

2 合同評価報告書

JOINT EVALUATION REPORT
ON
THE JAPANESE TECHNICAL COOPERATION
FOR
THE SENAI/SP MANUFACTURING AUTOMATION CENTER PROJECT
IN THE FEDERATIVE REPUBLIC OF BRAZIL

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SERVIÇO NACIONAL DE APRENDIZAGEM INDUSTRIAL OF SÃO PAULO (SENAI/SP)

MARCH 15, 1995

SÃO PAULO CITY, THE FEDERATIVE REPUBLIC OF BRAZIL



MUTUALLY ATTESTED AND SUBMITTED

TO ALL CONCERNED

MARCH 15, 1995

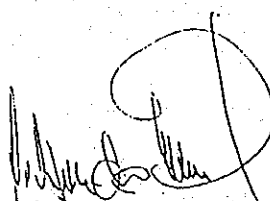
SÃO PAULO CITY, THE FEDERATIVE REPUBLIC OF BRAZIL

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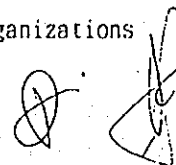




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1. INTRODUCTION

1 The Evaluation Teams

The Japanese Evaluation Team (hereinafter referred to as "the Japanese Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), headed by Mr. Tetsuo Koizumi, visited the Federative Republic of Brazil from March 4 to 17, 1995 in order to jointly evaluate with the Brazilian Evaluation Team (hereinafter referred to as "the Brazilian Team") the achievement of the Japanese technical cooperation for the SENAI/SP and the Coordinator of Bilateral Technical Cooperation of the Agência Brasileira de Cooperação (hereinafter referred to as "ABC") Manufacturing Automation Center Project (hereinafter referred to as "the Project") in the SENAI/SP on the basis of the Record of Discussions signed on June 28, 1990 (hereinafter referred to as "the R/D").

The Japanese Team discussed and studied together with the Brazilian Team regarding the achievement, impact, sustainability of the Project.

Through careful studies and discussions, both sides summarized their findings and observations as described in this document.

2 Schedule of the Japanese Evaluation Team (March 4 - 17, 1995)

Date	Schedule
4 Mar. (Saturday)	Departure from Tokyo - via U. S. A.
5 Mar. (Sunday)	Arrival in Brazilia - via São Paulo.
6 Mar. (Monday)	Visit to and meeting with JICA Brazil Office. Courtesy visit to the Embassy of Japan, the Agência Brasileira de Cooperação(ABC) and the International Department of SENAI. Departure from Brazilia and Arrival in Rio de Janeiro.
7 Mar. (Tuesday)	Courtesy visit to the Headquarters of SENAI. Departure from Rio de Janeiro and Arrival in São Paulo. Visit to and meeting with JICA São Paulo Office.
8 Mar. (Wednesday)	Discussion with Japanese Experts. Courtesy visit to the Regional Director of SENAI/SP.
9 Mar. (Thursday)	Discussion with SENAI/SP and other survey works.
10 Mar. (Friday)	Discussion with SENAI/SP and other survey works.
11 Mar. (Saturday)	Internal Meeting and Study of collected data.
12 Mar. (Sunday)	Study of collected data.

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- 13 Mar. (Monday) Discussion with SENAI/SP.
- 14 Mar. (Tuesday) Discussion with SENAI/SP. to draw up the Joint Evaluation Report.
- 15 Mar. (Wednesday) Hold the Joint Committee and signing of the Joint Evaluation Report.
- 16 Mar. (Thursday) Report to the General Consulate of Japan and JICA Office in São Paulo.
Departure from São Paulo.
- 17 Mar. (Friday) Arrival in Tokyo - via U. S. A.

3 Evaluators

3-1 Japanese Side

Mr. Tetsuo Koizumi	—	Leader
Mr. Sadamu Tamura	—	Planning and Training
Mr. Hisanori Takeguchi	—	Machineries
Mr. Hiroshi Nishikata	—	Electronics
Mr. Masayuki Matsuoka	—	Cooperation Planning
Mr. Hidenori Sasaki	—	Evaluation Arrangement

3-2 Brazilian Side

Mr. João Ricardo Santa Rosa	—	Director
Mr. Waldomiro Lunardi Pires Correa	—	Pedagogic Coordinator
Mr. Fernando Facchin Filho	—	Technical Coordinator
Mr. Fransisco de Assis Gonçalves	—	Agent of Training
Mr. Marcos Cardozo Pereira	—	Technical Coordinator
Mr. José Roberto Nunes do E. Santo	—	Head of Practical Training Coordination
Mr. Érulos Ferrari Filho	—	Head of Information Technology Coordination

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4. Methodology of Evaluation

In order to evaluate the past performance and achievement, the following materials were used:

- (1) The Record of Discussion (the R/D).
- (2) The Minutes of Meetings, the Annual Work Plans and other documents agreed upon or accepted in the course of implementation of the Project.
- (3) The feedback from the Japanese experts and Brazilian counterparts.
- (4) The Project Design Matrix (PDM) as shown in Annex 1.

II. BACKGROUND AND SUMMARY OF THE PROJECT

1. Brief Background of the Project

The Federative Republic of Brazil established the Serviço Nacional de Aprendizagem Industrial (SENAI: an organization of vocational training in the industrial fields for all over the country), based on the Presidential Order issued on 1942, and carry on the training by the way of apprenticeship in order to foster the middle class engineers/technicians.

Recently, it has been strongly demanded to SENAI to implement the training good for the fostering the middle class engineers suit to the high-productivity systems applying computer system from industrial firms and/or organizations. Especially, many firms in São Paulo State, a highly industrialized district, expect a lot for the materialization of abovementioned demands.

Under this circumstances, the Headquarter of SENAI had submitted to the Government of Japan through the proper channels a request for a project type technical cooperation for the purpose of the settlement of various production systems such as FMS, CNC, CAD/CAM, etc. at the training schools under the local bureau of São Paulo State, and the implementation of vocational training for operation, repairment and diagnosis of damages/breakages on such systems, in accordance with its plan.

