

# TECHNOLOGY PLANNING

## HEAT TREATMENT AND MATERIALS TECHNOLOGY

2004 2005 2006 2007 2008 2009

Heat treatment for dies

Surface treatment (CVD)

New materials for manufacturing dies

## PRODUCTION MANAGEMENT TECHNOLOGY

2004 2005 2006 2007 2008 2009

Management skills improvement

TQM  
(Total Quality Management)

Lean Manufacturing



*Dr.*

*Z.*

## REQUEST OF JAPANESE EXPERTS



### Long term experts:

- 2 Press work technology
- 1 Production Management technology
- 1 Heat treatment and surface treatment technology
- 1 Simulation and modelation by finite element for metal forming process

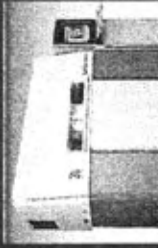
### Short term experts:

- 6 Press work technology
- 2 Production Management technology
- 2 Heat treatment and surface treatment technology
- 2 Simulation and modelation by finite element for metal forming process



*Dr.*

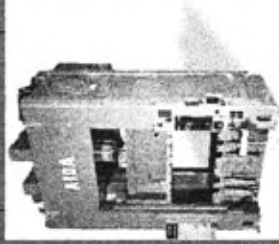
2004 2005 2006 2007 2008 2009



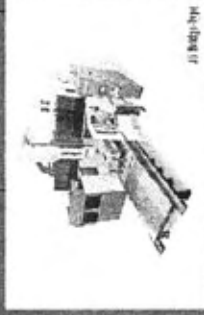
EQUIPO DE PROTOTIPADO  
RAPIDO POR  
ESTEREOLITOGRAFIA



BRAZO DE MEDICIÓN



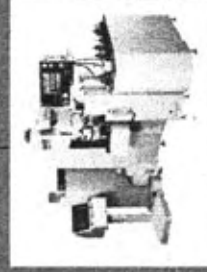
PRENSA MECANICA DE 250  
TN



CENTRO DE MAQUINADO  
VERTICAL  
5 EJES / 5 CARAS



CENTRO DE MAQUINADO TORNEADO-FRISADO  
5 EJES DE ALTA VELOCIDAD



RECTIFICADORA DE  
PERFILES



Premio  
Nacional  
de Tecnología  
2003

Centro de Ingeniería y Desarrollo Industrial • Un Equipo Avanzando Tecnológicamente



*DR.*

*7*

## Objectively Verifiable Indicators

1. Comparative studies of the imports on presswork and stamped products versus the national production.
2. Human factor highly specialized on the tooling and stamping field.
3. New offering enterprises.



Premio  
Nacional  
de Tecnología  
2 0 0 3



Centro de Ingeniería y Desarrollo Industrial ● Un Equipo Avanzando Tecnológicamente

*Dr.*

7

## Objectively Verifiable Indicators

1. Productivity raise on the enterprises
2. Number of participants on seminars and training courses
3. Growth of the presswork and stamping industry.
4. Raise on the jobs related to this field.
5. New providers insert on production chains.

## Objectively Verifiable Indicators

- 1.1.- Development of new products with cutting-edge technology.
- 1.2.- Growth on CIDESI's certified counterpart personnel
- 1.3.- Growth on the enterprise's certified counterpart personnel.
- 1.4.- Training booklets given to the counterpart
  
- 2.1.- Courses and seminars given on CIDESI.
- 2.2.- Number of participants on the courses and seminars given on CIDESI.
- 2.3.- Manuals, booklets and magazines about the project
- 2.4.- Participant's level of satisfaction.
  
- 3.1.- Services of technical support.
- 3.2.- Improvement on the satisfaction level of the supported industries.
- 3.3.- Improvement on the productivity of the enterprises.



*Dr.*

*Z*

## Means of verification

1. Industrial and sector-specific statistics, questionnaires and interviews involving the affected industries.



Premio  
Nacional  
de Tecnología  
2 0 0 3



Centro de Ingeniería y Desarrollo Industrial ● Un Equipo Avanzando Tecnológicamente

*R.*

*R.*

## Means of verification

1. Annual assessment report of every institution, questionnaires and interviews with the involved enterprises.
2. Report of the seminars and training courses for every institution, questionnaires and interviews to the participants.
3. Industry and sector specific statistics



*R.*

*77*



## Means of verification

- 1.1.- Assessment reports of the respective institutions.
- 1.2.- Monitoring Sheets for CIDESI's counterpart
- 1.3.- Monitoring sheets for the enterprise's counterparts.
- 1.4.- Personal resume, certification and qualification of the counterpart personnel.
- 1.5.- List of the manuals prepared for the technology transfer.
- 2.1.- Report of the seminars and training courses given on CIDESI.
- 2.2.- Participant's satisfaction survey.
- 3.1.- CIDESI's annual report, questionnaires and interviews with involved industries.
- 3.2.- CIDESI's annual report, report on the project's activities and the list of booklets and magazines.
- 3.3.- Assessment reports on the enterprises and institutions.



