3. Provision of Machinery and Equipment

Only equipment and machinery delivered as of March 31, 1997 were listed down as follows:

Japanese Fiscal year	Registration No.	Name of Machinery and Equipment
1994	EE94T-001	Vector Signal Generator
	EE94T-002	π /4 DQPSKI-Q Generator
	IE94T-001	FFT Analyzer
	IE94T-002	Internal Printer
	IE94T-003	Microphone
	IE94T-004	Microphone Pre-Amplifier
	IE94T-005	Calibrator
	IE94T-006	Impulse Hammer
	CE94T-001	Data Logger
	CE94T-002	Switching Box
	CE94T-003	Metal Form
	CE94T-004	Pan type
	ChE94T-001	Portable COD Meter
	ChE94T-002	Zoom Stereo Microscope System
	ChE94T-003	Dissolved Oxygen Meter
	ChE94T-004	Portable pH Meter
	ChE94T-005	Electronic Recorder
	ChE94T-006	Water Bath Incubator
	ChE94T-007	Continuous Gas Monitoring Apparatus
	ChE94T-008	Centrifugal Particle Size Analyzer
1995	IE95T-001	Personal Computer DEC PC VENTURIS
	IE95T-002	Personal Computer DEC PC VENTURIS
	IE95T-003	Personal Computer DEC PC VENTURIS
	IE95T-004	Personal Computer DEC PC VENTURIS
	IE95T-005	Personal Computer DEC PC VENTURIS

Japanese Fiscal year	Registration No.	Name of Machinery and Equipment
1995	IE95T-006	Personal Computer DEC PC VENTURIS
	IE95T-007	Personal Computer DEC PC VENTURIS
	IE95T-008	Color Monitor 17inches
	IE95T-009	Color Monitor 17inches
	IE95T-010	Color Monitor 17inches
	IE95T-011	Color Monitor 17inches
	IE95T-012	Color Monitor 17inches
	IE95T-013	Color Monitor 17inches
	IE95T-014	Color Monitor 17inches
	IE95T-015	Note Type PC IBM Think Pad
	IE95T-016	Work Station SUN ULTRASPA
	IE95T-017	Laser Printer EPSON
	IE95T-018	UPS THAI MAXWELL
	IE95T-019	AUTO CAD Software
	IE95T-020	WINDOWS 95 Software
	IE95T-021	WINDOWS 95 Software
	IE95T-022	WINDOWS 95 Software
	IE95T-023	WINDOWS 95 Software
	IE95T-024	WINDOWS 95 Software
	IE95T-025	WINDOWS 95 Software
	IE95T-026	WINDOWS 95 Software
	IE95T-027	Oxyen Consumption Meter
	CE95T-001	Personal Computer DEC PC VENTURIS
	CE95T-002	Personal Computer DEC PC VENTURIS
	CE95T-003	Personal Computer DEC PC VENTURIS
	CE95T-004	Personal Computer DEC PC VENTURIS
	CE95T-005	Personal Computer DEC PC VENTURIS
	CE95T-006	Personal Computer DEC PC VENTURIS
	CE95T-007	Personal Computer DEC PC VENTURIS

Japanese Fiscal year	Registration No.	Name of Machinery and Equipment
1995	CE95T-008	Color Monitor DEC 14"
	CE95T-009	Color Monitor DEC 14"
	CE95T-010	Color Monitor DEC 14"
	CE95T-011	Color Monitor DEC 14"
	CE95T-012	Color Monitor DEC 14"
	CE95T-013	Color Monitor DEC 14"
	CE95T-014	Color Monitor DEC 14"
	CE95T-015	Note Type PC IBM Think Pad
	CE95T-016	Work Station SUN ULTRASPA
	CE95T-017	Tape Drive FRONT-ROAD 1/2"
	CE95T-018	Laser Printer EPSON
	CE95T-019	Laser Printer EPSON
	CE95T-020	Laser Printer EPSON
	CE95T-021	Laser Printer EPSON
	CE95T-022	Laser Printer EPSON
	CE95T-023	Laser Printer EPSON
	CE95T-024	CALCOMP DRAWINGBOARD
	CE95T-025	Scanner CALCOMP SCANPLUS III
	CE95T-026	TECHJET Color
	CE95T-027	UPA THAI MAXWELL
	CE95T-028	SOLARIS 2 Software
	CE95T-029	SOLARIS 2 Software Manual
	CE95T-030	WINDOW 95 Software
	CE95T-031	WINDOW 95 Software
	CE95T-032	WINDOW 95 Software
	CE95T-033	WINDOW 95 Software
	CE95T-034	WINDOW 95 Software
	CE95T-035	WINDOW 95 Software
	CE95T-036	WINDOW 95 Software

Japanese Fiscal year	Registration No.	Name of Machinery and Equipment
1995	CE95T-037	Microbiology Environmental Laboratory
	CE95T-038	Waste Water Sampler
	CE95T-039	Dynamic Strainmeter
	CE95T-040	Water Bath
	ChE95T-001	Personal Computer DEC PC VENTURIS
	ChE95T-002	Color Monitor DEC 14"
	ChE95T-004	Laser Printer EPSON
	ChE95T-005	WINDOWS 95 Software
	ChE95T-006	Gas Chromatography
	ChE95T-007	Bench Top X-ray Fluorescence
	ChE95T-008	Heavy Metal Eliminater
	ChE95T-009	Air Compressor

4. Dispatch of Study Team

The Japanese Technical Guidance Team organized by JICA and headed by Prof. and Dr. Fumio NISHINO was dispatch to Thailand from June 26th to July 4th,1995 for the purpose of smooth and successful implementation of the Project. As a result of discussions with the Authorities concerned of the Government of Thailand, Minutes of Discussions was signed between both parties on Plan of Operation for whole Period, Annual Work Plan for JFY 1995, etc.

The member list is attached in Appendix 7 with the Project Design Matrix of the Project (Appendix 8) mutually agreeded on during its stay.

Part-2 Activities of the Project

1. Improvement of Teaching Capability at Faculty of Engineering

1.1 Curriculum Improvement

Curricula will be revised every four years. Therefore, curricula presently adopted in F.O.E. will be utilized until 1998 Thai academic year.

1.2 Course development

In order to improve course works, syllabuses in English were to be formulated by faculty members and were to be compared with those being used by Japanese universities at the begining of the implementation of the Project. However, no syllabus was shown to JICA expert even in the end of the 2nd quarter in 1995 Japanese fiscal year.

In the 11th steering committee held on September 3 in 1996, Dr. Chavalit Chaleeraktrakoon, in charge of academic affairs explained that some departments already finished the production of syllabuses in English, however, all departments did not finish yet though almost all departments finished the formulation of the syllabuses in Thai. Dr. H. Watanabe in charge recommended that only finished syllabuses should be filed and printed immediately because syllabuses must be improved every year. Dean and vice Dean agreed to this recommendation.

1.3 Improvement of teaching methods

(1) Improvement of teaching materials such as slides and vedio

(2) Improvement of teaching methods through field trips and workshop

(Common to All Departments of Faculty of Engineering)

JICA Seminar on "Various Aspects of Automotive Technology" was organized and held on August 22, 1995 by Faculty of Engineering, Thammasat University and JICA in order to introduce the widely ranged technologies adopted in automotive industry to the udergraduate students of Faculty of Engineering.

This seminar is outlined as follows:

Time schedule

09:00 ~ 09:10 Opening Address, by Dean

09:10 ~ 09:30 "JICA Thammasat Project: Policy, Framework, and Activities" by Minori SANO (JICA Expert, Chief Advisor)

09:30 ~ 10:30 "Status and Overwiew of Alternative Fuels in IC Engines" by PHULPORN Saengbangpla, (Assoc.Prof., Dept. Mechanical Engineering, Chulalongkorn University)

10:30 ~ 10:45 Coffee Break

10:45 ~ 12:00 "Automotive Technology & Emission Control" by Padung Chan-uthana, Tuanchai Munjit and Teera Krittayanawach, (ISUZU Group)

12:00 ~ 13:30 Lunch Break

13:30 ~ 14:15 "Automotive Industry and Electrical Engineering Where You Can Find Business Oppotunity" by Michiaki ITO (JICA Expert, Electrical Engineering, and Professor of Nagaoka University of Technology)

14:15 ~ 14:45 "Damage of Infrastructures (Highways, Bridges and Buildings) Due to Kobe Earthquake in Japan" by Hiroshi MUTSUYOSHI (JICA Expert, Civil Engineering, and Assoc.Prof., Saitama University)

14:45 ~ 15:00 Coffee Break

15:00 ~ 15:45 "Exhaust Gas Treatment Catalysis: Contribution of Chemical Engineering to Automobile Manufacturing"
Hiroo NIIYAMA (JICA Expert, Chemical Engineering, and Professor of Tokyo Institute of Technology)

15:45 ~ 16:00 Closing Remark

(Department of Electrical Engineering)

(a) "Realization of Circuit Functions using Operational Tranconductance Amplifiers and Grounded Capacitor" by Dr. Noriyoshi Kanbayashi (Short-term Expert, Nagaoka University of Technology) on November 7, 1994.

(b) "Moments and their Application" by Dr. Toshinori Yoshikawa (Short-term Expert, Nagaoka University of Technology) on November 7, 1994.

(c) "Power Electronics Seminar" organized by Department of Electrical Engineering, Thammasat University, November 20 and 21, 1996.

The outline of this seminar is described as follows:

Power Electronics Seminar Program Schedule

November 20, 1996	November 21, 1996
Morning 10:00-12:00	Morning 10:00-12:00
Tutorial A Tutorial B	Regular Session Tutorial D
Afternoon 13:00-15:30	Afternoon 13:00-16:00
Tutorial C Regular Session	Tutorial E Technical Tour
Lunch Time 12:00-13:00	Lunch Time 12:00-13:00
None	Social Event

Seminar Tutorials

Tutorial A : November 20, 1996 10:15-11:15

Power Converter

by Prof. / Dr. Isao Takahashi (Nagaoka Univ. of Tech., Japan)

Tutorial B : November 20, 1996 11:15-12:00

How should Research Activity Be in Universities

by Asst. Prof. and Asst. President / Dr. Wisut Titiroongruang (King Mongkut's Institute of Technology Ladkrabang)

Tutorial C : November 20, 1996 13:00-13:45

Speed-Sensorless Induction Motor Drives - Past, Present, and Future -

by Lecturer / Dr. Somboon Sangwongwanich (Chulalongkorn Univ.)

Tutorial D : November 21, 1996 11:00-11:45

Technical Trend of Electrical Vehicle

by Dr. Kanokvate Tungpimolrut (National Elec. and Comp. Tech. Center)

Tutorial E : November 21, 1996 13:00-13:45

Production Management at Shindengen Thailand Co., Ltd.)

Regular Sessions

November 20, 1996 14:00-15:30

1. : Present Status on Educational System for Electrical Engineering at Thammasat University.

by Paiboon Nakmahachalasint and Narin Watanakul (Thammasat Univ.)

2. : Direct Power Control of PWM Converter without Power Source Voltage Sensors

by Toshihiko Noguchi (Nagaoka Univ. of Tech., Japan)

November 21, 1996 10:00-11:00

3. : TBD, one or two lecturers planned.

Technical Tour

November 21, 1996 14:30-16:00

The technical tour is held by President Mr. Michiyoshi Saito's courtesy.

The participants will be guided by Mr. Sutee Silanmuay in the manufacturing lines.

Shindengen Thailand Co., Ltd.

Nava Nakorn Industrial Estate Zone 2

60/58 Moo 19 Nava Nakorn 13, Klongnueng, Klongluang, Pathumthani 12120

Phone : 529-1510~2, 529-0667~8 Fax: 529-1679

(d) Special Lecture on Technology Transfer by Dr. Toshihiko Noguchi during December 12, 1996 ~ February 27, 1997

The above lecture on Technology Transfer in the field of basic concept of power converter, basic composition, operation principle and instrumentation of choppers, etc. was specially planned and successfully undertaken 10 times during December 12, 1996 ~ February 27, 1997 by Dr. Toshihiko Noguchi, long-term JICA expert in order to transfer the up-to-date technology to his counterpart, Mr. Narin Watanakul and 4 senior students.

(Department of Industrial Engineering)

(a) "Success of IE Activities in Japanese Manufactures" by Mr. Hajime Suzuki, JICA Expert assigned to JICA/TPD Project, on October 25, 1994.

(b) "On-line Production Scheduling" by Mr. Masafumi Yoshizawa, JICA Expert assigned to JICA/TPD Project, on January 24, 1995.

(c) "The Base of High Quality, High Productivity Manufacturing" by Dr. Susumu Sato, Consultant for Indonesia Iron and Steel Project, on July 21, 1995.

(d) "Quality Management and Quality Assurance" by Mr. Mutsuo Takizawa (Komatsu Ltd.) on September 27, 1995.

(e) "Total Quality Control" by Mr. Tokihiro Sasahara (Short-term Expert, Komatsu Ltd.), during his tenure of February 26 to March 17, 1996.

(f) "System methodology and system application" by Dr.Ario Osato (Short-term Expert, Nagaoka University of Technology), during his tenure of March 24 to April 13, 1996.

(g) "Japanese Production System" by Mr. Mutsuo Takizawa (Short-term Expert, Komatsu Ltd.) during his tenure of July 1 to 21, 1996.

(h) "Industrial Engineering Workshop'96" organized and held on July 11th to 12th, 1996.

This seminar subtitled "Japanese Industrial Management" consists of the following three topics:

1. "Outlook of the Future of Cranes and Mobile Cranes in Japan" (Appendix 8) by Dr. Hiroshi Ito (Professor of Nagaoka University of Technology, JICA Long-term Expert) on July 11, 1996.

2. "The Japanese Production System" by Mr. Mutsuo Takizawa (General Manager of Komatsu Ltd., Technical Training Institute, JICA Short-term Expert) on July 11, 1996.

3. " Practical Japanese Style Production Management of Machineshop" by Mr. Yutaka Kanazawa (Technical Consultant of Thai Engineering Product Co., Ltd.) on July 11, 1996.

(i) "Cognitive and Behavioral Engineering Approach to Human Systems" by Dr.Kazuo Nakamura (Short-term Expert, Nagaoka University of Technology) on February 10, 1997.

(j) "Total Quality Management (TQM) Symposium: Towards TQM Progress in Thailand - The Role of University" organized by Department of Industrial Engineering, Thammasat University, on March 31, 1997

Participants were 65 researchers and engineers from inside and outside Thammasat University. In this symposium, the emphasis was placed on the importance of cooperative academic activities among universities to solve and cope with several practical TQM problems in Thai industries.

