4－1－3　アウトプット目標の達成状況

(1) カリキュラムの改善

1) 学部カリキュラム

従来の機械工学科のカリキュラムには

a) 機械工学で非常に重要な実験がない。

殆どの科目に演習時間が含まれ、そこで必要に応じて実験を教えるとしているが、実際にはその時間に教えておらず、実験テキストもない。また数十名の学生を１名の教員が、１つの装置で一度に教えることは無理である。機械工学実験を独立した教科とし、また学生を班分けしローテーションを組んで教える必要がある。

b) 機械設計（製図を含む）関係も機械要素の設計講義のみしか行われておらず、設計講義に関連させて図面を描かせたり装置や機械のようなシステム設計製図科目がない。

c) 難易度や、他の科目との関係などを考えた科目構成になっていない（例えば基本的な数値解析がないのに有限要素法の科目があるなど）。

このように機械工学科のカリキュラムとしては不十分なカリキュラムであった。そこで全面的に見直すようアドバイスし、ほぼそのアドバイスに沿って1989年６月に表４．８のようにカリキュラムの改訂が行われた。また同時期に一部教養課程のカリキュラムの改訂もおこなわれた。

なおこのカリキュラムは1989年度入学学生より適用されている。従って新カリキュラムで３年次にセットされた機械工学実験や機械設計製図の本格的な実施は1991年６月から完全に実施されている。

2) 大学院カリキュラム

大学の研究活動を充実するためには大学院が重要な役割を果たす。機械工学専攻の大学院修士課程は1987年に大学省により設置することを認められ、1989年に表４．９のようなカリキュラムが大学省に申請され、認可を得、1990年に正式に発足した。当初は院生は少なかったが、年々増加し、学科の研究活動の活性化に大きく結びついている。

表４．８　工学部・機械工学科の新カリキュラム

学年－学期	科目名	単　位	時間 講義・演習
	Elective in Sc. or Hm.	2	(2- 0)
	Engineering Laboratory 1	1	(0- 3)
	Mathematics 1(Part 1, II)	6	(6- 0)
1－1	English 1 or Japanese 1	3	(2- 2)
	Engineering Communications	2	(2- 0)
	Electrical Ccircuit Analysis	3	(3- 0)
	Mechanics	3	(3- 0)
		20	(18- 5)
	Engineering LaboratoryII	1	(0- 3)
	Mathematics II	3	(3- 0)
	English II of JapaneseII	3	(2- 2)
	Introduction to Computer Sc.	2	(2- 0)
1－2	Engineering Drawing	1	(1- 2)
	Thermodynamics	2	(2- 0)
	Electromagnetics	3	(3- 0)
	Digital Circuit and Logic Design	3	(3- 0)
	Quantum Physics	2	(2- 0)
		20	(19- 7)
	Mathematics III	3	(3- 0)
	Microprocessor & Microcomputer	3	(3- 0)
	Foundation of Electrical Machines	3	(3- 0)
2－1	Foundation of Engineering Electronics	3	(3- 0)
	Basic Electrical Laboratory	1	(0- 3)
	Solid and Fluid Mechanics	3	(3- 0)
	Material Sciences and Engineering	3	(3- 0)
	Principle of Computer Programming	2	(2- 0)
		21	(20- 3)
	＊Measurement and Instrumentation	3	(3- 0)
	System and Control Engineering	3	(3- 0)
	Solid Mechanics	3	(3- 0)
2－2	Fluid Mechanics	3	(3- 0)
	Engineering Thermodynamics	3	(3- 0)
	＊Manufacturing Process	3	(3- 0)
	Mechanical Workshop	2	(0- 6)
		20	(18- 6)
	＊Mechanical Drawing	2	(1- 3)
	＊Numerical Analysis 1	2	(2- 1)
	Mechanics of Machinery	3	(3- 0)
3－1	＊Machine Design 1	3	(3- 0)
	Heat Transfer	3	(3- 0)
	Mechanical Vibration	3	(3- 0)
	Elective in humanities	2	(2- 0)
	＊Mechanical Engineering Laboratory 1	1	(0- 3)
		19	(17- 7)

学年－学期	科目名	単　位	時間 講義・演習
	＊Machine Design II	3	(2- 3)
	Turbomachines	3	(3- 0)
	＊Internal Combustion Engines	3	(3- 0)
3－2	＊Numerical Analysis II	2	(2- 1)
	Engineering Elective(I subject)	3	(3- 0)
	Mechanical Engineering Laboratory II	1	(0- 3)
		15	(13- 7)
	Industrial Training		
	Project 1	3	(0- 9)
	Refrigeration and Air Conditioning	3	(3- 0)
4－1	Engineering Electives(3 subjects)	9	(9- 0)
	＊Seminar	1	(0- 3)
	Elective in Social Sciences	3	(3- 0)
		19	(15-12)
	Project II	3	(0- 9)
	Power Plant Engineering	3	(3- 0)
4－2	Engineering Elective(2 subjects)	6	(6- 0)
	Elective in Social Sciences	3	(3- 0)
		15	(12- 9)
	以下選択科目		
4－1	Automotive Engineering, Gas Turbines,		
4－2	Solar Energy, Nuclear Energy,		
	Quality Control, Lubrication,		
	Polution Control, Topics		
	以下略（選択科目は開講する場合としない場合がある）		
	卒業単位合計；　149 単位		

＊：今回新たに、または内容など修正された科目

表４．９　大学院機械工学科（修士）の新カリキュラム

	科　目　名	単　位	時　間
Seminar and Thesis	Research and Seminar 1	1	4
	Research and Seminar II	1	4
	Master Thesis	4	8
Mathematics	Computational Methods	3	3
	Operations Research	3	3
	System Optimization	3	3
	Matrix Analysis	3	3
	Functional Analysis	3	3
	Random Variable & Processes	3	3
Mechanical Design	Optimum Design of Mechanical Elements and System	3	3
	Matrix Method in the Design and Analysis of Mechanisms	3	3
	Friction, Lubrication and wear	3	3
	Computer Control of Machines	3	3
	Advanced Automation and Robotics	3	3
	Special Topics in Mechanical Engineering	3	3
Mathematics	Continuum Mechanics	3	3
	Theory of Elasticity I	3	3
	Theory of Elasticity II	3	3
	Theory of Plates & Shells I	3	3
	Theory of Plates & Shells II	3	3
	Theory of Plasticity	3	3
	Selected Topics in Continuum Mechanics	3	3
Thermal Sciences	Gas Dynamics	3	3
	Advanced Gas Dynamics	3	3
	Boudary Layer Theory	3	3
	Advanced Nuclear Power Engineering	3	3
	Advanced Conduction Heat Transfer	3	3
	Advanced Convection Heat Transfer	3	3
	Advanced Radiation Heat Transfer	3	3
	Advanced Mass Transfer	3	3
	Advanced Combustion Processes	3	3
	Advanced Thermodynamics	3	3
	Turbulent Heat and Momentum Transfer	3	3
	Special Topics in Fluid Mechanics, Thermodynamics and Heat Transfer	3	3

	科　目　名	単　位	時　間
終了単位	Seminar & Thesis	6	
	Mathematics	12	
	Major Course（A－Cから一つ選ぶ）	12	
	Minor Course（上記以外から一つ選ぶ）	9	
		9	
	終了単位合計	48 単位	

備考：1学年の院生定員：15名

(2) 現地語教科書の作成

タイ国全体でも機械工学科の学生数が1学年 500名程度なので、教科書を作ろうとしても採算が合わず、かなりの教科で英語のリプリント版教科書を使用している。

英語の教科書では学生の理解度や教育進度も悪く、また教員が教科書を自分で書くことは本人にとって非常に良い勉強になるだけでなく、また本人の業績としても評価される。そこでＪＩＣＡが初版の印刷費用を負担することを提案し、できるだけ多くの教員に教科書を作成するよう指導がおこなわれた。

本プロジェクトで出版された教科書は表４．10に示すように、当初見込み以上に多数出版され、執筆した教員の授業、実験実習および設計製図など良く利用されている。

表４．１０　現地語教科書の出版

Title	Author	Published Year	Course to be used (Year/Semester)
1. Basic Solid Mechanics	Mr. Somchal	1990	Solid-Fluid Mechanics (2/2)
2. Advanced Mechanics of Solid	ditto	1990	Solid Mechanics (2/2)
3. Engineering Drawing	Mr. Pornsak	1990	Engineering Drawing (1/2)
4. Mechanics of Machinery	Mr. Somchai	1990	Mechanics of Machinery (2/2)
5. Heat Transfer	Mr. Pongjeit	1990	Heat Transfer (3/2)
6. Principle of Refrigeration	Mr. Akradech	1990	Refrigeration and Air Conditioning (4/1)
7. Air Conditioning Practice	ditto	1990	ditto
8. Manufacturing Process	Mr. Thavee	1990	Manufacturing Process (2/2)
9. Mumerical Control	Dr. Jongkol	1990	Numerical Control (4/1)
10. Control Engineering Laboratory	Control Engineering	1990	Control Laboratory (3/1)
11. Engineering Laboratory	ditto	1990	Engineering Laboratory (2/1,2)
12. DC Motors Electronics Control and Servo System	Dr. Vothin	1990	Solid-State Motor Control (4/2)
13. Linear Algebra and State Space Equations	Mr. Vipan	1990	Linear Control System (4/1)
14. Modern System Analysis	Mr. Vipan	1990	Modern System Anlysis (4/2)
15. Machanical Drawing	Thaveesak et. al	1990	
16. Mechanical Laboratory I	Staff	1991	Engineering Laboratory (3/1)
17. Mechanical Laboratory II	Staff	1991	Engineering Laboratory (3/2)
18. Tool Design	Mr. Thavee	1991	Mechanical Engineering Problem Analysis (4/1)

Title	Author	Published Year	Course to be used (Year/Semester)
19. Material Science andy Engineering	Mr. Pornsak	1992	Material Science (2/1)
20. Mechanics of Composite Material	Mr. Somchai	1992	Composite Material (4/1, 2)
21. Thermodynamics	Mr. Tawatchai	1992	Thermodynamics (1/1)
22. Internal Combustion Engine	Mr. Attason	1992	Internal Combustion Engine (3/2)
23. Basic Lubrication Theory	Dr. Mongkol, Dr. Hashimoto	1992	Lubrication (4/1, 2)
24. Advanced Lubrication Theory	Dr. Mongkol, Dr. Hashimoto	1992	Friction Lubrication and Wear (Graduate)
25. Mechanical Design and Drawing	Mr. Thavee, Dr. Iijima, Mr. Chinda	1992	Mechanical Drawing (3/1)
26. Control Systems Engineering	Dr. Jongkol	1992	Control Engineering Systems (3/2)

(3) 機械工学実験体制の整備

プロジェクト開始以前のカリキュラムには機械工学実験がなかったが、改訂カリキュラムで３年次の１、２学期に機械工学実験がセットされた。そこで供与機材や手持ちの機材を使い、実験装置をつくると同時に実験テキストの作成も行い、1991年６月より下表のようなテーマで機械工学実験が実施されている。

表４．１１　機械工学実験テーマ

分　野	テーマ	機材名	担当者
材料工学	引張り試験	万能試験機	Somchai
	圧縮試験	同　上	同　上
	ねじり試験	ねじり試験機	同　上
	梁の応力測定	静歪計	同　上
	応力集中の測定	同　上	同　上
	硬さ試験	硬さ試験機	Pornsak
	顕微鏡組織の観察	顕微鏡、電気炉	同　上
流体工学	流速測定	ピトー管、送風機	Chamrong
	流量の測定	同　上	同　上
	管摩擦の測定	マノメーター	Akradech
	ポンプの性能試験	ポンプ	Chamrong
熱工学 内燃機関	熱交換器の実験	同　上	Pongjeit
	指圧線図の解析	＊圧力変換器	Attason
	エンジンの性能試験	ガソリンエンジン実験装置	同　上
	ガス分析	＊オルザートガス分析器	同　上
機械力学 メカトロ	線形振動	動歪計、動アンプ	Mongkol
	油圧回路の周波数応答	シンクロスコープ	Chamrong
	メカトロ実験１	ワンボードマイコン	Yothin &
	（制御言語の特性）		Jongkol
	メカトロ実験２	同　上	同　上
	（機械の制御）		
	切削抵抗の測定	動歪計、シンクロスコープ	Thaveesak
	空気マイクロメータ	ブロックゲージ	同　上
	ＣＮＣフライス加工	ＣＮＣフライス盤	同　上
	ＣＮＣワイヤカット	ＣＮＣワイヤカット	同　上

(4) 設計製図教育体制の整備

従来のカリキュラムの機械設計では単に機械要素の設計講義のみに週３時間、２学期を要しており（日本の２倍の授業時間）、また装置や機械など応用機械設計も全然教育していない。製図教育についても機械工学の基礎知識のない１年時にだけ機械製図があり、しかもそこではとても１年生では理解できないような高度な内容の図面を書かせており、機械要素講義に関連させた設計製図演習を行うカリキュラムになっていない。そこで前掲の表４．８に示すように機械設計を機械要素の設計と機械設計に明確に分け、また機械製図と機械設計の講義が関連して授業できるように同学年に配慮した。

また、機械設計も設計製図の演習を伴うようにカリキュラムを改訂した。なお機械設計１と機械製図は１年次の工業製図との関係があり、できれば２年次に配置するのが望ましかったが、２年次は他の基礎重要科目で時間がすべて占められてしまい３年次に配置せざるを得なかった。将来は工学部の共通科目である工業製図の時間配置を２年次に移すなど工夫が必要である。

設計製図関係の教材については、表４．10に示すように基礎製図および機械製図の現地語テキストを作成した。機械製図のテキストは機械設計の講義と関連するような内容になっており、かつ、設計講義担当者が製図の授業も担当するようにした。

製図室については機械工学科新館（４階建）の建築が遅れているので、暫定的に土木工学科の製図室を借りて、そこに新館から借用した30台とプロジェクトで購入した30台、計65台のドラフター付の製図台をセットし、製図教育ができる体制を整えた。なお、ＣＡＤ教育のためにはコンピュータが必要であるが、現状では学科で揃えるよりも、データ通信分野がコンピュータセンタに揃えた40セットのパソコンを利用するのが適切で、現在その方法でＣＡＤ教育が行われている。

(5) 機材の活用状況

1988年より1992年までに購入された教材のリストを以下表４．12に示す通りで、機械工学科の全研究室、実験室を視察し、また現地教員からもヒアリングした結果、各機材とも教育および研究に有効に利用されていることが確認された。

表４．１２　供与機械

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
	Equipment provided in 1988				
ME001	Universal Testing Machine	MTL	14,340	AH88	A
ME002	Static Strain Meter	MTL	820	AH88	A
ME003	Hardness Tester	MTL	1,342	AH88	A
ME004	Microscope	MTL	1,724	AH88	A
ME005	Polishing Attatchment	MTL	823	AH88	A
ME006	Electric Furnace	MTL	295	AH88	A
ME007	CNC Milling Machine	MTL	14,415	AH88	A
ME008	Profile Projector	MTL	2,000	AH88	A
ME009	Roughness Tester Apparatus	MTL	1,032	AH88	A
ME010	Dynamic Strain Meter	LCL	246	AH88	A
ME011	Digital Storage Oscilloscope	LCL	559	AH88	A
ME012	Pen Recorder	LCL	471	AH88	A
ME013	Printer	LCL	384	AH88	A
ME014	Plotter	ML	2,470	AH88	A
ME015	Digitizer	ML	165	AH88	A
ME016	Pressure Guage Calibrator	FEL	256	AH88	A
ME017	Pitot Tube	FEL	66	AH88	A
ME018	Goettingen Manometer	FEL	301	AH88	A
ME019	Hot-Wire Anemometer	FEL	4,041	AH88	A
ME020	Centrifugal Wind Fan	FEL	2,283	AH88	A
ME021	Centrifugal Water Pump	FEL	151	AH88	A
ME022	Electric Power Meter	EL	86	AH88	A
ME023	Multi-Thermometer	TEL	931	AH88	A
ME024	Milivolt Ampere Meter	MEL	208	AH88	A
ME025	Milivolt Ampere Meter	LCL	208	AH88	A
ME026	Centrifugal Wind Fan	FEL	1,515	AH88	A
ME027	Engine Performance Testing Apparatus	EL	7,018	AH88	A
ME028	Dynamic Strain Meter	LCL	246	AH88	A
ME029	Pressure Transducer	EL	172	AH88	A
ME030	Digital Storage Oscilloscope	LCL	559	AH88	A
ME031	Pen Recorder	ML	448	AH88	A
ME032	Oscillator	LCL	1,658	AH88	A
ME033	Dynamic Strain Meter	EL	1,230	AH88	A
ME034	Digital Storage Oscilloscope	ML	1,627	AH88	A
ME035	Oscilloscope	ML	786	AH88	A
ME036	Pen Recorder	LCL	1,480	AH88	A
ME037	X-Y Recorder	LCL	1,268	AH88	A

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
ME038	Universal Counter	LCL	429	AH88	A
ME039	Stroboscope	LCL	768	AH88	A
ME040	One Board Micro-Computer	ML	672	AH88	A
ME041	DC Power Supply	ML	72	AH88	A
ME042	DC Power Supply	LCL	600	AH88	A
ME043	DC Power Supply	LCL	828	AH88	A
ME044	Personal Computer	MTL	3,068	AH88	A
ME045	Printer	MTL	384	AH88	A
ME046	Plotter	MTL	342	AH88	A
ME047	Function Generator	LCL	606	AH88	A
ME048	Mini Control Valve	LCL	336	AH88	A
ME049	DC Servo Motor	FEL	201	AH88	A
ME050	DC Servo Motor Amplifier	FEL	486	AH88	A
ME051	AC Servo Motor	FEL	228	AH88	A
ME052	AC Servo Motor Amplifier	FEL	621	AH88	A
ME053	Step Motor	CED	80	AH88	A
ME054	Step Motor Driver	CED	390	AH88	A
ME055	Digital Controller	CED	345	AH88	A
ME056	Desplacement Sensor	CED	215	AH88	A
ME057	Brushless Resolver	CED	66	AH88	A
ME058	Brushless Resolver	CED	66	AH88	A
ME059	Acceleration Sensor	LCL	46	AH88	A
ME060	Acceleration Sensor	LCL	46	AH88	A
ME061	Torque Sensor	LCL	123	AH88	A
ME062	Torque Sensor	LCL	123	AH88	A
ME063	Load Cell	EL	327	AH88	A
ME064	Personal Computer	MEL	4,866	AH88	A
ME065	Printer	MEL	960	AH88	A
ME066	Plotter	MEL	870	AH88	A
ME067	Pen Recorder	MEL	2,240	AH88	A
ME068	Color Image Input Camera System	MEL	102	AH88	A
ME069	Graphic Soft	MEL	31	AH88	A
ME070	AD/DA Board	ML	162	AH88	A
ME071	Ram Board	ML	67	AH88	A
ME072	Color Printer	ML	415	AH88	A
ME073	Copy Machine	MED	1,499	AL88	A
	Total		90,304		

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
	Equipment provided in 1989				
ME074	Personal Computer	EL	4,944	AL89	A
ME075	Dynamic Strain Meter	EL	595	AH89	A
ME076	Dynamic Strain Meter	EL	798	AH89	A
ME077	Dynamic Strain Meter	ML	628	AH89	A
ME078	Data Recorder	EL	1,265	AH89	A
ME079	Oscilloscope	EL	371	AH89	A
ME080	Digital Storage Oscilloscope	EL	1,375	AH89	A
ME081	Oscilloscope Trace Recording System	ML	402	AH89	A
ME082	Digital Storage Oscilloscope	NCL	1,736	AH89	A
ME083	Function Generator	NCL	1,332	AH89	A
ME084	Camera	MED	493	AH89	A
ME085	Photo-Printing Equipment	MED	259	AH89	A
ME086	Multi-Meter	MEL	145	AH89	A
ME087	DC Amplifier	MEL	145	AH89	A
ME088	Hardness Tester	MEL	1,195	AH89	A
ME089	Hardness Tester	MEL	1,543	AH89	A
ME090	Microscope	MEL	1,374	AH89	A
ME091	Camera for Microscope	MEL	615	AH89	A
ME092	TV & Camera	MED	444	AH89	A
ME093	Polishing Attatchment	MEL	721	AH89	A
ME094	Electric Furnace	MEL	355	AH89	A
ME095	Heat Flux Meter	TEL	321	AH89	A
ME096	Gas Flow Meter	TEL	270	AH89	A
ME097	Multi-Thermometer	TEL	635	AH89	A
ME098	Mini Control Valve	TEL	527	AH89	A
ME099	Personal Computer	CED	2,566	AH89	A
ME100	NEC-IBM PC Soft Converter	NCL	196	AH89	A
ME101	FFT Analyzer	NCL	1,424	AH89	A
ME102	Precision Cutting Machine	MTL	1,743	AH89	A
ME103	Test Piece Set Equipment	MTL	572	AH89	A
ME104	Video Tape Recorder	MED	607	AH89	A
ME105	Shurielen System	FEL	4,633	AH89	A
ME106	Printer	FEL	800	AL89	A
ME107	Printer	FEL	1,350	AL89	A
ME108	Slit Light Supply	FEL	1,095	AH89	A
ME109	Nox Analyzer	EL	2,744	AH89	A
ME110	Infrared Gas Analyzer	EL	9,821	AH89	A
ME111	Hydrocarbon Gas Analyzer	EL	2,056	AH89	A