*R.*

*27*

## Important Assumptions

- a) National development policies on SMEs should stay unchanged
- Mexico's political and economical situation should stay stable



Premio  
Nacional  
de Tecnología  
2 0 0 3



Centro de Ingeniería y Desarrollo Industrial ● Un Equipo Avanzando Tecnológicamente

*DR.*

*77*

## Important Assumptions

- a) There shouldn't be drastic changes on Mexico's economic situation.
- b) All the personnel trained in the project will stay on its respective institutions.
- c) Old machinery and equipment will be replaced or renewed

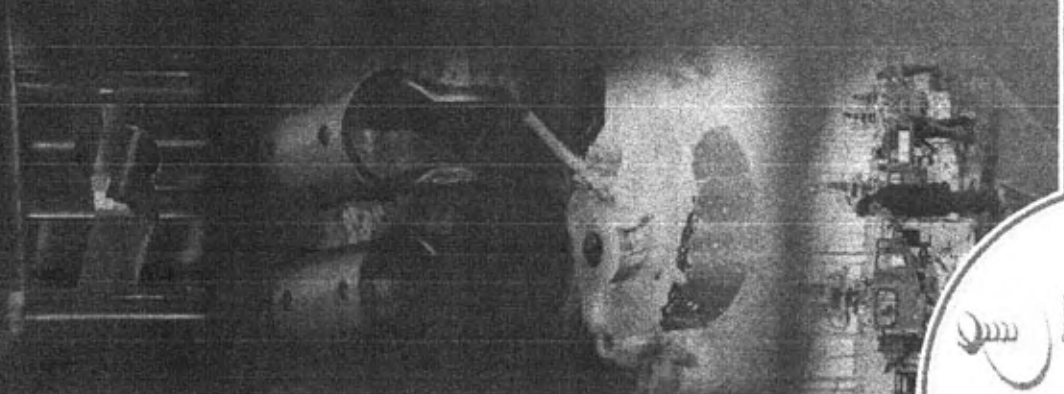


*Dr.*

*72*

## Important Assumptions

- a) Counterpart personnel which receives the technology transfer from the Japanese Experts will stay on CIDESI.
- b) The industrial sector will cooperate on the project activities, such as external services, information service, seminars and training courses organized by CIDESI



Premio  
Nacional  
de Tecnología  
2 0 0 3



Centro de Ingeniería y Desarrollo Industrial ● Un Equipo Avanzando Tecnológicamente

*R.*

77

CERTIFICADO  
**ISO 9001**  
VERSION 2000

Centro de Ingeniería y Desarrollo Industrial



TECNOLOGIA DE  
**HERRAMENTALES**

Thanks for your attention



Premio  
Nacional  
de Tecnología  
2003

Centro de Ingeniería y Desarrollo Industrial • Un Equipo Avanzando Tecnológicamente



JICA

CIDESI

## INVESTIGATION REPORT ON STAMPING AND DIE MAKING INDUSTRY

Contents :

1. Stamping and Die-Making Industry/Companies
2. Findings As a Result of Visits
3. Technologies Survey on Stamping and Die-Making Industries
4. Current Technological Levels of Local SMEs and Ways to Improve Them
5. Ways to Improve Stamping Die Technology in CIDESI