The programme of this symposium is shown below:

Date : Monday 31 March 1997

Place : Room 702, Faculty of Engineering, Thammasat University, Rangsit Campus

TIME	TOPICS
08.30-09.00	Registration
09.00-09.15	Opening Ceremony
09.15-10.15	Keynote Speech (Chair: Dr. Ario Osato, JICA) Towards TQM Progress in Thailand : The Role of University by Prof.Dr. Noriaki Kano, Science University of Tokyo Department of Management Science
10.15-10.30	Coffee break
10.30-12.30	Panel Discussion-Part I (Chair: Mr. Tritos Laosirihongthong, Thammasat University) : What can we learn from practical experiences in industries? Presentation #1 Business Systems and TQM Practices by Prof. Fumio Nishikawa, Nagaoka University of Technology Department of Planning and Management Science

Presentation #2

Practice TQM activities in Thai firms

by Mr. Prasit Tansuvan, Executive Director

Thailand Productivity Institute

12.30-13.30 Lunch break

13.30-15.15 Panel Discussion-Part II (Chair: Ms. Parichat Chuenwatanakul, Thammasat University)

: What should be educated and researched in universities?

Presentation #3

Current problems of TQM education and research in Thai University

by Dr. Julsiri Jaroenpuntarak, Thammasat University

Department of Industrial Engineering

Presentation #4

The role of university in TQM education

by Assoc.Prof.Dr. Paritud Bhandhubanyong, Chulalongkorn University

Department of Metallurgical Engineering

15.15-15.30 Coffee break

15.30-16.30 Free Discussion (Chair: Ms. Montalee Sasananan, Thammasat University)

Summarization and discussion among the speakers and the attendants

Moderator : Ms. Montalee Sasananan, Thammasat University, Department of Industrial Engineering

16.30-16.40 Closing of the Symposium

(Department of Civil Engineering)

(1) The following seminars were held during the tenure of Dr.Hiroshi Mutsuyoshi.

(a) "Constuction Management" by Professor Masahiko Kunishima (The University of Tokyo) on August 25, 1994.

(b) "Computer System in Civil Engineering" by Dr.William Tanzo (Saitama University) on August 30, 1994.

(c) "Computer System in Universities" by Dr. Kazuyoshi Iwashita (Saitama University) on December 13, 1994.

(d) "Distinct Element Simulation of Granular Materials" by Dr.Kazuyoshi Iwashita (Saitama University) on December 14, 1994.

(e) "Application f New Materials to Concrete Structure" by Dr. Hiroshi Matsuyoshi (Saitama University, Long Term Expert) on December 14,1994.

(f) "Hyogo-Ken Nanbu Earthquake Damage" by Prof. Hiroyuki Watanabe (Saitama University) on March 9, 1995.

(g) International Seminar on "Asian Concrete Model Code" was held in Bangkok on December 19 and 20, 1994. The proceeding consists of 14 paper.

(h) "Externally Prestressed Concrete Technique" by Mr. S. Matupayont on March 15, 1995.

(2) Following Seminars were held during the tenure of Dr. Hiroyuki Watanabe.

(a) "GIS (Geographic Information System) in Multi-Media Era" by Associate Prof. Dr. Yutaka Ohsawa (Saitama University) on March 26, 1996.

(b) "Method of Design for Water Front Structures and Submerged Structures - Design Load Estimation and Calculation Method for Sliding Distance of Structures -" by Prof. Dr. Katsutoshi Tanimoto (Saitama University) on April 2, 1996.

(c) "Segmental External Prestressed Concrete Structures" by Prof. Dr.Hiroshi Mutsuyoshi (Saitama University)" on August 15,1996.

(Department of Chemical Engineering)

(a) "Chemical Engineering Education in Japan" by Prof. Atsushi Kanzawa and Prof. Junjiro Kawasaki (Tokyo Institute of Technology) on August 5, 1994.

(b) "Roles of Universities in Technology Transfer to Developing Countries" by Prof. Hiroo Niiyama (JICA Expert, Tokyo Institute of Technology) on September 29, 1994.

(c) "Report for the Paper Presentation at Regional Symposium on Chemical Engineering held in Manila, the Philippines, October, 1994" by Prof. Hiroo Niiyama (JICA Expert), Mr. Pongtorn Dhupatemiya and Mr. Prodpran Siritheerasas on November 22, 1994.

(d) "Decolorization of Waste Water from Sugar Industries by Activated Carbon from Sugar Cane Bagasse" and "Adsorption onto Activated Carbon and its Potential Application to Waste Water Treatment" by Prof. Junjiro Kawasaki (Short-term Expert, Tokyo Institute of Technology) during his Assignment to Thammasat University from December 11 to 24, 1994.

(e) "Chemistry of Zeolites" by Prof. Tatsuaki Yashima (Tokyo Institute of Technology) and Prof. Tomoyuki Inui (Kyoto University) on December 16, 1994.

(f) "Multi-Solute Adsorption from Dilute Aqueous Solution" and "Pollution Control Process" by Dr. Hiroyuki Kage (Short-term Expert, Kyushu Institute of Technology) during his assignment to Thammasat University from March 15 to April 9, 1995.

(g) "Introduction to Polymer Engineering - Recent Research Activities-" by Dr. Sirijutharatana Covavisaruch (Chulalongkorn University) on April 19, 1995.

(h) "Approach to the Treatment of Waste Water with Activated Carbon from the Aspect of Energy Balance" by Dr. Atsushi Kanzawa (Short-term Expert, Tokyo Institute of Technology) during his assignment to the Thammasat University from July 20 to August 5, 1995.

(i) "Technical Guidance on Improvement of Chemical Engineering Laboratory" by Dr. Hidetoshi Sekiguchi (Short-term Expert, Lecturer of Tokyo Institute of Technology) during his assignment to the Thammasat University from July 25 to August 16, 1995.

(j) "Engineering Education in De La Salle University" by Prof. Susan Gallardo (De La Salle University, the Philippines) on August 29, 1995.

(k) "Campus Tour and Open Forum on Chemical Engineering Laboratory for better Chemical Engineering Education and Use of Computer in Chemical Engineering Education" organized by JICA Project and Thammasat University on October 12, 1995.

(l) "Importance of Chemical Engineering Laboratories in Engineering Education Experiences in Tokyo Institute of Technology and Specific Topics in Chemical Engineering Laboratories" by Dr. Hidetoshi Sekiguchi (Tokyo Institute of Technology) on October 23-25, 1995.

(m) "Special Seminar on Chemical Reaction Engineering" by Prof. Katsuhiko Wakabayashi (Kyushu University) on March 26, 1996.

(n) "Working as University Faculties in Thailand's Context, A case in Engineering Education" by Dr. Steera Prasertsan (Associate Professor of Prince of Songkla University) on May 27, 1996.

(o) "Topics on Modern Robotics" by Prof. Masashi Shimizu (Tokyo Institute of Technology) on July 19, 1996.

(p) "ENTECH'96 Symposium on Engineering for Public Safety" on August 15 to 18, 1996.

(q) "Special Seminar on Energy Technology" by Prof. Atsusi Kanzawa (Tokyo Institute of Technology) on November 26, 1996.

(Department of Mechanical Engineering)

(a) "Japanese Auto Industry, Quality Control, Development and Product Process and NISSAN's Intelligent Body Assembly System" by Mr. Kuniaki Okumi (Short-term Expert, NISSAN Motor Co., Ltd.) during his tenure of February 6 to 18, 1995.

(b) "Basic Structure and Concepts of Thermodynamics" by Dr. Takehiro Ito (Short-term Expert, Kyushu University) on November 17, 1995.

(c) "Pneumatic and Hydraulic Control" by Dr.Tohru Fukano (Short-term Expert, Kyushu University) during his tenure of October 7 to November 3, 1996.

1.4 Improvement of Laboratory/Workshop Courses

(1) Preparation of laboratory instruction manuals

(2) Experts to supervise for setting up laboratories

Short-term and long-term Experts occasionally give the appropriate advices to their counterparts on the improvement of laboratory and workshop courses whenever necessity arises. However, there are some concrete examples of cooperation in this area.

In case of Department of Chemical Engineering, Dr. Hideyuki Sekiguchi had concentrated most of his duties on the improvement of chemical engineering laboratories during his stay as a short-term Expert dispatched from July 25 to August 16, 1995 and had given once again the valuable guidances on the above matter on a volunteer basis during his stay in Thailand from October 23 to 24, 1995.

In the meantime, Dr. William Tanzo, Saitama University, contributed to the improvement of computer system in Civil Engineering on the occasion of his visit to the Thammasat University on August 30, 1994 and also Mr. T. Aravintan, Saitama University, gave a special guidance on method of experimental data analysis by data logger and personal computer on November 18, 1996.

Moreover, Dr. Toshihiko Noguchi has been devoted himself to the functional and organizational separation of laboratory "for research work" from that "for laboratory courses for student" in the field of power electronics since his assignment to this Project.

Activities for senior student projects and research works at higher levels have been effectively undertaken since its establishment.

Dr. Hidetoshi Sekiguchi gave the appropriate guidances on the establishment of laboratory for instrumental analysis prepared for research activity to take its functional utilization and maintenance into account, in which case sophisticated equipments were installed in air-conditioned room and the other related equipments were placed in nearby position for their efficient use outside the above air-conditioned room.

1.5 Assistance in supervision of senior student projects

JICA Expert group has decided to extend the best possible cooperation on a trial basis to the above item from the beginning of Japanese Fiscal Year 1996 taking the circumstances of each Department into full consideration.

Accordingly, to what extent JICA Experts will be involved in this task depends on the contents and scope of request from each relevant Department.

List of senior student projects for academic year 1996 is shown in Appendix 9.

(Department of Electrical Engineering)

Dr. Toshihiko Noguchi is ready to supervise the senior student projects for 4 students (Department of Electrical Engineering) from the next academic year starting in June, 1997.

In order to prepare in advance for the next academic year's senior student projects mentioned above, Dr.T. Noguchi intensively gave the lectures 10 times (20 hours) to the 4 students on the generalized theory on electrical machinery during March 17-31, 1997.

Two each students are assigned to the following two research topics : PM synchronous motor control and Dither signal application.

(Department of Civil Engineering)

Dr. H. Watanabe describes the status quo on this matter in his final report published in September, 1996 as follows:

(1) Improvement of the way of presentation of senior student project

In 23rd meeting on JICA project in the department of Civil engineering, the long term expert proposed to improve the way of presentation of senior student project. So far, the result of each senior student project had been presented only at a group of an advisor and two co-advisors. The proposal of the long term expert is that the result of every senior student project should be presented at a meeting which all faculty members and all senior students of each department attend. The reason is as follows.

1) The bachelor is a public degree, so that the examination for it, that is, the presentation of senior student project should be open to the society.

2) The implementation of the above brings on such merits that the faculty members can study other fields to each other and that every of faculty can know the level of teaching capability of other faculty, so that the teaching capability of all faculty members is improved naturally.

All faculty members attending the 23rd meeting agreed to the proposal and decided that the department of civil engineering will implement this system from next academic year if all faculty members agree this in the coming department meeting.

(2) Present situation of senior student project

All faculty members have senior student projects supervising senior students. In 1995, 13 senior student projects with 30 senior students were carried out. In 1996, 20 senior student projects with 53 senior students have been carried out.

(Department of Chemical Engineering)

Dr. Hidetoshi Sekiguchi has been extending assistance to the senior student projects for 4 students since the beginning of this academic year, 1996, the themes of which are as follows:

- Adsorption heat pump using activated carbon produced from food waste
- Reaction of volatile organic compound in ac packed-bed reactor

His knowledges and experiences obtained in the course of the assistance in senior student projects will be much expected to be effectively utilized for the improvement of research and teaching capability of academic staff, Department of Chemical Engineering.

1.6 Development of teaching materials and laboratory instructions

(Department of Electrical Engineering)

(1) "Basic Electrical Engineering Labs", 1995, by Mr. Pichai Aree

(Department of Industrial Engineering)

(1) "Quality Control", 1995, by Ms. Jirarat Theerawarapruk

(2) "Material Science", 1996, by Ms. Montalee Nagswasdi

(Department of Civil Engineering)

The following text books were published for the period of June, 1994 to August, 1995.

(1) "Environmental Engineering" , 1995 by Dr. Krittiya Lertpocasombut

(2) "Soil Mechanics" , 1995 by Weeraya Sae-Tia

Following four text books were published for the period of September, 1995 to September, 1996.

(3) "Hydraulic Engineering Laboratory Instruction" , 1996 by Dr. Uruya Weesakul

(4) "Construction Engineering & Management" , 1996 by Mr. Danai Wanthanakorn

(5) "Concrete Technology" , 1996 by Dr. Burachat Chatveera

(6) "Engineering Mechanics Statics" , 1996 by Dr. Burachat Chatveera

(7) "Engineering Mechanics Dynamics" , 1996 by Dr. Burachat Chatveera

(Department of Chemical Engineering)

(1) "Thermodynamics" , 1995, by Mr. Prodpran Siritheerasas

(Department of Mechanical Engineering)

Comprehensive lecture note on Fluid Mechanics I was made available in 1996 under the outstanding instruction and guidance by Prof. Tohru Fukano, short-term Expert.

2. Improvement of Research Capability at Faculty of Engineering

2.1 Improvement of Research Methods

(1) Publication of Annual Research Report Vol.1 in 1994

The committee on Research Report (Chairman is Dr. B. Chatveera and an adviser is Dr. H. Matsuyoshi (JICA Expert)) was set up and the first Annual Research Report Vol.1 (Appendix 10) was published in July 1995. The Research Report consists of 20 technical papers and abstracts of all senior projects in 1994 and its total pages are about 300. Five hundred copies were printed.

(2) Publication of Annual Research Report Vol.2 in 1995

The committee on Annual Research Report Vol.2 (Chairman is Dr. Burachat Chatveera and an advisor is Prof. Dr. Hiroyuki Watanabe) had been held as follows.

The 8th Committee '95 : September 15, 1995
The 9th Committee '95 : October 17, 1995
The 10th Committee '95 : November 21, 1995
The 11th Committee '95 : December 21, 1995
The 1st Committee '96 : January 30, 1996
The 2nd Committee '96 : February 28, 1996
The 3rd Committee '96 : March 20, 1996
The 4th Committee '96 : April 23, 1996
The 5th Committee '96 : May 28, 1996
The 6th Committee '96 : August 14, 1996
The 7th Committee '96 : September 2, 1996

The first print of annual research report Vol.2 was completed just before the 6th committee '96 and was checked by all committee members. After correction in the first print, Annual Research Report Vol.2 (Appendix 10) has been published in the end of August and five hundred copies have been printed.

The report Vol.2 consists of 25 technical papers, abstracts of all senior student projects in 1995. The total page is 360. Among 25 technical papers 23 papers are contributed by the faculty members in the department of civil engineering.