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
ME112	Pressure Transducer	EL	243	AH89	A
ME113	Hydraulic Pump	MTL	94	AL89	A
ME114	Hydraulic Pump	LCL	231	AL89	A
ME115	Hydraulic Pump	FEL	143	AL89	A
ME116	Sound Measurement System	NCL	1,849	AL89	A
ME117	Eddy Current Type Dynamometer	LCL	3,286	AH89	A
ME118	Difference Pressure Meter	FEL	120	AH89	A
ME119	Pressure Transducer	EL	155	AH89	A
ME120	FFT Analyzer	LCL	1,371	AH89	A
	Total		59,587		

Equipment provided in 1990

ME121	Scanning Electron Microscope	MEL	12,898	AL90	A
ME122	Rotary Bending Fatigue Testing Machine	MEL	3,812	AL90	A
ME123	Recorder	MEL	721	AL90	A
ME124	Digital Storage Oscilloscope	MEL	710	AL90	A
ME125	Regulated DC Power Supply	MEL	242	AL90	A
ME126	Drafting Machine	DR	4,081	AL90	A
ME127	Dynamic Strain Amplifier	ML	1,238	AL90	A
ME128	Dynamic Strain Amplifier	MTL	226	AL90	A
ME129	Static Strain Meter	MTL	919	AL90	A
ME130	Lathe Dynamometer	ML	314	AL90	A
ME131	Load Cell	ML	341	AL90	A
ME132	Pressure Transducer	EL	110	AL90	A
ME133	Acceleration Transducer	LCL	66	AL90	A
ME134	Acceleration Transducer	LCL	66	AL90	A
ME135	Acceleration Transducer	LCL	66	AL90	A
ME136	Torque Transducer	LCL	506	AL90	A
ME137	Torque Transducer	MAL	638	AL90	A
ME138	Lathe	MAL	2,101	AL90	A
ME139	Hydraulic Pump	MTL	204	AL90	A
ME140	CNC Lathe	MAL	5,445	AL90	A
ME141	Gap Sensor	LCL	495	AL90	A
ME142	Air Compressor	FEL	1,073	AL90	A
ME143	Electric Control Motor	FEL	451	AL90	A
ME144	Blower	FEL	138	AL90	A
ME145	Grinding Machine	MTL	1,342	AL90	A

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
ME146	Stepping Motor	CED	501	AL90	A
ME147	Stepping Motor	CED	594	AL90	A
ME148	DC Servo Motor	CED	413	AL90	A
ME149	AC Servo Motor	CED	792	AL90	A
ME150	Encorder	CED	17	AL90	A
ME151	Potentionmeter	FEL	66	AL90	A
ME152	Hydraulic Motor	LCL	451	AL90	A
ME153	Electro Hydraulic Servo Valve	FEL	539	AL90	A
ME154	Amplifier for Servo Valve	FEL	726	AL90	A
ME155	Personal Computer	MTL	2,090	AL90	A
ME156	Milling	MTL	2,580	AL90	A
ME157	Brand Vertical Metal Cutting Bandsawing	MTL	1,188	AL90	A
ME158	Air Compressor	EL	297	AL90	A
ME159	Stainless Rod	NCL	1,155	AL90	A
ME160	Variable Speed Motor	NCL	693	AL90	A
ME161	Arc Welding	NCL	369	AL90	A
	Total		50,674		
	Equipment provided in 1991				
ME162	Milling Machine	MAL	2,740	AL91	A
ME163	Automatic Control Simulator	CED	1,710	AL91	A
ME164	Robot	ML	3,300	AL91	A
ME165	SEM Image Frame Store System	MEL	3,670	AL91	A
ME166	Attachment for Universal Testing Machine	MTL	2,560	AL91	A
ME167	Block Gauge	MAL	370	AL91	A
ME168	Variable Speed Motor	LCL	700	AL91	A
ME169	Attachment for Internal Grinding Machine	MAL	250	AL91	A
ME170	Lathe	MAL	815	AL91	A
ME171	Three-Dimensional Measuring Machine	ML	7,700	AL91	A
	Total		23,815		

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
	Equipment provided in 1992				
ME172	Xray Micro-Analyzer	MEL	11,710	AL92	/
ME173	LDV	FEL	10,540	AL92	/
	Total		22,250		
	Equipment associated with experts in 1988				
ME174	Drawing Set	EO	74	BH88	A
ME175	Personal Computer	EO	893	BH88	A
ME176	Desplay	EO	190	BH88	A
ME177	Printer Set	EO	423	BH88	A
ME178	Books	EO	288	BH88	A
	Total		1,868		
	in 1989				
ME179	Basic Master	EO	51	BH89	A
ME180	Experimental Apparatus for Casting	MEL	576	BH89	A
ME181	DC Servo Mortor Set	EO	273	BH89	A
ME182	Materials for Experiments	EO	2,069	BL89	A
	Total		2,969		
	in 1990				
ME183	Encorder	EO	99	BH90	A
ME184	Microphone	NCL	25	BH90	A
ME185	CO2 Gas for Calibration	EL	54	BH90	A
ME186	Power Supply Unit	EO	58	BH90	A
	Total		236		
	in 1991				
ME187	Specimen for Microscope	MEL	896	BH91	A
ME188	Fluid Switch	FEL	286	BH91	A
ME189	Optional Processor	NCL	68	BH91	A
ME190	Cross-Roller Table	MAL	675	BH91	A
ME191	Mue-Checker	MAL	624	BH91	A
ME192	Materials for Noise Control Experimental Apparatus	NCL	523	BH91	A
	Total		3,072		

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
	in 1992				
ME193	Personal Computer	MAL	497	BH92	A
ME194	Software MATLAB	CED	590	BH92	A
ME195	Interface Board	EO	110	BH92	A
ME196	Gasoline Engine Set	EL	283	BL92	A
ME197	Material for Noise Control Experimental Apparatus	NCL	647	BL92	A
	Total		2,127		
	Grand Total		256,902		

Remarks

Place

MAL : Machine Tool Lab.
MEL : Material Engineering Lab.
MTL : Material Testing Lab.
LCL : Lubrication & Control Lab.
NCL : Noise Control Lab.
EL : Engine Lab.
ML : Mechatronic Lab.
FEL : Fluid Engineering Lab.
TEL : Thermal Engineering Lab.
CED : Control Engineering Dept.
DR : Drawing Room
MED : Mechanical Engineering Dept.

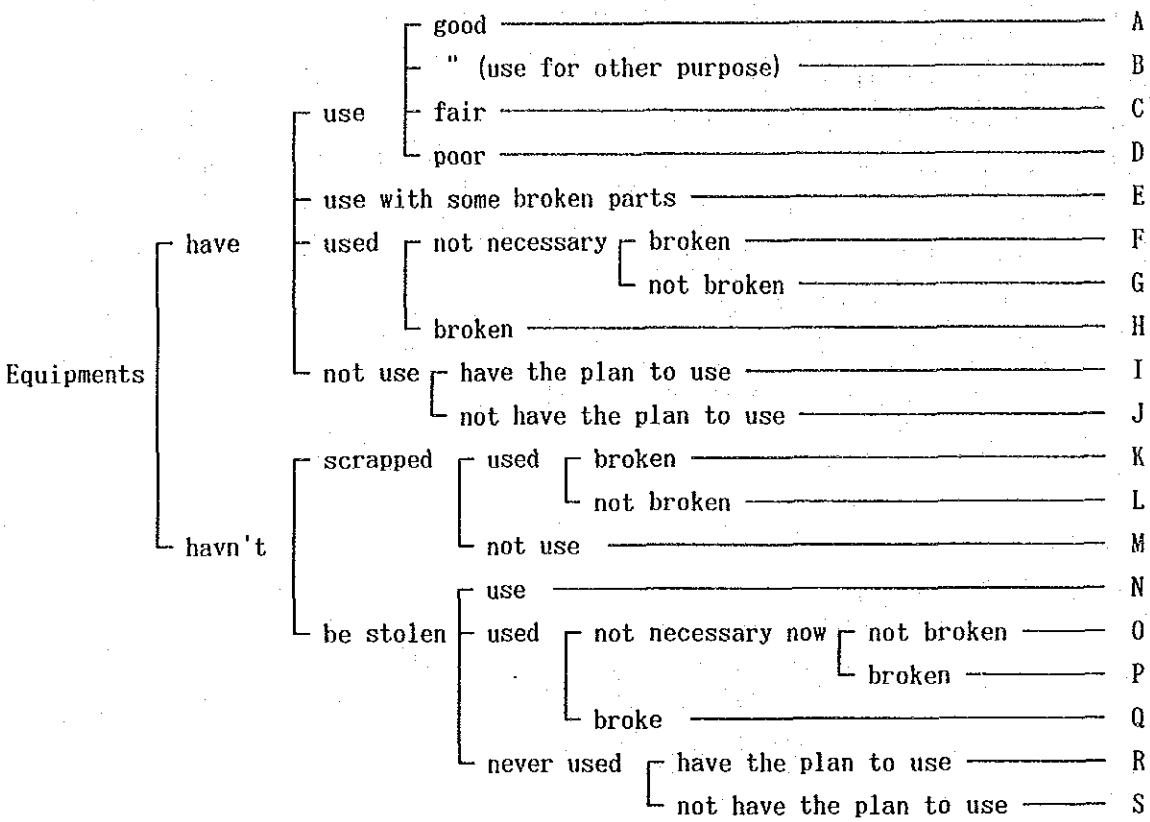
Budget

AH : Equipment directly supplied through JICA head-quarter
AL : Equipment supplied through local supply
BH : Equipment associated with expert through JICA headquarter
BL : Equipment associated with expert through local supply

Usage

A : have being used GOOD
B : have being used GOOD (Use for other purpose)
C : have being used FAIR
D : have being used POOR

Classification of equipment usage



(6) 機械工学科の実験研究室の整備

当初の機械工学科の建物はすべて昔機械実習工場として作られた建物なので、吹抜け構造で、建物全体で一つの部屋となっており、かつ入口も大きな鉄扉しかない。そのために室内は非常にほこりっぽく、計測器類を置いたり、学生実験、卒業研究などを行うには全く不適当な状態であった。そこで５年前からＫＭＩＴＬは機械工学科の新館建設計画をつくり、政府に予算も認められて1989年度より３年計画で完成するはずであったが、建設費の値上がりで未だ工事が着工できない状態であり、今回の技術移転ではこの新館を当てにせずに進めることにした。そこで1989年度納入された精密な大型機械（万能試験機、精密フライス盤）を設置するために工学部と学科の予算でこの機械用に２つの実験室に独立させた。しかしその後納入されてくる機材の設置や研究を行うためには分野ごとあるいは教員ごとにできるだけ多くの実験研究室を作る必要があり1989年６月にＪＩＣＡ本部の予算措置により、学生実験や研究用に現状の大きな部屋を間仕切りしたり、冷房をつけるなど改造工事を行い、1990年３月末に７つの新実験研究室を作ることができた（（予算約 350万円）。またその後学科予算などでさらに実験室を作り、最終的には下表のよにほぼ各教員が自分の実験研究室を持つことができた。これでやっと学生実験や卒業研究ができるような環境が整った。

それまでは卒業研究といっても実験研究室で学生の姿を見ることが少なかったが、この実験研究室が完成してからは卒研学生が毎日来るようになり大学らしい雰囲気になった。また従来は大学へ見学者が来ても機械工学科は見せなかったが最近は必ず見学コースに入るようになった。

表４．１３　新たに整備された実験研究室

室　名	使用教員名	主な学生実験および研究テーマ
材料力学実験研究室	Somchai	引張り試験、複合材料の強度の研究
熱工学実験研究室	Pongjeit	熱交換器の実験、フィンの伝熱特性
流体工学実験研究室	Chamlong	流量、流速測定、管内流の混合課程
制御工学実験研究室	Mongkol	滑り軸受けの動特性
メカトロ実験研究室	(Ming)	メカトロ実験、ロボットの設計製作
機械力学実験研究室	Chakrid	振動実験
内燃機関実験室	Attason	ＩＣＥ性能試験、排気ガス制御の研究
騒音制御工学実験室	Akradech	マフラーの消音特性
材料工学実験室	Pornsak, Tereza Prasit	金属の顕微鏡組織、疲労強度の研究 最適疲労強度の研究
機械加工実験室１	Thaveesak	ＣＮＣフライス加工
機械加工実験室２	同上	機械加工と表面粗さの研究
放電加工実験室	同上、Pornsak,Prasit	最適放電加工条件の研究

(7) 卒業者数の推移

以上に報告したようにＫＭＩＴＬ機械工学科の研究・教育の環境は大幅に改善されてきており、また研究成果の発表件数もプロジェクト開始当時に比べて飛躍的に増大してきた。

このような状況にも関わらず機械工学科を希望する学生数に1992年度の増加が認められない理由としては、実験棟（ワークショップ）などの老朽化が考えられる。ＫＭＩＴＬ工学部では、学部２年次に専攻学科を決定するシステムになっているが、各学科で実施している１年次の実験・実習時における実験棟や設備に対する印象が学科の選択を大きく左右しているものと思われる。したがって、機械工学科を希望する学生数を増加に転じるためには実験棟を含めた建物設備の更新が不可欠である。幸い機械工学科では、タイ政府の予算により教官の研究室を含めた教育・研究棟（４階建てビル）を現在建設中であり、1993年１月末の完成を目指して着々と工事が進んでいる。

新館竣工後にはＪＩＣＡの既供与機材を中心とする主要設備の再配置を計画しており、若手教官を中心とする今後の教育・研究体制をより強固なものにする予定である。

表４．１４　Number of Graduates

Educational Level	Academic Year					Total
	1988	1989	1990	1991	1992*	
Bachelor's Degrees						
· Dept of Telecommunications Engineering	45	45	37	24	30	181
· Dept of Industrial Technology	101	117	204	165	236	823
· Dept of Computer Engineering	35	44	51	34	50	214
· Dept of Mechanical Engineering	25	21	38	50	44	178
Master's Degrees						
· Electrical Engineering	15	9	14	27	30	95
· Mechanical Engineering	—	—	—	—	—	—
Doctor's Degree						
· Electrical Engineering	—	—	1	—	2	3
Grand Total	221	236	345	300	392	1,494

※ Estimated

(8) 機械工学分野での技術移転を受けた研究員の数を次表４．15に示す。

表４．１５ Name List of Counterparts(Mechanical Engineering)

Name	Position	Age	Graduation	Speciality
1. Dr. Mongkol Mongkolwongrojn	Head of Dept. Assistant Professor	40	BEng. (Hons), Ph.D. (UW-Madison)	Tribology
2. Mr. Somchai Norasethdasophon	Associate Professor	36	BEng(KMITN), MEng(Chula)	Solid Mechanics
3. Mr. Thavee Tescharoen	Assistant Professor	43	BEng(KMITN)	Manufacturing
4. Mr. Akradech Sindhuphak	Assistant Professor	51	BEng(IMITL), MS(West Coast)	Noise Control
5. Mr. Pongjait Promwong	Assistant Professor	36	BEng(KKU), MEng(Chula) Study abroad (Imperial College)	Thermal Eng.
6. Mr. Pornsak Attavanich	Assistant Professor	40	BEng(PSU)	Material Eng.
7. Mr. Attason Soontornchati	Lecturer	58	BEng(KMITT)	Automotive Eng.
8. Mr. Chakrid Wansairi	Lecturer	30	BEng(KMITL), MEng(Imperial College)	Solid Mechanics
9. Mr. Chamlong Prabkaeo	Lecturer	34	BSIED(KMITN)	Pluid Eng.
10. Mr. Ming Lokitsaengtong	Lecturer	38	BEng. (Tasmania), MEng(KMITT) Study abroad (Imperial College)	
11. Mr. Prasit Kampanyim	Lecturer	40	BSIED(KMITN)	Welding Tech.
12. Mr. Tawatchai Nakpipat	Lecturer	40	BEng. (KMITT)	Automotive Eng.

Name	Position	Age	Graduation	Speciality
13. Mr. Chinda Charoenphonphanich	Lecturer	23	BEng. (KMITL), Study abroad (Tokai Univ.)	
14. Mr. Jaruwat Charoensuk	Lecturer	23	BEng(Hons) (KMITL), Study abroad (Imperial College)	Combustion Eng.
15. Mr. Chinnarak Tienpong	Lecturer	23	BEng(KMITL)	Thermal System Design
16. Mr. Unnut Phinsopon	Lecturer	22	BEng(KMITL)	Control Eng.
17. Mr. Sunpasit Limnnorarattana	Lecturer	28	BEng(KMITL), M.Sc. (Melbourne)	Industrial Eng.
18. Mr. Monsak Pinsarn	Lecturer	24	BEng(KMITL)	Machine Design
19. Dr. Yothin Prempraneerach	Head of Dept. Associate Professor	47	BEng(KMITL) MSEE, DEng(Nihon)	Mechatron-ics
20. Mr. Vipan Prijapanij	Associate Professor	49	BSc(Hons), ACGI, MSc (Cantab)	Control Theory
21. Dr. Jongkol Ngamwiwit	Assistant Professor	45	BEng(KMITL), MEng, DEng (Tokai Univ.)	Modern Control

(9) 教員の研究活動

1) 教員の活動

プロジェクト開始前の教員の研究活動は殆ど無と言っても過言ではない状態であったが、プロジェクト開始と共に各教員とも以下に示すように、それぞれ専門別の短期専門家に一対一で指導を受け、研究を行っている。

1991年以降は表４．16に示すように、ほぼ全教員がタイ国内の機械工学シンポジウムで論文を発表しており、その論文数は国内の他の有名大学を凌駕している。また、国際シンポジウムや雑誌、紀要などの論文発表も当初の計画以上に数多く行われ、学位取得を目指すものも数名でてくるなど研究成果が挙がっている。

a) Dr. Mongkol (39才, Head of Mechanical Engineering Dept.)