In response to the request mentioned above, JICA dispatched Preliminary Survey Team in August to September 1988 and prepared the basic policy of the technical cooperation programme. In March to April 1990, the Implementation Survey Team was

dispatched to determine the basic idea of the project from technical view-points, detailed study and discussions on the implementation plan, method of technical transfer, goals, specification of machinery and equipment, and the measures to be taken by the Brazilian side, and the Record of Discussions was signed on June 28, 1990. Further, the Consultation Team was dispatched in March 1991 and reconfirmed the basic idea of training courses, progress of the Project and implementation schedule, and the matters to be prepared for project implementation at the time. In March 1992, the Technical Guidance Team was dispatched to find the progress of the Project after March 1990, and amended the project implementation schedule. In December 1992, the Mutual Consultation Team, and in March 1993, the Technical Guidance Team were dispatched respectively to check and confirm abovementioned matters again.

2. Chronological Review of the Project

The chronological review of the Project is as shown in Annex 2.

3. Objective of the Project

The objective of the Project is to establish the SENAI/SP Manufacturing Automation Center (hereinafter referred to as "the Center") for the purpose of training technicians for knowledge and skills in the operation, maintenance and trouble-shooting of manufacturing automation equipment and flexible manufacturing system (FMS).

The objective of the Japanese Technical Cooperation Program is to assist and advise Brazilian counterparts in conducting training courses for manufacturing automation.

As for the training targets, trainees, upon successful completion of a two-year training program will:

- a) be able to understand electronics and microprocessor based equipment and to trouble-shoot and repair such equipment;
- b) have knowledge of automatic control equipment and perform troubleshooting and repair of such equipment;
- c) have knowledge of CAD/CAM and be able to design products and develop CNC machine programs;
- d) have knowledge of CNC machine tools and be able to program and operate such machine tools;
- e) be able to understand the connections between numerical controllers and computers, and trouble-shoot such equipment;

- f) have knowledge of measurement equipment: be able to measure dimensions and evaluate the quality of manufactured products;
- g) understand the principles of FMS and be able to operate, modify and trouble-shoot the equipment related to FMS.

III. PROJECT ACHIEVEMENT

1. Inputs to the Project

1-1 The Japanese Side

Most of the planned inputs from the Japanese side were completed. The total outlay of the Project by the Japanese side from June 28, 1990 up to the end of Japanese fiscal year 1994 is as shown in Annex 3.

1-1-1 Dispatch of Japanese Experts and Survey Teams

JICA has dispatched eleven (11) long-term experts and thirty-three (33) short-term experts, and also sent seven (7) survey teams in relation to the Project as shown in Annex 4. Additionally, a short-term expert in the field of CAD/CAM is going to be dispatched on March 30, 1995.

1-1-2 Acceptance of the Brazilian Counterpart Personnel for Training in Japan

Within the framework of this technical cooperation, twenty-four (24) Brazilian counterpart personnel have completed the training in Japan as shown in Annex 5.

1-1-3 Provision of Machinery and Equipment

By the end of the Japanese fiscal year of 1994, the machinery, equipment and materials equivalent to approximately 595 million yen have been provided by the Japanese Government through JICA, and their list is shown in Annex 6.

1-2 The Brazilian Side

Necessary inputs for Project implementation were provided by the Brazilian side. Total input of the Project by the Brazilian side is approximately US\$ 9.6 million and 39 persons at present.

1-2-1 Allocation of Brazilian Counterpart and Administrative Personnel

The organization chart of SENAI/SP is attached as Annex 7, and the Brazilian side has allocated the counterpart personnel for the Center as shown in Annex 8. As of the end of the Japanese fiscal year of 1994, thirty-nine (39) personnel including administrative staff are allocated for the Project.

1-2-2 Purchase of Machinery and Equipment

The Brazilian side purchased approximately equivalent to US\$ 1.8 million of machinery and equipment from June 1990 to March 1995 which lists are shown in Annex 9.

2. Activities of the Project

All planned project activities have been completed as follows:-

2-1 Training syllabi and curricula

The training syllabi and curricula were produced, tested and revised for each training during the technical cooperation. The outline of training courses, and the lists of training syllabi and curricula are attached as Annex 10.

2-2 Training materials

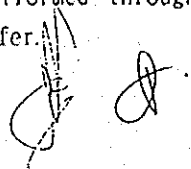
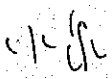
84 different kinds of textbooks for the training course and various other training materials have been prepared. The lists of training materials is shown in Annex 11.

2-3 Training of Brazilian counterpart personnel in Japan

A total of twenty-four (24) counterpart personnel have been trained in Japan by the end of March 1995 as shown in Annex 5.

2-4 Advise and training Brazilian counterpart personnel on the job

On-the-job training for the counterpart personnel has been performed through out the technical cooperation period as a part of technology transfer.



2-5 Establishment of the SENAI/SP Manufacturing Automation Center

With the supply of machinery, equipment and necessary spareparts from the both sides, the Center is sufficiently equipped for conducting training courses and is well maintained.

2-6 Implementation of training courses

The trainees are selected by entrance examination from the applicants who graduate high school or more higher educational level. The trainees join with the Center twice a year in every February and August in accordance with the education system in Brazil.

The training period for each batch is two and a half (2.5) year including on-the-job training at the firms for six (6) months.

During the period, in total 4,100 hours which is consisted by 160 units equivalent to 3,200 hours and 900 hours for the on-the-job training at firms.

Training for 44 persons have been completed by the end of Japanese fiscal year of 1994.

2-7 Monitoring and evaluation

The Joint Committee was organized and met as scheduled, and it monitored the project progress. Four (4) missions were dispatched from the Japanese side during the technical cooperation period for the purpose of monitoring the project implementation and providing technical advice.

The Joint Evaluation was conducted in March 1995.

3. Outputs from the Project

As already mentioned above, twenty-four (24) counterpart personnel were trained in Japan.

The Japanese expert team has accomplished its planned task of Technical Cooperation Programme and the current status of achievement level is shown in Annex 12 and 13.

As this Project is highly appreciated by the other concerning organizations, a number of the counterparts of SENAI/SP are used to be invited by various educational organizations, such as colleges and/or universities, and the firms in those concerning field. The number of dispatched counterparts are shown in Annex 14.