The 6th and 7th committees adopted following improvement of annual research report in future volume.

a. Every title in the list of titles of technical papers in appendix should be added by the name of journal, its volume and number, paper page and published month and year.

b. Technical papers should be separated into each department field for the sake of reading easily.

c. Abstract of senior student project should be two pages and should be written in the format as follows.

1. Introduction
2. Method
3. Result
4. Conclusion
5. References

d. At the end of abstract, brief abstract in English should be attached.

(3) Application System for Research Fund

In order to encourage the faculties to do research work, the application system for research fund was introduced. The faculties who applied for research fund can get some fund from JICA after reviewed by the long term Expert. The four faculties applied and they can get totally 230,000 Baht for research expenses during the stay of Dr. Hiroshi Mutsuyoshi.

(4) Implementation of contracted research

Conduct of contracted research will be highly recommendable to secure a close connection and cooperation between Universitites and Industries. Dr. H. Watanabe was quoted as reporting properly in his final report on this matter that;

Dr. Burachat Chatveera and Asst. Prof. Dr. Somnuk Tangtermsirikul in SIIT performed a research requested from Chichibu Onoda Cement Corporation and reported the results. Title of the research was "Strength of Bamboo fiber reinforced cement-based panel subjected to water absorption". This contracted research was a feasibility study and soon they will start the full scale research. Piling up such positive achievements, Dr. Burachat Chatveera can get many contracted researches as a chief researcher.

2.2 Assistance for presentations of the results in Academic Meeting and/or Journals

(Department of Electrical Engineering)

(1) Attendance at the 19th Electrical Engineering Conference

Dr.Toshihiko Noguchi and his four counterparts, Ms.Jarree Demeechai, Mr.Nopporn Leeprechanon, Mr.Paiboon Nakmahachalasint and Mr. Pongsak Mahachoklertwattana had the first experiences in attending the above Conference held in Khon Kaen during November 17-18, 1996. No research papers

were not presented from Department of Electrical Engineering, TU, but Dr.T. Noguchi reported in his official trip report that they had a good chance to learn and know the research levels and themes under way in academic institutions in Thailand and were able to get some suggestions on their research activities from the attendance at this Conference.

(2) Attendance and Presentation at the 3rd International Thermal Energy Congress (ITEC)

The above Congress will be held in Kita-Kyushu city, Japan during July 28-August 1, 1997. Mr.Nopporn Leeprechanon is scheduled to attend this congress and present his research paper entitled "Heat Tracing Systems by Mineral Insulated Cables". On this occasion, he is also requested to participate in Pacific Rim Forum for Teaching Mechanical Engineering to be held in the same city in advance to the above Congress.

Presentation of research paper at such international academic conference will definitely enhance and improve the research capability of each teaching staff.

(3) Presentation of research paper at Power Conversion Conference-Nagaoka jointly organized by IEEE, U.S.A. and IEE, Japan.

The research paper entitled "Precise Torque Control of Induction Motor with on-line Parameter Identification in Consideration of Core Loss" written by Dr.Toshihiko Noguchi and his two counterparts, Mr.Narin Watanakul and Mr.Paiboon Nakmahachalasint has been selected to be presented at the above International Conference to be held in Nagaoka city, Japan during August 3-6, 1997. The attendance will be more than 500 researchers and engineers from across the world.

This is the first presentation of research paper at International Academic Conference for Department of Electrical Engineering since its opening in 1990.

(Department of Industrial Engineering)

(1) Attendance at "Industrial Engineering for The Year 2000's" in Chaing Mai from November 8 to 9, 1995. Six members from Thammasat University including JICA Expert took part in this meeting and the following two pagers were presented:

(a) "Dynamic Process Layout Planning" written by Mr. Pongchanun Luangpaiboon & Dr. Peerayuth Charnsethikul, presented by Mr. Pongchanun Luangpaiboon, Lecturer, Thammasat University, Department of Industrial Engineering

(b) "A Branch and Bound Algorithm for the Dynamic Quadratic Assignment Problem" written by Mr. Pongchanun Luangpaiboon & Dr. Peerayuth Charnsethikul, presented by Dr. Peerayuth Charnsethikul, Assistant Professor, Kasetsart University, Department of Industrial Engineering.

(2) Participation in "International Manufacturing Technology Symposium" organized by NEDO and NSTDA and held in Bangkok on January 15, 1997

Dr. Kazuo Nakamura (Short-term expert) took part in the above symposium to get information on how to find the best mixture with advanced technology and conventional technology in the developing countries.

(3) Participation in "The Ergonomics Seminar : Applied Ergonomics for Safety and Productivity Improvement" held in Lampoon during February 28 to March 1,1997 organized by Mahidol University, The National Institute for the Improvement of Working Conditions and Environment and The Institute for Science of Labor, Japan.

Mr. Naris Charoenporn attended the above seminar to get technical information on the situation of ergonomic intervention into the factories and how ergonomics and safety are applied to the factories.

(4) Attendance at the First International Conference on Engineering Design and Automation (EDA'97)

Dr. Julsiri Jaroenpuntaruk and Dr. Ario Osato, JICA Expert, attended the above Conference held in Bangkok during March 18~21, 1997. Attendance was 180 researchers and engineers from inside and outside Thailand and as many as 165 research papers were presented there. Research papers were not presented this time from Department of Industrial Engineering, but the counterpart was able to get the most advanced knowledge on engineering design and automation for his further study and to get acquainted with many researchers and engineers from all over the world.

According to his report on this Conference, Dr.Ario Osato attached a considerable significance to the participation in this International Conference (EDA'97) as follows:

1) Understanding in reality that Thai industries have the great expectations to reconstruct the production systems by means of the automation, intelligent technology and computerization in the near future,

2) Confirming the up-to-date circumstances of on-going International researches concerning the automation, intelligent technology and computerization of production/manufacturing systems,

3) Contributing to the enhancement of future activities on production engineering at Department of Industrial Engineering, TU.

(Department of Civil Engineering)

(1) Attendance at International Conference on High Performance Concrete

Dean Dr. S. Praparntanatorn, Dr. B. Chatveera and Dr. H. Mutsuyoshi, JICA Expert, attended International Conference on "High Performance Concrete" held in Singapore during November 15 ~ 17, 1994. This project was fully supported by JICA. It was a good opportunity for the counterparts to get the latest information of new technique and to know many professors, researchers and engineers from all over the world.

(2) Attendance at 5th EASEC (East Asia-Pacific Conference on Structural Engineering and Construction)

Dean Dr. S. Praparntanatorn and Dr. H. Mutsuyoshi, JICA Expert, attended the 5th EASEC Conference held in Gold Coast, Australia during July 25-27, 1995. They had a presentation titled "Present Situation of Concrete Codes in Asia", which is a result of collaboration research between Thammasat Univ., AIT and JICA Expert. This project was supported by JICA.

(3) Attendance at the First Annual Convention of Civil Engineering in Suranaree University of Technology

The four faculties attended the first annual convention of Civil Engineering in Suranaree University of Technology on November 3 and 4, 1994. The three faculties had presentations.

(4) Survey in Japan to Investigate Kobe Earthquake Damage on January 17, 1995

Dean Dr. S. Prapamtanatorn and Dr. H. Mutsuyoshi, JICA Expert, were dispatched to Kobe, Japan during Feb. 15-18, 1995 to investigate damage of infrastructures due to Kobe earthquake.

(5) Attendance at ENTECH 95 (Conference on Engineering Technique 95)

Dr. U. Weesakul and Dr. B. Chatveera attended ENTECH 95 held in Bangkok on August 21, 1995 and had presentations.

(6) Attendance and presentation at the 2nd National Convention on Civil Engineering

Four faculty members and the long term expert (Prof. Dr. Hiroyuki Watanabe) attended the 2nd National Convention on Civil Engineering held at Pang Suan Kaew Hotel in Chiang Mai on November 9-11, 1995. This convention was promoted by the Engineering Institute of Thailand under H.M. the King's Patronage and Department of Civil Engineering from 25 Universities in Thailand and organized by Chiang Mai University. Attendance was about 200 and 54 papers were presented. Names of speakers of the counterparts and their paper titles are as follows.

Dr. Somnuke Prapamtanatorn : Mix Design of Mortar by Multiple Regression

Dr. Burachat Chatveera : Mechanical Behavior of Sisal Pulp-Mortar Composition

Dr. Krittiya Lertpocasombut : Study on a Three-Phase Fluidized-Bed Reactor for Biological Wastewater Treatment

Dr. Uruya Weesakul : ,Real Time Flood Forecasting Modeling in the South of Thailand

(7) Attendance and presentation at Regional Symposium on Infrastructure Development in Civil Engineering

Two counterparts and the long term expert attended at Regional Symposium on Infrastructure Development in Civil Engineering held at Rama Garden Hotel in Bangkok on December 19-20, 1995. This symposium was promoted by Tokyo Institute of Technology and Kasetsart University and organized by Kasetsart University. Participants were more than 150 coming from Kyoto University (Japan), Saitama University (Japan), Okayama University (Japan), Saga University (Japan), University of the Philippines, National University of Singapore, Thammasat University, Asian Institute of Technology, Chiang Mai University, King Mongkut's Institute of Technology, Prince of Songkla University and University of Gadjah Mada as well as the above two Universities. Names of the counterparts and their paper titles are as follows. As seen from the above attendance, this symposium was perfectly International Symposium.

Dr. Uruya Weesakul : Assessment of Water Resources Potential in Upper Northeastern Region of Thailand

Dr. Burachat Chatveera : Mechanical Properties of High Strength Concrete Containing Modified Rice Husk Ash

(8) Publication of a paper in the Journal of Hydraulics by Hydraulic Committee of Japan Society of Civil Engineers and Attendance at Suiri-Koenkai

A paper by a counterpart was accepted to be published in the Journal of Hydraulics by Hydraulic Committee of Japan Society of Civil Engineers. It is well known that the level of Hydraulics of Japan is the highest in the world, so that International Congress of International Association for Hydraulic Research (IAHR) is always promoted by Hydraulic Committee of Japan Society of Civil Engineers. Thus, the fact that a paper by a counterpart was accepted to be published in the Journal shows that the research capability of the counterpart is very high. This fact is one of great fruits of our JICA project. The counterpart attended Suiri-Koenkai, which is annual national conference in the field in Japan, with some private financial support by our JICA project team. Name of author and the title of the paper is as follows:

Dr. Uruya Weesakul : The Applicability of Real Time Flood Forecasting Model : A Case Study in Thailand

(9) Attendance and presentation at the 3rd Asia-Pacific Conference on Structural Engineering and Construction (APSEC'96)

One counterpart and the long term expert attended the 3rd Asia-Pacific Conference on Structural Engineering and Construction (APSEC'96) organized by Department of structures and Materials of Faculty of Engineering in collaboration with School of Professional and Continuing Education at Universiti Teknologi Malaysia and held at Puteri Pan pacific Hotel in Johor Bahru in Malaysia on June 17-19, 1996. About 100 researchers and engineers coming from 10 countries including Japan and U.K. attended the conference in which 35 technical papers were presented. This conference was regarded to be so much authorized one in ASEAN that the

Minister of Construction in Malaysia gave the opening address. The counterpart not only gave his presentation but also joined in the discussion in a session. This means that he has self-confidence in his research results and has a strong desire to carry out his researches in future. The fact that such counterpart as mentioned above appeared, in addition to Dr. Uruya Weesakul mentioned in above (8), proves that JICA project of our team is obtaining great fruits. It may be expected also that the fruits will affect well on the other faculty members of Faculty of Engineering at Thammasat University. The travel fee for us to attend the conference was supported for the first by the newly established budget for the Development of Higher Education Network in ASEAN. Name of a speaker and the paper title is as follows:

Dr. Burachat Chatveera : Volume Stability of Cement Paste and Mortar Using Lignite Fly Ash

(10) Acceptance of a paper to be published in the proceedings of International Congress on Concrete in the Service of Mankind, Dundee, U.K., June 24-28, 1996

A paper of one counterpart has been accepted to be published in the proceedings of International Congress on Concrete in the Service of Mankind, Dundee, U.K., June 24-28, 1996 and to be presented in the conference. This counterpart would like to attend the conference at first, however, because of lack of travel fee he gave up to do so. Instead, JICA supported him to purchase the proceeding. Name of author and the paper title is as follows:

Dr. Burachat Chatveera : The Use of Rice Husk Ash as A Pozzolan in High Strength Concrete

(11) Acceptance of a paper to be published in the proceedings of the 10th Congress of the Asia and Pacific Division (ADP) of the International Association for Hydraulic Research (IAHR), Langawi Island, Malaysia, on August 26-29, 1996

One counterpart would attend the conference and asked JICA's support, however, cancelled to attend because of lack of time. Name of author and the title of the paper is as follows:

Dr. Uruya Weesakul : The Application of Desalination Method for water Supply

(12) Presentation of a paper entitled "Vibration Modes of a Rockfill Dam Based on the Observations of Microtremors and Earthquake" by Prof.Dr.Hiroyuki Watanabe, et al, in Thammasat International Journals of Science and Technology, Thailand, Vol.1, No.1, September 1996.

(13) Acceptance of a paper to be published in the proceedings of International Conference on Water Resources & Environmental Research : Towards the 21st Century, Kyoto, Japan, October 29-31, 1996.

A paper of one counterpart has been accepted to be published in the proceedings of International Conference on Water Resources & Environmental Research : Towards the 21st Century, Kyoto, Japan, October 29-31, 1996 and to be presented in the conference. This counterpart will attend the conference and asks JICA to support the travel fee, however, the support is impossible due to the regulation of our JICA project. Name of author and the title of the paper is as follows:

Dr. Uruya Weesakul : Retrieval of Hydrological Characteristic of a Basin using Satellite Imageries and Geographical Information System

(14) Acceptance of a paper both for presentation and for publication in the proceedings in the Third CANMET/ACI International Symposium on Advances in Concrete Technology, Auckland, New Zealand, August 25-27, 1997

A counterpart will attend and present the technical paper. Name of author and the title of the paper are as follows.

Dr. Burachat Chatveera : Expansion of Cement Paste and Mortar Using Lignite Fly Ash.

(15) Acceptance of a paper both for presentation and for publication in a supplemental paper in the Fourth CANMET/ACI International Conference on Durability of Concrete, August 17-22, 1997 Sydney Hilton Hotel, Sydney, Australia

A counterpart will attend and present the technical paper. Name of author and the title of the paper are as follows.

Dr. Burachat Chatveera : High Performance Concrete.