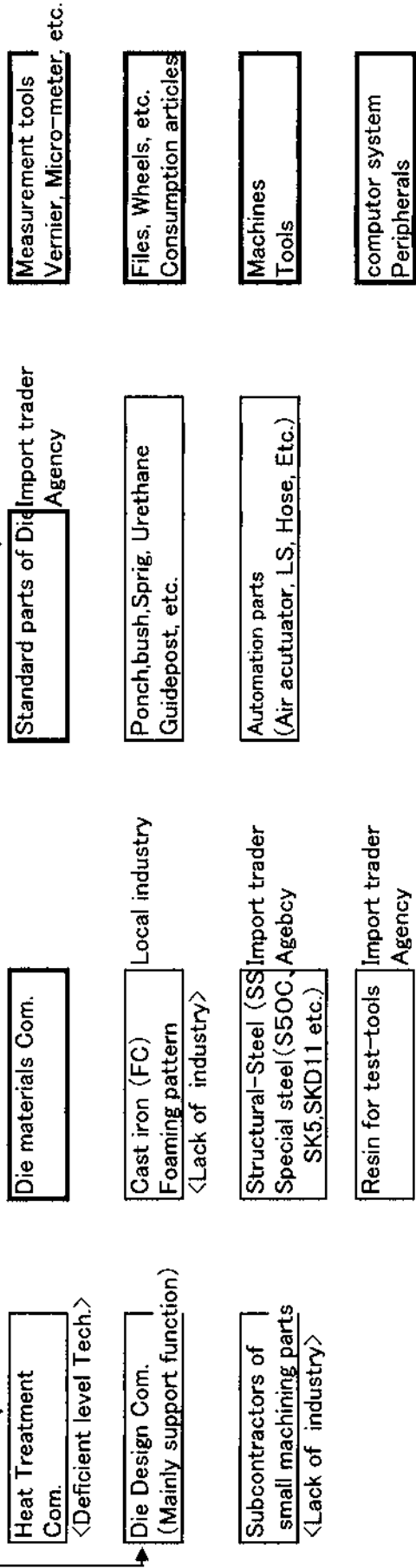
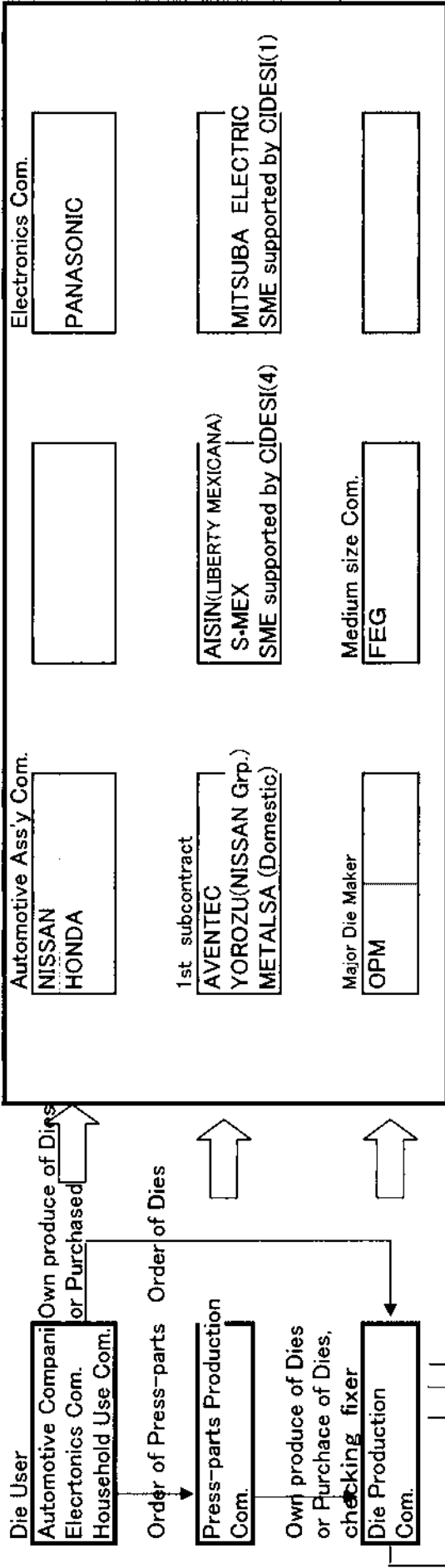
Investigation Period

2004. 2. 17 ~ 2004. 3. 10

JICA Ex-Ante Evaluation Study Team

# 1. STAMPING AND DIE-MAKING INDUSTRY/COMPANIES

## VISITING COMPANY MAP



Investigation of Cost, Delivery, Quality & Service)

RR.

Z

2. Findings As a Result of Visit

Nos.	Category	Company Name	Industry Classification	Nos. employees	Nos. Jap. expatriates	Local Procurement of Dies	Demands USMM \$	Nos. Maint. Specialist	Comments/Problems As Regards Die—Making Technology
No. 1	1st tier assembler	AISIN	automotive	600	3P	X import	2	4	*1 (See following supplementary sheet)
No. 2		PANASONIC	electric	839	8P	X import	1.5	3	*2
No. 3	CIDESI	TROQUELADOS Q	automotive	15	0	O local	1	2	*3
No. 4	guided	IM T	electric	55	0	O local		6	*4
No. 5	small company	ALAR DE MEXICO	automotive	30	0	O local	0.2	2	*5
No. 6		STAUBLE - DYTISA	electric	78	0	O local		6	*6
No. 7		PROCESOS CONTROLADOS	automotive	30	0	O local		0	*7
No. 8	1st tier	FEG	automotive			—	5	20	*8
No. 9	1st tier	S-mex	automotive	135	3P	X import		4	*9
No. 10	1st tier	AVENTEC	automotive	600	13P	X import	20	14	*10
No. 11	assembler	NISSAN	automotive	4,500	17P	X import	20	65	*11
No. 12	1st tier	YOROZU	automotive	314	8P	X import	8		*12
No. 13	assembler	HONDA	automotive	1,350	21P	X import	3	25	*13
No. 14	die maker	OPM	automotive	130	3P	—	8	50	*14 *15 *16
No. 15	1st tier	MITSUBA	electric	696	7P	X import		6	*17
No. 16	1st tier	METALSA	automotive	3,000	0	X (small dies O)		50	*18
No. 17	CIQA								*19
No. 18	CIDESI								*20
No. 19	Japanese Embassy.								*21
No. 20	Mexican Ministry of Foreign Affairs.								*22
No. 21	CONACYT								*23-1
No. 22	JETRO								*23-1
No. 23	Mexico Japan Commerce Industrial A.C.								*24
No. 24	Vocational School.								*25
No. 25	Mechatronics School.								*26
No. 26	Monterrey Institute of Technology (Material Science Laboratory)								*27
No. 27	UNAM (Material Science Laboratory)								*28
No. 28	Mexican Ministry of Economics.								*29
No. 29	1st tier	HI-LEX	automotive	860	3	X (small dies O)		10	*30 *31

