpose of using it as such or to obtain specific products.

This field is of a strategic character for the following reasons:

a. Biotechnologies are applicable to numerous economic and industrial sectors, some of which involve products of high added value or products that are sources of energy: pharmaceuticals, chemicals, production of food crops and livestock, production of ethanol and methane by fermentation, etc.

b. Biotechnologies make industrial production possible under normal temperature and pressure conditions that are, therefore, inexpensive from an energy standpoint. As a result, they are conducive to enhancing appreciably the competitiveness of the industries concerned.

Four special areas already appear to be particularly promising:

a. Fabrication of complex materials or substances impossible or extremely difficult to obtain by conventional chemical means;

b. Less costly production of known molecules, substances, impossible or biological systems;

c. Use of techniques contributing to the recovery of energy and raw materials and to protection of the environment;

d. Development of equipment and materials necessary to biotechnology.

Enclosure 5

Offshore Oil and Gas Operations

The offshore oil industry's operations are divided into two activities: industrial activity proper (manufacture of materials and equipment) and engineering and service activity. This industrial sector encompasses the following principal fields:

a. Exploration (geology, geophysics)

b. Drilling:

(1) Use of metal drilling rigs or platforms--self-elevating, semisubmersible, etc.--and drilling ships;

(2) Actual drilling;

(3) Logging, i.e. measurements and checks made of conditions at the bottom of the well being drilled.

(4) Various items of equipment such as drilling bits, pipes, etc.

c. Production:

(1) Use of fixed metal and concrete platforms installed by means of special barges;

(2) Production control equipment: valves, pipes, oil-gas separation units, flexible tubing, etc.;

(3) Storage of oil: offshore tanks, etc.

(4) Transporting: floating loading terminals and construction and laying of pipelines to the shore.

Along with the actual operation of these offshore facilities, mention also must be made of the important task of maintaining the installations, pipelines, platforms, etc.

The offshore industry's volume of business in 1979 was some 8 billion francs, almost all of which was in export trade. This figure represents about 6 to 8 percent of the world market. This industry includes some 20 firms employing approximately 8,000 persons.

The French offshore industry still has a good standing despite a decline in its share of the market due to emergence of new competition in offshore oil-producing countries. It remains fragmented, however, and is becoming vulnerable.

Because of the rapid rise in oil prices, the situation in petroleum-related activities has been very favorable for the past few months and further improvement is expected.

The goal set by government authorities is to regain a leading world position in this field. This will necessitate:

a. Being present in the world's major exploration and operation areas;

b. Strengthening French companies active in this field so as to give them a more solid financial base and put them in a position to weather the pronounced cycles so characteristic of this field;

c. Maintaining an adequate research and development program oriented in those directions corresponding to expected market changes.

APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000300060006-6

Enclosure 6

Energy-Saving Equipment

This sector's importance stems from three key factors:

a. The amount of foreseeable investments during the coming decade: 50-100 billion francs in capital spending for industrial energy-saving programs, and 30 billion francs for the housing and service sectors. Government authorities have earmarked 8 billion francs for investment during this period to achieve their special goal of reverting to the use of coal in industry and for home heating;

b. The inevitability of profound technological change: the success of the French energy conservation program and, in more general fashion, of the energy-oriented "redeployment" of our economy implies development and rapid dissemination of new techniques. Thus our industry has to make a substantial effort to retain its technical competitiveness;

c. The success of our energy-saving efforts conditions the success of our efforts in other industrial sectors inasmuch as the drop in costs resulting from energy savings has a direct effect on production costs, and consequently on the competiveness of most industrial sectors.

The items of equipment likely to be considered in looking for energy savings cover such a wide range that it was necessary to establish selection criterias which enable the CODIS to concentrate its efforts on those items of equipment offering the best prospects:

a. Prospects of a greatly expanding domestic and foreign market for such items of equipment, given their intrinsic energy-related importance;

b. Probability of extensive technological development;

c. Real possibility of creating credible industrial bases for a successful major penetration of the world market in the "slot" under consideration.

On this basis, government authorities have selected, for the initial phase, heating control equipment for homes and the service sectors, as well as equipment for the use of coal in industry and centralized community heating plants.