(16) Acceptance of a paper for presentation in 5th International Conference on Concrete Engineering and Technology "Current Trends in Concrete Engineering and Technology", May 6-8, 1997, Kuala Lumpur, Malaysia

A counterpart will attend and present the technical paper. Name of author and the title of the paper are as follows.

Dr. Burachat Chatveera : High Performance Concrete Containing Modified Rice Husk Ash.

(17) Attendance and presentation at the 3rd National Convention on Civil Engineering

Six faculty members and two long-term experts (Dr. Katsutoshi Tanimoto and Ms. Yuko Kishino) attended the 3rd National Convention on Civil Engineering held at Hat Yai during January 16-18, 1997. This Convention, theme of which was "Quality Assurance in Engineering Education and Profession Practices", was organized by the Engineering Institute of Thailand under H.M. the King's Patronage and Department of Civil Engineering, Prince of Songkla University in cooperation with Department of Civil Engineering from all universities in Thailand.

The number of presented papers was 67 with 60 authors. The title of papers presented by counterparts on this occasion is as follows:

- Dr. Virote Boonyapinyo:

  Analysis of Cable-Supported Bridges: Part I Nonlinear Flexural-Torsoinal Bucklings

  Analysis of Cable-Supported Bridges: Part II Combined Flutter and Buffeting Response in Time Domain
- Dr. Burachat Chatveera:

  Effect of Rice Husk Ash on High Performance Concrete
- Dr. Chavalit Chaleeraktrakoon:

  Estimation of the Distribution for Flood Volume
- Dr. Krittiya Lertpocasombut:

  Effects of Manganese on Microfiltration Membrane System for Drinking Water Treatment
- Dr. Uruya Weesakul:

  Flood Forecasting Model for Disaster Prevention and Reservoir Operation Scheme

(Department of Chemical Engineering)

(1) Regional Symposium on Chemical Engineering, Manila, the Philippines, on October 24-26, 1994.

The Expert and Counterpart attended and presented the following papers:

Pongtorn Dhupatemiya, et al : "Synthesis and Characterization of the Nickel --- Containing Silicoaluminophosphate (SAPO) - 34 Catalyst"

Prodpran Siritheerasas, et al : "Self-Carbonized Traditional Cooking Stove"

(2) The 4th ASEAN Science and Technology Week "Science and Technology : The Future of ASEAN" organized by ASEAN Committee on Science and Technology on August 21-September 1, 1995.

(3) Regional Symposium on Chemical Engineering, Bangkok, Thailand, on October 9-11, 1995.

Department of Chemical Engineering, Thammasat University was one of Co-organizers. Mr. Pongtorn and Mr. Prodpran were assigned as Co-chairman of one session.

(4) Domestic Meeting on Chemical Engineering, Khon Kaen, on October 21-22, 1994.

All Counterpart participated in this meeting and one paper entitled "A Study of β-Carotene Extraction from Tomatoes with Supercritical Carbondioxide" was presented.

(5) "Japan-US-China Symposium on Catalysis" on July 26-28, 1995, Tokyo. Mr. Pongtorn attended this Symposium.

(6) Regional Symposium on Chemical Engineering, Jakarta, Indonesia, on October 7-9, 1996

Dr. Junjiro Kawasaki and his two counterparts, Mr. Prodpran Sirithecrasas and Ms. Wanwisa Skolpap attended the above Symposium held in Jakarta, Indonesia during October 7-9, 1996, where the four research papers were presented from Department of Chemical Engineering, TU as described below:

- Mr. Prodpran S. : Sulfur Dioxide Emission during Coal Briquette Burning in Domestic Stove.
- Ms. Wanwisa S. : Mathematical Modeling of Dual-Substrate Utilization by Three Pure Populations by Mathematical and Simulsov Software and Sensitivity Analysis of All Parameters for Each Mathematical Model
- Mr. Wachira P. : Improvement of Mathematically Fluidized Bed Dryer
- Dr. J. Kawasaki : Behaviours of Liquid-Liquid Dispersion in Stirred Vessel and Mechanical Demulsification of O/W Emulsion

According to Dr. J. Kawasaki, attendence was approximately 170 researchers from Japan, Thailand, the Philippines, Malaysia, Singapore, Indonesia, etc. with 107 research papers and also participation in this Symposium was recognized to be effective to the enhancement of research and educational capability in Department of Chemical Engineering, TU.

2.3 Exchange of Information and Technology with the related Institutions

Seminars described in 1.3 above will contribute not only to the improvement of teaching method, but also to the improvement of research capability of teaching staff of F.O.E.

Therefore, reference will be made to those stated in the item 1.3.

(Common to All Departments of Faculty of Engineering)

Dr. Somnuke Prapamtanatorn and Dr. Uruya Weesakul attended "SEA Regional Seminar & workshop on Higher Engineering Education Network" held in Bandung, Indonesia during February 25-17, 1997 organized by Directorate General of Higher Education, Ministry of Education and Culture, Republic of Indonesia, Graduate Program, Institut Teknologi Bandung and Japan International Cooperation Agency.

(Department of Electrical Engineering)

(1) Visit to the National University of Singapore and Japan Artificial Intelligence Center and attendance at "Singapore ICCS'94" (Regional Conference of the Institute of Electrical and Electronic Engineers) for the period of November 14 to 19, 1994 by Dr. Michiaki Ito and Mrs. Jarree Demeechai

(2) "Harmonics in Power System" organized by Chulalongkorn University on August 27-28, 1996. Dr. T. Noguchi and Mr. Narin attended this seminar.

(Department of Civil Engineering)

(1) Visit to the National University of Singapore

Dean Dr. S. Praparntanatorn, Dr. B. Chatveera and Dr. H. Mutsuyoshi, JICA Expert, visited the National University of Singapore on November 15, 1994 to know the system of the university, the environment of education and research and recruiting of new faculties. This information will be useful for the faculty of Engineering of Thammasat University.

(2) Seminar for technical exchange with ERTC

Both departments of chemical engineering and of civil engineering of the Faculty of Engineering at Thammasat University (TU) held the 1st seminar of "A Series of Mini-Seminar on Environmental Protection" in cooperation with Environmental Research and Training Center (ERTC) of other JICA project on April 5, 1996. This series of mini-seminar had been planned to enhance the research capability of C/P in both TU and ERTC in the field of environmental engineering by the long term expert, Prof. Dr. Junjiro Kawasaki, for the department of chemical engineering and he requested the department of civil engineering to join in this seminar for its successful implementation because there are two counterparts studying the environmental engineering on waste water and water resources in both departments. Then, after contact with Dr. Monthip Sriratana Tabucanon, Director of ERTC, the long term experts in both departments, Dr. Krittiya Lertpocasombut (Civil Eng., TU), Ms. Wanwisa Skolpap (Chem. Eng., TU), Mrs. Phaka Sukasem (ERTC), Mrs. Pornthip Puncharoen (ERTC), Mr. T. Hamada (JICA, ERTC) and Mr. S. Kuriki (JICA, ERTC) had preparatory meeting two times and established the Organizing Committee as follows:

Organizing committee

Chair Person : Dr. Krittiya Lertpocasombut (Civil Eng., TU)

Co-Chair Person : Mrs. Pornthip Punchroen (Water Quality and Development Sec., ERTC)

Committee : Mrs. Phaka Sukasem (Air Pollution Sec., ERTC)

Committee : Ms. Sukunya Boonchalerkit (Toxic Substance and Hazadous Waste Waste Research and Development Sec., ERTC)

Committee : Prof. Dr. Junjiro Kawasaki (JICA, Chem. Eng., TU)

Committee : Prof. Dr. Hiroyuki Watanabe (JICA, Civil Eng., TU)

Committee : Mr. Takeo Hamada (JICA, Senior Advisor, ERTC)

Committee : Mr. Hiroshi Hoshino (JICA, ERTC)

Committee : Ms. Wanwisa Skolpap (Chem. Eng., TU)

The attendance to the 1st seminar was about 30 from ERTC and 4 from TU. Key Note Lectures were "Overview Problems in Thailand and the Role of ERTC" given by Dr. Monthip Sriratana Tabucanon, "Shirimp Pond Effluence : Pollution Problems and Treatment by Constructed Wetland" by Mr. Piya Sansanayuth, "Decolorization of Wastewater from Sugar Industry by Activated Carbon " by Prof. Dr. Junjiro Kawasaki and "Research Study proposal" by Dr. Krittiya Lertpocasombut

(3) Seminar on Urban and Trafic Engineering, and Geotechnical Engineering in Delta Areas-Joint Seminar between Thammasat and Hiroshima Universities

The Department of Civil Engineering of the Faculty of Engineering at Thammasat University, Sirindhorn International Institute of Technology at same University and Hiroshima University held an International Seminar on the title "Urban and Traffic Engineering, and Geotechnical Engineering in Delta Areas" on March 12 in 1996 at the main auditorium of Engineering at Thammasat University Rangsit Campus. This seminar was supported financially by both Matsuda Foundation and JICA.

Primary object of the seminar was to provide the engineers and experts in the above fields with the opportunity to exchange the experiences and ideas on engineering in the delta areas such as Bangkok and Hiroshima cities and to promote advancement of civil engineering.

This seminar was planned and steered by Organizing Committee under Advisory Committee as follows.

Advisory Committee

Assoc. Prof. Noranit Setabutr (Rector, Thammasat University)

Asst. Prof. Somnuke Prapamtanatorn (Dean, Faculty of Engineering)

Prof. Prida Wibulswas (Director, Sirindhorn International Institute of Technology)

Assoc. Prof. Suravuth Pratishthananda (Deputy Director, ditto)

Prof. Naksitte Coovathanachai (Deputy Director of National Science and Technology Department Agency)

Prof. Osamu Kusakabe (Hiroshima University)

Dr. Minori Sano (JICA, Chief Advisor)

Prof. Hiroyuki Watanabe (JICA, Expert)

Organizing Committee

Dr. Burachat Chatveera (Chairman)

Prof. Hiroyuki Watanabe (Co-Chairman)

Mr. Keiji Higa

Asst. Prof. Dr. Supot Teachavorasinskun

Assoc. Prof. Sathaporn Katekinta

Dr. Kridayuth Chompooming

Dr. Krittiya Lertpocasombut

Dr. Uruya Weesakul

Mr. Sayan Sirimontree

Mr. Saharat Buddhawanna

Ms. Saipin Komkai (Secretary)

Ms. Sudaporn Damnoen (Asst. Secretary)

This seminar was a great success owing to the active participation in planning, preparation and implementation for the seminar by all faculty members of the Civil Engineering Department. Attendance was about 130 from many organizations. An invited lecturer was a vice Governor of Bangkok and keynote lecturers were two faculty members from Hiroshima University, three ones from Asian Institute of Technology, two ones from Kasetsart University, one from King Mongkut's Institute of technology, and expert from Sindhu Pike Bodell and a JICA expert. Keynote lectures were such high level ones as those being accepted for publication in proceedings of top-ranking international conferences and discussion was active. It may be said that this success must bring conviction to the faculty of Civil Engineering Department and must stimulate the growth of capability of the faculty in administration of the Faculty of Engineering as well as the capability in research.

(4) Joint Seminar between Thammasat University and Hiroshima University

Following the First Joint Seminar between Thammasat University and Hiroshima University held on March 12, 1996, both Universities successfully held the Second Joint Seminar on March 11-13, 1997 at Rangsit Campus, Thammasat University and Central Plaza Hotel. There were 34 participants among which 6 are from Hiroshima University, 22 from FOE and SIIT of Thammasat University and 6 from JICA Experts. On the first day of March 11, students from both Universities presented and discussed the results of their Senior Student Projects with the mutual introduction of the activity of the Department of Civil Engineering of each University.

On second day of March 12, the topics of seminar were focused on "Repair and Rehabilitation of Reinforced Concrete Structures" under which theme many cases of damages and their repairing of reinforced concrete structures in Japan, Thailand and European countries were introduced. It was impressive to observe that counterparts from FOE, TU actively participated in discussion throughout this seminar.

On third day of March 13, we had the opportunity to visit the Research and Development Center attached to the Siam Cement Public Co., Ltd. and the Concrete (not hardened) Plant of the Concrete Products and Aggregate Co., Ltd. both of which belong to the leading companies in Thailand and also to know the needs and tasks surrounding the Thai industries in this sector.

There has been a growing conviction that this seminar definitely stimulated and enhanced the capability of research and administration in Department of Civil Engineering, TU.

Programme of this seminar is shown as follows:

Tuesday 11 March 1997 Discussion program at Faculty of Engineering, Thammasat University

09:00-09:15 Opening Speech by Dean of Faculty of Engineering, Thammasat University

09:15-10:00 Research and special programs of department of civil engineering
By Dr. Viroj Boonyapinyo

10:00-10:30 Proposal of this program and research in Hiroshima University
By Prof. Kusakabe Osamu

10:30-10:50 Coffee break

10:50-12:00 Student and Staff discussion

- A study on Autogencous Shrinkage of Cement paste with Classified Fly Ash
- Building Design for Earthquake in Thailand
- Effect of Wind Force on high-rise Building Design in Thailand

12:00-13:30 Lunch

13:30-14:30 Technical visit at Asian Game Project

14:30 Free time

Wednesday 12 March 1997 Seminar and Exhibition on Repair and Rehabilitation of Reinforced Concrete Structures (II). At Central Plaza Hotel

Session chairman : Assoc.Prof.Dr. Pichai Nimityongskul

08:30-09:00 Registration

09:00-09:15 Opening Speech by President of EIT (Prof. Arun Chaiseri)

09:15-10:45 "Experiences in the Great Hanshin Earthquake: Damages, Repair and Rehabilitation" by Dr. Kenji Kawai, Hiroshima University

10:45-11:15 Coffee break

11:15-12:00 "Carbon Fiber as A Repair Material: Experiences in Europe"
by Dr. Boonchai Stitmannaitham, Chulalongkorn University

12:00-13:30 Lunch

Session Chairman : Dr. Somnuk Tangtermsirikul

13:30-14:15 "Strengthening of Reinforced Concrete Column"

14:15-15:00 "Prestressed Concrete by External Prestressing Tendons"
by Dr. Songkiat Matupayong, J. Muller International (Thailand)

15:00-15:30 Coffee break

Session Chairman : Assoc.Prof.Dr. Kraiwood Kiattikomol

15:30-16:30 "Experiences on Repair and Rehabilitation of Reinforced Concrete Structures in Thailand" by Mr. Suebsak Promboon, Inter-Consult Co., Ltd.

16:30 Closing Seminar by Chairman of the Civil Engineering Chapter, EIT
(Assoc.Prof.Dr.Kraiwood Kiattikomol)

Remarks : Exhibition opened from 08:00-17:00

Thursday 13 March 1997 Technical Visit
The Concrete Products and Aggregate Co., Ltd.
R&D Center, The Siam Cement Public Co., Ltd.