研究指導者 : 橋本　巨 (JICA機械工学専門家)

研究テーマ : (1) 表面粗さを有する非真円流体軸受の静及び動特性に関する研究

(2) 非真円流体軸受におけるレオロジー

(3) ミニチュアベアリングで指示された小形回転機械の振動特性に関する研究

b) Mr. Pornsak (39才, Assistant Professor)

研究指導者 : 林　守人 (東海大学教授)

研究テーマ : (1) アルミニウム合金の耐熱疲労強度に関する研究

C) Mr. Somchai (35才, Associate Professor)

研究指導者 : 康井　義明 (東海大学教授)

粕谷　平和 (東海大学教授)

森山　裕幸 (東海大学講師)

研究テーマ : (1) 複合材料の強度に関する研究

d) Mr. Akradech (50才, Assistant Professor)

研究指導者 : 萩　三二 (東海大学教授)

村上俊太郎 (東海大学教授)

前田　裕幸（東海大学講師）

研究テーマ：　(1) 消音器の音響特性に関する研究

e) Mr. Traveesak (41才, Assistant Professor)

研究指導者：　西本　　廉（東海大学教授）

香川　勝一（東海大学講師）

研究テーマ：　(1) 切削条件の表面粗さに及ぼす影響

(2) 放電加工における最適加工条件に関する研究

f) Mr. Attason (57才, Lecturer)

Mr. Tawachai (39 才. Lecturet)

研究指導者：　飯島　敏雄（東海大学教授）

研究テーマ：　(1) ガソリンエンジンの排気ガス特性に関する研究

(2) ディーゼルエンジンの排気ガス特性に関する研究

(3) エンジン内のガス流動と燃焼特性に関する研究

g) Mr. Chamlong　(33才、Lecturer)

研究指導者：　青木　克己（東海大学教授）

研究テーマ：　(1) 噴流を利用した穀物輸送システムに関する研究

h) Mr. Prasit　(39才, Lecturer)

研究指導者：　西本　　廉（東海大学教授）

森下　忠衛（東海大学教授）

研究テーマ：　(1) 溶接加工に関する研究

i) Dr. Tereza　(37才, Temporary lecturer)

研究指導者：　林　　守人（東海大学教授）

研究テーマ：(1)大気下における金属腐食に関する研究

j) Mr. Pongjeit　(35才, Lecturer)

Mr. Ming (37 才, Lecturer)

Mr. Chdakrit (29才, Lecturer)

以上の３名については、現在博士号の取得を目的としてImperial College(The University of London)に留学中であり、学位取得後は再びＫＭＩＴＬ機械工学科教員として勤務することになっている。現在機械工学科の常勤教員で学位を持っているのはDr. Mongkol のみであり、彼らが首尾よく学位を取得して機械工学科に復帰すれば大きな戦力になり得るものと期待される。

k) Dr.Yothin (47才,Associate Professor, Head of Control Engineering Dept.)
Dr.Jongkol (41才,Associate Professor, Assistant Rector)

研究指導者 ： 橋本　　巨（ＪＩＣＡ機械工学専門家）

研究テーマ ： (1) ステッピングモータのマイクロステップ制御に関する研究
(2) ステッピングモータの閉ループ制御に関する研究
(3) ステッピングモータの水平型ロボットへの応用に関する研究
(4) 水平形ロボットの障害物回避軌道自動生成プログラムの作成

Dr. Youthin については、研究能力が極めて高く、博士課程の学生を指導出来るＫＭＩＴＬでは数少ない教員の一人である。既に数多くの研究論文を書いており、今後も自ら高いレベルの研究を進めてゆけるものと思われる。ただし、国際的な舞台での論文発表経験に乏しいので、上記のInternational Conferenceに参加させてより高い立場から研究活動が行えるよう配慮する必要があると考えられる。Dr. Jongkol についても同様である。

2) 研究論文発表の推移

研究活動の活性化を評価する最大の目安は、専門学術雑誌等に掲載された論文数および学会での講演発表数であり、これはアカデミックフィールドにおける世界共通の認識である。そこで、本プロジェクト発足時より最終年度に至るまでの総発表論文を論文のグレード別に分けて整理し、これに基づいてＫＭＩＴＬ機械工学科における研究活動の活性化の現状につき検討してみる。

機械工学科における研究論文発表数の推移を表４．16に示す。ただし、1992年度については審査中あるいは投稿予定も含めた見込みの数であることを断わっておく。

表４．１６　ＫＭＩＴＬ機械工学科における発表論文数の推移

年　度	1988	1989	1990	1991	1992	合計
国際的ジャーナル（大学紀要を含む）	0 (0 %)*	0 (0 %)	0 (0 %)	1 (5.9%)	17 (100 %)	14
国際的カンファレンス論文	0 (0 %)	0 (0 %)	2 (13.3%)	7 (41.2%)	6 (35.3%)	13
タイ国内ジャーナル	0 (0 %)	0 (0 %)	2 (13.3%)	1 (5.9%)	2 (11.8%)	2
タイ国内カンファレンス	4 (21.1%)	7 (43.8%)	13 (86.7%)	12 (70.6%)	15 (88.2%)	39
論　文　数　合　計	4 (21.1%)	7 (43.8%)	17 (113.3%)	21 (123.5%)	40 (235.3%)	89
教　官　数＊＊＊	19	16	15	17	17** (21)	－

注*　括弧内の数字は発表論文数を海外留学者を含めた全教官数で割って百分率表示したもの（論文発表率）で、研究活動の質をより実質的に表している。

注**　1992年度６月に４名の新規教官の採用があったが、これらの教官は実質ＫＩＭＴＬの研究活動に従事していなかったので、教官数から除外している。新規採用を含めた教官数は21名。

注***　教官数には機械工学科の全教員の他に制御工学科のメカトロニクス専攻の３名の教官を含む。

本プロジェクト発足当時、ＫＭＩＴＬの知名度はタイ国内で相当高かったにも拘わらず、教官のレベルは機械工学科を有するタイ国国立大学中低いクラスであると言われていた。1988年度の論文発表数がこの事実を如実に示している。しかしながら、表４．16から明らかなようにプロジェクトの進行とともに発表論文数および論文発表率が飛躍的に向上してきており、現時点では既に研究分野においてタイ国を代表する機械工学科に育ってきたと断言できよう。

なお、発表論文数の飛躍的な向上の理由として以下の点が挙げられる。

1)　機械工学科の教官の中では最も研究能力の高いMongkol 学科主任と専攻を同じくする、橋本長期専門家が直接研究指導し、さらに論文執筆の指導を重点的に行ってきた。

2)　多数の東海大学機械系教員が短期専門家として複数回にわたって来タイし、１名のカウンターパートに対して短期専門家１名が指導に当たるという形で、全教官が

それぞれ独自に設定された研究テーマのもとマンツーマンで密度の高い指導を受けることができた。また、カウンターパート研修を６ヵ月～12ヵ月間それぞれの研究指導者（短期専門家）の所属先である東海大学機械系学科で実施することができた。なお、飯島前長期専門家（東海大）が任期終了語もカウンターパートの面倒を見ている。

3) Mongkol 学科主任らの研究発表数が増えるにつれ、他の教官の間にも論文発表に対する競争意識が芽生えてきた。

4) プロジェクト前半で各教官の実験室を充実整備し、供与機材を効率的に配備したことが功を奏して４年生の卒業研究が活発化してきた。また、これと前後して教官サイドも卒業研究指導に情熱を持つようになってきた。

研究の活性化を目標としたプロジェクト後半の技術指導の効果が如実に現れて、論文としては最もグレードの高いレフェリー付の専門学術論文誌への投稿が著しく増している。

特に、機械工学分野では日本で最も権威のある日本機械学会論文集の厳しい審査に通り、既に掲載済み、あるいは掲載決定となった論文が３編あることは特筆に値する。

表４．18に研究論文の一覧を示す。

これらは言うまでもなく、いずれも最新技術に関する研究論文である。

また、表４．17およびグラフに見られるごとく、タイ国内でも発表論文数はこの５年間で飛躍的に増加し、その内容においても誇るべきものがある。このことは、専門家および研究員からのヒヤリングによってもその意欲が認められ、従って、本プロジェクトの成果は十分に挙がったものと評価する。

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表４．１７　Number of papers presented at
Thai Mechanical Engineering Conference

(i)

Name of University	1988	1989	1990	1991	1992
KMITL	2	5	5	11	13
KMITT	2	3	14	4	4
Chulalongkorn	9	2	3	2	2
Kasetsart	2	0	4	0	2
Khon Kaen	1	1	3	1	2
Others	3	5	1	17	3
	19	16	30	35	26

(10)その他の活動

下記に示すように最新技術に係わる講座やセミナーとして、ＣＮＣ（フライス・放電加工）工作機械セミナーは幅広くタイ国高専の教員を対象に２回開催し、いすず自動車寄付講座も２回開催した。更にメカトロニクスを含む機械工学セミナーも行い、プロジェクトを通して得られた研究成果を大学や企業など社会に還元した。

表４．１８　開催された講座・セミナー

講座・ｾﾐﾅｰ名	日　時	内　容	講　師	対　象	参加者
①ＣＮＣ工作機械セミナー	1991/ 2/12- 1991/ 2/13	CNC 工作機械	ＫＭＩＴＬスタッフ	高専教員	16名
②いすゞ自動車工学寄付講座	1991/ 7/17- 1991/ 8/ 2	自動車工学	いすゞ自動車スタッフ	教員、学生	50名
③放電加工セミナー	1991/11/18	放電加工機	㈱ｿﾃﾞｨｯｸｽﾀｯﾌ	学生	50名
④いすゞ自動車工学寄付講座	1992/ 8/ 6- 1992/ 8/ 7	自動車工学寄付講座	いすゞ自動車スタッフ	学生	40名
⑤機械工学セミナー	1992/ 8/10- 1992/ 8/13	研究発表(ﾒｶﾄﾛﾆｸｽを含む)	KMITLｽﾀｯﾌ専門家他	他大学、企業など	40名

1）　ＣＮＣ工作機械セミナーの日程と内容

日　時	時　間	内　容	講師
1991/ 2/12	9:30-10:00	開会式	Dr.Somkiat（工学部長）
	10:00-12:00	CNC 工作機械概説	Dr. Jongkol
	13:00-16:00	CNC 工作機械ﾌﾟﾛｸﾞﾗﾐﾝｸﾞ	Dr. Mr. Thavee
1991/ 2/13	10:00-16:00	ＣＮＣフライスと放電加工機でプログラミングと加工実習	同上および学科スタッフ
	16:00-16:30	閉会式（終了証書授与）	Dr. Somkidat

2）　放電加工セミナーの日程と内容

日　時	時　間	内　容	講師
1991/11/18	9:00-10:20	金型加工を支える放電加工技術	㈱ｿﾃﾞｨｯｸ　（大野秀生）
	10:40-12:00	放電加工における基礎知識	同上
	13:00-14:30	最新の放電加工機	同上
	15:00-16:00	実際の加工実例	同上

3)　いすゞ寄付講座＜自動車工学＞の日程と内容

		講　　師
1991/ 7/17	基調講演 自動車工学概論	小池貞光（いすゞ中央研究所会長） 岡田健治（いすゞ中央研究所取締役）
1991/ 7/18	ディーゼルエンジン	岡田健治（いすゞ中央研究所取締役）
1991/ 7/19	ガソリンエンジン	同　　上
1991/ 7/22	Production Planninig 工場見学	伊藤康憲（タイ国いすゞ技術センター所長）
1991/ 7/23	車体設計	小野令三（いすゞ自動車 IDS推進室長）
1991/ 7/24	自動車材料	北原　孝（いすゞ中央研究所車両研究部長）
1991/ 7/25	自動車性能	同　　上
1991/ 7/26	試験及びデータ解析	同　　上
1991/ 7/29	強度・信頼性など 工場見学	同　　上
1991/ 7/30	操縦性・運転性能	同　　上
1991/ 7/31	カーエレクトロニクス	同　　上
1991/ 8/ 1	生産技術	山崎嘉彦（タイ国いすゞエンジン製造社長）
1991/ 8/ 2	品質管理・製品精度	上月秀俊（タイ国いすゞ自動車社長）

4）　いすゞ寄付講座（自動車工学）の日程と内容

日　時	時　間	内　容	講師
1991/ 8/ 6	9:30-10:00	開会式	Dr.Somkiat（工学部長）
	10:00-12:00	ガソリンエンジン	岡田健治（いすゞ取締役）
	13:00-15:30	ディーゼルエンジン	同上
1991/ 8/ 7	9:30-12:00	車体・操縦性その他	北原　孝（いすゞ部長）
	13:30-15:30	試験・データ解析	同上
	15:30-16:00	閉会式	Dr.Somkiat

前年度（上述３）にひきつづきタイ国イスズ・グループより自動車工学に関する寄付講座の申し出があり、８月６、７日の両日機械工学科の４年生を対象に前述の表４．３に示す内容にしたがって実施した。講義は自動車工学の中核をなすエンジン並びに車体に関して行われたが、講師の岡田健治氏（いすゞ取締役）と北原孝氏（いすゞ部長）はいづれもこの分野で日本の第一人者であり、基礎から最近の開発動向に至る興味深い内容につきテキスト、ＶＴＲなどを駆使しながら講義して頂いた。そのテキスト講義資料（ビデオ等）はＫＭＩＴＬに寄贈された。

またいすゞ側より、プロジェクト終了後引続きＫＭＩＴＬ機械工学科において特別講座、および研究助成の寄付をして頂ける旨の申し出があり、本プロジェクトを通じてＫＭＴＬ機械工学科に産学共同の望ましい体制を確立することができた。

5）　機械工学セミナーの日程と内容

10（月）セミナー 9:30-10:00 参加登録 10:00-10:30 オープニング・スピーチ Dr.Pairash（KMITL 学長） 10:30-10:45 コーヒーブレーク 10:45-11:30 基調講演 橋本　巨（JICA専門家） 11:30-12:00 流体工学における可視化技術 青木克己（東海大） 12:00-13:00 昼　食	13:00-14:00 招待講演 機械のコンピュータ制御 Dr.Viboon,S.(Chula大) 14:00-15:15 内燃機関 飯島敏雄（東海大） Mr.Attason & Mr.Tawachai（KMITT） (14:30-14:45 コーヒーブレーク) 15:15-16:15 ロータ・ダイナミクス 橋本　巨（JICA） Dr.Mongkol(KMITL)
11（火）セミナー 9:30-11:00 自動車用エンジン開発の最近動向 岡田健治（いすゞ取締役） 11:30-11:10 コーヒーブレーク 11:10-12:10 車体開発の最近の動向 北原　孝（いすゞ部長） 11:10-13:00 昼　食	13:00-13:30 招待講演 NGF エンジンの着火技術 Dr.Somchai, J(KMITT) 13:30-14:30 騒音制御 Mr.Akradech, S(KMITT) 村上俊太郎（東海大） 14:30-14:45 コーヒーブレーク 14:45-15:45 自動車用材料 Mr.Pornsak, A(KMITL) 林　守仁（東海大） 15:45-16:45 材料の強度と生産加工 Mr.Somchai, N(KMITT) Mr.Thavee, T(KMITL)
13（木）セミナー 9:30-11:00 メカトロニクス 落合康住（東海大） Dr.Yothin & Dr.Jongkol(KMITL) 11:00-11:15 コーヒーブレーク 11:15-11:45 メカトロ機器の デモンストレーション 11:45-12:15 招待講演 ナチュラルガスの自動車用エンジンへの適用 Dr.Bundit, F(KMITN) 12:15-13:00 昼　食	13:00-13:30 招待講演 ナチュラルガスの利用技術 Dr.Pipon, B（カセリート大） 13:30-14:00 エポキシ材料の衝撃破壊強度 Mr.Chakrid, V(KMITL) 14:00-14:15 コーヒーブレーク 14:15-14:45 セミナー終了の挨拶 Dr.Somkiat,S(KMITL工学部長) 14:45-16:45 KMITL 機械工学科実験研究室見学 (KMITL機械工学科若手教官、技術職員、大学員学生)

（司会：　Mr.Supasit, L(KMITL), Dr.Mongkol, M.(KMITL 機械工学科主任)

(11) 以上をまとめてアウトプット目標の年次達成の状況を表３－１６に示す。

表３．１６　アウトプット実績　　機械工学分野

活動	予算年度	1988年	1989年	1990年	1991年	1992年
	月	4 7 10 1 3	4 7 10 1 3	4 7 10 1 3	4 7 10 1 3	4 7 10 1 3
教育関係	4.カリキュラム	実験実習、設計図等を中心にｶﾘｷｭﾗﾑ見直し	新ｶﾘｷｭﾗﾑ実施 1年生	2年生	3年生	4年生
	5.大学院ｶﾘｷｭﾗﾑ	ｶﾘｷｭﾗﾑ作成	大学省申請		大学院修士課程発足	
	6.教科書作成	10タイトル	出版	7タイトル出版	3タイトル	出版 10タイトル（執筆中）
	7.ｾﾐﾅｰ及び寄付講座			CNCｾﾐﾅｰ	寄付講座 EDMｾﾐﾅｰ（自動車工学）	機械工学ｾﾐﾅｰ他
研究関係	8.研究発表	国内ｼﾝﾎﾟｼﾞｳﾑ２件 学会誌を含む論文数２編	国内ｼﾝﾎﾟｼﾞｳﾑ５件 学会誌を含む論文数５編	国内ｼﾝﾎﾟｼﾞｳﾑ５件 学会誌を含む論文数７編	国内ｼﾝﾎﾟｼﾞｳﾑ11件 学会誌を含む論文数18編	国内ｼﾝﾎﾟｼﾞｳﾑ —(2件) —(3件) 国内ｼﾝﾎﾟｼﾞｳﾑ (13件) (2件) 学会誌を含む論文数40編
	9.教官別実験室の設置		11実験室の設置（各教官に１実験室の割当）			
	10.産学共同研究体制の確立（助成金等）				研究助成６テーマ（助成金額 220万円	＋東海大大学院留学費用＋機材供与）

４－２　物的・技術的自立発展性の見通し

本プロジェクト（機械工学分野）に対するＪＩＣＡ以外からの支援状況について

研究資金の調達状況は以下のごとく公的機関のみならず、民間企業の助成金も取得しており、資金の面でも自立発展を目指している。

(1) 助成金関係（1990～）

KMITL 機械工学科では長期専門家の斡旋で現在民間企業４社より表４．19に示す研究助成を受けている。これらの研究助成の多くは卒業研究に組み込んで利用されており、KMITL 機械工学科の研究の活性化に大いに役だっている。

なお、研究助成に関しては、NRCT, NECTECなどの公的な助成金を獲得出来るようになることが、学科の発展を目指す上でより重要である。

これまでは機械工学科のごく少数の教官がこのような公的研究助成金を獲得しているに過ぎなかったが、本年度はプロジェクトの最終年度であり、各教官の研究業績も前述のごとく相当挙がってきたことから、機械工学科のなるべく多くの教官が公的助成金に応募するよう指導が行われた。

表４．１９　民間企業による研究助成の現状

企業名	助成対象者	研究テーマ	助成内容
タイ国いすゞグループ㈱	Chinda C. (Lecturer)	内燃機関のシリンダ内部流れに関する研究（東海大学修士論文）	留学費用
	Attason S. (Lecturer)	ディーゼルエンジンの排ガス特性に関する研究	50,000 B ＋エンジン供与
	Akradech S. (Assist. Prof.)	消音器の音響特性に関する研究	50,000 B
ソデック㈱	Thavee. T. (Assist. Prof.)	EDM加工における表面粗さに関する研究	100,000 B
ミネベア㈱	Mongkol M. (Assist. Prof.)	ミニチュアベアリングで支持された回転軸系の振動に関する研究	120,000 B ＋機材供与
	Yothin P. (Assist. Prof.)	ステッピングモーターの制御に関する研究	110,000 B ＋機材供与
イズミピストン㈱	Pornsak A. (Assist. Prof.)	アルミ合金の耐熱疲労強度に関する研究	機材供与

表４．２０　Research Funds

Budget Source	1888／1989	1989／1990	1990／1991	1991／1992	1992／1993	Total
Thai Government		140,000 (1)				140,000 (1)
Isuzu Motors Co.,Ltd.			1,300,000 (2)	100,000 (1)	200,000 (1)	1,600,000 (4)
Sodick Co.,Ltd.			2,600,000 (1)			2,600,000 (1)
Minebea Co.,Ltd.				240,000 (2)		240,000 (2)
Thai-Asean Research Fund					200,000 (1)	200,000 (1)
Total		140,000 (1)	3,900,000 (3)	340,000 (3)	400,000 (2)	4,780,000 (9)

(Research Topics)

① Thai Government
FY1989/1990
1) Computer Control of Water-Level in Two Connected Tanks System — 140,000 Bt — Dr. Mongkol

② Isuzu Motors Co., Ltd.
FY1990/1991
1) Automotive Engineering — 100,000 Bt — Mr. Attason
2) Internal Combustion Engine — 1,200,000 Bt — Mr. Chinda
FY1991/1992
1) Automotive Engineering — 100,000 Bt — Mr. Attason
FY1992/1993
1) Automotive Engineering — 200,000 Bt — Automotive Staff

③ Sodick Co., Ltd.
FY1990/1991
1) Optimum Parameter of EDM Wire Cut — 100,000 Bt — Mr. Thavee
2) EDM Wire Cut Machine — 2,500,000 Bt — Mr. Thavee

④ Minebea Co., Ltd.
FY1991/1992
1) Vibration in Small Ball Bearing — 120,000 Bt — Dr. Mongkol
2) Closed Loop Control of Stepping Motor — 120,000 Bt — Dr. Yothin

⑤ Thai-Asean Research Fund
FY1992/1993
1) Wind Velocity Measurement at High Altitude in Thailand — 200,000 Bt — Dr. Mongkol

(2) 次世代を担う若手教官の育成状況

以上報告したように KMITL機械工学科の研究活動は本プロジェクトを背景に急速に活性化してきたが、この状況を維持しつつ本プロジェクト終了後も学科を発展させて行くためには、独立して研究活動をおこない、かつ質の高い研究業績を生み出し得る若手教官の育成が急務である。

現在機械工学科教官の大半が40才以上と比較的高齢であり、また２年前までは研究能力の高い教官の流出（より給与の高い私立大学への転職など）が止まらず憂うべき状況であった。さらに、博士号を有する教官の確保も将来研究活動の中心的存在になるべき大学院課程の充実発展のために必要不可欠である。これら２つの重要問題に対して、本長期専門家のアドバイスを参考にしつつ Mongkol学科主任らにより現在下記のような対策がこうじらえている。