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4. Project Performances

The counterpart personnel gained sufficient knowledge and experience to conduct training courses, and SENAI/SP is currently well equipped, firmly structured and financially sound. Therefore, as long as the trained counterpart personnel remain at the Center, SENAI/SP should be able to carry on the training activities, and the middle level engineers/technicians will be fostered continuously.

The output, performed by the Project implementation, are beyond the Project targets settled by the R/D much more, appreciated and expected further contributions by the industrial world in Brazil.

5. Overall Goal


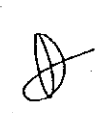
Although it is rather premature to assess the achievement level of the overall goal at this moment, it is considered that the trained instructors and technicians will make positive impacts on the development of automatized manufacturing services in the Federative Republic of Brazil.

IV. IMPACT OF THE PROJECT

1. Contents of Impact

- 1) The counterparts who received technical transfer from Japanese experts are now able to carry out own training courses.
- 2) Those who need new training are able to easily acquire higher technologies through the trained instructors.
- 3) The new knowledge and technology gained through the Project contribute to the advancement of technology of SENAI/SP.

2. Diffusion of Impact and the Range of Beneficiaries

- 1) Trainees of the Center have acquired new skills.
 - 2) New skills are easily transferable to semi-skilled staff.
 - 3) SENAI/SP has obtained skilled instructors and technicians, so that it can provide better automatized manufacturing services.
- (1/2/1)  

V. THE PROSPECT OF SUSTAINABILITY

1. The Prospect of Sustainability from the Organizational Aspect

- 1) The Center is well structured and firmly positioned in the SENAI/SP organization structure that has enough resources and capability to sustain the future programs.
- 2) It is considered that SENAI/SP has secured the required number of staff to manage and implement training programs. The high management ability of the Center personnel and their motivation to promote the Project are clearly shown from the facts such as:-
 - SENAI/SP established new posts for instructors.
 - SENAI/SP maintained a stable budget during the past five (5) years, and
 - SENAI/SP took an initiative to open new courses for semi-skilled technicians.

2. The Prospect of Sustainability from the Financial Aspect

As the Center is a formal subordinate training facility of SENAI/SP, it will continue to be financially supported and sustained by SENAI/SP and the higher authorities concerned even after the completion of the Project.

3. The Prospect of Sustainability from the Human Resources and Technical Aspect

- 1) As already mentioned, the Brazilian counterpart personnel have acquired sufficient knowledge and technologies to conduct training programs.
- 2) The Center is well equipped with administrative personnel.

4. Restrictions on Administration

- 1) It is desirable for staff who have undergone the technology transfer programs to be retained within the SENAI/SP Manufacturing Automation Center.
- 2) It is important for SENAI/SP to cooperate and liaise with local branches.

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[Signature]

VI. SUMMARY OF EVALUATION

1. Technology Transfer

In general, the technology transfer program is successfully performed.

2. Training Programs of the Brazilian Counterpart Personnel in Japan

The training programs of the Brazilian counterpart personnel in Japan covered all areas as stipulated in the Record of Discussions. Most of the counterparts expressed their satisfaction of the training programs prepared by JICA.

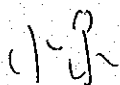
3. Storage, Maintenance and Operation of Machinery and Equipment

The machineries, equipments and facilities provided by JICA to the Center have been put to practical use and well maintained.

VII. CONCLUSION

The Japanese Team and the Brazilian Team reached the following understandings for the Joint Evaluation after a series of meetings and discussions.

1. In general, the Project has been progressing satisfactory as a result of mutual efforts and cooperation by the Japanese and the Brazilian authorities concerned, experts and counterpart personnel.
2. The Project shall be highly appreciated on its fruitful performances, and shall be successfully concluded.



Annex 1.

Project Design Matrix (PDM) of Final Evaluation
for the SENAI/SP Manufacturing Automation Center Project

Narrative Summary	Verifiable Indications	Means of Verifications	Important Assumption
<p><<Overall Goal>> To foster the middle class technicians in order to promote the introduction of production system using computer system for the Brazilian industries.</p> <p><<Project Purpose>> To foster the middle class technicians which are needed by Brazil by means of training or transfer of the knowledge concerning to the Manufacturing Automation machineries and necessary technologies for operation, management and repairment of PMS.</p> <p><<Output/Results>> Counterparts (Instructors) should be fostered to be able to train or instruct along the training course at the Manufacturing Automation Center.</p>	<p>1. Number of the graduates 2. Technical level of the graduates and the appreciation given by the firms or companies who employ them.</p> <p>1. To foster the C/P who can instruct the trainees. 2. Number of C/P or instructor from the points of view of quantity and quality. 3. To keep certain number of the trainees and their quality and quantity. 4. Financial situation of the Center.</p> <p>1. Performance of the opening of training course. 2. Distribution of personnel. 3. Managing and using circumstances of equipment and tools. 4. Provision of consumable materials and spareparts. 5. Technological transfer to C/P with the level of the Professional technologies 6. Ability of C/P to conform curriculum and to instruct. 7. Sort quality and quantity of the teaching materials. 8. Capacity of financial division.</p>	<p>1. Pursuit survey of the graduates 2. Statistics made by the Government of Brazil</p> <p>Implementation Report of Training of the Center</p> <p>1. Quarterly Reports by Japanese Experts 2. Implementation Report of Training by the Center 3. The Report of Mutual Consultation Team 4. The Report of Consultation Team</p>	<p>The industrial world of Brazil is introducing the production system utilizing computer system, and demands middle level technicians in these fields.</p> <p>The industrial world in Brazil wishes to SENAI to foster middle level technicians in the abovementioned fields.</p> <p>To be secured enough amount of management funds for SENAI, and to be fixed the counterparts at the Center.</p>
<p><<Input/Activities>> 1. To develop curriculum for training. 2. To develop teaching materials for training. 3. To invite Brazilian C/P for training in Japan. 4. To train and instruct Brazilian staffs at project site. 5. To establish and operate the Center of SENAI/SP. 6. To open the course of training. 7. Monitoring and appreciations</p>	<p><<Japanese Side>> 1. Long-term Expert (person) 2. Short-term Expert (person) 3. C/P training in Japan (person) 4. Provision of equipment (1000yen) 5. Share for the local cost (1000yen)</p> <p><<Brazilian Side>> 1. C/P distribution Admin. Instructor others (person) (person) (person) 2. Local cost (1000yen)</p>	<p>1990 1991 1992 1993 1994 Total</p> <p>3 6 9 10 7 11 2 7 6 5 2 33 166.193 355.242 35.125 19.947 18.343 594.940 1.200 2.600 20.653 17.156 17.469 Brought by the Expt.: 22.850 5 6 6 6 6 Procured in Brazil: 27.075 - 18 18 16 - 20 20 20 4.200 300.000 343.500 120.000 120.000 Total 887.700</p>	<p><<Promises>> 1. The SENAI Center should be renovated. 2. Each laboratory should be rearranged and equipped.</p>