(5) Visit to Chiang Mai University (CMU)

Dr. Katsutoshi Tanimoto and his three counterpart, Dr. Virote Boonyapinyo, Dr. Burachat Chatveera and Dr. Krittiya Lertpocasombut paid a visit to Department of Environmental Engineering (started in 1980), Department of Civil Engineering (started in 1970) and JICA's Plant Biotechnology Research Project (started

in 1993) at Chiang Mai University during March 20-22, 1997, the main objectives of which were to observe the facilities of Departments, to exchange technical information, to discuss the possibility of future cooperative research, etc. with the faculty members of CMU.

Dr. K. Tanimoto described in his official trip report that faculty members of Department of Civil Engineering, TU, who had been positively engaged, but less experienced in research and educational activities, need to learn more from the activities undertaken in the other advanced Universities like CMU.

Moreover, Dr. Burachat Chatveera concluded in his official trip report as follows:

According to this visiting, we must have more informations about the ways to exchange academic abilities resulting in the improving of our capabilities for researches in Faculty of Engineering at Thammasat University. In the next plan, we would like to make a joint agreement between Faculty of Engineering and Departments of Civil and Environmental Engineerings. The possibility of future cooperative research among faculty members in graduate level will be preferred and established.

(Department of Chemical Engineering)

(1) Joint Seminar with ERTC

The above Seminar was prepared and held in close cooperation with the Department of Chemical Engineering. Accordingly, reference will be made to the explanation stated above in the category of Department of Civil Engineering.

(2) Visit to University of Prince of Songkla

Dr.Junjiro Kawasaki visited University of Prince of Songkla with his three counterparts from 10th to 12th, July, 1996 and had the exchange of information and technology on the effective utilization of agricultural wastes abundantly found in southern part of Thailand from the viewpoint of pollution control.

(3) Visit to Khon Kaen University

Dr. Hidetoshi Sekiguchi and his three counterparts, Mr. Prodpran Siritheerasas, Ms. Wanwisa Skolpap and Mr. Wachira Promsakanasakolnakorn visited the above Khon Kaen University during February 16-17, which is one of the most prestigious national universities, to observe the laboratories and facilities as well as to discuss with the teaching staff there on three joint research projects proposed by Khon Kaen University.

Dr. H. Sekiguchi reported in his official trip report that the purpose of this visit was almost accomplished with the fruitful discussions mutually made among both universities. The followings are the titles of three joint research projects under consideration:

1) Catalytic Decomposition of Ethanol

2) Progress Development for a Renewable Ethanol-based Ether
Emphasis on Superacid Catalyst

3) Bio-diesel from Oils and Fats

(4) Visit to Prince of Songkla University (PSU)

Dr. Hidetoshi Sekiguchi made a visit to the above University during March 27~29, 1997 with his counterparts, Mr. Wachira Promsakanasakolnakorn and Dr. Chidpong Pradistsuwana to mainly discuss with the academic staffs there on the progress of cooperation research between TU and PSU entitled "Utilization of solid residue from agriculture/forestry/fishery and related industries" and to observe the palm oil factories nearby.

Dr. H. Sekiguchi stated in his official trip report that this was a very meaningful visit for Chemical Engineering staffs of TU and this cooperation will enhance the research capability of Chemical Engineering Department of TU.

2.4 Enhancement of Research and Development Capability through Studying here in Thailand and Abroad

(1) Study in Universities in Japan under the Monbusho Scholarship allocated to JICA

- Weeraya Sae-Tia (Department of Civil Engineering) Doctoral Degree at Hiroshima University, 1994-1997
- Pongtorn Dhupatemiya (Department of Chemical Engineering) Doctoral Degree at Kyushu University, 1996-1999

(2) Study in Universities in Thailand under the scheme of JICA Project

- Somsak Chueakittisak (Department of Industrial Engineering) Master Course, Chulalongkorn University, from June, 1996.
- Sayan Sirimontree (Department of Civil Engineering) Doctor Course, Chulalongkorn University, from June, 1996.

(3) Participation in ISO 9000 Seminar

• Montalee Nagswasdi (Department of Industrial Engineering) September 23-27, 1996

• Parichat Chuenwatanakul (Department of Industrial Engineering) December 16-20, 1996

(4) Participation in Seminar on Production Management : Theory & Practice "On the Job Training Program (OJT)" organized by Technology Promotion Association (Thailand-Japan) and Siam NISSAN Automobile Co., Ltd.

• Danupun Visuwan (Department of Industrial Engineering)

January 14-16, 22-23, 30-31, 1997

February 13-14, 18-19, 24-28, 1997

March 5-8, 1997

3. Improvement of Administration System of Faculty of Engineering

3.1 Training academic staff and technicians to be able to operate equipment

Several number of teaching staff of Faculty of Engineering were dispatched in J.F.Y. 1995 to the related enterprises and institutions in Japan for the operation and maintenance of 644 million yen (Approximately 155 million bahts) worth of equipment and machinery provided under the grant-aid scheme of the Government of Japan.

On the other hand, 3 short-term Experts are scheduled to give technical guidance in J.F.Y. 1996 to the teaching staff and technicians of Faculty of Engineering on the operation and maintenance of equipment granted under JICA's technical cooperation scheme.

3.2 Maintenance and management of equipment and machinery

On the several occasions of Steering Committee of the Project, special attention has been drawn, as appropriate, to the related staff of Faculty of Engineering on the smooth and prompt implementation of the maintenance and management of equipment provided to the Project based on "Equipment Management Guidelines" published in February, 1994 by JICA.

3.3 Education and research grouping in each department if necessary

(Department of Electrical Engineering)

Department of Electrical Engineering is devided into the following 5 groups with its relevant counterparts described below:

1) Control Engineering

Mr. Suppachai Vorapojpisut

Mr. Sanya Mitaim

Mr. Paiboon Nakmahachalasint

Mr. Kitti Teleakgniatkjorn

2) Power Engineering

Mr. Nain Watanakul

Mr. Pichai Aree

Mr. Noppom Leeprechanon

Mr. Pornrapeepat Bhasaputra

3) Telecommunication Engineering

Ms. Jarree Demeechai

Mr. Somchart Chokchaitam

Mr. Venus Limcharoen

4) Computer Engineering

Mr.Jakratep Rampungkit

Mr. Taweesak Kijkanjanarat

Mr. Pongsak Mahachoklertwattana

Mr. Dahmmaet Bunnjaweht

5) Opto-Micro Electronics Engineering

Mr. Wanchai Pijitrojana

Mr. Narong Boubthong

Mr. Charkree Maleevan

(Department of Industrial Engineering)

A department should be organized systematically and be devided into three or four groups. In the Department of Industrial Engineering, the following four laboratories were established:

1. Manufacturing Laboratory: Precision Engineering, Computer Numerical Control, etc.,
2. Design Engineering Laboratory: CAD/CAM, Robotics, etc.,
3. Ergonomics Laboratory: Instrumentation Engineering, Human Engineering, etc.
4. Management System Laboratory: Production Management, TQM/TQC, etc.

In addition, counterparts have been assigned to each group as follows:

(1) Manufacturing ----------Somsak, Sawat, Apiwat (CNC)

---------Jirawan,Chairath (Automatation)

(2) Management----------Montalee, Parichat, Jirarat, Tritos, Danuphan (QC)

---------Julsiri, Pongchanun (OR,AI)

(3) Ergonomics----------Naris

(4) Material Science----------Wararat, Samerujit

(Department of Civil Engineering)

Dr. H. Watanabe properly stated in his final report published in September, 1996 as follows:

(1) Introduction of Grouping System to Department of Civil Engineering

A department can be divided into three or four groups, one of which has almost the same field. Merits of this system can be considered as follows;

- The field in one group for education and research becomes clear.
- The number of the faculties among the groups can be well balanced.
- Experimental equipments can be maintained by not one faculty, but some faculties who belong to the same group.
- Senior students who belong to the same group can help each other with experimental works.
- A research project can be conducted easily in the same group.

In the Department of Civil Engineering, the following four groups were established;

(a) Structural Engineering and Materials

(b) Environment and Hydraulics

(c) Soil and Rock

(d) Planning, Transportation, Survey and Construction Management.

Each faculty member belongs to one of the above groups.

(2) Demarcation of Departments

Arrangment to demarcate the area for every department including the private room for every faculty member, laboratory, the room for senior project, meeting room and so on should be officially regularized and the signboard indicating the department with the arrangement plan of the above rooms should be put up in the entrance of the department.

(3) Research Grouping

Dr. H. Watanabe maintained in his final report on this matter as follows:

Necessary fields in civil engineering department should be established as standing fields during tentatively 5 to 10 years though there is no lecturer in some fields and a number of lecturers change every year. After establishment of the above situation the department should try to supply the lack of lecturers in the fields. The private rooms for the lecturers in same field should be arranged close to each other so that they can easily and friendly discuss about their researches as well as senior projects, collaborate with one another and grow young lecturers to be grown-up researchers. The implementation of the above is very research grouping. So far nothing has been done, consequently the department should start to implement the above.

(Department of Chemical Engineering)

Department of Chemical Engineering is devided into the following 6 groups to take the balancing of the future recruitment of academic staff and thereby, the enhancement of research and educational activities into consideration:

(1) Catalysis

(2) Process System

(3) Unit Operation

(4) Material

(5) Environment

(6) Biotechnology

3.4 Improvement of decision making process of committees of academic staff

(1) Seminar for academic system & organization of International Seminar

(Mini-Seminar on Academic System of Faculty of Engineering)

The faculty of engineering at Thammasat University and JICA project team held a seminar on the academic system of faculty of engineering on March 12, 1996 at the Meeting Room, 7th Floor, Faculty of Engineering at Thammasat University Rangsit Campus.

Primary object of the seminar is to introduce the administration of every department at the faculty of engineering and the system of graduate school in Japan so that the capability of every faculty on the administration concerned is to be improved.

Organizing Committee was same as the one for "The Seminar on Urban and Trafic Engineering, and Geotechnical Engineering in Delta Areas" which was a joint seminar between Thammasat University and Hiroshima University under the sponsorship of both Matsuda Foundation and JICA held on same day.

Keynote lecturers were all excellent professors and their lectures were very useful and interesting for the faculty of the Faculty of Engineering at Thammasat University as well as for students.

Frankly saying, it may not be said that this seminar was successful because there were a small attendance coming from only both Departments of Civil Engineering at Thammasat University and SIIT though the announcement on holding the seminar was done in advance by the name of Dean at Thammasat University. Any faculty members of other departments whom we wanted to make listen to the Keynote Lecturers did not attend the seminar. We must try to devise how to hold the seminar hereafter.

(2) Self-Examination (Self-Study) and Accreditation

Individual member at the faculty of Engineering should recognize the achievement of everything conceming every activity in University in order to improve every capability of each member. Accreditation throughout Self-Examination or Self Study being carried out by the faculty itself will be very useful for the above purpose. Self-Examination (Self-Study) and Accreditation should be performed every year and the results should be published and distributed to the public society. The first implementation of the above, however will need more than two or three years, so that the faculty need not hurry to complete it. Discussion on various kind of problems in University is the most important.

Fortunately, the faculty of engineering established the Self-Study Committee (Chair Person : Dr. Uniya Weesakul) on a voluntary basis in June 1996 and thereafter this was rearranged to new official committee under the Vice Dean for Academic Affairs in September, 1996.

3.5 Post Graduate Program

(1) Progress of the Establishment of Post-Graduate Programme at Faculty of Engineering

The effort to establish graduate school at the Faculty of Engineering has been continued. The establishment of graduate school at the Faculty of Engineering has been possible only in the Department of Civil Engineering because this department has seven Doctors while the other departments have only a few Doctors. Department of Civil Engineering, Faculty of Engineering, Thammasat

University (hereinafter referred to FOE) and Department of Civil Engineering, Sirindhorn International Institute of Technology, Thammasat University (hereinafter referred to SIIT) have had a regular meeting being held once a week to establish a post graduate course. In the process of the above activity FOE and SIIT agreed to cooperate on the establishment of Graduate Program of Civil Engineering on October 31, 1995.

In February, 1996, the above Graduate Program of Civil Engineering finally started. This program is to be self-supportedly operated and admits ten students per a year to the Graduate Program. It began to select the graduate students following to the minimum requirement for the marks at undergraduate school that Grade Point Average (GPA) should be more than or equal to 2.75 and there were six applicants however, only four passed the point. Besides, one of them has gone to other graduate school. The number of students with which the Graduate Program can be maintained economically is five. FOE and SIIT intended to open the Graduate Program from the begining of June, 1996, however, could not help prolonging the opening untill October. The faculty of both FOE and SIIT advised three admitted applicants to wait for the opening untill October and they agreed to do so.

The present situation is that there are two qualified applicants at least in the field of concrete material engineering. One of them is the 1st honor of the Department of Civil Engineering at Chiang Mai University whom Dr. Burachat Chatveera has advised to come to the Graduate Program and has agreed to do so. Consequently, FOE and SIIT must open the Graduate Program in October in 1996.

(2) Science and Technology Postgraduate Programs by University Consortia

Ministry of University Affairs (MOUA) gives higher priority to the development of Science and Technology Postgraduate Programs in an effort to strengthen postgraduate education and research capability at public Universities in Thailand.

This program that constitutes consortia of relevant institutions seems to be an urgent and feasible measure for the maximum utilization of limited human resources in an attempt to solve the shortage of qualified manpowers widely occurred at present all over the county.

Under these circumstances, this program will be worth observing and studying its objectives and progress while taking the successful implementation of JICA's Project into consideration.

The followings are excerpts of outlines of Science and Technology Higher Education Project prepared and planned by MOUA.

1. The Ministry of University Affairs is planning a major project with financial assistance from the Asian Development Bank to promote the development of science and technology (S&T) postgraduate programs at Thai public sector universities.

2. The main objective of the Project is to strengthen postgraduate education and research capability in Thailand in cooperation with the productive sector. This will contribute to building a strong foundation for research and development (R&D) activities and supporting the country's global competitiveness. In particular, the Project aims to increase the supply of international quality postgraduate personnel in S&T related fields to provide industry, research institutions, and academia with more and better scientists, researchers and engineers.

The Project will establish new postgraduate institutions, or upgrade existing postgraduate education and research institutions, to become R&D centers of excellence in their respective fields. The Project will also support the development of R&D and project management capability at both the Ministry of University Affairs and at the participating universities. It will support the implementation of a number of policy reforms to improve the efficiency and effectiveness of postgraduate education and research.

3. Five fields have been identified as important areas for developing the country's postgraduate education and research capacity. While program proposals in these fields will be given priority, the areas are not exclusive and promising programs in other related areas will be considered.