- 新規教官の採用（学部新卒者３名および大学院修士課程終了者１名）。なお３名の学部新卒業については来年度アメリカの大学院（修士・博士）へ国費留学させる計画である。なお専門は Robotics, Thermal Engineeringなどを予定している。
- 機械工学科最年少教官（24才、昨年度採用）を来年度アメリカの大学院へ国費留学させ修士・博士の学位を取得させる計画である。なお専門はDesign Engineeringの予定である。
- 現在タイ国イスズグループ㈱の奨学金により東海大学大学院に留学中の教官（24才、昨年度採用）については帰国後自動車工学関係の教育研究に当たってもらう計画である。
- 現在英国ロンドン大学（インペリアル・カレッジ）へ３名の教官が留学中（いづれも博士号取得を目的）であり、来年度以降継続的に帰国して教育研究に当たる予定である。

表５．１は以上の措置をまとめたものである。表からわかるように、近い将来には外国の大学院で高度な訓練を受けた９名（博士６名、修士３名）の若手教官（20代が中心）が機械工学科に復帰することになり、本プロジェクトの成果（研究遂行上のノーハウ、実験室・機材などの設備、学科運営上のノーハウ、民間企業との協力関係）を受け次いでこれを有効に活用しつつ学科の発展に大いに貢献するものと期待される。

なお、現在学科の中心になって教育研究を担っている40才以上の教官（本プロジェクトのカウンターパート）についてもJSPS論博プログラム、東海大学大学院留学制度（学術協定に基づくもの）などを活用して博士号取得の機械をなるべく多く確保しておく計

画であり、本年度はPornsak Attavanich助教授が博士号取得を目指してJSPS論博プログラム（指導教員：林守仁東海大動力機械工学科教授）に応募している。

表４．２１　KMITL 機械工学科における若手教官の育成状況

No.	教官名	年　令	職　位	留　学　先	目標学位
1	Oongjait P.	36	Assist. Professor	London University Imperial Collage	Ph. D Degree
2	Chakrid W.	30	Lecturer	London University Imperial Collage	Master Degree （取得済み）
3	Ming L.	38	Lecturer	London University Imperial Collage	Ph. D Degree
4	Jaruwat C.	24	Lecturer	London University Imperial Collage	Master Degree Ph.D Degree
5	Chinda C.	24	Lecturer	東海大学大学院 修士課程	Master Degree
6	Chinnaruk T.	24	Lecturer	USA Graduate School （1993年度国費留学決定）	Master Degree Ph. D Degree
7	Unnut P.	25	Lecturer	USA Graduate School （1993年度国費留学 検討中）	Master Degree Ph. D Degree

５．大学の実施運営体制

５－１　自立発展性の見通し

５－１－１　組織的自立発展の見通し

(1) 組織機構

ＫＭＩＴＬの組織機構は表１のとおりとなっており５学部（工学部、建築学部、産業教育学部、理解部、農業技術部）と大学院、センター等から成っている。

5学部の学科構成は以下のとおり。

◎工学部
- 工学技術学科
- 建築技術学科
- 工業計測学科
- 農業技術学科
- コンピュータ学科
- 機械工学科
- 通信工学科
- 電気工学科
- 制御工学科
- 電子工学科

◎建築学部
- 工業デザイン学科
- 建築学科
- 建築インテリア学科
- コミュニケーションアート・デザイン学科

◎産業教育学部
- 産業社会科学科
- 言語・社会科学科

◎理学部
- 数学・コンピュータ学科
- 科学科
- 応用生物学科

◎農業技術学部
- 農業技術学科
- 種苗生産学科
- 家畜生産学科
- 農業経営学科
- 産業生産学科

なお、本プロジェクト実施中は、ＫＭＩＴＬ学長がプロジェクトの長としてプロジェクト実施の全体責任者に、電気通信・放送工学・データ通信・機械工学に関連する学部長が、センター長、及び学科責任者が各々の分野の直接的責任者となった。

(2) 教官、学生数

ＫＭＩＴＬは組織的発展および、タイ社会の技術者への需要増大により別表２に見るごとく、特に学生数が顕著に増大している。

以上組織の機構および規模からみてもＫＭＩＴＬはしっかりとしておりレベル的にも、特に工学部はタイ国内でもトップレベルの国立大学と表され、卒業生への就職先からの評価は高い（資料３：「主な就職先へのインタビュー結果」参照）。このように組織的に自立発展性は充分あると判断し得るが、教官の質のみならず量を増やし、合わせて定着性を高めることが必要と言うのが日タイ相方の一致した見解である。

５－１－２　財務的自立発展性の見通し

大学の歳入財源としては、政府予算（大学省）と学生の授業料がある。表３にあるとおり、財務的には近年、殊に伸びを示している。

大学省の予算は、大別して経常経費（運営費）と投資予算がある。大学省による運営費は、人件費・物品費・機材費で構成されているが、物品費は４年生の卒論研究実施費であり、予算上スタッフの自由研究に配布される物品費はない。また機材費は学科に必要な測定器や教育用機材に充てられ、特殊かつ高度な研究材料の購入はほとんど不可能である。

また、学生の授業料をプールした大学運営費の運用は大学に任されており、大学の建物・施設の整備や対外活動に使われているが、研究活動の支援にはあまり使われていない。

つまり、大学の設備、学生の教育という側面からみれば財務的問題は見受けられないものの、教官の研究費はスタッフが自分自身で確保せざるを得ない状況にある。彼らは、

・National Research Council of Thailand (NRCT)

・National Electronic and Computer Technology Center (NECTEC)

等の政府助成金のほか、企業との共同研究等によって研究費を確保している。本プロジェクトの協力目標の一つである、研究の推進を今後もはかるためには、技術的な面以外に、財政面での自助努力を期待する。

なお、本プロジェクトの協力期間中、ＤＴＥＣは表４のとおり本プロジェクトのために予算を支出しプロジェクトの円滑な推進に貢献した。

表1　Project Organization Chart

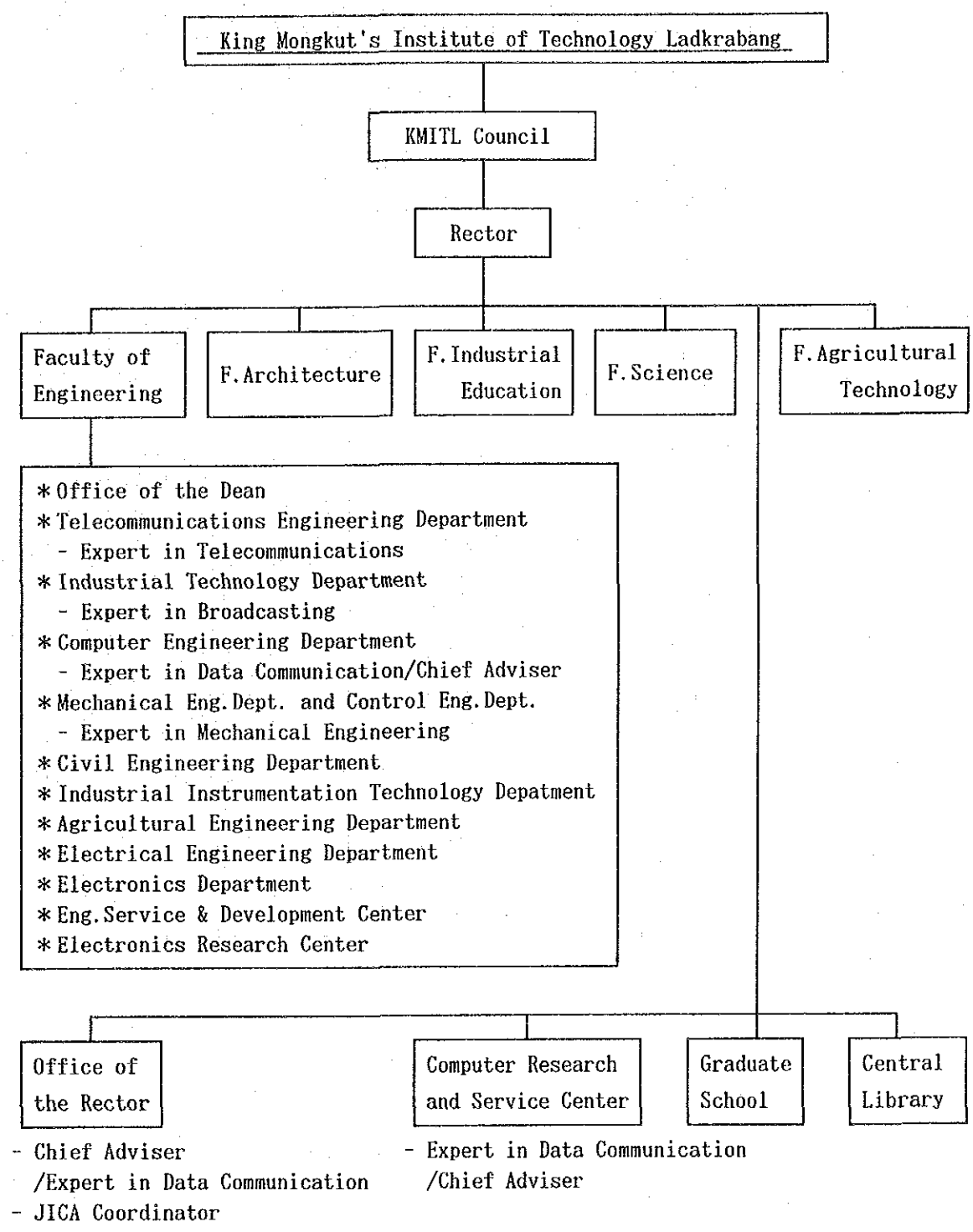

表2 Trend of Number of Students and Staff Since 1961

Academic Year	Number of Students	Number of Teaching Staff	Number of Administrative. Staff
1961	23	20	—
1962	50	22	—
1963	85	23	—
1964	110	26	—
1965	135	28	—
1966	141	28	—
1967	154	29	—
1968	215	30	—
1969	357	32	—
1970	457	38	—
1971	515	46	—
1972 *	909	127	—
1973	1008	138	—
1974	1094	160	—
1975	1099	174	—
1976	1103	192	—
1977	1115	207	12
1978 **	1156	214	16
1979	1274	224	66
1980 ***	1964	285	91
1981	2124	302	123
1982	2425	337	141
1983	2762	342	152
1984	3030	354	169
1985	3566	368	190
1986	4263	364	217
1987	3987	399	230
1988	4416	415	271
1989	5070	428	269
1990	5688	468	288
1991	6390	466	304
1992	6928	492	346

Notes: * Faculty of Architecture joined KMITL.
** Faculty of Industrisl Education and Science was established.
*** Faculty of Agricultural Technology joined KMITL.

表3　KMITL Budgets (1968-1992)

Fiscal Vear	(1) Operation Budget	(2) Investment Budget	Total (Million Baht)
1968	0.97	—	0.97
1969	1.07	—	1.07
1970	1.18	—	1.18
1971	1.43	—	1.43
1972	1.70	6.00	7.70
1973	3.45	0.11	3.56
1974	3.96	8.42	12.38
1975	4.23	3.12	7.35
1976	5.66	7.38	13.04
1977	7.17	5.77	12.94
1978 (3)	16.30	10.48	26.78
1979 (4)	17.57	15.79	33.36
1980 (5)	25.20	28.15	53.35
1981	39.92	59.19	99.11
1982	39.45	70.01	109.46
1983 (6)	53.82	20.03	73.85
1984	61.06	21.78	82.84
1985	63.55	22.24	85.79
1986	63.73	44.55	108.28
1987	69.23	48.36	117.59
1988	79.09	20.50	99.59
1989	95.11	34.68	129.79
1990	123.00	71.91	195.00
1991	157.12	165.50	322.62
1992	187.85	194.14	381.99

Notes: 1) Operation budget includes salaries, wages and materials.
2) Investment budget includes equipment and building expenses.
3) The budget of the Faculty of Architecture is included.
4) The budget of the Faculty of Industrial Education and Science is included.
5) The budget of the Faculty of Agricultural Technology is included.
6) The budget of the Computer Research and Service Center is included.

表４　DTEC Budgets for the Expansion Project (1988-1922)

(September 1992)

	1988	1989	1990	1991	1992
Materials					
Oil	71,200	104,400	101,400	116,800	79,550
Car Repair	10,000	15,000	15,000	15,000	13,330
Car Spare Parts	5,000	10,000	10,000	10,000	10,000
(Total)	(86,200)	(126,000)	(126,400)	(141,800)	(102,880)
Employments					
Secretary's Salary	177,000	312,000	336,500	354,000	391,000
Driver's Salary	67,800	114,000	152,750	159,800	128,250
(Total)	(244,200)	(426,000)	(489,250)	(513,000)	(519,550)
Personnel					
Accmmodation	240,000	360,000	360,000	360,000	340,000
(Total)	(240,000)	(360,000)	(360,000)	(360,000)	(340,000)
TOTAL	517,000	912,400	975,650	1,014,800	962,430

５－３－１　ＫＭＩＴＬの将来構想

ＫＭＩＴＬはさらに教育、研究活動を拡充するにあたって以下のような将来構想を有している。

① タイおよび近隣国の社会・経済的発展に資するため、科学技術分野での人的資源を育成する。

② 科学技術分野の中で電気通信および情報工学を核としてゆきたい。

③ 卒業生の数および質の両面を向上させてゆく。また教育研究のレベルを国際的に通用するものにさせる。

④ 成功の鍵となる教官の育成・支援を考えてゆく。

IV．評価結果総括

1．評価の総括

ア．ＫＭＩＴＬの教官の質・量定着状況及び予算措置等に関し、大きな問題は見当らず、日本側として、これまでのタイ側の対応を高く評価出来る。

イ．タイ側としても、日本側のとった専門家派遣、研修員受入、機材供与等の必要な措置を高く評価している。

ウ．Ｒ／Ｄに書かれている目標を十分に達成しているものと認められる。

1－（1）　目標達成度

ア．教育活動

(ｱ) カリキュラム開発はタイ側産業界のニーズに照らし、教官自身により、適宜、柔軟に変更・改良が加えられている。

(ｲ) 卒業生は理論のみならず、実技に秀でていると、タイ産業界において高く評価されている。

(ｳ) 卒業生の就職率はほぼ 100%に達しており、工学部の新入生の入試成績は、チュラロンコン大学と並びタイにおいてトップレベルにある。

(ｴ) 供与機材は整然と管理され、有効に活用されている。また、これらの維持・管理についても、自身の手で、問題なく行っている。

イ．研究活動

(ｱ) 研究論文発表数・内容とも年々充実してきている。また、機械工学分野においては、技術開発にともない新しい講座を開設している。

(ｲ) 国際学会シンポジューム等で、Ｃ／Ｐが発表するケースもみられるようになっている。

1－（2）協力効果の広がり

ア．例えば、電気通信分野では「第三国研修」を行い、また機械工学分野では「ＣＮＣ工作機械セミナー」をタイ高専の教員を対象に行うなど、協力の効果はＫＭＩＴＬ内部にとどまることなく、広く外部へも波及している。

1－（3）　自立発展

ア．C／Pの学位取得が進んでいる。

ただし、優秀なC／Pの定着、確保を考えた場合、民間との給与格差の是正が、今後の大きな課題と認められる。

イ．第7次国家開発計画に則り、KMITLの組織改革・拡充が着実に進められている。

ウ．KMITLの予算はこれまで組織の拡充とあいまって、着実に増加している。

ただし、今後十分な研究費を以下に確保していくかが課題である。

2．在バンコク・プロジェクト関係者の見解

（1）DTEC

ア．これまでの長年に亘るわが方の協力を感謝するとともに、本プロジェクト協力終了後も、何らかの型でわが方の協力を継続するよう希望している。

イ．ただし、どのような分野、どのような形態による協力を継続するのかは、わが方の出方をうかがっている感がある。

（2）大学省

ア．これまで30年におよぶわが方の協力がKMITLの発展に大きく寄与したとして高く評価している。

イ．KMITLに対するタイ産業界の期待は益々高いものとなっている。

（3）在バンコク日本大使館

ア．本プロジェクトはタイにおけるわが方技術協力の代表的なものである。

イ．これまで永年かけて育ててきたプロジェクトであり、ここにきて日本側がKMITLに対し全面的に協力を止めてしまうことは、他の先進国が本プロジェクトを横取りすることにもなりかねず、好ましくない。

ウ．Kosol 前学長の後を継いだ Pairash新学長が考えるKMITLの将来構想を聞き出し、何らかの型で今後わが方が同構想実現に向けお手伝いしていくかを、JICAとして検討してほしい。

（4）JICAタイ事務所

ア．本プロジェクトはタイにおいて実施している数多くのJICAプロジェクトの中でも、とりわけ成功しているプロジェクトであると認識している。いわゆる「日本プロジェクト」の代表である。

イ．したがって、当初設定した協力目標が達成されているからといって、協力を終了す

るようなことはせず、何らかの型で協力を継続し、「日本プロジェクト」を拡充させていってほしい。

ウ．ＫＭＩＴＬは国立大学でもあり、財政的にしっかりしており、サステナビリティ上、問題が少ない。

３．教訓および提言

（１）教　訓

① この５年間の協力は成功裡に終わったと言え、ＫＭＩＴＬの教育・研究体制は強化された。しかし、ＫＭＩＴＬの成功はこの５年間の協力のみならず、30年以上にわたって日本側の協力が脈々と続けられたことによるところも大きい。

日本の技術協力は一定年限を定めて行われ、プロジェクト方式技術協力の場合、当初協力期間は最長５年間となる。相手国の自助努力を考えると、年限を区切って協力することは当然であるが、特に教育分野においては技術協力に時間を要することも事実である。

ＫＭＩＴＬに対しては、30年以上という異例の長さで、また様々な形態で協力し、それが実をむすび大きく開花した例と言えよう。

② この間、ＫＭＩＴＬ自身による努力も大きく、これなくしては日本側だけが懸命になっても今日の発展はなかった。特に、前学長Dr.Kosolの努力および政治的手腕によるところは大きい。

③ 大きな成果を上げたプロジェクトをみると必ず日本側の関係機関が大変協力的であるものだが、本件についても同様である。特に、同じ短期専門家を毎年派遣し、Ｃ／Ｐに継続的に技術移転をはかってゆく等、細かい配慮は有効であった。

また、当事業団とは別に、東海大学とＫＭＩＴＬの学術交流協定や、いすゞ自動車からの日本留学への奨学金等の支援も大変重要な意味を持っている。

（２）提言および要望

① 日本側はプロジェクトの終了後も引き続きタイ側が、ＫＭＩＴＬの活動を持続させ強化してゆくために最善の努力をするよう申し入れた。特に教官を増員・定着させてゆくこと（そのためには給料の見直し）、研究費を確保してゆことは重要である。

② タイ側は前章５－１－３のＫＭＩＴＬの将来構想を実現させるため、新たに日本側プロジェクト協力を要請したいと考えているが、それに先立ち、個別専門家にコンサルテーションをお願いしたいとのことであった。

③ 情報工学の新設を効果的に行うためにＪＩＣＡによってこれまで行われてきたようなサポートをタイ側は要請したいとのことだった。

④ またタイ側はアフターケア協力にも関心を示したので、調査団はアフターケアについて概略説明を行った。

4．所　感

（1）ＫＭＩＴＬへの建学以来の協力は、わが国の最も成功したプロジェクトの一つとして高く評価出来る。

これは、日・タイ双方の関係者がたゆまぬ努力を行ったことと、及び30年という長い期間、継続して協力が行われてきたことによるものである。

（2）今回の評価結果に基づき、1988年４月からはじまった５ヶ年間のプロジェクト方式技術協力に明年３月終止符が打たれることになるが、これまでに ALL JAPANとして育ててきたＫＭＩＴＬに対し、今後も「日本プロジェクト」として何らかの型で継続協力していく意義は大きいと考える。

（3）これまでのわが方の協力によってＫＭＩＴＬは一定レベルに達しているところから、今後の協力に当っては、わが方の協力機関の選定あるいは協力分野の十分な絞り込み等が、重要になるものと思われる。

（4）新学長によるＫＭＩＴＬの「将来計画」がわが方にプロポーズされており、出来うれば、個別専門家等によって今後１～２年時間を掛けてプロジェクト形成をしていくことが望まれるところである。

（5）現在、行われている第三国研修（研修事業部）はこれまで行われたわが方の強力なかんずく本プロ技協の成果を広く波及させる意味で極めて有効に機能しており、かつ、新学長の将来構想の一つでもある「KMITL のRegionalな役割」にも合致しているところから、プロ技協終了後においても引き続き、継続実施されることが切望される。

（6）現在、本プロジェクトとは別に実施されている東海大学等とＫＭＩＴＬの学術交流は、有意義なものと認められ、今後更なる拡大が期待される。

＜付属資料＞

1．ミニッツ（EUALUATON　REPORT）

2．Ｊｏｉｎｔ　Ｃｏｍｉｔｔｅｅ　資料
(The Report for the Fifth Joint Comittee)

3．ＫＭＩＴＬ卒業生の主な就職先へのインタビュー結果

1．ミニッツ（EUALUATON REPORT）

MINUTES OF MEETINGS
BETWEEN
THE JAPANESE EVALUATION TEAM
AND
THE AUTHORITIES CONCERNED OF
THE GOVERNMENT OF THE KINGDOM OF THAILAND
ON
THE JAPANESE TECHNICAL COOPERATION
FOR
THE EXPANSION PROJECT OF KING MONGKUT'S INSTITUTE OF TECHNOLOGY LADKRABANG

The Japanese Evaluation Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Norinobu Hayashi visited the Kingdom of Thailand from 18 November to 26 November 1992, for the purpose of evaluating the Expansion Project of King Mongkut's Institute of Technology Ladkrabang (hereinafter referred to as "the Project"), as agreed in the Record of Discussions signed on 15 December 1987 between the Thai side and the Japanese side.