*[Handwritten signature]*

*[Handwritten mark]*



2

## 2. Findings As a Result of Visit

### Comments/Problems As Regards Die-Making Technology

1. They badly need die maintenance technicians. They also need local suppliers of parts necessary for die maintenance.
2. They need self-sustaining die maintenance capability
3. They need CAD/CAM engineers. They also need die maintenance technicians.
4. They need to acquire CAD/CAM technologies. They need human resources specifically trained on the fundamental die design/manufacturing technologies.
5. They cannot make necessary modifications with large dies.
6. They need die design specialists. They need to develop in house capability for making low-cost dies. They knowledge and skills for better production schedule control.
7. They need die maintenance specialists. They have hardships in procuring locally made dies at reasonable prices. They paid exorbitant prices to local die manufacturer.
8. They do die design in Japan, and manufacture in Mexico with imported casting materials. They are not willing to nurture local 2<sup>nd</sup> tier suppliers.
9. They do quality assurance of products using dies imported from Japan. They do die maintenance by themselves. They do worker training in Japan.
10. They need die maintenance technicians.
11. They need die maintenance technicians.
12. They need die maintenance technicians.  
(These die manufacturers are competing for a limited number of die maintenance technicians locally available.)
13. They want to develop local first-tier suppliers. They intend to procure dies from the global marketplaces.
14. They need acquire CAD/CAM technology. They also need human resources with basic knowledge/skills.
15. They face a sever problem in not being able to procure casting materials locally. The also have a difficulty in not being to locate good local heat treatment specialists for outsourcing.
16. They have a sever difficulty in not being able to locate die machining specialists locally for small-scale dies.
17. They need die maintenance technicians.
18. They need to acquire CAD/CAM technologies. They need human resources specifically trained on the fundamental die design/manufacturing technologies.
19. They are doing basic research and analysis in the chemistry field.
20. They are assisting SMEs in supplying tools.
- 21.
22. They expressed a high expectation for the Project since it is being undertaken at an oportune time for the development Mexican national auto industry.
23. -1 There are official facilities for promoting the national die/mold manufacturing businesses, e.g., a special promotion fund and/or special tax treatments.
23. -2 There is an official fund in the state government specifically directed toward solution of problems the businesses face.
24. They have shown interest in this ex-ante project evaluation mission.
25. They introduced YOROZU and MITSUBA to the Mission.
26. There is no training /education program for die/mold design/manufacturing.  
A training institute for teachers of technical high schools. They have no research 2. 2. 2.

R.

**2. Findings As a Result of Visit**

**Comments/Problems As Regards Die-Making Technology**

- 27. theme on stamping dies.
- 28. They have no research theme for stamping dies.
- 29. They mainly do basic research for materials and metals.
- 30. We reported our survey result.
- 31. They are not interested in local procurement of dies. They are not interested in nurturing local 2<sup>nd</sup> tier suppliers.

2

Di.

75

### 3. Technologies Survey on Stamping and Die-Making Industries

By: JICA Consultants Team

#### CONCLUSIONS

(About auto assemblers and their first tier-suppliers)

1. The number of new car models the auto-assembly transplants in Mexico from Japan, U.S.A. and European countries ramp up every year in Mexico average 2.0 to 2.5.
2. According to a credible source, the total amount of demands for dies for those new car models is in the order of U.S. \$ 200 to 300 million, which is being satisfied almost solely by imports from foreign countries. In other words, the foreign auto transplants and their first-tier suppliers in Mexico have virtually no in-house die manufacturing capacity. Hence, their sole concern at present in their Mexican operations is how to maintain the imported dies in good conditions.



*1: Though they badly need good die maintenance crews, the local supply thereof is very limited. As a result, there is a cut-throat competition for locally available die maintenance technicians. It represents a sellers' market for the benefit of die maintenance technicians with rising salaries at the cost of their employers with rising personnel and other costs. In order to cut off this vicious circle, there is a need for a large increase in the supply of die maintenance technicians in Mexico.*

(About small-to-middle sized, stamping companies and those wishing to be die manufacturers)

3. There is a die manufacturer producing a range of very-small "progressive" dies in Mexico but their production capacity is very small.
4. There are also a few local manufacturers of small auto stamping parts in Mexico, however, their locally purchased dies have problems in terms of delivery, quality and cost. Therefore, they wish to make dies for their own use themselves. However, due to lack of die design and manufacturing capability, they cannot make their dies.

*R.*



R

*2: There is an urgent need for up-grading the technology level of the existing small local die-making companies. There is also a need for teaching the existing local autoparts-stamping companies basic die design/manufacturing technologies including CAD/CAM operations.*

(About local die manufacturers)

5. FEG de Queretaro S.A. de C.V., a subsidiary of a Japanese multinational company producing small-to-medium sized auto parts and dies, has set up a plant in Queretaro recently having an eye on the growing Mexican auto industry and the absence of truly competitive local die manufacturers.
6. "OPM" (a joint venture of O-GI-HA-RA, a Japanese, world-class auto-die specialist of medium-to-large sized dies, with Mexican interests) is the only one stamping die manufacturer for medium-to-large auto parts in Mexico. However, their supply capacity is limited to 10 to 12 dies per month.
7. Since there is no casting material supplier in Mexico, those two (2) companies mentioned above cannot as yet enjoy the merits of having established their plants in Mexico.
8. There are only a few dependable local heat treatment specialists serving local clients (stamped products and stamping dies) in Mexico, and, according to a source, the number of which is decreasing.
9. There are no dependable local small-product machining companies. Hence, they have to do all of the machining work in-house in stead of outsourcing it, which is inefficient.