(I) basic science (including chemistry, mathematics, physics, and biology);

(II) biotechnology and fields relating to agro-processing industry (including genetic engineering, food science, post-harvest technology, production and processing, plant biotechnology, animal biotechnology, and medical biotechnology;

(III) engineering and materials science (including engineering and applied sciences relating to manufacturing, production processes and design, and construction technology);

(IV) information technology (including telecommunications, computer science, information science, multimedia applications, automation, and innovative research and development); and

(V) environmental science and technology (including air quality, solid and liquid waste management, ecology, bio-diversity, and other related fields).

4. Public sector academic institutions are invited to submit applications for the development of postgraduate education and research programs in specific academic disciplines.

The following eligibility criteria must be met by all proposers:

(I) Proposals to develop postgraduate education and research centers of excellence must be submitted by a consortium. The consortium may be composed of two or more public universities/ institutions, or of two or more faculties within a public

university. Private universities or institutions can be included in a consortium but will not be eligible for direct financial support derived from this project. A consortium may submit proposals for several interrelated disciplines such as biology and biotechnology or mathematics and information technology. In this case, each program should be proposed as a separate program, with explanation of the reasons for combining the development of two or more programs.

(II) Each of the members of consortia proposing the establishment of a new program, or the upgrading of an existing program, must already have postgraduate programs in science and technology, as well as undergraduate programs in the relevant fields.

(III) The application and program proposal should include explicit mention of private sector collaborators in developing research programs and in identifying the types of academic programs and courses to be developed.

(IV) The consortium must make available at least 5-10 full-time academic staff at the beginning and 20 at program maturity, together with the necessary full-time administrative and support staff (including laboratory technicians).

(3) Future Plan for Opening the Post-Graduate Programme at Faculty of Engineering

Meanwhile, Faculty of Engineering at Thammasat University has the tentative plan for opening the Post-Graduate Programme towards its future development as is described below no matter how it might be organized and managed under the self-supporting scheme, conventional scheme or consortium scheme:

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- Electrical Engineering	about 1997-1998
- Industrial Engineering	about 1997-1998
- Civil Engineering	about 1995-2996
- Chemical Engineering	about 2000
- Mechanical Engineering	unconfirmed but about 2000-2003

3.6 Publication of Faculty of Engineering Annual Report, 1995 and Newsletter

Activities with various statistics were comprehensively compiled and published for the first time in Thai language in 1995 in Faculty of Engineering under the support of JICA Project and distributed to the institutions concerned.

From next year's edition onward, explanation in English is to be highly recommendable in some basic and important figures and tables.

In order to keep the activities at Faculty of Engineering better informed to the institutions inside and outside of Faculty of Engineering, Thammasat University, Newsletter were published twice at present in September, 1995 and in June, 1996.

From this time on, its periodical publication will be highly desirable and recommendable to attain its original objectives.

3.7 Staff Development and Staffing Plan

There is at all times a big shortage of qualified manpower in Thailand because of its rapid growth of industries.

In Thailand, the fact is that the demand of highly educated engineers in industrial sector is 13,000 persons every year but their supply from Universities meet only 38% (a little more than 5,000) of their demand.

This is also the case in educational and academic circles where they seriously suffer from the shortage of well-qualified staff.

The shortage of academic staff in Universities directly causes the lack of numbers of engineers urgently needed in industries and thereby the deacceleration of economic growth.

As is shown in Appendix 11, the numbers of academic staff at Faculty of Engineering are 68 persons as of December 31, 1997 among which 11 persons are increased for the past two(2) years as compared with those of academic staff as of December 1, 1994.

In addition, qualification of academic staff has been slightly improved judging from the fact that holders of Doctor degree and Master degree are increased steadily in number from 21 to 23 persons and from 5 to 10 persons during the past two (2) years, respectively.

It is also noticeable that number of academic staff currently studying abroad shows the increase from 17 to 23 persons during the same period. Such countries as U.S.A., UK, Germany, France, Canada, Australia, New Zealand and Japan have been approved to be eligible for studying abroad by the Government of Thailand.

3.8 Student Enrollment Plan

The Appendix 12 shows that number of students to be enrolled in every academic year range from 180 to 300 for the period of 1995-1999 according as the increase of number of academic staff and the expansion of facilities necessary for the education of students.

The number of students enrolled at Faculty of Engineering was 558 as of December 1, 1994 and are currently 585 in this academic year of 1996 as is shown in Appendix 13.

The main reason why the number of students is received behind the plan is simply because there is a lack of academic staff at Faculty of Engineering in spite of its utmost efforts to recruit them.

3.9 Academic Exchange

Cooperative relationship and partnership between Faculty of Engineering, Thammasat University and Japanese Universities which support the implementation of this Project have been visibly enhanced and accelerated since the commencement of this Project.

As a result, agreement on academic exchange (Appendix 14) was reached between Thammasat University and Tokyo Institute of Technology on August 8th, 1996 and students from both parties have been successfully exchanged for their studies in respective countries on a basis of the above agreement.

Furthermore, Memorandum on Student Exchange between Faculty of Engineering, Thammasat University and Faculty of Engineering, Saitama University (Appendix 15) was signed by both parties on March 26, 1997. The exchange of students will be promoted every year in accordance with the above Memorandum.

Appendix 1 : Higher Education Institutions in Thailand

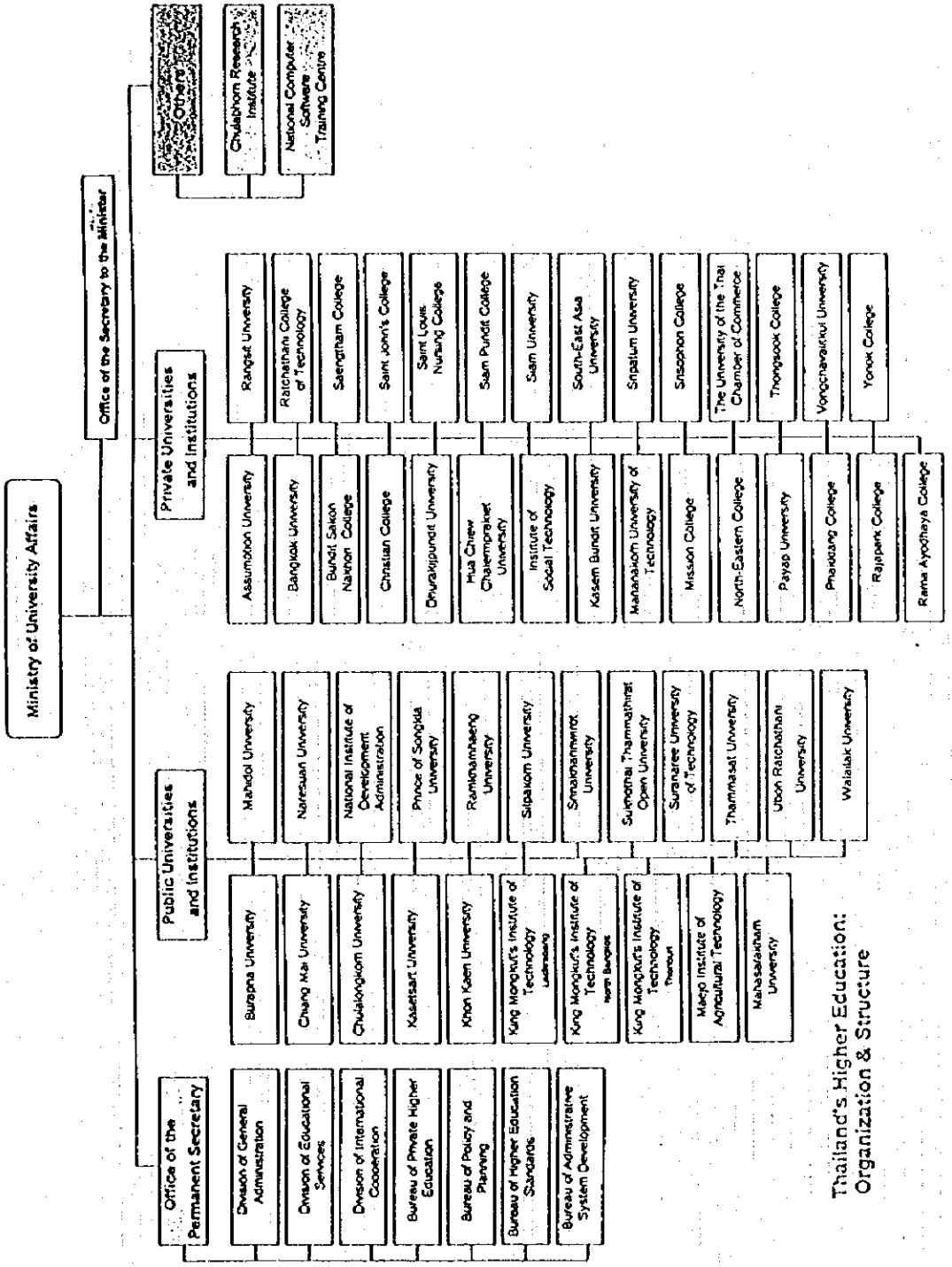
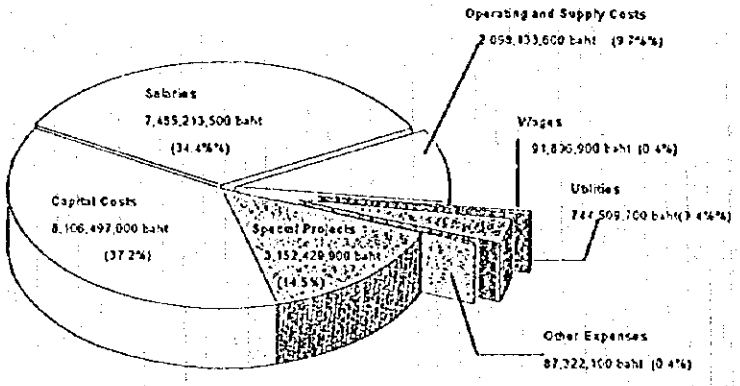


Fig. 6:
Distribution of Ministry of University Affairs Budget (1994 Fiscal Year)



Personnel:

Fig. 7:
Ministry of University Affairs: Number of Personnel (1993 Fiscal Year)

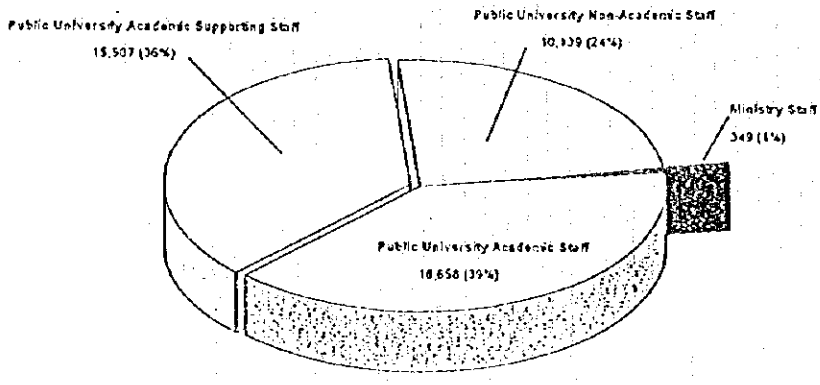


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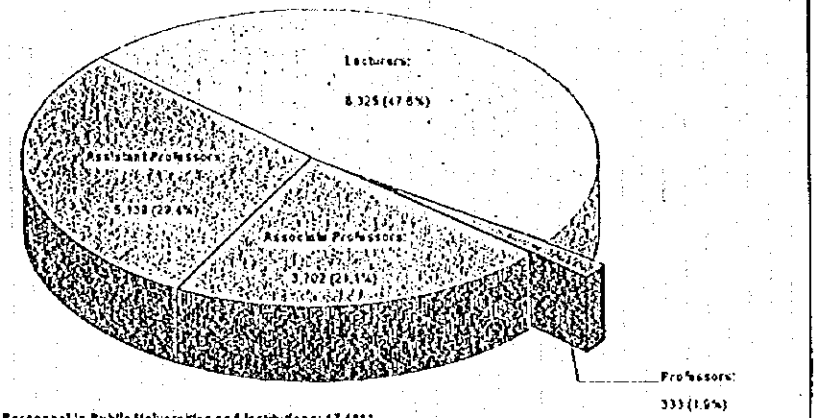
Fig. 8:
Number of Academic Personnel in Public Universities and Tertiary Institutions
October, 1994



Total Number of Personnel in Public Universities and Institutions: 17,498*

* Does not include personnel from Mahasarakham University

Students:

Table 5: Overall Student Numbers (1994) and Graduates (1993)

Programs of Study	New Enrolments- 1994	Total Enrolments- 1994	1993 Graduates
Bachelor Degree Programs	236,818	663,210	75,809
Master Degree Programs	12,883	30,801	7,441
Doctorate Degree Programs	234	1,007	133
Higher Certificate Programs	1,000	1,253	867
Other Programs	4,580	11,381	4,203
Total	265,622	706,652	88,643

Table 6: Student Enrolments for Academic Year 1994 and Number of Graduates for Academic Year 1993

Programs of Study	1994 New Enrolments (Public Universities & Institutions)	1994 New Enrolments (Private Universities & Institutions)	1994 Total Enrolments (Public Universities & Institutions)	1994 Total Enrolments (Private Universities & Institutions)	1993 Graduates (Public Universities & Institutions)	1993 Graduates (Private Universities & Institutions)
Bachelor Degree	188,891	47,927	519,979	133,231	51,924	23,885
Master Degree	7,227	5,656	24,706	6,095	6,686	755
Doctorate Degree	234	0	1,007	0	133	0
Higher Certificate	1,000	0	1,253	0	867	0
Other	3,669	1,000	7,792	3,589	2,348	1,882
Total	205,139	50,483	554,736	141,916	61,958	26,685
Grand Total	265,822		706,652		88,643	

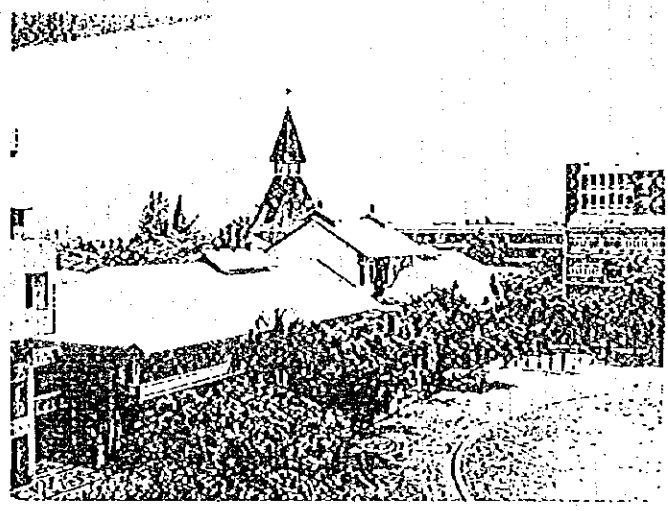
Appendix 2 : Profile of Thammasat University

Thammasat University

Founded: 1933 *"Loving Thammasat Teaches People To Love Others"* 14,930 Students

The second oldest university in Thailand, Thammasat University consists of eleven faculties and a graduate school. Since its foundation in 1933, the University has produced around 3,000 graduates per year which have contributed significantly to the country's development.