During its stay in the Kingdom of Thailand, the Team had a series of discussions with the Thai authorities concerned on the progress and evaluation of the Project.

In conclusion, both sides reaffirmed that the implementation of the Project has made significant contribution and agreed to report on the results of the evaluation to their respective governments as referred to in the attached document.

Bangkok, 25 November, 1992

林 典伸

Mr. Norinobu Hayashi
Leader
Evaluation Team
Japan International Cooperation Agency

P. Thajchayapong

Dr.Pairash Thajchayapong
Rector
King Mongkut's Institute
of Technology Ladkrabang
The Kingdom of Thailand

ATTACHED DOCUMENT

I .INTRODUCTION OF THE PROJECT

1.Project Background

Upon the request for the technical cooperation of the Thai Government, the Japanese Government through JICA dispatched the Preliminary Survey Team and the Technical Survey Team in March and in September 1987 to conduct the study for the needs and the situation of King Mongkut's Institute of Technology Ladkrabang (KMITL). As the results of this survey, the necessity for technical cooperation had been confirmed by the Japanese Government.

In this connection, The Japanese Implementation Survey Team was dispatched in December 1987 in order to have further discussion with the Thai authorities concerned regarding the contents of the Project, and subsequently based on mutual consent, the Record of Discussions (R/D) has been signed by both sides. The cooperation period of the Project was decided to be for five (5) years from 1 April, 1988 to 31 March,1993.

2.Project Objective

The objective of the Project is to promote and strengthen education and research activities in the fields of Telecommunications, Broadcasting, Data Communication and Mechanical Engineering in KMITL, and thus to contribute to the development of above-mentioned fields in the Kingdom of Thailand.

II .OBJECTIVE AND METHODOLOGY OF EVALUATION

1.Objective

(1)To make overall review of the inputs and the results of the Project performance so far obtained since the beginning of the Project.

(2)To make a comprehensive evaluation on the achievements in line with R/D of the Project, on the impact of the Project and on the expected sustainability.

(3)To feedback the results of the evaluation for the improvement of formulation and implementation of technical

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cooperation project in the future.

2.METHODOLOGY

(1)Materials used as Reference

In order to evaluate the past performance and achievements both qualitatively and quantitatively, the following materials are used as a basis of reference:

- The Record of Discussions
- The Tentative Schedule of Implementation
- The Minutes of Discussions agreed by both sides in the process of the implementation of the Project
- The Report for the Fifth Joint Committee Meeting
- Others

(2)Discussion and Observation

The both sides evaluated various aspects of the Project through discussions among the members in Appendix 1, and also observed the provided machinery and equipment how they are utilized effectively and maintained properly.

Ⅲ .INPUTS

1.Cooperation from the Japanese Side

1.1 Dispatch of Japanese Experts

(1)Long-term Experts

One long-term expert each in the four fields mentioned in R/D and a project coordinator have been stationed during the project. The dispatch of experts was made on schedule.

Details of the dispatch of long-term experts are in Appendix 2.

(2)Short-term Experts

More short-term experts than planned at the starting time of the Project have been dispatched. Ninety-four (94) short-term experts in the four fields will have been dispatched by the end of the Project.

Details of the dispatch of short-term experts are in Appendix 3.

1.2 Provision of Equipment

The total amount of machinery and equipment provided for the Project objective during the Project period has a

value of about 882 million yen. This includes the amount of provided equipment which is allocated for each expert.

Most of the provided equipment is utilized effectively and is kept in good condition in general.

The list of the provided equipment and the condition of their utility is in Appendix 4.

1.3 Training of Thai Counterparts in Japan

Thirty-five (35) Thai counterparts of the four fields received training in Japan, and three more are planned to be sent by the end of the Project.

Details of the counterparts training are in Appendix 5.

1.4 Others

(1)Local cost

As the project running cost, about 14 million yen was allocated within the cooperation period.

(2)Cost for Textbook Publication

Under the support program for textbook publication, the Japanese side provided the cost for the first printing of the newly written textbooks. The total amount of the supporting cost was about 35 million yen.

(3)Cost for Improvement of Facilities

Works of partition of laboratories and research rooms and installation of air-conditioners were assisted by budgetary support of JICA.

(4)Technology Exchange Program

Under the technology exchange program, KMITL exchanged notes with Jomo Kenyatta University College of Agriculture and Technology, and some Japanese experts and Thai counterparts visited Kenya.

(5)Japanese Missions

Several Japanese missions have been dispatched for the consultation of the implementation of the Project.

2.Measures Taken by the Thai Side

2.1 Provision of Land, Buildings and Facilities

The Thai side has provided land, buildings and facilities necessary for the Project.

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2.2 Allocation of Budget

The Thai side has allocated necessary budget to relevant departments and center and special DTEC budget for the Project as well.

2.3 Assignment of Counterparts and Other Personnel

The assigned counterparts in the four fields are as in Appendix 6. But some counterparts moved from KMITL during the cooperation period.

Secretaries were assigned for each long-term expert.

IV .OUTPUTS

Several remarkable outputs were obtained as a result of the Project activities which have been performed for the purpose of promoting and strengthening education and research in KMITL. Main and common outputs in the four fields are as below:

1.Curriculum

Curricula were revised and improved within the Project period and the present curricula are as in Appendix 7.

2.Textbooks

Thai and English textbooks published are as in Appendix 8.

3.Equipment and Facilities

Many equipment and machinery were provided from the Japanese side as mentioned before. As a result, conditions for education and research were improved.

4.Technical Papers

With the cooperation of Japanese experts, Thai counterparts have written technical papers as shown in Appendix 9.

V .RESULT OF EVALUATION

1.Telecommunications

1.1 Attainment

The modern telecommunications facilities and systems consist of digital technology instead of analogue technology.

The objective of the Project in the field of telecommunications is to enhance and improve KMITL's education and research activities in order to coincide with current technical trends of telecommunications

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engineering and social and economic demand for telecommunications engineers in Thailand.

In order to attain this purpose, both the Japanese side and the Thai side have collaborated together and expanded equipment and materials needed for education and research activities since the beginning of the Project especially in the technology of digital switching, optical fiber communication and digital microwave.

The Japanese side has provided more than the level of resource committed in R/D in terms of the provision of equipment, the number of short-term experts and the number of counterpart training in Japan. Especially in the latter half of the Project period, the resource was mainly provided into the enhancement of research activities. On the Thai side, it arranged classrooms, laboratories and a workshop, installed computer local area network (LAN) system for the Department of Telecommunications Engineering and made effort to increase the department's research budget.

The curriculum was revised in line with the technical trend of current and future telecommunications technology. In addition to digital technology in the curriculum, new subjects were developed on such topics as digital signal processing, computer communication and integrated service digital network (ISDN).

The equipment and instruments provided under the Project have been effectively used for student experiments and staff research. New experiment was also added in the Telecommunication Laboratories by utilizing them.

Writing textbooks in Thai is one of the important purpose of the Project. Thirty-five (35) textbooks were prepared or revised including laboratory guidebooks,and within those twenty-eight (28) were written in the Thai language.

Research activities are becoming more and more active each year during the Project period, and within the subjects of staff research seven (7) topics have been advised and cooperated by the Japanese experts. As the results, the number of research papers presented has increased from six (6) papers in 1988/89 to thirty-three (33) papers in 1991/92 and twenty-nine (29) papers in 1992/93. KMITL now shares about 60% of number of research papers presented at the Electrical and Electronic Conference of Thailand (EECON). The increment of total number of papers, the

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increment number of papers presented and accepted at the internationally outstanding institute of electrical and electronics technology such as Institute of Electrical and Electronics Engineering (IEEE) shows the improvement of level of research in the Department.

1.2 Impact

A survey to the companies where the KMITL graduates are working has shown that they are highly esteemed for their ability and potential by industry.

Moreover, applicants to the Faculty of Engineering of KMITL highly regard its national entrance examination results and admission proportion rank high among Thai universities, whose entrance examination is becoming more difficult each year. Especially, the number of students who select the Telecommunications Engineering Course has extremely increased since the academic year 1992/93. Based on the above, the both sides evaluate that the education in the Telecommunications Engineering Course of KMITL sufficiently meets social needs.

Since KMITL's staff plays an important role as lecturers in Third Country Training Program, which has been promoted jointly by JICA and the Thai Authorities concerned, and it has contributed to the training of telecommunications engineers in the country of Asian and Pacific area, KMITL is becoming internationally recognized for its achievements in the area and it is expected that KMITL will further develop its function from now on.

1.3 Sustainability

Counterparts have not resigned and successors to the present counterparts might be obtainable because of the recent increase in students applying to the Telecommunications Engineering Course.The professional level of the staff is also expected to rise as the number of staff with doctorate degree is expected to double in a few years.

The equipment and instruments have been operated and maintained properly and the necessary budget for their future maintenance could be also expected to be obtainable because the operating budget for the Department has been increased during the Project period based on the request from the Department. In addition, the Thai side will be able to expand the Project activities by its own expense because the Thai side has allocated the necessary budget to a considerable degree for the expansion of the Department's facilities such as in the installation of computer local area network (LAN) and the arrangement of

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laboratories. The increase in research papers and the increment of papers accepted at international journals and conferences show the progress of research activities both in quantity and quality.

2.Broadcasting

2.1 Attainment

It is considered that transfer of technology in the field of broadcasting has been attained smoothly by the advice and guidance of Japanese experts. The provision of equipment, publishing of textbooks and training of counterparts have been carried out very well according to the master plan.

The curriculum of Department of Industrial Technology has been revised substantially where it includes subjects of the rapid progress in technology, such as High Definition TV, video test signal and digital technology.

Students of the Department of Industrial Technology have progressed in technical level due to the substantial curriculum and research facilities.

Research activities in Department of Industrial Technology have been improved by the advice of Japanese experts. The number and quality of the technical papers published by the Department have increased and developed.

2.2 Impact

One of the counterparts under the advice of Japanese experts has presented his research paper in the international conference held in Korea in 1992.

Students have made a receiving system with parabolic antenna by themselves, and succeeded in receiving of TV signal from satellites PALAPA and ASIASAT. This is utilized for the graduation thesis. Thus, improvement of the technical level in this Department is remarkable.

The employment rate of graduates from KMITL is 100 % and most of them are employed in the leading enterprises in Thailand. They are highly esteemed for their ability and potential by the industries. Also entrance examination results and admission proportion of students selecting KMITL have been kept in the first-class level. This shows that the demand of the students graduated from this Department is

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extremely strong in Thailand.

2.3 Sustainability

Electronic laboratory using the provided equipment has been introduced and carried out very well, and also textbooks written by counterparts are utilized in the class usefully.

Publishing of the advanced technical papers shows that knowledge and techniques of the lecturers and students in the Department have been improved greatly.

The number of the lecturers are increasing steadily under the effort of KMITL.

3.Data Communication

3.1 Attainment

Equipment provided by the Japanese side has been operated and maintained well by the Thai side.

The development of KMITL Management Information System (KMIS) which uses the equipment has been for the most part completed and is in operation. The equipment has been used in class as well.

In order to establish the campus network and the interuniversity network, a study on connectivity between the equipment and the networks was done.

As regards to the education in the Department of Computer Engineering, the curriculum was revised to meet the technology innovation. The part-time courses were also set up to meet the demand for larger number of engineers. Beside the current master of science program in Computer Science and Information Technology, the curriculum for the master of Computer Engineering was prepared to give another program in this discipline.

Objectives and curriculum were envisaged for the Faculty of Information Technology which was authorized in the Seventh National Development Plan.

3.2 Impact

The technology of online computer network was attained by KMITL staff and it is used for the university management to alleviate routine work. It has much possibility to open the door of new development for network which facilitates education and research.

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KMITL is producing as many students as it could with the level which is matching the fast change of technology. Graduate course in this discipline is also strengthened.

3.3 Sustainability

The Thai side has attained the ability to maintain, operate and utilize the equipment. The Thai side also has enough knowledge to broaden the usage of the equipment.

It will be required for the Thai side to make best efforts and take appropriate measures to establish and develop the Faculty of Information Technology.

4.MECHANICAL ENGINEERING

4.1 Attainment

The objective in the field of mechanical engineering is to improve and to strengthen education and research activities in order to be able to contribute to the development of mechanical engineering in Thailand.

Curriculum for bachelor course students was reconsidered and improved. The most important subjects in mechanical engineering, such as mechanical engineering laboratory (experiments on mechanical engineering), mechanical drawing and machine design course, was modified and empathized as major subject in the Department of Mechanical Engineering. The curriculum for master course student was also developed. These curricula have now been implemented to bachelor course and master course students. Education of the department has been strengthened through the improvement of curricula and utilization of many newly published textbooks and provided equipment in the Project.

All staff of the Department of Mechanical Engineering started their researches with advice and cooperation of Japanese experts. Their research activities have been extremely promoted. All of them have presented their research paper in the Mechanical Engineering Symposium in Thailand since 1990. Especially, in 1992, the number of papers which were presented by the staff of the Department of Mechanical Engineering was just 50% of all papers presented in the symposium. Furthermore, many papers have been presented in international conference and have been published in international technical journals and proceedings. Research cooperation between the Department and local companies has been made in the field of auto-technology, material engineering, tribology and

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mechatronics.

New technologies, such as CAD/CAM and mechatronics are also introduced to the education of mechanical laboratory, manufacturing process as well as the joint research in both Department of Mechanical Engineering and Department of Control Engineering. These Departments have contribute to the development of mechanical engineering in Thailand through the CNC Seminar held at KMITL in 1991 for technical colleges, the Mechanical Engineering Seminar held at KMITL in 1992 for university staff and engineers in the industries in Thailand.

4.2 Impact

Activities in education and research at the Department of Mechanical Engineering have been improved very much and have been highly evaluated. Applicants to the Department of Mechanical Engineering have increased and the students who entered to the Department have made good score. The graduates got good jobs and their work are highly evaluated.

Many staff of universities, which are developing a new mechanical engineering department, visit KMITL and discuss how to develop and promote the education and research activities of their departments. Also many Thai companies are interested in the Department of Mechanical Engineering and have made collaboration.

4.3 Sustainability

Maintenance and repair of the provided equipment are very important. The Department staff learned not only operation but also maintenance for the equipment. Local companies and agencies for maintenance and repair can be found for some big and accurate equipment such as CNC milling, electron scanning microscope, etc.

All staff have collaborated with Japanese counterparts who are professors in Japanese universities for their research, and then they can sustain and promote their research activities. The Department has made collaboration with many companies and that is very useful for promotion and leveling up of their research activities.

5.ADMINISTRATION

5.1 Organizational Sustainability

KMITL has become one of the top-level national universities, especially in the field of engineering.

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Graduates from KMITL are highly esteemed from the companies where they are employed. KMITL is also making an endeavor to increase their staff both in quality and in quantity.

It is expected that KMITL is able to continue to meet the social demand of producing engineers in great number, and also will contribute in research and development.

5.2 Budget Sustainability

The budget resource of KMITL administration comes from Ministry of University Affairs and from tuition fee paid by students. For research of the staff, they apply for the National Research Council of Thailand (NRCT) or the National Electronic and Computer Technology Center (NECTEC). Besides some joint research with companies is conducted.

The Japanese side suggested the Thai side to continue the effort to get the research budget.

VI. CONCLUSION

1. The Japanese side expressed high appreciation of the great efforts made by the Thai side for smooth transfer of technology through the Project, especially in terms of assignment of Thai counterparts, budgetary allocation and so on.

2. The Thai side also appreciated that the Japanese side had taken necessary measures for dispatching Japanese experts, accepting Thai counterparts in Japan and providing machinery and equipment.

3. Both sides were quite satisfied on the achievement of the Project in line with R/D and reaffirmed the implementation of the Project would provide significant contribution to the development of each field of Telecommunications, Broadcasting, Data Communication and Mechanical Engineering in the Kingdom of Thailand.

VII. OTHERS

1. The Japanese side strongly requested the Thai side to continue to try its best to meet the increasing needs for sustaining and strengthening activities in KMITL after the expiration of the Project.

2. The Thai side proposed the following future plans to strengthen and expand education and research activities in

KMITL.

(1) To develop the human resources in science and technology for the economic and social progress of Thailand and this region.

(2) The technological field of cooperation is to cover at least the telecommunications and information technology as the core technology.

(3) Both quality and quantity of graduates must be taken into account. The education and research are to be strengthened to meet the international standard and quality.

(4) Key success of the cooperation such as ways and means to promote and support the academic staff is to be taken into account.

The Thai side added that an Individual Expert would be requested to assist in the formulation of the future cooperation.

The Japanese side responded to convey these future plans to the Japanese Authorities concerned for further consideration, and at the same time the Japanese side also advised the Thai side that various future plans were to be consulted with JICA Thailand office.

3. As for the establishment of the Faculty of Information Technology, the Thai side requested such cooperation which has been taken by JICA so far is needed for the efficient and effective attainment.

4. The Thai side expressed its interest in the After-care Cooperation in the future. The Japanese side stated that the After-care Cooperation Survey Team would be dispatched at the request of the Thai side after a few years of the date of the expiration of the Project.

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Appendix 1

Member of Joint Committee

1. Prof.Dr.Pairash Thajchayapong,KMITL Rector,Chairman
2. Assoc.Prof.Dr.Somkiat Supadech, Dean ,Faculty of Engineering
3. Assoc.Prof.Dr.Chom Kimpan, Director,Computer Research and Service Center
4. Asst.Prof.Dr.Kobchai Dejhan, Head, Department of Telecommunications Engineering
5. Mr.Pradit Vachrapibool, Head, Department of Industrial Technology
6. Asst.Prof.Dr.Mongkol Mongkolwongrojn, Head, Department of Mechanical Engineering
7. Assoc.Prof.Dr.Yothin Prempraneerath, Head,Department of Control Engineering
8. Dr.Voravat Limpoka, Head, Department of Computer Engineering
9. Ms.Vandee Ketanitinan, Ministry of University Affairs. MUA Representative
10. Mrs.Tipsuda Nopmongcol, Chief of Japan Sup-Division, External Cooperation Div. III, Department of Technical and Economic Cooperation, DTEC Representative
11. Representative , Office of the Civil Service Commision
12. Mr.Poonsup Piyanant,Assistant Director, Bureau of the Budget
13. Mr.Norinobu Hayashi, Member , JICA Evaluation Team
14. Mr.Kaoru Suzuki, Member, JICA Evaluation Team
15. Mr.Kiyoshi Yamamoto, Member ,JICA Evaluation Team
16. Mr.Kazutoshi Kurauchi, Member, JICA Evaluation Team
17. Prof.Dr.Shiro Yamada, Member, JICA Evaluation Team
18. Ms. Eri Sugita, Coordinator, JICA Evaluation Team
19. Mr.Chiyohiko Hakoishi, Chief Adviser and Expert in Data Communication
20. Mr.Mutsuo Murasato, Expert in Broadcasting
21. Mr.Kaname Hiraguri, Expert in Telecommunications
22. Prof.Dr.Hiromu Hashimoto, Expert in Mechanical Engineering
23. Mr.Tomoyuki Irie, JICA Coordinator
24. Mr.Makoto Ashino, Assistant Resident Representative, JICA Thailand Office (Representative: Mr.Nobuji Abe, Resident Representative, JICA Thailand Office)

Observers

1. Asst.Prof.Dr.Supachai Ratanopas, Vice-Rector for Academic Affairs
2. Assoc.Prof.Dr.Kosan Kusamran, Vice-Rector for International Affairs
3. Asst.Prof.Dr.Jongkol Ngamwiwit, Assistant Rector for International Affairs
4. Mr.Masahiko Metoki, First Secretary, Embassy of Japan
5. Ms.Orachorn Sangprapai, Bureau of the Budget
6. Mr.Tomikazu Inagaki, Department of Technical and Economic Cooperation.