*3: As there is no casting materials supplier in Mexico, local medium-to-large die manufacturers have no way but to make dies with other materials or to import half-made cast dies from foreign countries. This is a competitive disadvantage in terms of costs and delivery than would have been otherwise.*

*4: Development and promotion of the local heat treatment service and small-product machining capability is of urgent need in order for local Mexican die manufacturing businesses competitive in the global marketplaces.*

(end)

R

#### 4. Current Technological Levels of Local SMEs and Ways to Improve Them

##### Results of Investigations

1. There is a very deep technological gap between what 1st-tier suppliers require and what local SMEs can afford.
2. Some 1st-tier suppliers placed orders with local SMEs, however, they often experienced frustrations with local SMEs because the capability of local SMEs turned out to be far short of what was expected in terms of quality, cost, and delivery.
3. The traditional, hence "current", practice of CIDESI in extending support to local SMEs does not work.

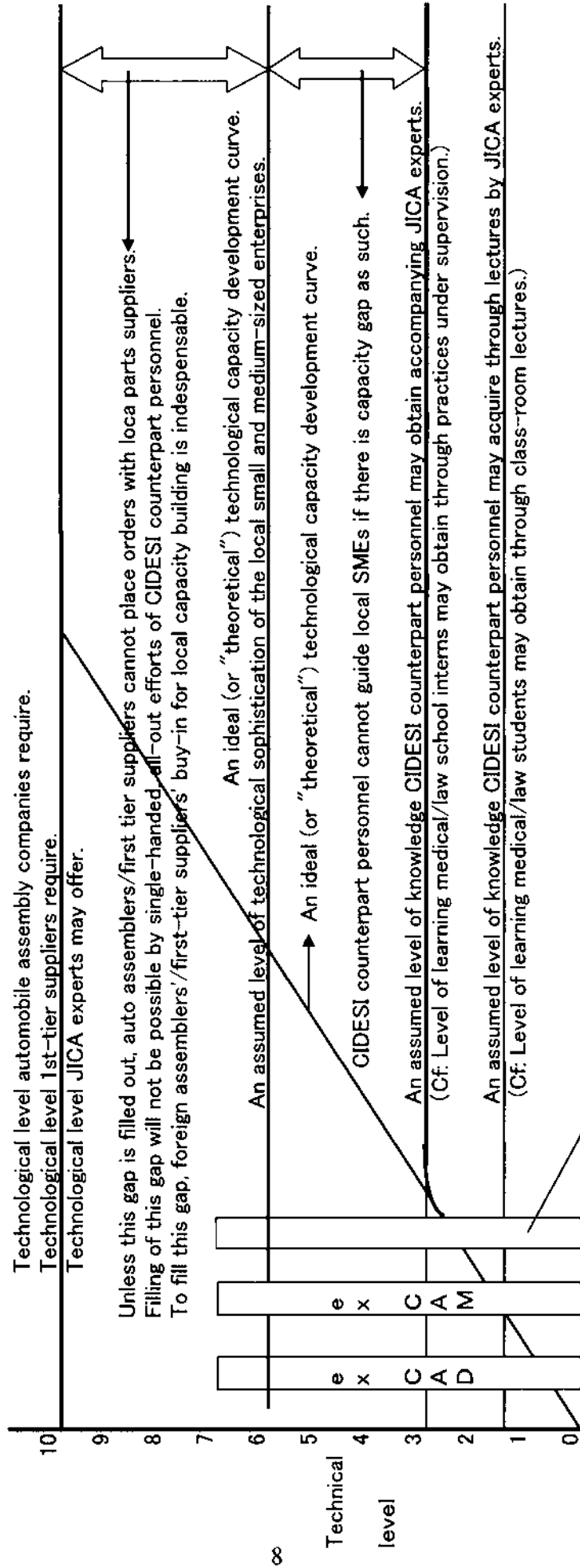
Reasons for the above findings:

1. The technological superiority of CIDESI counterpart personnel over local SMEs, as far as stamping dies are concerned, may be minimal as best on having bookish knowledge, or negative in practical production skill.
2. There is a large of varieties of stamping dies used in the industry, and hence, it is simply impossible to make effective technology transfer by means of a JICA project in a standard "Counterpart Technology Transfer Model".
3. The speed of technological innovation at the 1st-tier suppliers' level is ever accelerating. Hence, there is an ever-widening technological gap between 1st-tier suppliers and Mexican local SMEs as far as stamping die technologies are concerned.



4. Current Technological Levels of Local SMEs and Ways to Improve Them

Levels of Technological Sophistication Required to Improve Mexican Stamping and Die-Making Industrial Capacity



Die-design and -making technologies within a limited range.

Focused technology transfer by JICA experts enables CIDESI counterpart personnel to have an edge over local SMEs.