N.B. Duration of the Technical Cooperation : 28 June, 1990 to 27 June, 1995
Name of Cooperating Organization : Serviço Nacional de Aprendizagem Industrial (SENAI). The Federative Republic of Brazil

Annex 2

Chronological review of the Project

1986 January	The Government of the Federative Republic of Brazil requested to the Government of Japan for technical cooperation.
1987 December	The Preliminary Survey team was dispatched by JICA.
1988 March	The Preparatory Survey team was dispatched by JICA.
1988 July	The Brazilian team was dispatched to Japan.
1988 August	The Preliminary Survey team and the Long-term Survey team were dispatched by JICA.
1989 March	The Implementation Survey team was dispatched by JICA, and the Government of Japan and the Government of the Federative Republic of Brazil signed in the document of R/D.
1990 April	The JICA's director visited SENAI/SP.
1990 June	The R/D was modified and signed by both Governments.
1990 October	Three long-term experts were dispatched.
1991 February	Two counterpart personnel were accepted for training in Japan.
1991 March	The consultation Survey team was dispatched.
1991 April	A long-term expert was dispatched.
1991 May	Two counterpart personnel were accepted for training in Japan.
1991 September~ October	Five counterpart personnel were accepted for training in Japan.
1991 October	A long-term expert was dispatched.
1992 March	A long-term expert was dispatched.

1992 March	The Guidance Survey team was dispatched.
1992 June	Four counterpart personnel were accepted for training in Japan.
1992 June-November	Ten short-term experts (installation) were dispatched.
1992 August	A long-term expert was dispatched.
1992 December	The Consultation Survey team was dispatched.
1993 January	Two counterpart personnel were accepted for training in Japan.
1993 January	Five short-term experts were dispatched.
1993 February	Two short-term experts were dispatched.
1993 March	Two long-term experts were dispatched (substitution).
1993 May	Two Short term experts were dispatched.
1993 July	Two counterpart personnel were accepted for training in Japan.
1993 October	A counterpart personnel was accepted for training in Japan.
1993 October	Two long-term experts were dispatched (substitution).
1994 January	Two counterpart personnel were accepted for training in Japan.
1994 February ~ March	Five short-term experts were dispatched.
1994 March	The Guidance Survey team was dispatched.
1994 May	A short-term expert was dispatched.
1994 July	Two counterpart personnel were accepted for training in Japan.

1994 August ~ December	Four short-term experts were dispatched.
1995 January	Two counterpart personnel were accepted for training in Japan.
1995 January	Four short-term experts were dispatched.

1995

1995

1995

Annex 3.

Input by the Japanese Side

Japanese Fiscal Year	1988 Apr. '88 ~ Mar. '89	1989 Apr. '89 ~ Mar. '90	1990 Apr. '90 ~ Mar. '91	1991 Apr. '91 ~ Mar. '92	1992 Apr. '92 ~ Mar. '93	1993 Apr. '93 ~ Mar. '94	1994 Apr. '94 ~ Mar. '95	Total
Dispatch of Team	Aug. 13. '88 ~ Sep. 3. '88 (7)	Mar. 25. '90 ~ Apr. 9. '90 (4)	Mar. 1. '91 ~ Mar. 14. '91 (4)	Mar. 14. '92 ~ Mar. 27. '92 (4)	Dec. 5. '92 ~ Dec. 18. '92 (5)	Mar. 11. '94 ~ Mar. 24. '94 (5)	Mar. 4. '95 ~ Mar. 17. '95 (6)	7 Times (35)
Dispatch of Experts								
Long	-	-	3	6	9	10	7	11
Short	-	-	-	-	17	7	11	35
Acceptance of C/P	-	-	2	7	6	5	2	22
Provision of Machinery / Equipment (Thousand Yen)	-	-	166,193	355,242	35,125	19,947	18,343	594,940

Annex 4.

Dispatch of Japanese Experts and Survey Teams

(1/4)

Fiscal year	1988	1989	1990	1991	1992	1993	1994	1995
Duration of Cooperation	Preliminary 8/73 — 9/3	Implementation 3/25 — 4/5	Consultation 3/1 — 3/14	Technical Guidance 3/14 — 3/27	Mutual Consultation 12/5 — 12/18	Technical Guidance 3/11 — 3/24	Evaluation 3/4 — 3/17	6/27
Survey Team								
Long-term	Team Leader Ko Ito		10/10		4/9			
	Coordinator Morihiro Hanada				3/25			6/27
	Computer Yoshimichi Moro		10/10					6/27
	C & C Kenji Hiramatsu		10/10			10/9		
	F & S Masayuki Oda					10/14		6/27
	Electricity Yuki Ito			4/1		3/31		
	Electronics Shunji Yoshimoto				3/25			6/27
	EO / CM Kunio Nishihara						3/25	
	Installation of Computer Mitsuru Yokoyama			10/24		10/23		6/27
	Instal. of PMS Yoichi Kato				8/1	10/14	8/5	
Short-term	Mitsuyuki Tomimaga				6/6 — 6/22			
	Tadahiro Matsushima				6/6 — 6/22			
	Akihiro Sasaki				6/19 — 7/5			
	Yoichi Tamura				7/1 — 7/24			
	Hisao Onda				7/1 — 7/24			
	Yoshio Hayase				7/17 — 8/7			
	Yoshiyuki Harada				8/19 — 8/31			
	Toshiaki Adachi				8/29 — 9/14			
					10/17 — 11/2			
					10/17 — 11/2			
					1/15 — 1/31			