Enclosure 7

CODIS
General Secretariat

Date of submission:

Application Form

Project forwarded by:
Name of firm:

Manager:
Banking references:
Stockholder(1):

Address of main office:

Activity(ies):

- for CODIS-approved category(2):

- outside CODIS-approved category(2):

RECENT PERFORMANCE		19-	19-	19-	%(3)	sector average
Total volume of business (CA)					%	
Expert CA	) In % of	%	%	%		
Gross margin of profit reinvested in firm	) total CA	%	%	%		
Net result	)	%	%	%		
Investments	(1. In fixed assets				%	
	(2. In research & development				%	
Own Funds (amount and in % of CA)						
Short and long-term debts						
Total indebtedness in % of CA						
Net working capital in frames and days of CA						
Number of employees					%	

Description of project:

Investment goals(4):

Location of investments:
- in France
- in other countries

PROGRAM COSTS	19-	19-	19-	Total
Program's investments (in millions of francs):				
- Research & development				
- Real estate				
- Equipment				
- In other countries				
- Others				
Total investments				

Cumulative investment (in fixed assets) / Cumulative volume of business (CA) for 3 previous fiscal years

Cumulative total (program + others) investments (in fixed assets) / Cumulative volume of business (CA) for length of program &

ANTICIPATED PERFORMANCE WITH GOVERNMENT AID	19-	19-	19-	Δ
Total CA (including % in activity of CODIS concern)	( )	( )	( )	
Exports (including % in activity of CODIS concern)	( )	( )	( )	

ANTICIPATED PERFORMANCE WITHOUT GOVERNMENT AID	19-	19-	19-
Total CA (including % in activity of CODIS concern)	( )	( )	( )
Exports (including % in activity of CODIS concern)			

Planned contractual obligations(5):

FINANCING PLAN 19- TO 19-

REQUIREMENTS (for period of program's implementation)	RESOURCES
Program	Capital
Other investments	Current account
Repayment of credit, loans	Profits reinvested in firm
Dividends	Government aid requested
Working capital requirements	Long-term loan
	Medium-term credit
TOTAL	TOTAL

Detailed description of government assistance requested:

Government assistance obtained during 3 previous fiscal years:

FOOTNOTES:

1. Principal stockholder. If the firm is a corporation, describe the nature of its activity, its size, and the composition of its stockholders.

2. Percentage of total volume of business; share of world or European market.

3. Average annual growth rate.

4. Gains in share of market (France and abroad), gains in productivity, and changes in volume of business.

5. Obligations may pertain to, inter alia: volume of business, exports, investments, research and development effort, reorganization, commercial agreements, etc.

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CSO: 8019/0220

SCIENCE POLICY

EFIM TO INVEST 450 BILLION LIRE IN RESEARCH

Milan IL SOLE-24 ORE in Italian 30 Sep 80 p 4

[Text] In the 1980-84 5-year time frame, EFIM [Participation, Financing Agency of the Manufacturing Industry] plans to increase its commitment in the sector of research and development in order to furnish indispensable technological support for all members of the group to bring about a more decisive presence on national and foreign markets by manufacturing highly innovative products.

The initiative, which complements research projects undertaken by individual group members, aims to link areas of common interest characteristic of several operational units from the same sector, as well as to coordinate, at group level, individual group member research projects in order to obtain better results while minimizing costs. With this end in mind, according to a communique, an increased commitment in favor of the Breda Research Institute has been decided upon. This will be in the form of a direct financial subsidy by the agency as well as the creation of a new section which will be added to those already in operation in Milan and Bari. This new section, to be built in Campania, is part of the whole restructure framework of the ATI.

In the 1980-84 5-year period, the group plans a total expenditure of over 450 billion lire for research, which is equal to an increase of 63 percent over the last 5-year period.

Employment will also be significantly increased, expanding from 1,000 employees in 1979 to over 1,600, to include researchers, employees and laborers by 1984, pointing to an increase of 55 percent. The mechanical sector will get the lion's share with a total of 71 percent.

In the sector of research and development, EFIM has a working relationship with the Breda Research Institute and the Light Metals Research Institute and also has plans to set up an aluminum research center in Cagliari.

END

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