7

## 5. Ways to Improve Stamping Die Technology in CIDESI

Issue 1. How will CIDESI be able to help local SMEs' efforts to become qualified suppliers to the 1st-tier suppliers in the Mexican auto industry?

Answer: CIDESI may help local SMEs, for example, by teaching CAD/CAM operations and/or basic die design/manufacturing skills using a few selected model dies.

Issue 2. Is there any way to fill a deep technological gap that exists between local SMEs and the 1st-tier suppliers in the auto industry?

Answer (1) CIDESI acquires knowledge/skills through JICA Project in the areas mentioned above, and transfer those knowledge/skills to SMEs.

Answer (2) Local SMEs will become technologically competitive only through completing actual jobs they have contracted with first tier supplier . Given the current technological level of many local SMEs, however it is very unlikely that 1st-tier supplier will place any orders with local SMEs.

Hence, there is a need for a special arrangement whereby 1st tier suppliers give local SMEs opportunities to do trials on making contracted products (i.e., dies) and let them succeed somehow in meeting the stringent quality, cost, and delivery requirements to satisfaction of a client.

This process has to be repeated over and over again, during which local SMEs might acquire necessary technological core competence. CIDESI may use its influence to let 1st-tier suppliers get interested in giving such chances through placing trial-orders for dies to local SMEs as mentioned above.



5. Ways to Improve Stamping Die Technology in CIDESI

Issue 3. What are the measures with which to improve the technological level of CIDESI in the field of stamping die desing/manufacturing?

Answer One possibility to improve the technological level of CIDESI in the field of stamping die desing/manufacturing is to do the job of making dies for local SMEs who have difficulties in procuring dies at reasonable costs on a commerical basis. That is to let CIDESI staff design and manufacture dies with good quality, within budget and on-schedule. This will have to be reapeted over and over again, durign which the knowledge and skill levels of CIDESI engineers/technicians might improve.

Before starting the venture as mentioned above,

- 1) CIDESI shall make a critical self evaluation of its workforce in terms of their current knowledge and skill levels as well as their potential to design and manufacture dies which local SMEs want.
- 2) CIDESI shall make a critical self evaluation of the capability of existing machines and equipment that is necessary for die design and manufacture at a commercial scale.

if, as a result of above self evaluation, there is any deficit in the human and hardware capacity, CIDESI shall prepare a plan for measures to be taken.

The following are the pre-conditions to be satisfied in order for this idea to be taken seriously.

- (1) CIDESI shall make a market survey so as to confirm that there is a good enough amount of demand for stamping dies to be designed and manufactured by CIDESI from local SMEs.
- (2) CIDESI shall have decided upon the category of stamping dies it might reasonably expect to design and manufacture efficiently on a competitive basis. At the same time, CIDESI shall establish the necessary organizational and managerial system in place.

Ex.: For Mono Functional Dies : Maximum Product Dimensions = 300X200XH100  
For Progressive Dies : Maximum Product Dimensions = 150X50XH50





### Individual interview for C/P candidates

To confirm the C/P candidate's ability against the project-plan, individual interview was done by the Japanese consultants about the following items.

- (1) Each personal history (Age, Educational background, Specialty)
- (2) Company experiences without "CIDESI"
- (3) Present works at "CIDESI"
- (4) Main experiences and results during the past pilot project as C/P
- (5) Main experiences and results after past pilot project
- (6) Individual ambitions

#### Individual interviewee list

No.	Interviewee name	C/P work-plan
1.	Jorge Rangel Garcia	Die design (See Note-2)
2.	Javier Angeles Lugo	Die design (See Note-2)
3.	Saul Rubio Rodriguez	Die design (See Note-2)
4.	Alberto Rodriguez Calderon	Die design (See Note-2)
5.	Rolando Venegas Camarena	Die design (See Note-2)
6.	Noe Reyes	Tooling & Machining work shop (See Note-2)
7.	Luis del Liano Vizcaya	Computer analysis & simulation (See Note-2)
8.	Manuel Delgado Rosas	CAD/CAM/CAE (See Note-2)
9.	Irma Moran Chavez	Production administration
10.	Carmen Constante Rivera	Production administration

Note-1: Interviewees were selected who had C/P experiences in the past or have direct relevance on the present work on the project plan.

Note-2: To confirm the C/P candidate's ability objectively, fundamental test was done.