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Dispatch of Japanese Experts and Survey Teams

Fiscal year	1988	1989	1990	1991	1992	1993	1994	1995
Duration of Cooperation								
Survey Team								
Instal. of CAD/CAM	Minoru Watabata				1/16 - 1/31			
CNC	Takayuki Ishida				1/21-3/5			
LAN	Kazumi Sato				1/21-3/5			
PLC	Namio Kinoshita				1/21-3/5			
PMS Seminar	Tosio Amano				2/21-3/12			
	Teruhiko Iinaka				2/21-3/12			
PMS Processing	Akihiro Sasaki				5/8-5/22			
PMS Maintenance	Mitsuo Iwanaka				5/22-6/5			
PMS Communication	Nasakazu Murakami				3/5-3/21			
PMS Production Control	Takeshi Akiyama				3/19-4/4			
Automatic Control	Yasumori Hishimi				2/10-3/16			
Hardware	Osami Nozomi				3/31-4/30			
CAT	Kenji Hiemoto				3/31-4/30			
CAD/CAM	Toshiaki Adachi				5/21-6/12			
Electricity	Mitsuru Ikeda				8/22-10/12			
Electronics	Hisashi Shinka				10/20-12/5			
Oil/Pneumatic	Hisashi Shinka				10/20-12/5			
Pressure	Hisashi Shinka				10/20-12/5			
Software	Hisashi Shinka				10/20-12/5			
Teaching	Hitoshi Kuribayashi				1/19-3/6			
Materials of CAD/CAM	Hitoshi Kuribayashi				1/19-3/6			
CAD/CAM	Toru Yatsuzaki				2/13-3/5			
CNC	Kyoshi Maeda				2/13-3/5			
Vocational Training Seminar	Hirotaki Inoue				2/13-3/5			
Engl. Inspection	Katsushi Kondo				2/13-3/5			

Japanese Experts Dispatched by JICA

(3/4)

Dispatch of Japanese Experts and Survey Teams

Fiscal year	1988	1989	1990	1991	1992	1993	1994	1995
Amount (¥1,000 -)			161,693	350,991	22,616	15,000	5,300	
Main item			MS Equipments	Computer CNC, CAD/CAM, etc.	Transistor, Computer, etc.	3 dimensions Plotter, BMS, etc.	MS Simulator, Plotter	
Amount (¥1,000 -)					6,400		10,000	
Main item					CNC Simulation		Cutting Test machine, etc.	
Total Amount (¥1,000 -)			161,693	350,991	29,016	15,000	15,300	
Amount (¥1,000 -)			4,500	4,251	6,109	4,572	3,043	
Main item			Personal Computer Facsimile, etc.	Personal Computer, etc.	Online monitor, personal Computer, etc.	Spares parts, etc.	Boring Head, Screw Test Books, etc.	
Amount (¥1,000 -)						375		
Main item						Lowhold rule, etc.		
Total Amount (¥1,000 -)			4,500	4,251	6,109	4,947	3,043	
General Situations of Training	Jurandyr de Carvalho João Ricardo Santa Rosa			9/17 — 10/12 9/17 — 10/12				
Admin/Management	Fernando Facchin Filho Marcos Cardoso Pereira		2/16 — 4/30 2/16 — 4/30			10/19 — 2/1		
Software	Waldemir L. Correa Claudio Luis Albiero		5/7 — 11/3 5/7 — 11/3					
Hardware	Eduardo Ferrari Filho Antonio Geremio Evaristo		10/7 — 4/1 10/7 — 4/1					
Automatic Control	Marcos Galli		10/7 — 4/1					
CNC	Silvio Luis Oliveira		10/7 — 4/1					
FMS	Eduardo Lulai Ferreira Márcio Pock Branco			1/5 — 6/30 6/16 — 12/13 6/16 — 12/13			1/25 — 7/5	
CAD/CAM	Fabio Papalardo Eladio Villas Boas							
Basic Electronics	Sidney Ortega Pace Helio de Siqueira Prado Jose Roberto K. E. Santo			6/16 — 12/13 6/16 — 12/13 1/5 — 6/30				

Dispatch of Japanese Experts and Survey Teams (4/4)

Fiscal Year	1988	1989	1990	1991	1992	1993	1994	1995
Electronics Control	Luis Fernando Salati					7/15 — 12/18		
	Aburcio Correa de Almeida						7/25 — 1/24	
Metrology	Edmilson Cabral					7/15 — 12/18		
Materials Dynamics	Jose A Figueiredo de Souza						7/25 — 1/24	
Project Management	Klan Rizzaro Boco					1/25 — 6/25		
Practical Training at Firms	Francisco de Assis Goncalves						1/23 — 3/1	
C/P in CNC	Francisco Augusto Teixeira						1/23 — 7/5	

Annex 5.

Counterpart Personnel Trained in Japan

(1/2)

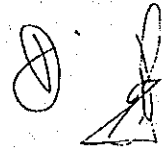
Counterpart	Position	Term	Training Institutions
Fernando Facchin Filho	Technical Assistant	Feb. 16. '91 ~Apr. 30. '91	MAZAK The Polytechnic University
Marcos Cardozo Pereira			
Cláudio Luís Albiero	Software	May. 7. '91 ~Nov. 3. '91	Kitakyushu Polytechnic College
Érulos Ferrari Filho			
Jurandyr de Carvalho	Coordinator	Sep. 17. '91 ~Oct. 12. '91	Associated Industries Vocational Training Center
João Ricardo Santa Rosa	Director		
Sílvio Luís M. Oliveira	CNC	Oct. 7. '91 ~Apr. 1. '92	Kitakyushu Polytechnic College
Antonio Germano Evaristo	Hardware		
Marcos Galli	Automatic Control		
Kalenin Pock Branco	FMS	Jun. 16. '92 ~Dec. 13. '92	Kitakyushu Polytechnic College
Fabio Papalardo			
Sidney Ortega Pace	CAD/CAM		
Hélio de Siqueira Prado			
José Roberto N. E. Santo	Basic Electronics	Jan. 5. '93 ~Jun. 30. '93	Kitakyushu Polytechnic College
Eduardo Lula Ferreira	CNC	Jan. 5. '93 ~May. 26. '93	Kitakyushu Polytechnic College
Luís Fernando Saluti	Electronic Control	Jul. 15. '93 ~Dec. 18. '93	Kitakyushu Polytechnic College
Edmilson Cabral	Measurement		
Waldomiro Lunardi Pires Correa	Vocational Training	Oct. 19. '93 ~Feb. 1. '94	The Polytechnic University
Natan Rizzaro Buso	Project	Jan. 25. '94 ~Jun. 25. '94	Kitakyushu Polytechnic College
Eládio Villas Boas	FMS		