Appendix 2

Long-Term Experts

No.	Name	Field	Assigned Period	Organization
1.	Toshio Iijima	Mechanical Eng.	1988.4.18 - 1991.4.17	Tokai Univ.
2.	Masabumi Kawamura	Data Communication ＊	1988.5.31 - 1991.5.30	MPT
3.	Yonosuke Tamura	Broadcasting	1988.5.31 - 1990.5.30	NHK
4.	Hiroshi Kato	Coordinator	1988.6.30 - 1989.9.29	JICA
5.	Masayasu Komoto	Telecommunications	1988.8.18 - 1990.8.17	NTT
6.	Hideo Sakuraba	Coordinator	1989.9.20 - 1992.3.31	JICA
7.	Mutsuo Murasato	Broadcasting	1990.5.21 - 1993.3.31	NHK
8.	Kaname Hiraguri	Telecommunications	1990.8.9 - 1993.3.31	NTT
9.	Hiromu Hashimoto	Mechanical Eng.	1991.4.9 - 1993.3.31	Tokai Univ.
10.	Chiyohiko Hakoishi	Data Communication ＊	1991.8.22 - 1993.3.31	MPT
11.	Tomoyuki Irie	Coordinator	1992.3.12 - 1993.3.31	JICA

＊ Chief Adviser

Appendix 3

Short-Term Experts

No.	Name	Field	Subject	Assigned Period	Organization
1.	Y. Suzuki	Telecomm.	Digital Microwave Installation	Jun.20 - Jul.11,1989	NEC
2.	T. Ikeda	ditto	Digital Microwave Equipment Guidance	Jun.27 - Jul.11,1989	NEC
3.	M. Wakimoto	ditto	Optical Fiber Multiplex Equipment Installation	Jul.18- Aug. 1,1989	NEC
4.	Y. Sato	ditto	Radio Communication Guidance	Jul.16 - Aug.24,1989	NTT
5.	T. Kuroda	ditto	Optical Fiber Multiplex Guidance	Aug. 8- Sep.24,1989	NEC
6.	Y. Moriya	ditto	Microwave Propagation Guidance	Aug. 9 - Sep. 7,1989	Tokai Univ.
7.	S. Fujikawa	ditto	Measurement Technic Guidance	Aug.24 - Sep. 7,1989	Anritsu Co.
8.	S. Doi	ditto	Transmission Line Guidance	Nov. 1 - Dec.15,1989	NTT
9.	T. Wakabayashi	ditto	Electromagnetic Wave Technology & Research Guidance	Aug. 1 - Aug.14,1990	Tokai Univ.
10.	Y. Moriya	ditto	Microwave Propagation Technology & Research Guidance	Dec. 5 - Dec.31,1990	Tokai Univ.
11.	T. Matsura	ditto	Research Guidance on Sign Recognition	Jul.30 - Aug.15,1991	Tokai Univ.
12.	K. Eguchi	ditto	Installation & Operation of ISDN Protocol	Jan.25- Feb. 5,1991	Tekelek Co.
13.	T. Naganawa	ditto	Technology and R&G Guidance on ISDN Protocol	Feb.3 - Feb.22,1991	NTT
14.	Y. Moriya	ditto	Research Guidance on Microwave Propagation	Feb.10 - Feb.23,1991	Tokai Univ.
15.	K. Tokuda	ditto	Installation of Workstation and Software Set-up	Feb.28 - Mar.12,1991	Tokodai Univ
16.	K. Eguchi	ditto	ISDN Protocol	Apr.27 - May 5,1992	Tekelek Co.
17.	Y. Moriya	ditto	Radio Wave Propagation	Aug.16 - Sep. 5,1992	Tokai Univ.
18.	T. Matsuura	ditto	Digital Circuit	Aug.20 - Sep.13,1992	Tokai Univ.
19.	H. Kimura	ditto	Optical Communication	Nov. 8 - Nov.15,1992	Tokai Univ.

No.	Name	Field	Subject	Assigned Period	Organization
20.	T. Wadabayashi	Telecomm.	Electromagnetics	Dec.19 - Dec.29,1992	Tokai Univ.
21.	H. Okada	ditto	Information Communication	Jan.,1993	Tokai Univ.
22.	-	ditto	ISDN Protocol Technology	-	NTT
23.	M. Ito	Broadcasting	Measurement Technique	Jul.20 - Sep.19,1989	NHK
24.	H. Sekino	ditto	Measuring Equipment	Jul. 2 - Jul.28,1990	SONY
25.	Y. Iwahana	ditto	Measurement Technique	Jul.23 - Sep.22,1990	NHK
26.	Y. Nakahata	ditto	HDTV Technology	Aug.21 - Aug.28,1990	NHK
27.	K. Seo	ditto	HDTV Technology	Aug.21 - Aug.28,1990	NHK
28.	S. Kondo	ditto	Image Processing	Dec.16 - Dec.25,1991	Tokai Univ.
29.	K. Nio	ditto	Broadcasting Satellite	Jan. 9 - Jan.29,1992	TOSHIBA
30.	M. Teramoto	ditto	Filter Designing	Feb.10 - Feb.23,1992	Tokai Univ.
31.	T. Ohmura	ditto	HDTV	Feb.17 - Mar.16,1992	NHK
32.	Y. Takahashi	ditto	Gohst Reduction	Mar. 5 - Mar.28,1992	NHK
33.	N. Takahashi	ditto	Digital Signal Processing	Aug.20 - Sep. 2,1992	Tokai Univ.
34.	A. Ohya	ditto	Teletext	Aug.23 - Sep. 6,1992	NHK
35.	M. Imamura	ditto	Image Processing	Nov. 5 - Nov.23,1992	NHK
36.	K. Nio	ditto	Broadcasting Satellite	Nov.30 - Dec.16,1992	NHK
37.	-	ditto	Ghost Reduction	Dec.,1992	NHK
38.	-	ditto	HDTV	Feb.,1992	NHK
39.	-	ditto	HDTV	Feb.,1992	NHK

No.	Name	Field	Subject	Assigned Period	Organization
40.	Y. Oka	Data Comm.	Installation	Jan.27 - Jul.10,1989	NEC
41.	S. Himeno	ditto	Installation	Jan.27 - Jul.24,1989	NEC
42.	K. Shikano	ditto	Installation	Jul. 3 - Aug.20,1989	NEC
43.	H. Kawata	ditto	Installation	Jul. 3 - Aug.20,1989	NEC
44.	K. Shikano	ditto	Software Training	Oct.20 - Dec.19,1989	NEC
45.	H. Kawata	ditto	Software Training	Oct.20 - Dec.19,1989	NEC
46.	S. Himeno	ditto	Hardware expansion	Nov.10 - Nov.30,1989	NEC
47.	S. Minamizono	ditto	Hardware expansion	Nov.10 - Nov.30,1989	NEC
48.	K. Shikano	ditto	Data Base	Jan.17 - Jul.28,1990	NEC
49.	H. Kawata	ditto	Data Base	Jul. 1 - Jul.28,1990	NEC
50.	T. Otsuki	ditto	Graphics	Jul. 1 - Jul.14,1990	NEC
51.	K. Shikano	ditto	(NCS) Software	Dec. 2 - Dec.29,1990	NEC
52.	Y. Kawata	ditto	(NCS) Software	Dec. 2 - Dec.28,1990	NEC
53.	S. Ohara	ditto	Information Technology	Mar. 9 - Mar.23,1992	Tokai Univ.
54.	H. Tominaga	ditto	Information Technology	Mar. 8 - Mar.15,1992	Waseda Univ.
55.	T. Nomiya	ditto	Data Communication	Feb.23 - Mar. 7,1992	NEC
56.	H. OKuno	ditto	Local Area Network	Mar. 1 - Mar. 7,1992	NEC
57.	M. Kanazawa	ditto	Campus Network	Sep.19 - Sep.27,1992	Kyoto Univ.
58.	H. Nomura	ditto	Information Technology	Sep.27 - Oct. 4,1993	Tokai Univ.
59.	S. Ohara	ditto	Information Technology	Sep.27 - Oct. 4,1992	Tokai Univ.
60.	Y. Tsuchihashi	ditto	Protocol Analysis	Nov.22 - Dec. 5,1992	NEC

No.	Name	Field	Subject	Assigned Period	Organization
61.	J. Nagayama	Data Comm.	Protocol Aanlysis	Nov.29 - Dec. 5,1992	NEC
62.	T. Nomiya	ditto	Advanced Software Training	Nov.22 - Dec.12,1992	NEC
63.	-	ditto	Campus Network	-	NEC
64.	-	ditto	Information Technology	-	-
65.	M. Waku	Mechanical Engineering	Manufacturing Process	Sep.24 - May. 8,1989	Shimazu Co.
66.	K. Nagase	ditto	Manufacturing Process	Apr.24 - May. 8,1989	Shimaszu Co.
67.	K. Kojima	ditto	Internal Combustion Engine	Jun.20 - Jul. 3,19989	Daizen Co.
68.	N. Kitakaze	ditto	Internal Combustion Engine	Jun.20 - Jul. 3,1989	Daizen Co.
69.	M. Hayashi	ditto	Material Engineering	Aug. 1 - Aug.15,1989	Tokai Univ.
70.	K. Nishimoto	ditto	Manufacturing Process	Aug.20 - Sep. 3,1989	Tokai Univ.
71.	T. Morishita	ditto	Manufacturing Process	Sep.20 - Sep. 3,1989	Tokai Univ.
72.	H. Hashimoto	ditto	Lubrication Robotics	Aug.20 - Sep. 3,1989	Tokai Univ.
73.	M. Maeda	ditto	Thermodynamics	Jul.16 - Aug. 4,1990	Tokai Univ.
74.	K. Tsuruoka	ditto	Internal Combustion Engine	Jul.20 - Aug. 9,1990	Shimadzu Co.
75.	H. Kazuya	ditto	Material Engineering	Jul.27 - Aug. 8,1990	Tokai Univ.
76.	K. Nishimoto	ditto	Manufacturing Process	Aug.13 - Aug.25,1990	Tokai Univ.
77.	H. Hashimoto	ditto	Lubrication	Aug.13 - Aug.25,1990	Tokai Univ.
78.	S. Murakami	ditto	Thermodynamics	Aug.21 - Sep. 6,1990	Tokai Univ.
79.	M. Sato	ditto	Manufacturing Process	Mar. 8,1991	Tokai univ.
80.	H. Waku	ditto	Manufacturing Process	Feb.,1991(2 weeks)	Nihon Denshi Co.

No.	Name	Field	Subject	Assigned Period	Organization
81.	K. Aoki	Mechanical Engineering	Fluid Mechanics	Jul.16 - Aug. 2,1991	Tokai Univ.
82.	M. Maeda	ditto	Thermodynamics	Jul.16 - Aug.11,1991	Tokai Univ.
83.	M. Hayashi	ditto	Material Engineering	Jul.30 - Aug. 8,1991	Tokai Univ.
84.	T. Iijima	ditto	Internal Combustion Engine	Jul.30 - Aug.19,1991	Tokai Univ.
85.	S. Murakami	ditto	Thermodynamics	Dec.16 - Jan.11,1991	Tokai Univ.
86.	M. Sato	ditto	Manufacturing Process	Dec.17 - Dec.30,1991	Tokai Univ.
87.	S. Aoki	ditto	Precision Engineering	Dec.17 - Dec.30,1991	Tokai Univ.
88.	M. Hayashi	ditto	Material Engineering	Jul.29 - Aug.18,1992	Tokai Univ.
89.	Y. Ochiai	ditto	Control Engineering	Jul.29 - Aug.18,1992	Tokai Univ.
90.	T. Iijima	ditto	Thermal Engineering	Jul.29 - Aug.26,1992	Tokai Univ.
91.	S. Murakami	ditto	Noise Control Engineering	Jul.29 - Aug.26,1992	Tokai Univ.
92.	K. Aoki	ditto	Fluid Engineering	Jul.29 - Aug.26,1992	Tokai Univ.
93.	T. Iijima	ditto	Thermal Engineering	Dec.,1992	Tokai Univ.
94.	S. Murakami	ditto	Noise Control	Dec.,1992	Tokai Univ.

Appendix 4

4-1. EQUIPMENTS LIST (Telecommunications)

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
	Optical Fiber Transmission Equipment(Including MUX)	:	68,803		
(Optical Transmission and Multiplexer System)			(13,932)		
Tel001	8Mbps Optical Fiber Transmission System	Telecom. 3F Trans. Lab.	4,640	A88	A
Tel002	8M Optical Repeater	-- ditto --	2,625	A88	A
Tel003	8M Digital Multiplexer	-- ditto --	820	A88	A
Tel004	2M PCM Multiplexer	-- ditto --	903	A88	A
Tel005	Accesories	-- ditto --	3,051	A88	A
Tel006	Orderwire	-- ditto --	1,893	A88	A
(Measuring Instruments)			(37,510)		
Tel007	Optical Fiber Transmission Measuring Set	-- ditto --	18,319	A88	A
Tel008	Probe and Power Supply	-- ditto --	152	A88	A
Tel009	Optical Spectrum Analyzer	-- ditto --	3,946	A88	A
Tel010	optical Time Domain Reflectometer	-- ditto --	2,739	A88	A
Tel011	Optical Wave Monitor	-- ditto --	412	A88	A
Tel012	Optical Power meter	-- ditto --	922	A88	A
Tel013	Digital Transmission Analyzer	-- ditto --	2,098	A88	A
Tel014	Frequency Synthesizer	-- ditto --	2,034	A88	A
Tel015	Jitter Modulation Oscilator	-- ditto --	502	A88	A
Tel016	Storage Oscilloscope	-- ditto --	4,097	A88	A
Tel017	PCM MUX Tester	-- ditto --	2,289	A88	A
(Parts and Devices)			(17,361)		
Tel018	Parts and Devices • Light Source • Optical Attenuator • Averager • Optical Fiber • Optical Fiber Cord • Others	-- ditto --	17,361	A88	A
	Digital Microwave Transmission Equipment	:	16,073		
(Digital Microwave System)			(8,726)		
Tel019	2GHz Digital Microwave Equipment	Telecom. 3F Radio Lab.	5,154	A88	A
Tel020	RF Attenuator	-- ditto --	712	A88	A
Tel021	2GHz Parabolic Antenna	-- ditto --	732	A88	D
Tel022	Coaxial Switch	-- ditto --	162	A88	A
Tel023	Accsesories	-- ditto --	370	A88	A
Tel024	Spare Parts	-- ditto --	1,596	A88	D

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
(Measuring Instruments)			(7,347)		
Tel025	Power Meter	Telecom. 3F Radio Lab.	666	A88	A
Tel026	Frequency Counter	-- ditto --	979	A88	A
Tel027	Microwave Spectrum Analyzer	-- ditto --	3,305	A88	A
Tel028	Stereo Signal Demodulator	-- ditto --	681	A88	A
Tel029	Signal Generator	-- ditto --	750	A88	A
Tel030	IF Tester	-- ditto --	966	A88	A
	Digital PABX System :		33,189		
(PABX Mainframe)			(24,555)		
Tel031	NEAX2400 IMS Main Unit	Telcom. 2F Switching Room	16,136	A90	A
Tel032	Digital Interface	-- ditto --	2,253	A90	A
Tel033	Analog Interface	-- ditto --	516	A90	A
Tel034	MDF	-- ditto --	720	A90	A
Tel035	Power Supply Equipment	-- ditto --	2,987	A90	A
Tel036	Modem Pooling	-- ditto --	849	A90	A
Tel037	PA-M00 Extention Package	-- ditto --	39	A90	A
Tel038	Consumable Spare Parts	-- ditto --	83	A90	D
Tel039	Spare Packages	-- ditto --	973	A90	D
(Terminals)			(2,424)		
Tel040	NEAX2400 DA-005A Data Adapter	-- ditto --	172	A90	A
Tel041	NEAX2400 DT-001A Data Module	-- ditto --	181	A90	A
Tel042	D-Term 16D	-- ditto --	78	A90	A
Tel043	Personal Computer APC-IV	-- ditto -- Telcom. 2F Switching Lab.	1,993	A90	A
(Measuring Instruments for NEAX2400)			(283)		
Tel044	M1011A Test Handset	Telecom. 2F Switching Room	27	A90	A
Tel045	1224B PBX Tester	-- ditto --	243	A90	A
Tel046	Maintenance Tools	-- ditto --	13	A90	D
(Multiplexer Interface Units)			(177)		
Tel047	Interface Unit	-- ditto --	177	A90	A
(Measuring Instruments)			(5,750)		
Tel048	Logic Analyzer	Telecom. 2F Switching Lab.	2,497	A90	A
Tel049	Dynamic Signal Generator	-- ditto --	2,230	A90	A
Tel050	Function Generator	-- ditto --	1,023	A90	A

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
	ISDN Equipment	: **34,038**			
Tel051	ISDN Protocol Tester(Camereon 32)	Telecom. 2F Switching Lab.	29,470	A91	A
Tel052	Digital Telephone for ISDN	-- ditto --	456	A91	A
Tel053	ISDN Board	-- ditto --	592	A91	A
Tel054	Personal Computer	-- ditto --	1,405	A91	A
Tel055	G4 Fax	-- ditto --	2,115	A91	A
	Workstation System	: **21,285**			
(Workstation for DSP)			(11,124)		
Tel056	Workstation (SPARKstation IPC)	Telecom. 2F DSP Lab.	6,655	A91	A
Tel057	Personal Computer (IBM 8570-061)	-- ditto --	1,249	A91	A
Tel058	Software	-- ditto --	1,905	A91	A
	• DSP Chip Design Software (Texas Instrument)				
	• Programable Gate Array Design Soft. (Zxilinx)				
Tel059	LSI Chip	-- ditto --	645	A91	A
Tel060	UPS	-- ditto --	670	A91	A
(Workstation for Other Research Group)			(10,161)		
Tel061	Workstastion (SPARKstation IPC)		※ 8,025	A92	
	• for Switching Research Group	Telecom. 1F Network Lab.			
	• for Transmission Research Group	Telecom. 3F Trans. Lab.			
	• for Microwave Research Group	Telecom. 3F Radio Lab.			
Tel062	Line Printer(Printronix P6280L)	Telecom. 1F Network Lab.	※ 2,136	A92	
	Training Kit	: **4,440**			
Tel063	Digital Circuit Training Kit	Telecom. 3F Radio Lab.	3,099	A91	A
Tel064	Digital Microwave Training Kit	-- ditto --	※ 500	A91	A
Tel065	Microwave Circuit Training Kit	-- ditto --	841	A91	A

Inventory Number	Name of Equipment	Place		Price (¥1,000)	Budget	Usage
	Measuring Instruments :			**17,786**		
Tel066	Digital Storage Oscilloscope	Telecom. 2F Circuit Lab.	*	1,210	A91	A
Tel067	Selective Lebel Meter	Telecom. 3F Trans. Lab.		1,240	A91	A
Tel068	Standard Lebel Meter	-- ditto --		882	A91	A
Tel069	Microwave Network Analyzer	Telecom. 1F Electromagnetics Lab.	*	8,863	A91	A
Tel070	AMPS Cellular Radio Test System	Telecom. 2F	*	5,591	A92	A
	Other Equipment(Accesories/Spare Parts/Others) :			**3,371**		
Tel071	Personal Computer(NEC)	Telecom. 2F Switching Lab.		1,038	A92	
Tel072	Terminal Network Control(TNC)	Telecom. 3F Radio Lab.		62	A92	
Tel073	Attendant Console and Spare Packages for NEAX2400 PABX	Telecom. 2F Switching Room	*	1,200	A92	
Tel074	Other Spare Parts and Accesories	-	*	1,071	A92	
	Equipment Associated with Experts :			**23,950**		
Tel075	Equipment for Mr.Komoto • Digital Volt Meter • Electronic Volt Meter • Spare Package of Power Suuply Module for Optical Fiber Trans. • Others	Telecom. 3F Trans. Lab.		959	B88	A
Tel076	Equipment for Mr.Komoto • Diode Power Sensor and Other Spare Parts	Telecom. 3F Trans. Lab.		401	B89	D
Tel077	Equipment for Mr.Komoto • Cord and others	Telecom. 3F Trans. Lab.		261	B89	D
Tel078	Equipment for Mr.Komoto • Optical Fiber Cord • Spare Parts for 8M Digital MUX • Spare Parts for 2M PCM MUX • Frequency Shifter	Telecom. 3F Trans. Lab.		1,048	B89	D
Tel079	Equipment for Mr.Sato • Oscilloscope	Telecom. 3F Trans. Lab.		1,531	B90	A
Tel080	Equipment for Mr.Moriya • Dish Antenna and Trans. Equipment • Accesories • Personal Computer and Others	Telecom. Loof/ 2F Switching Lab.		575 2,680	B89 B89	A A