#### Interview results

##### 1) Die design & simulation section

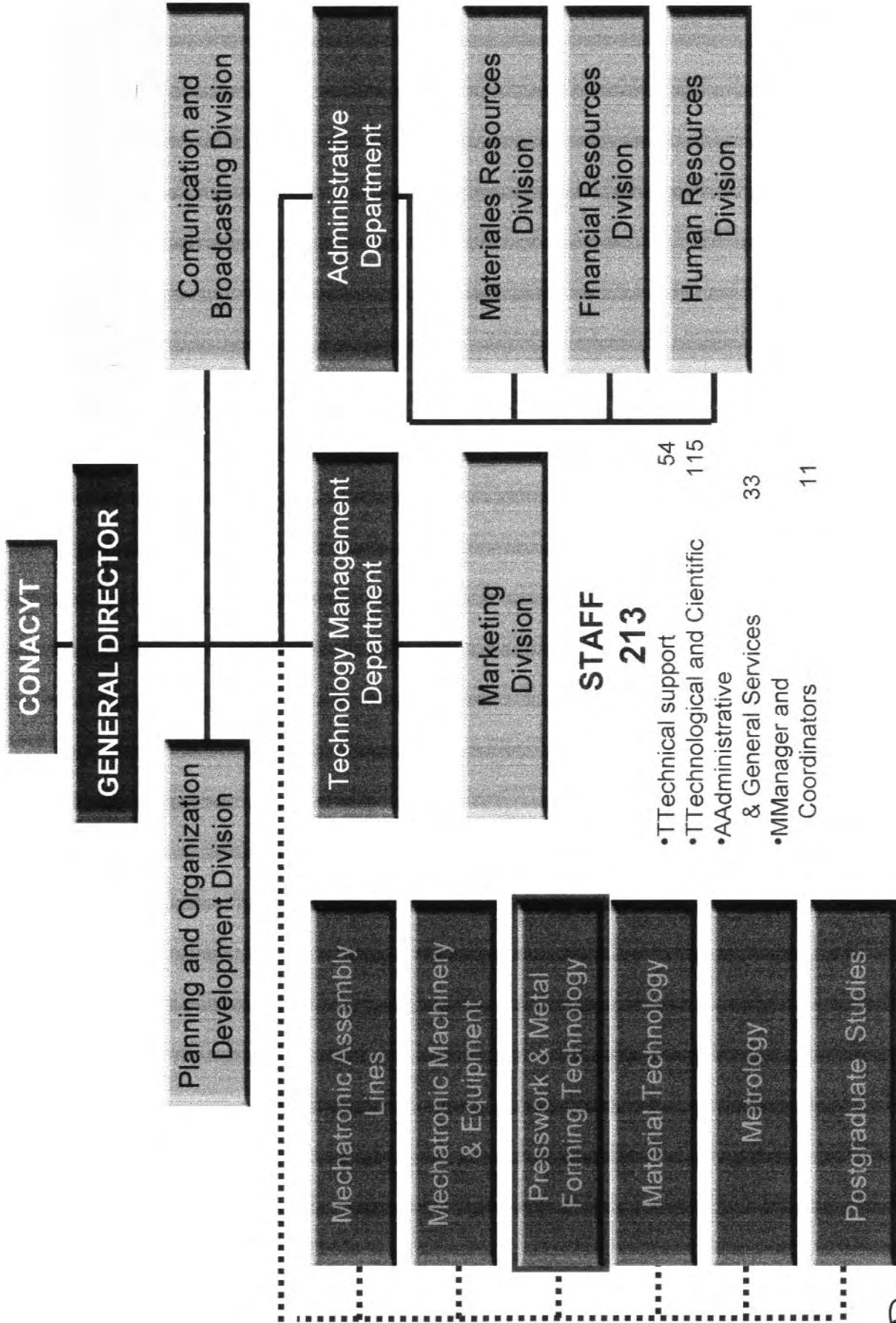
Fundamental abilities are recognized, though, lack of experiences, practical abilities are not satisfied at present.

##### 2) Tooling & Machining work shop section

For the results of the consignment machining business, suitable machining abilities are recognized on CNC machine operation technology. CAM operation technologies are not sufficient at present.

##### 3) Production administration section

For the results of the several company supports, suitable production administration abilities are recognized.



**STAFF**  
**213**

- T Technical support 54
- T Technical and Scientific 115
- A Administrative & General Services 33
- M Manager and Coordinators 11