Counterpart Personnel Trained in Japan

(2/2)

Counterpart	Position	Term	Training Institutions
Maurício Correa de Almeida	Electronic Control	Jul. 25. '94 ~ Jan. 25. '95	Kitakyushu Polytechnic College
José Antonio Figueiredo de Sousa	Basic Machinery		
Francisco Augusto Teixeira	Working Technique	Jan. 23. '95 ~ Jul. 5. '95 (studying)	Kitakyushu Polytechnic College
Francisco de Assis Goncalves	Research of Vocational Training	Jan. 23. '95 ~ Mar. 1. '95	The Polytechnic University

16/2



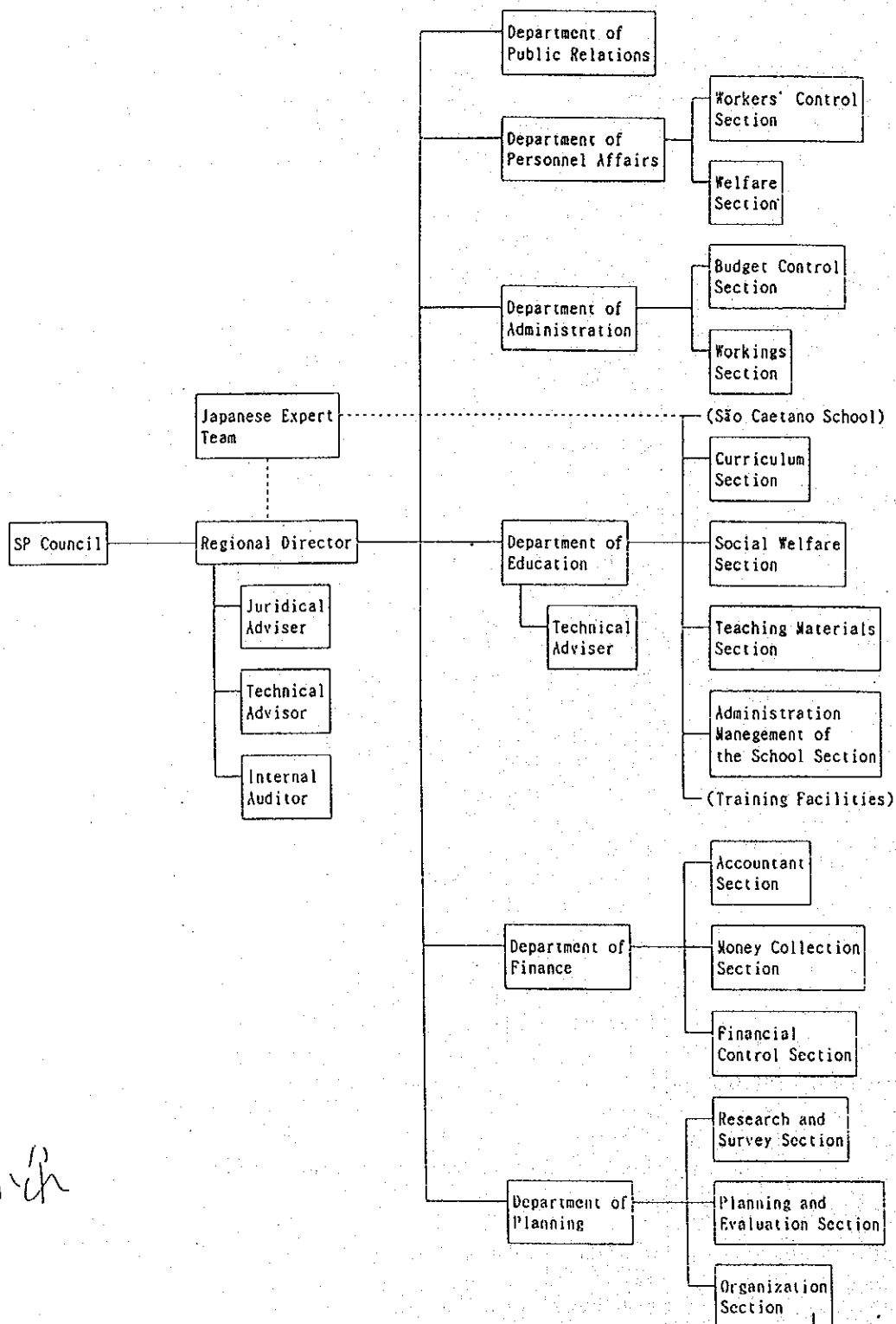
Annex 6.

List of Machinery and Equipment Supplied by JICA

Laboratory	Machinery and Equipment
FMS	Flexible Manufacturing System (Machining Center, CNC Lathe, Stacker Crane and so on) FMS Simulator CAM system Universal Testing Machine Profile Projector
CNC	Horizontal CNC Lathe Bridge Type Machining Center CAM System Dynamic Signal Analyzer CNC Simulator System
CAD/CAM	CAD/CAM (3D-Graphic Station, Software, Plotter and so on) 3D-Plotter Inkjet Plotter
Hardware	Personal Computer PCB Fabrication Equipment Spectrum Analyzer Digital Storage Scope Function Generator Pulse Generator
Software	Image Scanner Interrupt I/F Board Translator for Ethernet Network System EWS Personal Computer Protocol Analyzer
Automatic Control I	Automatic Control Load
Automatic Control III	Optical Training Board Sensor Characteristics Testing Equipment Feedback Control Board
Measurement	Surface Roughness Tester
Audio-Visual	Video Projector System