Inventory Number	Name of Equipment	Place		Price (¥1,000)	Budget	Usage
Tel081	Equipment for Mr.Moriya • Rain Flow Meter • Recorder • Frequency Counter • Others	Telecom. 2F Switching Lab./ 3F Radio Lab.		872	B90	A
Tel082	Equipment for Mr.Moriya • FV Converter • Program Loader • Rain Guage • Wide Band Receiver • Signal Level Meter • Others	Telecom. 3F Radio Lab.		629	B90	A
Tel083	Equipment for Mr.Moriya • Recorder • Antenna • Selective Lebel Meter • Facsimile	Telecom. Loof/ 2F / 3F		3,200	B90	A
Tel084	Equipment for Mr.Moriya • 180cm Offset Antenna	Telecom. Loof		532	B91	A
Tel085	Equipment for Mr.Moriya • Antenna Pole and others	Telecom. Loof		496	B91	A
Tel086	Equipment for Mr.Moriya • Field Intensity Measuring Meter • Receiving Signal Indication Meter • Temparature/Humidity Meter • Recorder and others	Telecom. 3F Radio Lab.		1,395	B91	A
Tel087	Equipment for Mr.Moriya • Temparature/Humidity Meter • Recording Paper • Rain Guage	Telecom. 2F Switching Lab.		554	B92	A
Tel088	Equipment for Mr.Doi • Digital Transmission Analyzer	Telecom. 3F Trans. Lab.		1,781	B89	A
Tel089	Equipment for Mr.Wakabayashi • Personal Computer	Telecom. 1F Electromagnetics		1,225	B90	A
Tel090	Equipment for Mr.Wakabayashi • Sweep Oscillator • Regular Pressure Wave Detector	-- ditto --		400	B90	A
Tel091	Equipment for Mr.Wakabayashi • Scalar Network Analyzer • Sweep Frequency Measure System • Sweep Oscillator	-- ditto --		1,500	B91	A
Tel092	Equipment for Mr.Wakabayashi • Personal Computer(Macintosh)	-- ditto --	*	624	B92	A
Tel093	Equipment for Mr.Wakabayashi	-- ditto --			B92	

Inventory Number	Name of Equipment	Place		Price (¥1,000)	Budget	Usage
Tel094	Equipment for Mr.Hiraguri • Floppy Disk and others	Telecom. 2F Expert Room		37	B90	A
Tel095	Equipment for Mr.Hiraguri • Books	-- ditto --		716	B90	A
Tel096	Equipment for Mr.Hiraguri • UPS	Telecom. 2F switching Lab.	*	220	B90	A
Tel097	Equipment for Mr.Hiraguri • UPS	Telecom. 2F Expert Room	*	303	B91	A
Tel098	Equipment for Mr.Matsuura • Personal Computer	Telecom. 3F Circuit Lab.		883	B91	A
Tel099	Equipment for Mr.Matsuura • Hard Disk Unit	-- ditto --		431	B92	A
Tel100	Equipment for Mr.Naganawa • Extention Board(M-Card 64) • Software	Telecom. 2F Switching Lab.		475	B91	A
Tel101	Equipment for Mr.Naganawa	-- ditto --				
Tel102	Equipment for Mr.Eguchi • RAM Board • Software • Terminal Adapter	-- ditto --		222	B91	A
Tel103	Equipment for Mr.Kimura	Telecom. 3F Trans. Lab.			B92	
Tel104	Equipment for Mr.Okada	Telecom. 1F Computer Room			B92	
		Grand Total :		222,935		

Remarks

1. The equipment of which price is marked with (*) is procured in Thailand. The exchange rate of price is ; 5.5 Yen/Bahts.
2. In the column "Budget" ;
   "A" shows the equipment directly supplied to the Project site and
   "B" shows the equipment associated with the experts and finaly donated to the Project site.
   The two digits of figure succeeding to "A" or "B" show the Japanese Fiscal Year.
3. The last column "Usage" shows the followings.
   A : being used in good,
   B : being used in good (used for other purposes),
   C : being used in fair,
   D : being used in poor.
4. Total Price of equipment supplied under the Project is about ¥ 222,935,000
   the equipment directly supplied ; ¥ 198,985,000
   the equipment associated with experts ; ¥ 23,950,000

4-2. EQUIPMENTS LIST (Broadcasting)

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
	Equipments provided in 1988				
88-B1	Synchronized generator(1411R)	T302B	1,987	A88	A
88-B2	Waveform/Vector Scope(1751)	T302B	1,018	A88	A
88-B3	Color Gain & Delay Test Set(MS321A/A1)	Nontaburi	573	A88	A
88-B4	Function Generator(TM501)	T302B	347	A88	A
88-B5	3-Tube Color Camera(PXC-M3APK/MK2)	T302B	2,167	A88	A
88-B6	Tripod for Camera(WT=204)	T302B	253	A88	A
88-B7	Oscilloscope (100 MHz 2 Phenomena)(2236)	T302B	526	A88	A
88-B8	Waveform Monitor(1481)	T302B	1,761	A88	C
88-B9	Oscilloscope(150 MHz 4 Phenomena)(2245B)	T302B	1,114	A88	C
88-B10	Digital TV Generator(TSG271)	T302B	1,167	A88	A
88-B11	Audio Tone Burst Generator(506)	T302B	264	A88	C
88-B12	Satellite Receiving System(SR-500)	502	699	A88	A
88-B13	Personal Computer(APC-4)	T302B	800	A88	A
88-B14	X-Y Plotter(SR-6310)	T302B	611	A88	C
88-B15	GP-IB Interface Board	T302B	(B-9)	A88	C
88-B16	Personal Computer(APC-4)	T302B	800	A88	A
88-B17	Oscilloscope (100 MHz 2 Phenomena(2236)	T302B	526	A88	A
88-B18	Pulse Generator(PG501)	Nontaburi	331	A88	A
88-B19	Color Monitor(CMM20-7/2)	T302B	722	A88	A
88-B20	Camera for waveform(C5-C)	T302B	102	A88	A
88-B21	Scope-Mobile(K212)	T302B	106	A88	A
88-B22	Test Chart	T302B	207	A88	D
88-B23	ID Audio Tone signal Generator	T302B	(B-10)	A88	C
88-B24	GP-IB Interface Board(APC-H1500)	T302B	50	A88	C
88-B25	Oscilloscope Probe(P6108A)	T302B	38	A88	A
88-B26	Additional Probe Input Circuit	T302B	(B-8)	A88	A
	Total		16,170		
	Equipments provided in 1989				
89-(1)	Field Strength Meter(ML-518A)	T302B	3,840	A89	A
89-(2)	Video casette Recorder(AG-6200-ENZ)	T302B	244	A89	C
89-(3)	Electric White board(UB 1850)	T302B	571	A89	A
89-(4)	Portable Digital Audio TapeRecorder(D10)	T302B	335	A89	C
89-(5)	Digital Audio Tape Recorder(DTC-1000E)	T302B	193	A89	C
89-(6)	Disk Player(CLD-360)	T302B	142	A89	A
89-(7)	A/V Monitor(TC-AV29)	T302B	148	A89	A
89-(8)	Digital Audio Tape(DT-60R,DT-120R)	T302B	59	A89	C
89-(9)	Digital Multimeter(DMM175)	T302B	514	A89	C
89-(10)	V/A Distributer(EP-20)	T302B	250	A89	C
89-(11)	Antenna Rotator(KR-800SDX/1000SDX)	T302B	168	A89	A
89-(12)	Antenna Tower(HS-3700W)	T302B	87	A89	A

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
89-(13)	Parabola Antenna(CS600S)	T302B	3,680	A89	A
89-(14)	Tool Set(S-75,S-81)	T302B	222	A89	A
89-(15)	BNC Connector & Cable Joint Tools	T302B	116	A89	A
89-(16)	Delay Line Trainer(P240L211,P050D181)	T302B	265	A89	A
89-(17)	Wide Band Receiver(RZ-1)	Nontaburi	210	A89	A
89-(18)	Floppy Disk(MD2-D,MD2-256HD)	T302B	30	A89	A
89-(19)	Bread Board(WBU-206,WBU-208)	T302B	148	A89	C
89-(20)	A/D Convertor IC(HA19210TP)	T302B	33	A89	A
89-(21)	Digital Signal Processor-IC(TM32010NL)	T302B	33	A89	C
89-(22)	BBD-IC(MN3005)	T302B	45	A89	C
89-(23)	Video & Audio Soft for Testing	T302B	42	A89	A
89-1	Spectrum Analyzer(2710)	T302B	1,982	A89	A
89-2	Logic Analyzer(1241)	T302B	2,427	A89	A
89-3	Frame Store Synchronyzer(P147-30)	T302B	1,120	A89	C
89-4	Audio Analyzer(SYS-224)	T302B	1,897	A89	C
89-5	Betacam Studio Recorder(BVW-70P)	T302B	5,769	A89	A
89-6	Stereo Analyzer(856A)	T302B	1,280	A89	C
89-7	Component Waveform Monitor(WFM-300A)	T302B	903	A89	A
89-8	Component TV Generator(TSG-300)	T302B	1,449	A89	A
89-9	Network Analyzer(MS3401)	T302B	2,602	A89	C
89-10	Video Plotter(UA-455A)	T302B	304	A89	D
89-11	Color Video Noise Meter(925D)	T302B	1,900	A89	A
89-12	Digital Storage Oscilloscope(2230)	T302B	873	A89	A
89-13	Video Sweep Generator(SV11A)	T302B	929	A89	A
89-14	Function Generator(FG504)	T302B	761	A89	A
89-15	Personal Computer(APC-4)	T302B	1,300	A89	A
89-16	Oscilloscope(2235A)	T302B	307	A89	A
89-17	UHF-Television Transmitter(147B-R)	Nontaburi	4,900	A89	A
89-18	Color Monitor(CMM-11/1.2)	T302B	1,693	A89	C
89-19	Waveform, Vector Video Analyzer(1781R)	T302B	2,117	A89	C
89-20	Video Attenuator(M-215C)	T302B	240	A89	C
89-21	Audio Attenuator(STA-11)	T302B	118	A89	C
89-22	Camera Tripod(VT-440)	T302B	258	A89	A
89-23	U-Matic VTR(BVU-950P)	T302B	3,288	A89	D
89-24	White Balance Checker(CW80C)	T302B	879	A89	C
89-25	Personal Computer(APC-4)	T302B	1,300	A89	A
89-26	Waveform Camera(C-5C)	T302B	111	A89	A
89-27	Test Chart for Camera Adjustment	T302B	235	A89	D
89-28	Cart(K-212)	T302B	153	A89	A
89-29	Thruline RF Directional Wattmeter	Nontaburi	553	A89	A
89-30	Video Casette Tape for Betacam L	T302B	132	A89	C
89-31	Video Casette Tape for U-Matic	T302B	189	A89	D
89-32	Cleaning Casette Tape	T302B	10	A89	D
89-33	Oscilloscope Probe	T302B	170	A89	A
	Total		53,402		

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
	Equipments provided in 1991				
91-1	Antenna Direction Controller(ADL-6)	KMITL	988	A91	A
91-2	Digital Storage OscilloscopeCS-300AR)	T302B	645	A91	A
91-3	X-Y Plotter(GRX-300AR)	T302B	884	A91	A
91-4	Personal Computer(PCI 486DX-33)	T302	582	A91	A
91-5	Palabora Antenna Horizontal Rotator	KMITL	1,040	A91	A
91-6	Work Station(SPARC Station 2GX)	T302B	5,720	A91	A
91-7	Digital Image Processing Unit(FINEVISION)	T302B	990	A91	A
91-8	Bus Repeater(SFVME116)	T302B	1,875	A91	A
91-9	Power Supplie(UPS)	T302B	442	A91	A
91-10	HDTV Monitor with MUSE Decoder(36H-HD1)	T302	4,185	A91	A
91-11	HDTV Disk Player(VDP-H500)	T302	3,950	A91	A
91-12	HDTV Signal Disk(HLD-NEP007)	T302	1,230	A91	A
91-13	HDTV Signal Generator(TSG-1125)	T302	3,800	A91	A
91-14	Connecting Cable	T302	26	A91	A
91-15	Power Transformer(SE-1000)	T302	15	A91	A
	Total		26,372		
	Equipments provided in 1992				
92-1	HDTV Display (Liquid Crystal)(XL-100)	T302	8,966	A92	/
92-2	1/2-inch High Definition VCR(HDV-10)	T302	15,475	A92	/
92-3	HD Projection Monitor(55")(KWP-5500HD)	T302	2,735	A92	/
92-4	Video/Audio Distributor(DA-500)	T302	90	A92	/
92-5	Audio System(SS-GT88,SRP-P2005,SRP-X1008)	T302	272	A92	/
92-6	Hivision Converter with Transformer(9135)	T302	4,010	A92	/
92-7	Three Value Sync-Signal Generator(GSG24A)	T302	730	A92	/
92-8	Wide Band Compensator & Distributor(8340)	T302	310	A92	/
92-9	Cable for HDTV System	T302	80	A92	/
92-10	1/2-inch Video Tape for HDTV	T302	520	A92	/
92-11	HDTV Wave Form Monitor(1735H)	T302	1,170	A92	/
92-12	Television Standards Converter(P256)	T302B	1,970	A92	/
92-13	Spectrum Analyzer with Option(2712)	T302B	3,296	A92	/
92-14	Spectrum Analyzer with Option(459P)	T302B	4,504	A92	/
92-15	Short Wave Band Tranceiver(TS-950SDX)	T302B	668	A92	/
92-16	VHF Band Tranceiver(IC-970)	T302B	372	A92	/
92-17	Communication Terminalcontroller(TNC-201)	T302B	45	A92	/
	Total		45,213		

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
	Equipments associated with experts in 1988				
TM-1	Personal Computer(PC9801VX41)	T203	565	B88	A
TM-2	RAM Board (PC9801-21N,PC9801-31)	T203	46	B88	A
TM-3	Soft Ware (MS-DOS)	T203	17	B88	A
TM-4	Automatic Voltage Regulator	T203	56	B88	A
TM-5	Books	T203	25	B88	A
TM-6	Printer(PC-PR201H2)	T203	218	B88	A
TM-7	Color Display(N5913L)	T203	123	B88	A
	Total		1,050		
	in 1989				
IT-1	8 m/m Camera (CCD-V88)	T302B	178	B89	A
IT-2	Battery Charger(BC-1WA)	T302B	69	B89	C
IT-3	Accessary Kit(ACC KIT-75) & AV Cable	T302B	30	B89	C
IT-4	MAVICA(MVC-C1)	T302B	60	B89	C
IT-5	Playback Adapter(MAP-T1) & Transfomer	T302B	31	B89	C
IT-6	GPIB Interface Boad(PC-9801-29N)	T302B	47	B89	C
IT-7	GP-IB Cable(PC-8896	T302B	19	B89	C
IT-8	8 m/m Video Tape(P6-60MPN)	T302B	10	B89	A
IT-9	Floppy Disk for MAVICA(VFD-50)	T302B	9	B89	C
	Total		453		
	in 1990				
M-1～3	Dual Band FM Transceiver(IC-2400/D),Acc.	T302B	369	B90	A
M-4	All-mode Terminal(TNC-23MK II)	T302B	105	B90	A
M-5	GP Antenna(X-30)	T302B	26	B90	A
M-6	Antenna Mast(BK-80)	T302B	53	B90	A
M-7	8E Yagi Antenna(HS-FOX727)	T302B	29	B90	A
M-8	CS 201 II Coaxial Switch (Maker:Daiwa)	T302B	11	B90	A
M-9	Atenna Tuner(CNW-727)	T302B	64	B90	A
M-10～12	Handheld Transceiver(IC-24) & Acc.	T302B	185	B90	A
M-13	98 Note(PC-9801N)	T302B	390	B90	A
M-14	MAVICA(MVC-A10)	T302B	114	B90	C
M-15～17	IC (CM201, CM200, AD843)	T302B	61	B90	C
M-18	Delay Line, 75 Ω,10MHZ(0364L 325)	T302B	139	B90	A
M-19	Delay Line (DT 300 N.101)	T302B	16	B90	A
M-20	BPF (4.43MHZ) (BPAE 0443)	T302B	54	B90	A
M-21	Oscilloscope Probe (1.5M)(for 2236)	T302B	183	B90	A

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
	in 1990				
M-22～27	Books	T302B	69	B90	C
M-28	TSUUSHIN SOFT CT-98 II Ver.2-50	T302B	20	B90	A
M-29～30	Coaxial Cable (100-FB) & Connectors	T302B	98	B90	A
M-31	Control Cable(4W)	T302B	50	B90	A
M-32	Power Supply Cable (400V, 10A)	T302B	19	B90	A
M-33～36	Plastic Pipe for Cable (3"4m) & Others	T302B	63	B90	A
S-1～7	Software with Interface Boad	T302B	1,132	B90	A
I-1～7	Softwares	T302B	313	B90	A
I-8	Floppy Disk Driver " PC Line 35D "	T302B	45	B90	A
I-9～10	Books	T302B	7	B90	C
I-11～13	Mouse & RS 323C Cable	T302B	12	B90	A
	Total		3,627		
	in 1991				
K-1～6	Personal Computer(J-3100SX001) & Acc.	T302B	528	B91	A
K-7～9	Color Image Scanner JX-220	T302B	138	B91	A
N-1～2	BS Antenna(BS-35) & Tuner(ST-8)	T302B	65	B91	A
N-3～4	IF Booster(BSB-25T) & Cable	T302B	20	B91	A
T-1～4	Personal Computer(J3100SX001VW) & Acc.	T302B	499	B91	A
TA-1	TV Antenna MASPRO(112GKB)	T302B	12	B91	A
TA-2,22	Personal Computer NEC PC-9801NS/T	T302B	265	B91	A
TA-3	Software(MS-DOS V3.3D)	T302B	8	B91	A
TA-4	TV Tuner(TT-GC9)	T302B	93	B91	A
TA-5	Antenna(DX CPCV-A)	T302B	56	B91	A
TA-6～7	VHF Booster(BV-301A)& Cable(5C-2V 100m)	T302B	18	B91	A
TA-8～16	Connector & Attenuator(FP5)	T302B	33	B91	A
TA-17～21	Adapter,Distributer & Antenna Selecter	T302B	12	B91	C
TA-23	Antenna(112NP40)	T302B	26	B91	C
	Total		1,773		
	in 1992				
TAN-1～2	Books(144 vol.)	KMITL	100	B92	C
TAN-3～7	Personal Computer(PJD1994DX2-50JLB),Acc.	KMITL	549	B92	A
:			:		
			<2,000>	B92	/
	Total		2,750		

A88 + B88	: 16,170	+ 1,050
A89 + B89	: 53,402	+ 453
A90 + B90	: --	+ 3,627
A91 + B91	: 26,372	+ 1,773
A92 + B92	: 45,213	+ (2,750)
Total	: 141,157	+ (9,653)

Grand Total	150,810

Remarks

Budget A : Equipments donated by JICA.
B : Equipments accommpanied by short-term experts (donated by JICA).
88 etc : 1988 Japanese Fiscal Year, and so on.
Operation A : have being used GOOD.
B : have being used GOOD (Use for other Purpose).
C : have being used FAIR.
D : have being used POOR.