The University is housed on two campuses with a third under construction. The original campus at Tha Prachan is in the heart of Bangkok on the eastern bank of the Chao Phraya River. Its second campus is at Rangsit on the northern outskirts of the city. In order to service the rapidly developing eastern seaboard, a third campus is under construction at seaside town of Pattaya. Tuition fees at Thammasat University range from 200-1,200 baht per credit.



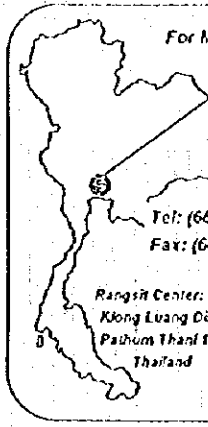
Administrative Officers

Rector
Vice Rector for Academic Affairs
Vice Rector for Finance and Property Management
Vice Rector for General Administration at Rangsit Center
Vice Rector for General Administration at Tha Prachan Campus
Vice Rector for International Affairs
Vice Rector for Student Affairs
Vice Rector for Development and Technology

Faculties and Other Facilities

Faculty of Commerce and Accountancy
Faculty of Economics
Faculty of Engineering
Faculty of Journalism and Mass Communication
Faculty of Law
Faculty of Liberal Arts
Faculty of Medicine
Faculty of Political Science
Faculty of Science and Technology
Faculty of Social Administration
Faculty of Sociology and Anthropology
The Graduate School

Career Advisory Center
Graduate Volunteer Center
Guidance Service Center
Human Resources Institute
Institute for Continuing Education and Social Service
Language Institute
Libraries
Thai Khadi Research Institute
The Information Processing Institute for Education and Development



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Rangsit Center:
Klong Luang District
Pathum Thani 12121
Thailand

Tel: (66 2) 516 0020-39
Fax: (66 2) 516 0976

Courses Available:

Faculty of Commerce and Accountancy: Bachelor Degree Programs: Accounting, Business Administration(*), Finance and Banking, Human Resources and Organization, Industrial Management, International Transport, Management Information Systems, Marketing
Graduate Diploma Programs: Auditing
Master Degree Programs: Accounting, Business Administration, The Executive MBA Program, Marketing(*)
Doctoral Degree Programs: Business Administration

Faculty of Economics: Bachelor Degree Programs: Economics(*)
Master Degree Programs: Economics(*)
Doctoral Degree Programs: Economics*

Faculty of Engineering: Bachelor Degree Programs: Chemical Engineering, Civil Engineering, Industrial Engineering, Mechanical Engineering

Faculty of Journalism and Mass Communication: Bachelor Degree Programs: Advertising and Public Relations, Radio and Television Broadcasting, Cinematography and Photography, Communication, Newspaper and Publications
Master Degree Programs: Communication Policy and Planning, Development Communication, Mass Communication Research

Faculty of Law: Bachelor Degree Programs: Law,
Graduate Diploma Programs: Law
Master Degree Programs: Business Law, Criminal Law, International Law, Private Law, Public Law

Faculty of Liberal Arts: Bachelor Degree Programs: Chinese, Drama, English Language and Literature, French, Geography, German, History, Japanese, Library and Information Science, Linguistics, Philosophy and Religious Psychology, Russian, Thai
Graduate Diploma Programs: Thai and English Translation, Thai and French Translation
Master Degree Programs: History, Industrial Psychology, Library and Information Science, Linguistics

Faculty of Medicine: Bachelor Degree Programs: Medicine

Faculty of Political Science: Bachelor Degree Programs: Government, International Relations, Public Administration
Master Degree Programs: Government, International Relations and Diplomacy, Public Administration
Special Executive Programs: Public Administration, Government(Political Science)

Faculty of Science and Technology: Bachelor Degree Programs: Agricultural Technology, Biotechnology, Chemistry, Computer Science, Environmental Science, Food Science, Health Science, Mathematics, Physics, Rural Technology, Applied Statistics
Master Degree Programs: Applied Statistics

Faculty of Social Administration: Bachelor Degree Programs: Social Work
Master Degree Programs: Community Development, Generic Social Work, Labour Welfare, Medical Social Work, Social Work in Criminal Justice, Social Work in Education

Faculty of Sociology and Anthropology: Bachelor Degree Programs: Sociology and Anthropology
Master Degree Programs: Sociology and Anthropology

International Institute of Technology: Bachelor Degree Programs: Civil Engineering*, Electrical Engineering*, Industrial Engineering*, Chemical Engineering*, Mechanical Engineering*

**Conducted in English, (*) Separate course conducted in English*

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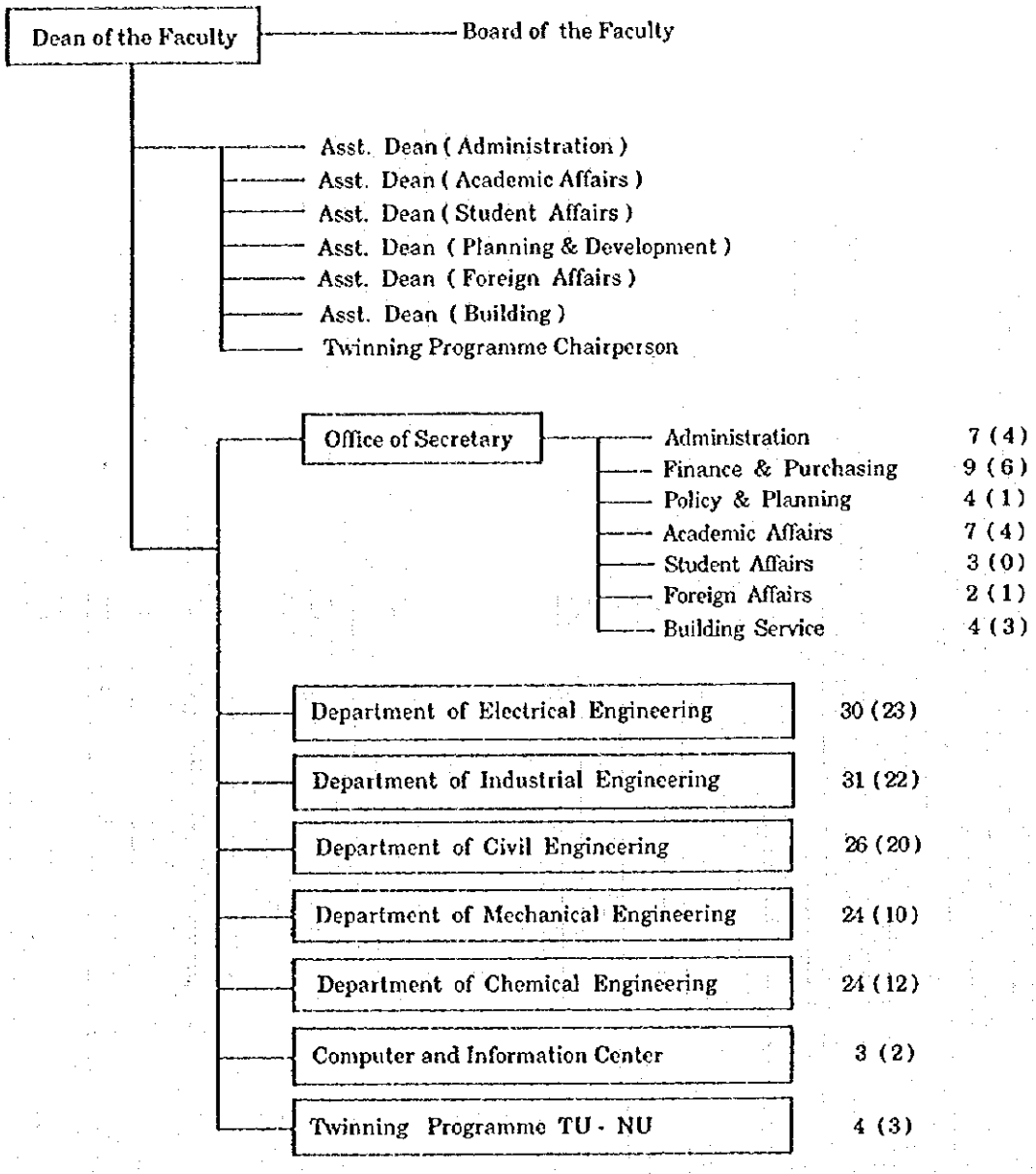
Appendix 3 : Organization Chart of Thammasat University

(As of April '97)

REMARKS : Office of Union Science and Educate Continuously is a New Projects in Plan 8 which will be improved and expand the Centre for continuing Education and Social Service to cover Management Education for Academic Degree

Appendix 4 : Organization Chart of the Faculty of Engineering Thammasat University



Remarks

1. The number outside the parenthesis is the one of available positions in the Faculty.
2. The number inside the parenthesis is the one of existing staff in the Faculty. This number includes both academic and non-academic staff.

Appendix 5 : Budget for Faculty of Engineering, Thammasat University

Budget for Faculty of Engineering
(Fiscal Year : October - September)

Categories	Annual Budget (Baht)					
	1990	1991	1992	1993	1994	1995
1. General Administration						
1.1 Salaries	237,600	445,100	529,500	471,000	610,000	528,500
1.2 Operation *	70,000	200,000	500,000	680,000	870,000	870,000
1.3 Office Equipment	220,400	678,000	376,600	950,000	0	600,200
Building Facilities						
subtotal	290,400	878,000	876,600	1,630,000	870,000	1,470,200
2.Teaching						
2.1 Salaries	611,100	1,372,300	3,380,700	4,952,400	6,990,200	7,826,400
2.2 Payroll for special expert					1,080,000	1,080,000
2.3 Operations	300,000	620,000	2,368,000	3,627,500	5,174,000	6,446,600
Personnel services						
Travelling, repair equipment						
2.4 Teaching Equipments						
2.4.1.Electrical Engineering	0	0	9,479,700	17,696,000	12,435,000	11,000,000
2.4.2. Industrial Engineering	0	0	10,337,300	17,034,500	12,363,000	9,234,000
2.4.3.Civil Engineering	0	0	9,412,300	12,150,700	12,922,500	13,514,000
2.4.4.Chemical Engineering	0	0	0	0	13,668,000	14,920,000
2.4.5.Mechanical Engineering	0	0	1,680,300	2,108,000	2,320,000	4,530,000
2.4.6.Shared Equipment	6,732,700	20,057,000	0	6,112,000	6,800,000	0
Subtotal	7,643,800	22,049,800	36,658,300	63,681,100	73,752,700	68,601,000
Total	7,934,200	22,927,800	37,534,900	65,311,100	74,622,700	70,071,200
Grand Total						278,401,900

Note. 1. * Personnel services, expendable supplies, travelling, equipment repair,etc.

Budget for Faculty of Engineering

(Fiscal Year : October - September)
(Education Year:June - May)

YEAR	BUDGET TYPE		
	FISCAL BUDGET	TU.BUD	ENG. BUDGET
1989	0	571,400	0
1990	8,171,800	889,762	0
1991	23,373,600	1,584,302	0
1992	38,064,400	1,562,600	1,037,400
1993	65,782,100	2,024,650	2,872,800
1994	75,232,700	1,995,080	5,127,143
1995	70,599,700	1,928,200	7,546,200
1996	80,039,260		
TOTAL	361,263,560	9,955,994	16,583,543
GRAN TOTAL			387,803,097

Appendix 6 : Five-Year Master Plan for the Expansion of Faculty of Engineering during 1997-2001 Thai Fiscal Year

Outline of 5-Year Master Plan

Activity	Operating Budget (Million Baht)					Investment Budget (Million Baht)					Lecturer Requirement (Person)					Officer Requirement (Person)				
	40	41	42	43	44	40	41	42	43	44	40	41	42	43	44	40	41	42	43	44
Educational Support Planning																				
1. Administration	6.37	6.71	7.08	8.49	8.94	2.95	2.95	2.5	2.2	3.2						4				
2. Computer-Database System for Administration and Management	0.08	0.08	0.08	0.08	0.08	0.18	0.08	0.08	0.08	0.08								1	1	1
Total	6.45	6.79	7.16	8.57	9.02	3.13	3.03	2.58	2.28	3.28						4		1	1	1
Educational Planning																				
1. Bachelor Degree	23.78	26.6	44.37	47.21	50.12	104.83	106.45	76	63.7	62.7	8	10	3	1		16	13	5	4	
2. Bachelor Degree (Special Programme)	0.2	0.25	0.33	0.35	36	188	10													
3. Bachelor Degree (Twinning Programme)																				
4. Master Degree	4.25	7.96	8.47	8.76	10.45	10	45.2	13	10	20	8	8	6	4	4	7		2		
5. Master Degree (Special Programme)	0.8	1	1	1	1															
Total	29.03	35.81	54.19	57.39	61.97	170.83	342.65	101	73.7	85.7	16	18	9	7	4	13	13	7	4	1
Development Planning																				
1. Staff Development	5	5	10	10	10	0.27	0.1	0.1	0.1	0.1										
2. Textbook, Academic Journal and Lecture Notes Production	0.3	0.3	0.33	0.33	0.33	0.17	0.19	0.15	0.06	0.06										
3. Academic Auditing	0.1	0.13	0.15	0.23	0.23															
4. Computing Service	0.1	0.1	0.1	0.1	0.1	0.5	0.15	0.15	0.15	0.15										
5. Information Technology Center	0.3	0.3	0.5	0.5	0.5	9	9	33	8	8										
Total	5.8	5.83	11.1	11.2	11.2	9.94	9.44	33.4	8.31	8.31										