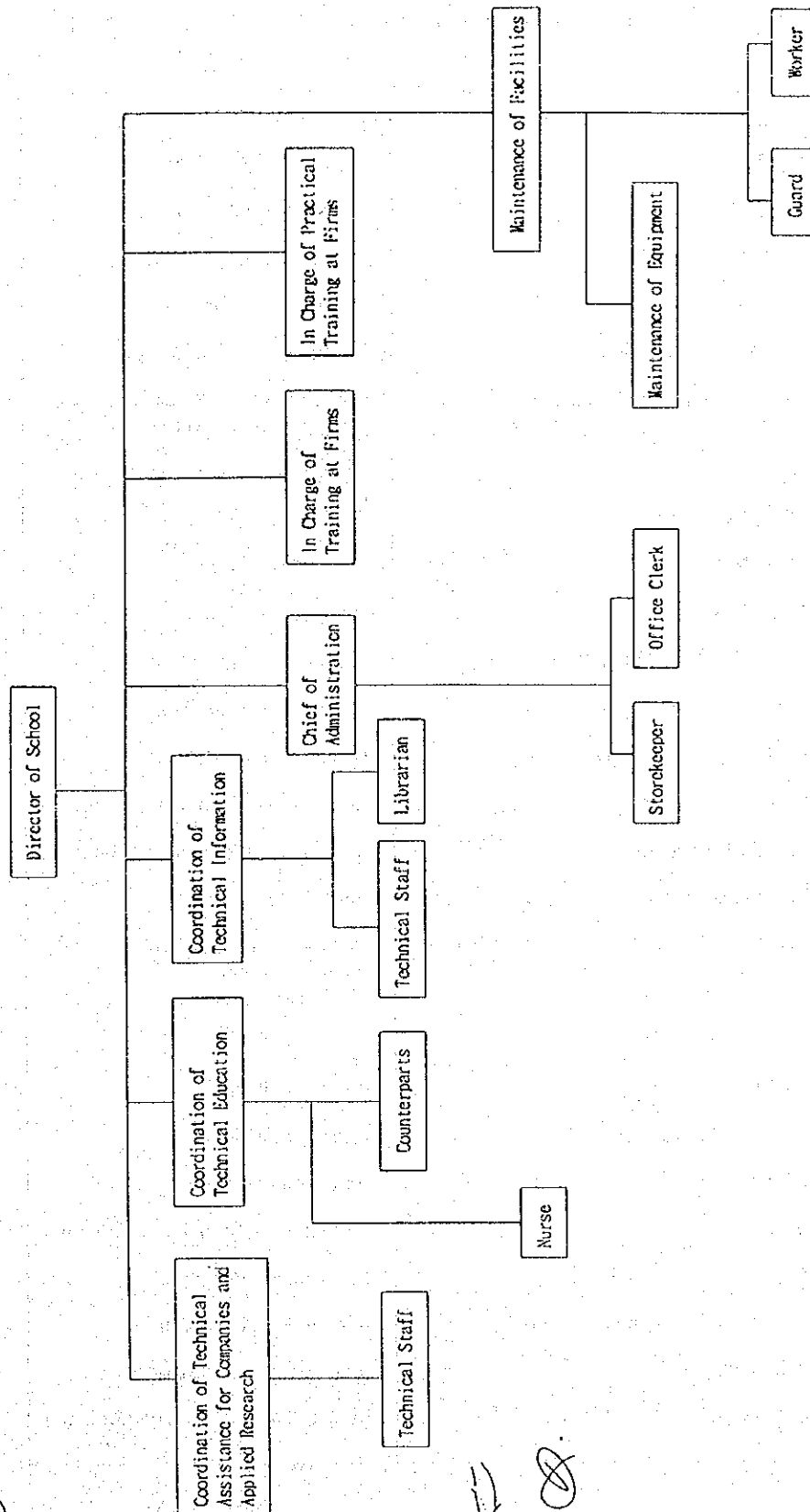
Annex 7

Organization Chart of SENAI/SP



Organization Chart of SENAI/SP Center

since November 1994 ~



Annex 8

List of Brazilian Counterparts

N A M E	POSITION
1 FÁBIO LUIZ MARINHO AIDAR	Regional Director
2 AÉCIO BATISTA	Technical Adviser
3 JOÃO ALBERTO SIMÕES	Technical Adviser
4 MILTON GAVA	Director of Education
5 JOÃO RICARDO SANTA ROSA	Director of School Administration
6 WALDOMIRO LUNARDI P CORREA	Coordinator of Department of Educational Affairs
7 FERNANDO FACCHIN FILHO	Coordinator of Department of Technical Assistance for Company
8 MARCOS CARDOSO PEREIRA	Coordinator of Department of Technical Training
9 ÉRULOS FERRARI FILHO	Instructor (Software)
10 CLÁUDIO LUÍS ALBIERO	Instructor (Software)
11 ANTONIO GERMANO EVARISTO	Instructor (Hardware)
12 HÉLIO DE SIQUEIRA PRADO	Instructor (CAD/CAM)
13 JULIO CESAR DE A FREITAS	Instructor (Project)
14 CARLOS GONZALES CARDOZO	Instructor (Machining Process)
15 CARLOS AKIO FUKATSU	Instructor (Mechanical Basic)
16 LUÍS FERNANDO SALUTI	Instructor (Hardware)
17 JOSÉ ROBERTO NUNES DO ESPIRITO SANTO	In charge of Practical Training at Firms
18 SÍLVIO LUÍS OLIVEIRA	Instructor (FMS)
19 EDUARDO LULAI FERREIRA	Instructor (CNC)
20 ELÁDIO VILLAS BOAS	Instructor (FMS)
21 FRANCISCO AUGUSTO TEIXEIRA	Instructor (CNC)
22 EDMILSON CABRAL	Instructor (Measurement)
23 MARCOS GALLI	Instructor (Automatic Control)
24 MAURÍCIO CORREA DE ALMEIDA	Instructor (Project)
25 JOSÉ ANTONIO FIGUEIREDO DE SOUSA	Instructor (CAD/CAM)
26 FRANCISCO DE ASSIS GONCALVES	In Charge of Training at Firms
27 GILBERTO JUNIOR TANASOVICI	Instructor (Automatic Control)

Annex 9.