4-3. EQUIPMENTS LIST (Data Communications)

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
	I. NEC SYSTEM 610 (I) :		129,331		
	(A. HARDWARE)		(81,233)		
DC 001	CENTRAL PROCESSING UNIT	CRSC	29,220	A88	A
DC 002	INPUT - OUTPUT CONTROL UNIT	CRSC	6,975	A88	A
DC 003	SYSTEM OPERATION CONSOLE	CRSC	2,538	A88	A
DC 004	LINE PRINTER	CRSC	3,565	A88	A
DC 005	DISK CONTROLLER	CRSC	1,360	A88	A
DC 006	DISK UNIT	CRSC	8,475	A88	A
DC 007	MAGNETIC TAPE CONTROLLER	CRSC	1,190	A88	A
DC 008	MAGNETIC TAPE UNIT	CRSC	7,140	A88	A
DC 009	COMMUNICATION CONTROL UNIT	CRSC	5,399	A88	A
DC 010	INTELLIGENT TERMINAL				
- 015	- APC-III Type I (3 Terminals)	CRSC	1,252	A88	A
	- APC-IV Type I-1(2 Terminals)	CRSC	713	A88	A
	- APC-IV Type I-2(1 Terminals)	CRSC	560	A88	A
DC 016	SERIAL PRINTER	CRSC	412	A88	A
DC 017	LASER BEAM PRINTER	CRSC	319	A88	A
DC 018	X-Y PLOTTER	CRSC	292	A88	A
DC 019	MODEM	CRSC	708	A88	A
DC 020	AVERAGE VOLTAGE REGURATOR	CRSC	4,816	A88	A
DC 021	POWER DISTRIBUTER	CRSC	2,282	A88	A
DC 022	DATA COMMUNICATION ANALIZER	CRSC	4,020	A88	A
	(B.SOFTWARE)		(48,098)		
DC 023	MAIN FRAME	CRSC	11,734	A88	A
DC 024	LANGUAGE	CRSC	4,880	A88	A
DC 025	SOFTWARE DEVELOPMENT TOOL	CRSC	2,094	A88	A
DC 026	SYSTEM UTILITY	CRSC	16,178	A88	A
DC 027	PACKAGE SOFTWARE	CRSC	12,728	A88	A
DC 028	TERMINAL SOFTWARE	CRSC	486	A88	A
	II. NEC SYSTEM 610 (II) :		82,340		
	(A. HARDWARE)		(68,683)		
DC 029	ADDITIONAL MAIN MEMORY	CRSC	5,746	A89	A
DC 030	INPUT - OUTPUT CONTROL	CRSC	5,425	A89	A
DC 031	LINE PRINTER	CRSC	4,960	A89	A
DC 032	DISK CONTROLLER	CRSC	1,360	A89	A
DC 033	DISK UNIT	CRSC	9,155	A89	A
DC 034	COMMUNITION CONTROL	CRSC	5,167	A89	A

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
DC 035	INTELIGENT TERMINAL	CRSC			
	- APC-IV Type II-1(10 Terminals)	ENG(2sets)	15,841	A89	A
		ARC(2sets)			
		IND(2sets)			
		SCI(2sets)			
		ARG(2sets)			
	- APC-IV Type II-2 (6 Terminals)	ENG(1set)	713	A89	A
		GRA(1set)			
		REC(4sets)			
	- APC-IV Type III-1(30Terminals)	CRSC	3,150	A89	A
	- APC-IV Type III-1(5 Terminals)	CRSC	3,063	A89	A
DC 087	SERIAL PRINTER	CRSC	3,601	A89	A
DC 088	LASER BEAM PRINTER	CRSC	319	A89	A
DC 089	GRAPHIC DISPLAY	CRSC	5,230	A89	D
DC 090	X-Y PLOTTER	CRSC	2,782	A89	C
DC 091	MODEM	CRSC	2,123	A89	A
DC 092	CCITT X.25 INTERFACE	CRSC	765	A89	A
	(B. SOFTWARE)		(13,657)		
DC 093	SOFTWARE DEVELOPMENT TOOL	CRSC	2,717	A89	A
DC 094	PACKAGE SOFTWARE	CRSC	7,652	A89	A
DC 095	TERMINAL SOFTWARE	CRSC	3,289	A89	A
	III NEC SYSTEM 610(III) :		13,590		
	(A. HARDWARE)		(7,772)		
DC 096	COMMUNICATION CONTROL	CRSC	5,269	A91	A
DC 097 - 101	LAN TERMINAL (5 Terminals)	CRSC	2,503	A91	A
	(B. SOFTWARE)		(5,818)		
DC 102	MAIN FRAME	CRSC	5,505	A91	A
DC 103	TERMINAL SOFTWARE	CRSC	314	A91	A
	IV. Others :		19,431		
DC 104	MITSUBISHI LANCER STATION WAGON	REC	1,295	A88	A
DC 105	COMPUTER NEC PC-9801 VM	REC	* 1,020	A88	A
DC 106	COMPUTER NEC PC-H 2010E (4unit)	CRSC(1)	* 3,800	A88	A
- 109		ENG (3)			A
DC 110	CANNON Laser Printer (4unit)	CRSC(1)	* 2,689	A88	A
- 113		ENG (3)			A
DC 114	PHOTOCOPIER RICOH FT.5590	ENG (3)	* 5,997	A88	A
- 117	(4unit)	REC (1)			A
DC 118	VIDEO CASSETLE RECORDER	REC	163	A88	C
DC 119	MONITOR TV TC-AL 2190T	REC	122	A88	C

Inventory Number	Name of Equipment	Place	Price (¥1,000)	Budget	Usage
DC 120	VIDEO CAMERA NV-7E0	REC	264	A88	C
DC 121	MEDIABOARD 100	CRSC	486	A88	A
DC 122	SLIDE PROJECTOR"CABIN"	CRSC	124	A88	A
DC 123	CAMERA F-401 "NIKON"	REC	104	A88	A
DC 124	DAISY WHEEL PRINTER HR-40 etc.	CRSC	513	A88	A
DC 125	SPARE PARTS	CRSC	2,854	A92	A
	V. EquipmentS Associate with Experts :		6,261		
DC 126	Equipment for Mr.Kawamura				
	- PERSONAL COMPUTER(PC 98XL)	CRSC	1,784	B88	A
DC 127	Equipment for Mr.Kato				
	- PHOTOCOPIER CANNON NP-4540	REC	‡1,368	B88	A
	- WORD PROCESSOR NEC "BUNGOU"	REC	951	B88	C
DC 128	Equipment for Mr.Kawata				
	- PERSONAL COMPUTER(PC 98INS)	CRSC	351	B90	A
DC 129	Equipment for Mr.Shikano				
	- PERSONAL COMPUTER (T1200XE & T1200HB)	CRSC	820	B90	A
DC 130	Equipment for Mr.Sakurab				
	- WORD PROCESSOR CANON	REC	157	B90	A
DC 131	Equipment for Dr.Ohara				
	- PERSONAL COMPUTER(PS 55)	CRSC	400	B91	A
DC 132	Equipment for Dr.Ohara				
	- PERSONAL COMPUTER (DYNABOOK) etc.	CRSC	435	B92	A
	Grand Total :		250,953		

Remarks

1. The equipment of which price is marked with (‡) is partially procured in Thailand.The exchange rate is 1 Baht = 5.5 Yen
2. In the column "Budget" ;
   "A" shows the equipment directly supplied to the Project site and
   "B" shows the equipment associate with the experts and finaly donated to the project site.
   The two digits of figure succeeding to "A" or "B" show the Japanese Fiscal Year.
3. The last column "Usage" shows the followings.
   A : being used in good,
   B : being used in good but used for other purposes,
   C : being used in fair,
   D : being used in poor.

4. Total Price of equipment supplied under the Project is approximately ¥ 250,953,000

the equipment directly supplied	;	¥ 244,692,000
the equipment associated with experts	;	¥ 6,261,000

5. Place

CRSC	=	COMPUTER RESEARCH AND SERVICE CENTER
ENG	=	FACULTY OF ENGINEERING
ARC	=	FACULTY OF ARCHITECTURE
IND	=	FACULTY OF INDUSTRIAL EDUCATION
SCI	=	FACULTY OF SCIENCE
AGR	=	FACULTY OF AGRICULTURAL TECHNOLOGY
GRA	=	SCHOOL OF GRADUATE STUDIES
REC	=	RECTOR'S OFFICE

4-4. EQUIPMENTS LIST (Mechanical Engineering)

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
	Equipments provided in 1988				
ME001	Universal Testing Machine	MTL	14,340	AH88	A
ME002	Static Strain Meter	MTL	820	AH88	A
ME003	Hardness Tester	MEL	1,342	AH88	A
ME004	Microscope	MEL	1,724	AH88	A
ME005	Polishing Attatchment	MEL	823	AH88	A
ME006	Electric Furnace	MEL	295	AH88	A
ME007	CNC Milling Machine	MAL	14,415	AH88	A
ME008	Profile Projector	MAL	2,000	AH88	A
ME009	Roughness Tester Apparatus	MAL	1,032	AH88	A
ME010	Dynamic Strain Meter	LCL	246	AH88	A
ME011	Digital Storage Oscilloscope	LCL	559	AH88	A
ME012	Pen Recorder	LCL	471	AH88	A
ME013	Printer	LCL	384	AH88	A
ME014	Plotter	ML	2,470	AH88	A
ME015	Digitizer	ML	165	AH88	A
ME016	Pressure Guage Calibrator	FEL	256	AH88	A
ME017	Pitot Tube	FEL	66	AH88	A
ME018	Goettingen Manometer	FEL	301	AH88	A
ME019	Hot-Wire Anemometer	FEL	4,041	AH88	A
ME020	Centrifugal Wind Fan	FEL	2,283	AH88	A
ME021	Centrifugal Water Pump	FEL	151	AH88	A
ME022	Electric Power Meter	EL	86	AH88	A
ME023	Multi-Thermometer	TEL	931	AH88	A
ME024	Milivolt Ampere Meter	MEL	208	AH88	A
ME025	Milivolt Ampere Meter	LCL	208	AH88	A
ME026	Centrifugal Wind Fan	FEL	1,515	AH88	A
ME027	Engine Performance Testing Apparatus	EL	7,018	AH88	A
ME028	Dynamic Strain Meter	LCL	246	AH88	A
ME029	Pressure Transducer	EL	172	AH88	A
ME030	Digital Storage Oscilloscope	LCL	559	AH88	A
ME031	Pen Recorder	ML	448	AH88	A
ME032	Oscillator	LCL	1,658	AH88	A
ME033	Dynamic Strain Meter	EL	1,230	AH88	A
ME034	Digital Storage Oscilloscope	ML	1,627	AH88	A
ME035	Oscilloscope	ML	786	AH88	A
ME036	Pen Recorder	LCL	1,480	AH88	A
ME037	X-Y Recorder	LCL	1,268	AH88	A

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
ME038	Universal Counter	LCL	429	AH88	A
ME039	Stroboscope	LCL	768	AH88	A
ME040	One Board Micro-Computer	ML	672	AH88	A
ME041	DC Power Supply	ML	72	AH88	A
ME042	DC Power Supply	LCL	600	AH88	A
ME043	DC Power Supply	LCL	828	AH88	A
ME044	Personal Computer	MTL	3,068	AH88	A
ME045	Printer	MTL	384	AH88	A
ME046	Plotter	MTL	342	AH88	A
ME047	Function Generator	LCL	606	AH88	A
ME048	Mini Control Valve	LCL	336	AH88	A
ME049	DC Servo Motor	FEL	201	AH88	A
ME050	DC Servo Motor Amplifier	FEL	486	AH88	A
ME051	AC Servo Motor	FEL	228	AH88	A
ME052	AC Servo Motor Amplifier	FEL	621	AH88	A
ME053	Step Motor	CED	80	AH88	A
ME054	Step Motor Driver	CED	390	AH88	A
ME055	Digital Controller	CED	345	AH88	A
ME056	Displacement Sensor	CED	215	AH88	A
ME057	Brushless Resolver	CED	66	AH88	A
ME058	Brushless Resolver	CED	66	AH88	A
ME059	Acceleration Sensor	LCL	46	AH88	A
ME060	Acceleration Sensor	LCL	46	AH88	A
ME061	Torque Sensor	LCL	123	AH88	A
ME062	Torque Sensor	LCL	123	AH88	A
ME063	Load Cell	EL	327	AH88	A
ME064	Personal Computer	MEL	4,866	AH88	A
ME065	Printer	MEL	960	AH88	A
ME066	Plotter	MEL	870	AH88	A
ME067	Pen Recorder	MEL	2,240	AH88	A
ME068	Color Image Input Camera System	MEL	102	AH88	A
ME069	Graphic Soft	MEL	31	AH88	A
ME070	AD/DA Board	ML	162	AH88	A
ME071	Ram Board	ML	67	AH88	A
ME072	Color Printer	ML	415	AH88	A
ME073	Copy Machine	MED	1,499	AL88	A
	Total		90,304		
	Equipments provided in 1989				
ME074	Personal Computer	EL	4,944	AL89	A
ME075	Dynamic Strain Meter	EL	595	AH89	A
ME076	Dynamic Strain Meter	EL	798	AH89	A
ME077	Dynamic Strain Meter	ML	628	AH89	A

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
ME078	Data Recorder	EL	1,265	AH89	A
ME079	Oscilloscope	EL	371	AH89	A
ME080	Digital Storage Oscilloscope	EL	1,375	AH89	A
ME081	Oscilloscope Trace Recording System	ML	402	AH89	A
ME082	Digital Storage Oscilloscope	NCL	1,736	AH89	A
ME083	Function Generator	NCL	1,332	AH89	A
ME084	Camera	MED	493	AH89	A
ME085	Photo-Printing Equipment	MED	259	AH89	A
ME086	Multi-Meter	MEL	145	AH89	A
ME087	DC Amplifier	MEL	145	AH89	A
ME088	Hardness Tester	MEL	1,195	AH89	A
ME089	Hardness Tester	MEL	1,543	AH89	A
ME090	Microscope	MEL	1,374	AH89	A
ME091	Camera for Microscope	MEL	615	AH89	A
ME092	TV & Camera	MED	444	AH89	A
ME093	Polishing Attatchment	MEL	721	AH89	A
ME094	Electric Furnace	MEL	355	AH89	A
ME095	Heat Flux Meter	TEL	321	AH89	A
ME096	Gas Flow Meter	FEL	270	AH89	A
ME097	Multi-Thermometer	TEL	635	AH89	A
ME098	Mini Control Valve	TEL	527	AH89	A
ME099	Personal Computer	CED	2,566	AH89	A
ME100	NEC-IBM PC Soft Converter Board	NCL	196	AH89	A
ME101	FFT Analyzer	NCL	1,424	AH89	A
ME102	Precision Cutting Machine	MTL	1,743	AH89	A
ME103	Test Piece Set Equipment	MTL	572	AH89	A
ME104	Video Tape Recorder	MED	607	AH89	A
ME105	Shurielen System	FEL	4,633	AH89	A
ME106	Printer	FEL	800	AL89	A
ME107	Plotter	FEL	1,350	AL89	A
ME108	Slit Light Supply	FEL	1,095	AH89	A
ME109	Nox Analyzer	EL	2,744	AH89	A
ME110	Infrared Gas Analyzer	EL	9,821	AH89	A
ME111	Hydrocarbon Gas Analyzer	EL	2,056	AH89	A
ME112	Pressure Transducer	EL	243	AH89	A
ME113	Hydraulic Pump	MTL	94	AL89	A
ME114	Hydraulic Pump	LCL	231	AL89	A
ME115	Hydraulic Pump	FEL	143	AL89	A
ME116	Sound Measurement System	NCL	1,849	AL89	A
ME117	Eddy Current Type Dynamometer	LCL	3,286	AH89	A
ME118	Difference Pressure Meter	FEL	120	AH89	A

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
ME119	Pressure Transducer	EL	155	AH89	A
ME120	FFT Analyzer	LCL	1,371	AH89	A
	Total		59,587		
	Equipment provided in 1990				
ME121	Scanning Electron Microscope	MEL	12,898	AL90	A
ME122	Rotary Bending Fatigue Testing Machine	MEL	3,812	AL90	A
ME123	Recorder	MEL	721	AL90	A
ME124	Digital Storage Oscilloscope	MEL	710	AL90	A
ME125	Regulated DC Power Supply	MEL	242	AL90	A
ME126	Drafting Machine	DR	4,081	AL90	A
ME127	Dynamic Strain Amplifier	ML	1,238	AL90	A
ME128	Dynamic Strain Amplifier	MTL	226	AL90	A
ME129	Static Strain Meter	MTL	919	AL90	A
ME130	Lathe Dynamometer	ML	314	AL90	A
ME131	Load Cell	ML	341	AL90	A
ME132	Pressure Transducer	EL	110	AL90	A
ME133	Acceleration Transducer	LCL	66	AL90	A
ME134	Acceleration Transducer	LCL	66	AL90	A
ME135	Acceleration Transducer	LCL	66	AL90	A
ME136	Torque Transducer	LCL	506	AL90	A
ME137	Torque Transducer	MAL	638	AL90	A
ME138	Lathe	MAL	2,101	AL90	A
ME139	Hydraulic Pump	MTL	204	AL90	A
ME140	CNC Lathe	MAL	5,445	AL90	A
ME141	Gap Sensor	LCL	495	AL90	A
ME142	Air Compressor	FEL	1,073	AL90	A
ME143	Electric Control Motor	FEL	451	AL90	A
ME144	Blower	FEL	138	AL90	A
ME145	Grinding Machine	MTL	1,342	AL90	A
ME146	Stepping Motor	CED	501	AL90	A
ME147	Stepping Motor	CED	594	AL90	A
ME148	DC Servo Motor	CED	413	AL90	A
ME149	AC Servo Motor	CED	792	AL90	A
ME150	Encorder	CED	17	AL90	A
ME151	Potentionmeter	FEL	66	AL90	A
ME152	Hydraulic Motor	LCL	451	AL90	A
ME153	Electro Hydraulic Servo Valve	FEL	539	AL90	A
ME154	Amplifier for Servo Valve	FEL	726	AL90	A
ME155	Personal Computer	MTL	2,090	AL90	A

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
ME156	Milling	MTL	2,580	AL90	A
ME157	Brand Vertical Metal Cutting Bandsawing Machine	MTL	1,188	AL90	A
ME158	Air Compressor	EL	297	AL90	A
ME159	Stainless Rod	NCL	1,155	AL90	A
ME160	Variable Speed Motor	NCL	693	AL90	A
ME161	Arc Welding	MEL	369	AL90	A
	Total		50,674		
	Equipment provided in 1991				
ME162	Milling Machine	MAL	2,740	AL91	A
ME163	Automatic Control Simulator	CED	1,710	AL91	A
ME164	Robot	ML	3,300	AL91	A
ME165	SEM Image Frame Store System	MEL	3,670	AL91	A
ME166	Attachment for Universal Testing Machine	MTL	2,560	AL91	A
ME167	Block Gauge	MAL	370	AL91	A
ME168	Variable Speed Motor	LCL	700	AL91	A
ME169	Attachment for Internal Grinding Machine	MAL	250	AL91	A
ME170	Lathe	MAL	815	AL91	A
ME171	Three-Dimensional Measuring Machine	ML	7,700	AL91	A
	Total		23,815		
	Equipment provided in 1992				
ME172	Xray Micro-Analyzer	MEL	11,710	AL92	/
ME173	LDV	FEL	10,540	AL92	/
	Total		22,250		

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
	Equipments associated with experts in 1988				
ME174	Drawing Set	EO	74	BH88	A
ME175	Personal Computer	EO	893	BH88	A
ME176	Display	EO	190	BH88	A
ME177	Printer Set	EO	423	BH88	A
ME178	Books	EO	288	BH88	A
	Total		1,868		
	in 1989				
ME179	Basic Master	EO	51	BH89	A
ME180	Experimental Apparatus for Casting	MEL	576	BH89	A
ME181	DC Servo Motor Set	EO	273	BH89	A
ME182	Materials for Experiments	EO	2,069	BL89	A
	Total		2,969		
	in 1990				
ME183	Encorder	EO	99	BH90	A
ME184	Microphone	NCL	25	BH90	A
ME185	CO2 Gas for Calibration	EL	54	BH90	A
ME186	Power Supply Unit	EO	58	BH90	A
	Total		236		
	in 1991				
ME187	Specimen for Microscope	MEL	896	BH91	A
ME188	Fluid Switch	FEL	286	BH91	A
ME189	Optional Processor	NCL	68	BH91	A
ME190	Cross-Roller Table	MAL	675	BH91	A
ME191	Mue-Checker	MAL	624	BH91	A
ME192	Materials for Noise Control Experimental Apparatus	NCL	523	BL91	A
	Total		3,072		

Inventory Number	Name of Equipments	Place	Price (¥1,000)	Budget	Usage
		in 1992			
ME193	Personal Computer	MAL	497	BH92	A
ME194	Software MATLAB	CED	590	BH92	A
ME195	Interface Board	EO	110	BH92	A
ME196	Gasoline Engine Set	EL	283	BL92	A
ME197	Material for Noise Control Experimental Apparatus	NCL	647	BL92	A
	Total		2,127		
	Grand Total		256,902		

Remarks

Place

MAL : Machine Tool Lab.
MEL : Material Engineering Lab.
MTL : Material Testing Lab.
LCL : Lubrication & Control Lab.
NCL : Noise Control Lab.
EL : Engine Lab.
ML : Mechatronic Lab.
FEL : Fluid Engineering Lab.
TEL : Thermal Engineering Lab.
CED : Control Engineering Dept.
DR : Drawing Room
MED : Mechanical Engineering Dept.

Budget

AH : Equipment directly supplied through JICA head-quarter
AL : Equipment supplied through local supply
BH : Equipment associated with expert through JICA head-quarter
BL : Equipment associated with expert through local supply

Usage

A : have being used GOOD
B : have being used GOOD (Use for other purpose)
C : have being used FAIR
D : have being used POOR

Classification of equipments usage