Research Planning																				
1. Academic and Research Cooperation	12.95	12.95	30.5	30.5	30.5	0.3	0.2	0.1	0.1	0.1										
2. Fundamental Research	11.17	11.63	12.19	12.23	12.27	2.67	2.49	0.42	0.41	0.41										
3. Advanced Research	2.82	2.87	2.92	2.62	2.62	7.43	62.3	2.25	2.24	2.24										
Total	26.94	27.45	45.61	45.35	45.39	10.4	64.99	2.77	2.75	2.75										
Academic Service Planning																				
1. Academic Service																				
Student Activity Planning																				
1. Student Activity Encouragemen	0.08	0.08	0.08	0.08	0.08	0.2	0.15	0.15	0.15	0.15										
2. Student Welfare	0.2	0.2	0.2	0.2	0.2	0.4	0.05	0.05	0.05	0.05										
Total	0.28	0.28	0.28	0.28	0.28	0.6	0.2	0.2	0.2	0.2										
Grand Total	68.5	76.18	118.34	122.79	127.86	194.9	420.31	141.95	89.24	100.24	16	18	9	7	4	22	13	8	5	1

Appendix 7 : JICA's Technical Guidance Team

ITINERARY

The Technical Guidance Team, Expansion for Faculty of Engineering
Thammasat University in Thailand

June 26 - July 4, 1995

Date	Time	Schedule	Accommodation
June 26 (Mon)	15:05 15:45	Arr. Bangkok JL. 717 Arr. Bangkok TG 623	Delta Grand Pacific
June 27 (Tue)	08:00 08:40 11:30 14:00	Pick up at Hotel Visit JICA Courtesy call on Embassy of JAPAN Courtesy call on Ministry of University Affairs (Office of the Permanent Secretary) Prof. Kasem Watanachai, M.D. Permanent Secretary, MOUA Courtesy call on DTEC	AIT Center
June 28 (Wed)	09:00	Courtesy call on Thammasat University: Dr. Somnuke Dean, Faculty of Engineering Discussion at Thammasat University	AIT Center
June 29 (Thu)		Discussion at Thammasat University	AIT Center
June 30 (Fri)		Discussion at Thammasat University	Delta Grand Pacific
July 1 (Sat)		-	"
July 2 (Sun)		-	"
July 3 (Mon)	09:00 11:00 14:00	Joint Committee Meeting at Delta Grand Pacific Signing Ceremony at Delta Grand Pacific Report to JICA and Embassy of Japan	"
July 4 (Tue)	10:30 11:00	Leave Bangkok TG 620 Leave Bangkok TG 640	

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NUMBER LIST OF THE TECHNICAL GUIDANCE TEAM, EXPANSION FOR FACULTY OF ENGINEERING, THAMMASAT UNIVERSITY IN THAILAND

LEADER	FUMIO NISHINO PROFESSOR OF INTERNATIONAL DEVELOPMENT GRADUATE SCHOOL POLICY SCIENCE SAITAMA UNIVERSITY
EDUCATION OF UNIVERSITY	TADAO ISHIZAKI UNIT CHIEF OF GENERAL AFFAIRS, TECHNICAL EDUCATION DIVISION, HIGHER EDUCATION BUREAU, MINISTRY OF EDUCATION
CHEMISTRY ENGINEERING	MORIO OKAZAKI PROFESSOR, DEPARTMENT OF CHEMICAL ENGINEERING, FACULTY OF ENGINEERING, KYOTO UNIVERSITY
MACHINE ENGINEERING	SHIGEO OZONO PROFESSOR, GRADUATE SCHOOL OF ENGINEERING, KYOTO UNIVERSITY
COOPERATION PLANNING	MOTOHARU WATANABE STAFF, FIRST TECHNICAL COOPERATION DIVISION, SOCIAL DEVELOPMENT COOPERATION DEPARTMENT, JICA

Appendix 8 : Project Design Matrix for the Project

PROJECT DESIGN MATRIX OF THE PROJECT TO ENHANCE THE CAPABILITY OF THE FACULTY OF ENGINEERING AT THAMMASAT UNIVERSITY

ANNEX 8

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal To produce Faculty of Engineering graduates at Thammasat University who will become one of the leading faculties in the field of engineering in Thailand	1. High quality of students attracted 2. Faculty popularity during entrance exam. 3. Faculty positions to become as attractive as those at leading Faculties in Thailand	1. Entrance Exam. Score 2. No. of Applicant 3. Qualification of Applicants in terms of degree, research and other research aspects	The policy of Thai government concerning policy are to be changed
Project Purpose To enhance capability of Faculty of Engineering at Thammasat University	1-1. More than at least maintain its popularity from the students in the Entrance Exam as at present. 2-1. Become easier for the graduate such to get external researches and consulting works 3. The vacancy in the post of Faculty becomes less. 4. Establishment of graduate program	1. Entrance Exam. Score 2. No. of Research Courses 3. Administrative Data 4. No. of Appointments to graduate faculty positions 5. Annual Report by MOUA, Report by student affairs at T.U.	Material Development of Thailand to keep continue
Outputs 1. Graduate to be of higher quality 2. Research capability of academic staff to be improved 3. Administrative system of Faculty of Engineering to be improved	1-1. Feedback about the practice from the students becomes better. 1-2. Many of the graduates can get good jobs in leading companies 1-3. No. of the percentage of the graduate who further their studies becomes large. 2-1. The number of publications 2-2. The quality of the senior student projects 2-3. The No. of papers prepared by academic staff using the results of senior student projects 2-4. The No. of academic staff promoted to higher academic ranks 3-1. Availability of equipment 3-2. Revised of teaching materials 3-3. Availability of O.A. equipment	Questionnaire Annual Research Report Report by Student Affair at T.U. Personal Data Questionnaire Annual Research Report Annual Research Report	1. Turnover rate of the Faculty Members is kept at reasonable level Budgetally allocation for each expenses does not decrease Access to the campus free Facilities to be improved
Activities The Staffs of the Departments, Electrical, Industrial, Civil, Chemical and Mechanical Engineering 1. To make capability improvement: a. Curriculum improvement: b. Course development: Experts to give special lectures in collaboration with Thai lecturers to improve teaching capability of academic staff c. Improvement of teaching methods c1. Improvement of teaching materials such as slides and videos c2. Improvement of teaching methods through field trips and workshops d. Improvement of laboratory/workshop courses d1. Preparation of laboratory manuals manuals d2. Experts to supervise for setting up laboratories e. Assistance in supervision of senior student projects f. Development of teaching materials and laboratory procedures g. Research capability improvement: a. Improvement of research methods b. Assistance for presentations of the results in academic meetings and/or journals h. Administrative system improvement of Faculty: a. Training technicians to be able to operate equipment b. Maintenance and management of equipment and machinery c. Education and research programs in each department of Engineering d. Improvement of decision making process of committees of academic staff	Input Japanese Side Chief Advisor Coordinator Long term experts for 5 departments Short term experts for 5 departments and administration section Attendance of C/P personnel in Japan Equipment for 5 departments ASSUMPTIONS T.U. : Thammasat University Fac. : Faculty of Engineering	Thai Side Necessary land, building and facilities for the Project Necessary training expenses for implementation of the Project Necessary personnel for implementation of the Project	Key employees' services for lecturers does not become worse.
			Pre-condition • The No. of student enrolling in Engineering program of Thai university does not decrease. • Budget allocation of Thai government to the engineering programs of Thai University does not decrease.

Appendix 9 : List of Senior Student Project

Dec. 19, 1996

List of Senior Project - Department of Electrical Engineering

Theme of Senior Project	Advisor (s)	Co-Advisor (s)
Neural Controller Application	Paiboon	Pongsak, Sinchai
Unity Power Factor Correction	Paiboon	Narin, Kitti
DC Chopper Speed Control of Vector Control System	Narin	Paiboon, Pornrapeepat
3 Phase Inverter of Vector Control System	Narin	Paiboon, Pornrapeepat
Implement of Computer Vision	Kitti	Somchart, Jakratep
DC Power Supply	Pornrapeepat	Narin, Charkree
Centralized Control System	Narong	Somchart, Kitti
PLC Application	Narong	Paiboon, Kitti
Development Image Processing for Agriculture	Narong	Kitti, Pongsak
Fuzzy Logic Control	Narong, Somchart	Kitti
Designed DES Chip by Using FPGA	Somchart, Narong	Charkree
Communication Software with X. 25 Protocol	Somchart	Pornrapeepat, Jakratep
Protocol Analyzer	Somchart	Pornrapeepat, Jakratep
A Survey on PEG Image Compression	Thani	Pongsak, Jakratep
CAI	Pongsak	Jakratep, Paiboon
Character Recognition	Pongsak	Jakratep, Kitti
Database System	Pongsak	Paiboon, Narit
Linear Predictive Coding	Jarree	Jakratep, Pongsak
Wave to MIDI File Format	Jakratep	Pongsak, Jarree
Fast Speed Multiplier Circuit	Charkree	Pornrapeepat, Narin

Senior Project

Industrial Engineering 1996

No	Title	Advisor	Student
1	Evaluation of Quality According to ISO 9002 International System Standard : A Case Study in Cathode Ray Tube Manufacturing Process	Mr. Tritos	Chote Vanichayakul Supawan Suwannodom
2	A Study of Continuous Die Design for Spur Gear.	Mr. Peecha Mr. Apiwat	Phavit Phattaranungrong Sripoom Boonsit Tananchai Rojnunggruang
3	A Study of Jominy End Quench Test.	Ms. Montalee Mr. Apiwat	Nopparit Wongajang Kosachain Jariyavirojna Sutliphong Maihom
4	A Study of Thermoplastic Injection Molding Design	Ms. Montalee Mr. Apiwat	Taweesak Chonlavichit Tawach Penpobpichanan Panu Somboon
5	Quality Manual Preparation to ISO9002 : A Case Study in Department of Industrial Engineering, Thammasat University.	Ms. Montalee	Tripeng Ghuntapura Noppol Wisuutipongwattana
6	Project Feasibility Study of Air Filter Production	Mr. Siripong Mr. Naris	Kriangsak Tantivipast Sitthinan Makaranan Chavalit Panpetch
7	Dynamic Production Planning by Using Genetic Algorithm	Dr. Sinchai	Sujin Jareenkajeonchai Santhana Tasanasant
8	Maintenance Management for Industrial Engineering Department Workshop	Dr. Sinchai Mr. Pongsak	Kanokporn Patoonroj Chaiyout Muankaew
9	Productivity Improvement Using Line Balancing Technique : A Case Study in Automobile Assembly Process	Mr. Danuphan	Kirati Dajnirattisai Chanchai Bovonchokchai Touchchai Sarutiankul
10	Simulation Model of Car Parking System in Faculty of Engineering, Thammasat University.	Dr. Julsiri	Duangapa Somsurawanit Ammanee Pernpibul Siripom Kittiatcharaphon
11	Improvement and Development of AGVS System	Dr. Julsiri	Nattawut Lappanasiriwanch Aukarachai Taupradist Tewarak Polyomma
12	Dynamics Inventory Management	Mr. Pongchanun	Nuttapun Pongpoon Chao Buasuwan
13	Use of EMG and Biomechanical Model to Compare Squating on Ground and Sitting on Chairs	Mr. Naris	Pariya Tangweengwang Songsak Sacang Denchai Prasitphon

Senior Projects in Civil Engineering in 1996

(Title subject to change)

No.	Title	Student	Advisor
1	Mortar Design by Multiple Equations	3	Dr.Somnuke Praporntanatorns
2	Natural Fiber Reinforced Composite Board	2	Dr.Burachat Chatveera Dr.Somnuk Tangtermsirikul(SIIT)
3	Autogeneous Shrinckage for Lignite Fly Ash	2	Dr.Burachat Chatveera Dr.Somnuk Tangtermsirikul(SIIT)
4	Flexural Strength of Repaired Composite Beam	3	Mr.Saharat Buddhawanna Mr.Sayan Sirimontree
5	External Prestressed Concrete Girder	3	Mr.Saharat Buddhawanna Mr.Sayan Sirimontree
6	Computer Program for Analysis and Design of Reinforced Concrete Beams using Visual Basic	3	Dr.Kridayuth Chompooming
7	Optimum Design of Truss Structures	2	Dr.Kridayuth Chompooming
8	Static and Dynamic Analysis of High-rise Building under Earthquake	3	Dr.Virote Boonyapinyo Dr.Nakhorn Poovarodom
9	Aerodynamic Analysis of High-rise Building	3	Dr.Virote Boonyapinyo Dr.Nakhorn Poovarodom
10	Soile Profile in Area of Thammasat University Rangsit Campus	3	Mr.Tanet Weerasiri(Part-time Lec.) Dr.Kridayuth Chompooming
11	Special Topic	3	Mr.Tanet Weerasiri(Part-time Lec.) Dr.Kridayuth Chompooming
12	Preliminary Design of Flood Prevention Systems for Municipal Area in Loei, Nangkai and Undon Thani Province	3	Dr.Uruya Weesakul Dr.Chaisak Sripadungtham(SIIT)
13	Preliminary Design of Flood Prevention Systems for Municipal Area in Nakhonphanom and Mukdahan	3	Dr.Uruya Weesakul Dr.Chaisak Sripadungtham(SIIT)
14	Simulation of Multisite Stream Flows by Singular Value Decomposition	3	Dr.Chavalit Chaleeraktrakoon
15	Feasibility Study of Membrane Filtration Sysytem for Water Reuse in High-rise Building	2	Dr.Krittiya Lertpocasombat
16	Membrane Filtration System for Wastwater Recycle: Case Study for a High-rise Building in Thailand	2	Dr.Krittiya Lertpocasombat
17	Contractor's Strategy	2	Mr.Sathaporn Ketekinta

Senior Project Topics of Department of Chemical Engineering, Thammasat University in Academic Year 1996

List of Project Topics	Project Advisor	Project Co-Advisor	Students
Evaluation of equation of state for predicting properties of Freon-12	Mr.Prodpran		Mr.Sanuen Mr.Panat
Heat effect on preparation of active carbon	Mr.Prodpran		Mr.Sithichai Mr.Hauphol
Effect of parameters on separation of dye solids by foam separation method	Mr.Wachira		Ms.Thantiwa Mr.Pholpat
Characterization of activated carbons prepared from palm shell and/or durian shell and compare results with activated carbons prepared from other food waste sources; i.e., coconut shell	Ms.Wanwisa		Ms.Chanika Ms.Pattamasuda
Study of influence of parameter to filtration of glucose prepared from yam flour	Dr.Chitpong	Mr.Prodpran	Mr.Atipat Mr.Piyachat
Study of hydrogen gas production from ethanol by reforming process	Dr.Apichai		Mr.Prakit Ms.Poompattra
Study of appropriate conditions for preparation Pd/Mg, Ca/Al_2O_3 catalysts	Dr.Supaporn		Mr.Chanin Mr.Kamphol
Adsorption heat pump using activated carbon produced from food waste	Dr.Sekiguchi	Ms.Wanwisa	Mr.Porntap Mr.Weera
Reaction of volatile organic compound in ac packed-bed plasma reactor	Dr.Sekiguchi	Ms.Wanwisa	Mr.Pirat Mr.Dhanasak