List of Machinery and Equipment purchased by the Brazilian Side

Laboratory	Machinery and Equipment
Hardware	Multi Meter DC Power Supply Logic Board
Software	Automatic Voltage Regulator Uninterruptible Power Supplies
Basic Electronics	Function Generator DC Power Supply Logic Board Multi Meter Volt Amp Meter R-L-C Load Logic Trainer
Automatic Control I	Programable Logic Controller
Automatic Control II	Equipment for Pneumatic Experiment
Automatic Control III	Equipment for Hydraulic Experiment
Measurement	Three Dimension Coordinates Measurement Machine
Work Shop	Universal Milling Machine Drilling Machine Duplex Grinding Machine Tool Grinding Machine Cylindrical Grinding Machine Surface Grinding Machine Lathe(Common) Lathe(Small)
Project	Volt Amp Meter Logic Board DC Power Supply Personal Computer

ANNEX 10

Outline of Training Courses, Lists of Training Syllabus and Curriculum

SECONDARY-LEVEL LONG-TERM QUALIFICATION COURSE						Total Hour 4.100H
Qualification : INDUSTRIAL INFORMATION TECHNICIAN						Unit of Training 20 Weeks
School Name : ESCOLA SENAI "ARMANDO DE ARRUDA PEREIRA"						
Training Subject	SEMESTERS				Units	Hours
	1°	2°	3°	4°		
MECHANICS						1.200
-METROLOGY	4	2	-	-	6	
-MECHANISMS AND SCIENCE OF MATERIALS	4	2	2	-	8	
-MACHINING PROCESSES	10	-	-	-	10	
-AUTOMATIC CONTROL	-	4	-	-	4	
-CNC	-	6	5	5	16	
-FMS	-	-	7	9	16	
THERMODYNAMICS	2	-	-	-	2	40
ELECTRICITY	8	-	-	-	8	160
ELECTRONICS						360
-BASIC ELECTRONICS	4	6	-	-	10	
-MICROCOMPUTER ARCHITECTURE	-	4	4	-	8	
COMPUTER SCIENCE						360
-PROGRAMMING LANGUAGES	4	6	-	-	10	
-COMMUNICATION TECHNOLOGY	-	4	4	-	8	
PERIPHERALS	-	6	4	-	10	200
DRAWING						800
-MECHANICAL, ELECTRICAL AND ELECTRONICAL DRAWING	4	-	-	-	4	
-CAD	-	-	9	7	16	
-PROJECT WORK	-	-	5	15	20	
INDUSTRIAL STUDIES	-	-	-	4	4	80
Units and Hours	40	40	40	40	160	3.200
Training at Factory						900
Total Hours						4.100

1 Unit : 20hours

Annex 11

Lists of Training Materials

FIELD	TYPE	QUANTITY
ELECTRICITY & ELECTRONICS	TEXT	5
	MODEL	4
COMPUTER SOFTWARE	TEXT	6
	VIDEO	1
COMPUTER HARDWARE	TEXT	4
COMMUNICATION	TEXT	4
FMS	TEXT	12
	VIDEO	3
MACHINING PROCESSES	TEXT	2
METROLOGY	TEXT	2
	MODEL	3
DRAWING	TEXT	1
CNC	TEXT	10
	MODEL	1
CAD/CAM	TEXT	26

1/2

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Annex 12

Technology Transfer to Counterparts

FIELD	CONTENTS	NUMBER OF COUNTERPARTS
Sensor	Photo SW Proximity SW Level SW Limit SW X-Ray SW	1
Actuator	Principle of Various Types Motor Control Circuits Motor Driver Circuits	2
Automatic Control	Automatic Control Relay Control PLC	1
Computer Software	Operating System Language Processor Application Software Peripherals Control	1
Communication	RS-232C GP-IB LAN	1
Computer Hardware	One-Board Computer Hardware Interface Driver PCB Fabrication	1
FMS	Introduction to Factory Fundamental of FMS Industrial Robotics Automatic Warehouse Control System and Software Others	2

FIELD	CONTENTS	NUMBER OF COUNTERPARTS
Mechanisms and Science of Materials	Engineering Material Material Testing Strength of Materials Machine Elements Machine Design	1
CAD/CAM	CAD/CAM Outline CAD Basic Operation Design CAM Basic Operation CAM Application	3
Machining Processes	Cutting condition of General purpose Machine Fine Cutting Workings except the Cutting CNC	1
Metrology	Cutting condition of General purpose Machine Fine Cutting Workings except the Cutting Three Coordinate Measuring Machine	1
CNC	Fundamental of CNC CNC Programming CNC Machining Practice Maintenance and Trouble shooting	2

1.1/2

2.1/2

Annex 13

Implementation of Training Courses

BATCH	1	2	3	4	5	6	7
ENTRANCE PERIOD	92/2	92/8	93/2	93/8	94/2	94/8	95/2
APPLICANTS	206	114	298	120	231	186	269
SUCCESSFUL APPLICANTS	174	52	191	78	143	106	194
ENROLLMENT	32	32	30	32	30	32	32
COMPETITIVE RATIO FOR APPLICANT	6.4	3.6	9.3	3.8	7.2	5.8	8.4
REGISTERED AT PRESENT	22	22	31	29	30	32	32
GRADUATES	22	22					

1/1/2

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Annex 14

Number of counterparts dispatched to the other organizations as for the trainers

I T E M O F S T U D Y		UNIT	F I S C A L Y E A R					
			1990	1991	1992	1993	1994	1995
1. Number of counterparts dispatched to the other technical education schools in each course	(1) Computer	number						
	(2) F W S	number					1	
	(3) C N C	number					1	
	(4) C A D / C A M	number					1	
	(5) Electricity/Electronics	number					3	
2. Number of counterparts dispatched to the other firms and/or factories	(1) Computer	number				5	2	
	(2) F W S	number						
	(3) C N C	number				6	4	
	(4) C A D / C A M	number				3	6	
	(5) Electricity/Electronics	number				2	2	

JICA