*R.*

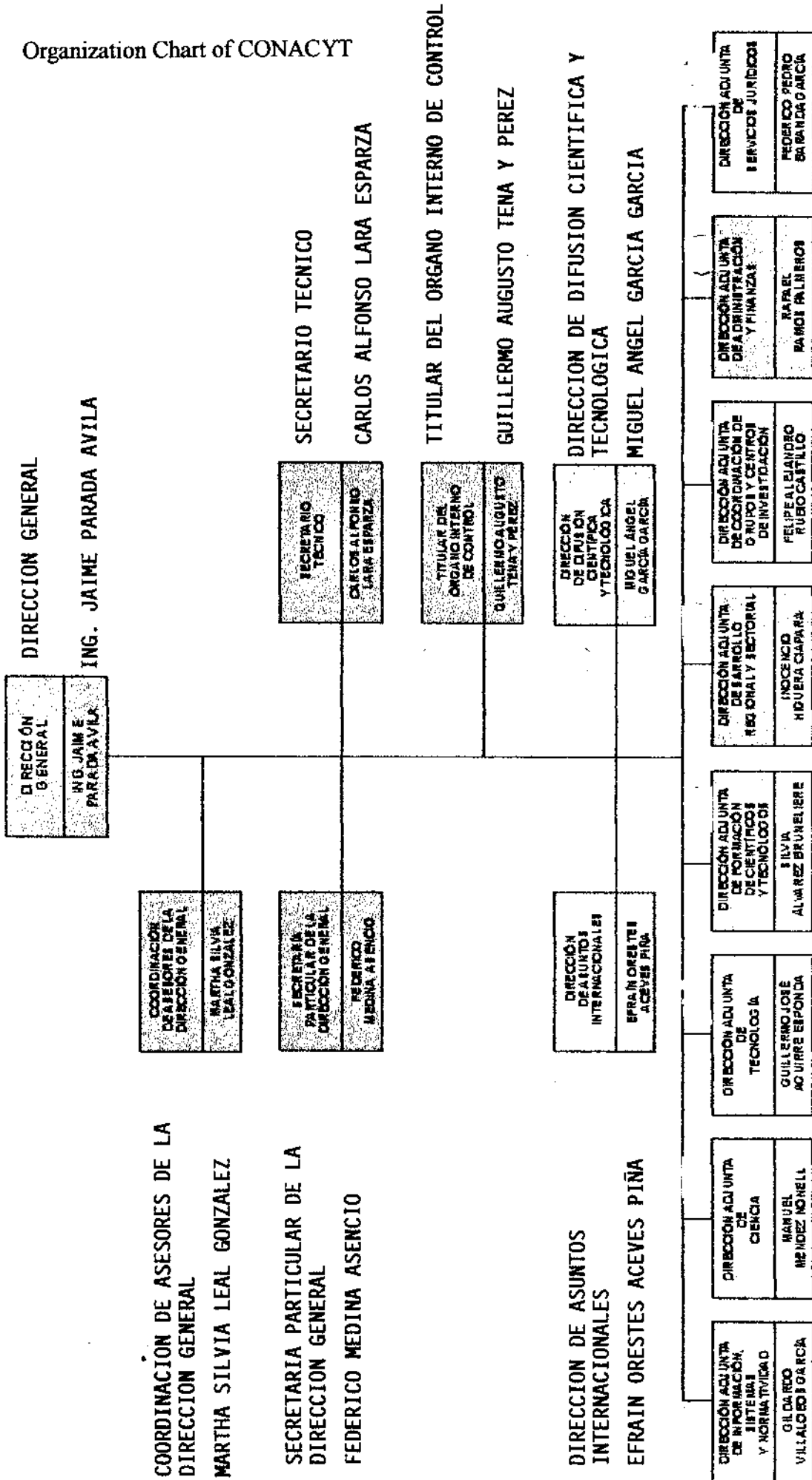
*2*

## Annual Budget of CIDESI for the last 5 years

(DLS)

YEARS	YEARS				
	1999	2000	2001	2002	2003
<b>INCOMES</b>	<b>5,467,360.91</b>	<b>7,231,346.36</b>	<b>9,125,233.64</b>	<b>9,672,956.36</b>	<b>12,855,880.00</b>
LABOR COSTS	3,122,568.18	3,670,485.45	4,646,420.91	5,039,777.27	6,175,393.12
MATERIALS COSTS	631,105.45	1,047,251.82	814,733.64	1,289,740.00	1,586,113.64
MAINTENANCE AND OPERATION OF MACHINERY & EQUIPMENT	159,768.18	286,385.45	388,655.45	400,367.27	415,308.26
TRANSPORTATION COSTS	152,248.18	174,968.18	186,628.18	348,047.27	322,478.89
OTHERS SERVICES	648,158.18	820,066.36	1,035,184.55	1,527,856.36	1,910,045.60
MACHINERY, EQUIPMENT	627,430.91	623,300.00	1,183,370.00	545,211.82	1,552,906.37
BUILDING AND FACILITIES	16,455.45	275,208.18	277,408.18	140,360.00	319,395.21
SUNDRY EXPENSES	56,659.09	129,507.27	66,839.09	66,397.27	76,819.18
<b>TOTAL OUTGO:</b>	<b>5,414,393.64</b>	<b>7,027,172.73</b>	<b>8,599,240.00</b>	<b>9,357,757.27</b>	<b>12,358,460.27</b>

Organization Chart of CONACYT



*A List of Attendance in the Discussion***Japanese side**Ex-Ante Evaluation Study Team

Shigeo Ishida	Leader
Kaneo Nasu	Technical Transfer Planning
Etsuji Yoshimura	Cooperation Planning
Hikomichi Hra	Project Evaluation
Akihiro Inada	Consultant
Atsuo Kasuya	Consultant
Fusako Yamawaki	Interpreter

Embassy of Japan

Satoshi Shoda	Second Secretary
---------------	------------------

JICA Mexico Office

Koji Kawai	Resident Representative
Hitoshi Matsumoto	Assistant Resident Representative

**Mexican side**Ministry of Foreign Affairs

Cristina Ruiz	Director of Bilateral Cooperation
---------------	-----------------------------------

Ministry of Economics

Sergio A. García de Alba Z.	Dputy Minister for SMEs
-----------------------------	-------------------------

CONACYT

Felipe Ruibio Castillo	Director Adjunto de Coordinación de Grupos y Centros de Investigación
Carlos O'Farrill Santibáñez	Director de Coordinación y Apoyo Institucional

CIDESI

Angel Ramirez Vázquez	General Director
Jorge Rangel García	Director de Tecnología de Herramientales